

## A STUDY ON THE SYSTEMS OF MANAGEMENT OF SAFETY IN INDIAN CONSTRUCTION SECTOR

BURHAN MEHAROON<sup>1</sup>, NADENDLA RAFI<sup>2</sup>

<sup>1</sup>M.Tech Student, Dept. of Civil Engineering in Global College of Engineering and Technology, Rayalapanthulapalle, KADAPA, AP.

<sup>2</sup>Assistant professor, Dept. of Civil Engineering, Global College of Engineering and Technology, Rayalapanthulapalle, KADAPA, AP.

### ABSTRACT:

The construction industry in India plays a significant role in the growth and development of the country, as well as an important role in the economy. The construction industry accounts for between 40 and 50 percent of India's total capital spending across a variety of sectors, including highways, roads, and railroads, as well as irrigation systems, and the construction industry is one of the biggest in the country, second only to agriculture. It contributes around 11% of India's total GDP. However, there is no standard recording and reporting system for building accidents in certain countries, while in others, such as India, the procedures do exist but there are problems with how they are implemented. Occupational illness and accidents at work are issues that affect people all over the globe. For the purposes of preventative work at the national level, statistics as well as job-related accidents are required. Because construction accident data are either not collected at all or are grossly underestimated, this contributes to a scenario in which enough attention to safety measures is not taken.

Concerns about health and safety are not only of a humanitarian but also an economic nature, and they call for effective management supervision. The precautionary measures have to be thought of from the very beginning of the work process right up until it is finished. For there to be safe working conditions, there must be proper coordination between the employees and the contractors, which is something that is severely missing in the Indian construction areas. Occupational health and safety (OHS) is a field that is concerned with the health, safety, and prosperity of persons involved in any activity, regardless of sex, religion, region, age, etc. OHS is also known as occupational medicine.

The Occupational Health and Safety Act is essential to the well-being of both employers and employees. The overall welfare of the nation will improve as a consequence of this development. As a result, the government of India has periodically enacted new laws, rules, and procedures in order to advance occupational health and safety (OHS) in the workplace, protect worker health and welfare, and look out for workers' economic interests. Changes in behaviour may be encouraged and supported in order to bring down the overall

number of injuries and deaths that occur. Errors caused by humans are a complicated subject that are inextricably tied to both the cognitive process and an individual's capacity to assign blame. The Occupational Safety and Health Act (OSHA), together with its accompanying rules, has had a significant effect on the building and construction sector. Therefore, the purpose of this study is to explore whether or not it is possible to acquire information about building accidents, health dangers and diseases that are connected to them, as well as ways to avoid them.

### I. INTRODUCTION

Construction plays a significant role in the formation of both a nation's infrastructure and its industrial sector. The construction sector plays a catalytic role in the development of employment in the nation thanks to its backward and forward connections with a variety of other industries such as cement and steel bricks, amongst others. Following closely after agriculture as the most important contributor to the economy is the building industry. However, this rapid expansion comes with some potentially negative consequences. In spite of the enormous sums of money at stake, the industry shows little consideration for the well-being of the employees who are employed at its lower levels. Comparing the construction business in India with that of industrialised nations reveals that the construction sector in India relies far more on human work. Due to the prevalence of construction-related accidents, injuries, and illnesses, the construction business is a dangerous one in both industrialised and developing nations. According to the findings of researchers, the rates of disease and injury are much higher than in European nations. that there is either very little or very little official record of the deaths of employees in construction, one of the reasons why these tragedies raise minimal worry - or efforts to guarantee improved safety - is that there exists very little or very little official record of the deaths of workers in construction. Statistics on occupational dangers are available in developing countries, although the information is derived from statistics collected in industrialised nations. While carrying out their jobs, workers on

construction platforms must contend with a variety of obstacles, just like employees in any other profession. In principle, inspectors from the Department of Labour are supposed to undertake inspections to verify that safety measures are in place, particularly if there has been an accident. This is especially the case when there has been an accident. Unfortunately, in actual practise, such inspections are quite uncommon. The employees that come from rural areas don't have a lot of experience, aren't very knowledgeable about construction safety, and aren't used to being able to predict the potential risks that may occur on the building sites.

### Why Is Construction Site Safety Important?

The construction industry is one the most dangerous in terms of workplace fatalities. The . As a manager in this line of work, you have an obligation to understand the risks and keep workers safe on the job.

Constