

A study about the Status of Implementation on Safety Standards and Legal Requirements Pertaining to Construction Safety

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Abstract: *Accidents are social and economic evils. These are essentially a human problem in which the entire human force is directly or indirectly involved. In construction projects, every year large number of workers dies and seriously injured due to accidents. Accidents are not only costly but also a ghastly affair too. No amount of monetary compensation can restore a lost limb to the worker or the lost life to his family. The mental torture and agony of an incapacitated worker are unbearable to him and to his family. The gravity of this situation necessitates the creation of awareness on a good safety system and the proper implementation of safety legislations relevant to the construction industry.*

This project work deals with the major reasons for increasing the rate of accidents in the construction projects, especially in the civil construction projects including high rise buildings, in Kerala and the status of implementation of the important statutory requirements pertaining to construction industry are reviewed.

This project work done by the data collection of safety matters from the selected projects, interviews with the site management personnel and the workforce, work site inspection, discussion with the top management personnel, discussion with the concerned statutory authorities, and the study about the relevant provisions given in the statutory requirements.

This project work includes the study and analysis of the safety performance level of the selected construction projects by the nationally and internationally accepted norms and relevant safety standards, rules and regulations. The output of the project work definitely gives the clear picture of the reasons behind the accidents in the construction field and what exactly we should do to prevent the same.

Index Terms: *construction safety, Safety Management, safety while work at heights, project safety management, and safety inspection and auditing, Construction related fatality, statutory requirements pertaining to construction safety.*

I. INTRODUCTION

Construction industry today is developed so fast with advanced technology and fast moving construction methods. Similarly, we have adequate legislations pertaining to construction safety. Yet despite of all these, accidents could not be prevented effectively.

An analysis of accidents in construction projects reveals that most of the accidents are attributable directly or indirectly to human failure or human neglect – whether be a failure of the designer to provide fool proof in-built safety devices or the failure to provide safeguards & other protective arrangements at hazardous places; or the failure of workers in observing and obeying site safety rules and in making use of protective equipment and appliances; or the failure of the management in the selection of suitable personnel, maintaining periodic maintenance, providing safe work places or working conditions, compliance of relevant statutory requirements, and ensuring effective supervision etc., or the failure of the statutory authorities to monitoring the construction projects periodically.

Accidents cost a lot. The worker loses his wages, sometimes his vital limbs and capacity to work. The employer loses production & productivity. He has also to pay compensation to the injured worker as per the legal requirements. Loss of production in individual projects result loss in the aggregate production of the country, eventually affecting its economic prosperity. Finally all these losses fall on the society. To avoid this enormous loss, accident must be prevented and safety should be made the way of life of one to all. “SAFETY IS EVERYBODY’S BUSINESS”. Many research studies has been proved that a large number of accidents can be prevented with the help of scientific safety methods.

There have been many research studies carried out to establish a relationship between accidents and incidents. Almost all the findings were very similar. There were minor injuries and several near misses behind each and every major injury. The person who commits mistakes in his work may cause accident to himself or to some others. It is easily to understand that the injury is caused by an accident. Accidents are mainly the result of an unsafe act or unsafe working conditions or both. Both of these are due to the fault/failure of persons. The reason for the fault of a person is personal behavior based on heredity and social environment. Accident prevention program offers safety of men, machines, materials and environment. The operations may slightly vary from project to project, but the safety procedures, statutory requirements etc. are almost the same.

Therefore, nobody can deviate from the effective accident prevention program.

Behind every accident lies a cause, which may be related to either the environment in which the accident occurs or to the individual victim or any other person. Accidents just do not happen – but they are caused. Only a small percentage of accidents occur due to natural calamities (below 2percent), remaining 98 percent are caused due to specific reasons, which can be averted or removed.

Management can be considered to be the process of planning, organizing, leading and controlling the efforts of organization members, and of using all other organizational resources to achieve stated organizational goals.

There are several internationally accepted guidelines for the establishment of effective and efficient Health and Safety Management System. They are:

- OHSAS 18001 : 1999 “Occupational Health and Safety Management Systems – Specifications”
- OHSAS 18001: 2000 Occupational Health and Safety management Systems

- OHSAS 18002 : 2000 Occupational Health and Safety Management Systems – Guidelines for the implementation of OHSAS 18001
- BS 8800: 1996 “ Guide to Occupational Health and Safety Management Systems”
- HS (G) 65 “Successful Health and Safety Management Systems”.
- ILO/OSH 2001 Guidelines on Occupational Safety and Health Management Systems
- OSHA (Occupational Safety and Health Administration) - (US Department of labour)

2. Safety fundamentals

Construction industry today is developed so fast with advanced technology and fast moving construction methods. Similarly, we have adequate legislations pertaining to construction safety. Yet despite of all these, accidents could not be prevented effectively.

An analysis of accidents in construction projects reveals that most of the accidents are attributable directly or indirectly to human failure or human neglect, especially, due to the failure of the compliance of safety standards and lack of proper implementation of the relevant statutory requirements pertaining to construction safety.

Accidents cost a lot. The worker loses his wages, sometimes his vital limbs and capacity to work. The employer loses production & productivity. He has also to pay compensation to the injured worker as per the legal requirements. Loss of production in individual projects result loss in the aggregate production of the country, eventually affecting its economic prosperity. Many research studies have been proved that a large number of accidents can be prevented by the effective implementation of the provisions given in the legislations pertaining to construction safety.

2.1 Need for Safety

1. The needs for safety can be summarized as follows:
2. To protect the human beings
3. To protect the machines and materials
4. To increase the production as well as productivity
5. To reduce the cost of production
6. To satisfy the statutory requirements
7. To ensure a safe working environment
8. To increase the morale of employees
9. To get the good will of the public

In order to prevent accidents we must know that what is an accident? What are the needs for accident prevention? , how the accidents are caused? and what the causes are?

2.2 Causes of Accident

Behind every accident lies a cause, which may be related to either the environment in which the accident occurs or to the individual victim or any other person. Accidents just do not happen – but they are caused. Only a small percentage of accidents occur due to natural calamities (below 2%), remaining 98% are caused due to specific reasons, which can be avoided or eliminated. The main reasons that cause accidents are:

- ❖ Unsafe working conditions/workplace arrangements.
- ❖ Unsafe acts/practices.
- ❖ Environmental factors
- ❖ Personal factors.

2.3 Reasons for Accident Prevention

Accident prevention program offers safety of men, machines, materials and environment. The operations may slightly vary from project to project, but the safety procedures, statutory requirements etc. will be almost the same. Therefore, nobody can deviate from the effective accident prevention program. There are mainly three reasons for accident prevention. They are:

- 1) Humanitarian Reason
- 2) Economic or Financial Reason
- 3) Legal Reason

3. OBJECTIVES OF THE PROJECT

1. To know about the present legislations in our country pertaining to construction safety.
2. To know about the fundamentals in construction safety.
3. To find out the role of implementation of safety legislations for reducing the accident rates in construction projects.
4. To find out the living & working conditions of the migrant Laborers in the construction projects in Kerala.

4. SCOPE OF THE PROJECT

1. To study about the safety standards for the constructional activities in general and safety legislations in particular.
2. To select a typical and suitable Civil Construction Project in Kerala.
3. To study about the implementation of general safety standards and the Provisions given in the statutory requirements in the project by:
 - a. Frequent site visits.
 - b. Data collection (safety records & reports),
 - c. Interviews with key personnel and other employees, and
 - d. Discussions with the Safety Professionals.
4. To assess and evaluate the status of implementation of the safety legislations in the construction project.
5. To extract the Findings & Recommendations.

5. SAFETY MANAGEMENT

All enterprises should have safety management systems, as part of their overall management of the enterprises (in fact, there is a clear correlation between safely-run enterprises and well-managed operations). A safety management system provides a structured approach to those arrangements needed to achieve good safety performance within an enterprise. It should be based on the Safety Policy. The system should define an ambition level that the enterprise considers adequate for its business, as well as the safety concerns and requirements specific to their sites. As a minimum, the requirements of the legislation and other imperative sources should, under all circumstances, be fulfilled.

5.1 SAFETY POLICY

To provide all workers with a safe place of work and safe environment and to preserve environment and properties, the management is committed to declare a suitable H.S.E Policy and enforce and implement this policy by providing adequate resources. The policy shall be in English as well as in the local language. It shall be brief, specific, and it shall be signed and dated by the Chief Executive of the Organization. The contractor should communicate the HSE Policy to all employees and other relevant personnel. The copy of the Policy shall also be displayed in the prominent places including the Head Office and site office premises

5.2 Statutory requirements in construction safety

5.2.1 Statutory requirements

- Act & Rules
- Regulations
- Code of Practices
- Standards & Guidelines

5.2.2 IMPORTANT ACT & RULES

1. "Buildings and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996".
2. "Buildings and Other Construction Workers (Regulation of Employment and Conditions of Service) Kerala Rules, 1998"
3. Inter State Migrant Workmen (Regulation of Employment & Conditions of Service) Act, 1979.

6. Major construction activities

6.1 Safety while work at heights

Accidents while work at height are usually serious and often result in disabling injuries and even death. Therefore, safety standard of view, work at height or elevated work is considered when any work area is at a height of 1.8 m (generally it is considered as 2m) or more.

Hazards associated while working at heights

- Falling of materials, equipment or tools from the height
- Fall of personnel from the height, and
- Collapse of scaffolding
- Electrical Hazards

6.2 SAFETY IN EXCAVATION WORK

Any man-made cavity or depression in the earth's surface, including its sides, walls or faces, formed by earth removal and producing unsupported earth conditions.

Trench excavation

A narrow excavation made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench is not greater than 4.5 m.

Protective Systems

The systems used to protect employees from cave-ins, from material that could fall or roll into the excavation onto the workers or from collapse of adjacent structures. Protective systems include supports, sloping and benching, shields and other means to protect workers.

The major hazards associated with the Excavation work includes: Collapse of sides, Persons falling into excavations, Striking underground utility services, Persons in excavations being struck by falling materials, Building or structures, collapsing, Flooding, Asphyxiation or poisoning due to ground conditions or fumes from plant, Plant running into excavations, Plant sinking into unstable ground.

6.3 Work place transport

Vehicles pose a variety of risks to the health and safety of people at work, and are a significant cause of fatalities and serious accidents. In addition, employees who drive workplace vehicles, such as lift trucks and dumber trucks, are at risk of being injured if the vehicle overturns or if they fall from the vehicle's cab.

The most common type of transport accidents are:

- Being struck by or falling from a vehicle;
- Vehicles overturning; and
- Material falling from vehicles.

6.4 Erection of steel structures

Structural members should not be forced into place by the hoisting machine while a worker is in such a position that he could be injured by the operation. Open-web steel joists that are hoisted singly should be placed directly in position and secured against dislodgement.

Bundles of joists should be secured against dislodgement before being hoisted. No load should be placed on open-web steel joists until they have been placed in position and secured.

While panels or structural members are being hoisted, hand ropes should be used to maintain control of the load

7. Construction related fatality

The number of fatalities at work in the construction sector remains a matter of serious concern for the government, employers and employees. Statistics on fatalities generally places the construction sector as the second highest industry, only surpassed by the agricultural sector. Among the most common sources of fatalities in construction falls from heights is the category that accounts for the highest proportion of deaths.

Approximately fifty percent of construction fatalities have been attributed, in a wide range of studies, to falls from heights. Furthermore, scaffolders, roofers, steel and structural trades have a high risk of fatal accident, though fatalities occur across a wide range of construction occupations. The statistics also show that fatalities are spread across housing construction and general contracting, large and small companies (though much of the industry is made up of small subcontractors) and in both urban and rural regions.

8. SITE SAFETY INSPECTION (GENERAL ACTIVITIES)

Sl No	Activity/ description	Condition/nature	Remarks
1	House keeping	Poor Housekeeping Over all the work site	Access and stairs are accumulated with unwanted materials like timber with nails, concrete debris etc. Edge protection is not provided on several floors.
2	Excavation	Below Average/ Foundation work	Excavations are barricaded, Access Ladders are not provided. Unwanted Excavated materials are not removed from the site regularly.
3	Concrete work	Poor/ Working at height	Unsafe Safe Runways, Shuttering materials stored unsafely, no proper removal of concrete debris, Workers are not using the relevant ppes such Gumboots and safety goggles etc.
4	Scaffolding/ ladders	Poor/ Working at height	Scaffolding is not erected properly, No proper guard rails, soleplate and Base Plates are not provided, No Scafftag, Scaffold plat form overloaded.
5	Crane/ hoisting/ /rigging	Poor/ Working at height	Third party certificate for the crane is not available, Slings, Belts, Shackles Hooks, are not in good condition, Rigging is carried out without Signal man. No outriggers for the mobile crane
6	Grinding, welding, cutting , drilling	Hot work	Equipment are not in good condition, Rotating parts are not protected with proper guards, Cable are not in good condition, Proper P.pes. Are not used, Fire Extinguishers are not kept nearby, Gas cylinders are not secured
7	Fire protection / emergency handling	Lack of protection	Fire Points are limited, Adequate safety sign boards are not provided. Fire Extinguishers are not in place, No Smoking, Escape Routes, P.P.E. Signs, Danger Signs, etc. Are not provided in the right place. Signs are obstructed and not clearly visible. Emergency Handling Procedure is not available, Emergency Telephone Numbers are not displayed emergency Assembly point is not addressed.
8	Work standards	Personal Protection	Helmets, Gloves, Safety Goggles, Face Protection, Body Protection, Ear Plug or Muff, Dust Masks, full body safety harness, Coverall etc, are not properly issued and used.

Table 8.1: Work Site -Safety Inspection

9. INTERVIEWS & DISCUSSIONS

The following information has given by the workers at the time of interviews and discussions:

1. The drinking water facilities at the site as well as camp premises are inadequate.
2. The toilets and urinals are inadequate and not cleaning regularly
3. The damaged PPEs are not replaced even after several request
4. No proper lighting facilities at the camp premises
5. There is no first-aid facilities at the camp premises
6. No safety induction training at the site
7. No portable fire extinguishers provided at the camp premises
8. No proper cooking facilities at the camp.

10. FINDINGS

1. The important safety documents such as Safety Manual, Site Safety Plan, BOC Act 1996 & BOC Kerala Rules 1998 etc., are not available at the construction site.
2. Full time Safety Officer and Nurse or Doctor for giving first-aid & medical assistance are not available at the site.
3. There is no dedicated site safety office and first-aid centre. There is no ambulance or specific vehicle at the site for using the emergency situation.
4. Bad housekeeping practices throughout the site premises.
5. The site management personnel don't have knowledge on statutory requirements relating with safety.
6. Fire prevention & control procedures at the site are not at all satisfactory
7. Employees don't know what they should do in case of emergencies.
8. No proper supervision at the work place.
9. The concerned Trade unions are not bothered for the safety of workers.
10. No proper safety training at the site and no safety training records available at the site.
11. Top management personnel at the site are not bothered about site safety matters
12. No Safety inspection at the construction sites by the statutory authorities
13. The accommodation facilities of the workers are not as per the standards
14. Majority of the people at the site are not wearing the relevant PPE

11. RECOMMENDATION

1. The important safety documents such as Safety Manual, Site Safety Plan, BOC Act 1996 & BOC Kerala Rules 1998 etc., should be available at the construction site. Its responsibility falls on the concerned Project Manager. It shall be referred accordingly and implement the provisions while carrying out the construction work.
2. There shall be a full time Safety Officer or at least a competent full time Safety Representative at the site to look after project safety matters. There shall be a site safety office for keeping the safety records & reports and for conducting safety induction training.
3. There shall be a Nurse or Doctor for giving first-aid & medical assistance at the site. There shall also be a dedicated first-aid center with adequate facilities. An ambulance or a suitable vehicle should also available at the site.
4. Always maintain good housekeeping practices at the site premises and accommodation facilities. Suitable skips and waste bins shall be placed in the relevant areas and collect the debris accordingly. The removal and dumping the debris in the designated place are also very important.
5. Fire prevention & control procedures at the site should be as per the relevant safety standards. Relevant safety sign boards shall be displayed at the relevant places. Information, Instruction and Training shall be provided among the employees on fire prevention & control. Proper and usable portable fire extinguishers shall be provided at the relevant places.
6. There shall be a suitable Emergency Evacuation Procedure at the site. The copy of it shall be displayed at the prominent locations with an emergency contact telephone numbers. All personnel at the site should have proper information about the site emergency evacuation procedure.
7. Effective Supervision shall be ensured at the workplace because it one of the tools for avoiding the accidents.
8. Safety trainings such as Safety Induction Training, In-house Safety Training etc. shall be conducted on the need basis and the records shall be maintained.
9. Top management personnel should have adequate knowledge on safety statutes and safety standards. In addition to this, they should ensure that all activities at the site are being done as per the relevant provisions given.
10. Adequate drinking water facilities, first-aid boxes with relevant medicines, lighting facilities, good housekeeping practices etc. shall be provided in the labour accommodation.
11. The recognized Trade Unions have a vital role in safety management of the construction project. They have the right to know the site safety management system. They can also recommend the concerned Project Manager to rectify the safety deficiencies at the site.
12. All personnel at the site should get the relevant PPE with free of cost. The concerned superiors should also ensure that the personnel working under them are wearing the relevant PPE at work.

12. CONCLUSIONS

The major need for safety is to protect the health and life of the human beings. That is why the Govt. of India enacted several safety legislations for construction industry. Generally speaking, safety is everybody's business. But legally the responsibility on safety in a construction project falls on the concerned line management. Therefore, it is the responsibility of the principal or main Contractor to implement the provisions given in the relevant safety statutes and the general safety standards at the construction areas. In the present situation, the status on implementing safety standards at the construction projects in Kerala is not at all satisfactory.

In one way or in the other way, the workforce is the backbone of construction industry. If we fail to ensure their life and health, it will be a big loss to their family, to the society and to the nation in general. Remember that the important provisions of the safety legislations given for the protection of the workforce.

Therefore, all Builders, Developers & Contractors; the Government & Governmental agencies; and the recognized Trade Unions should give great care to eradicate the major injuries and fatalities at the construction projects especially for protecting the health and life of the human beings.

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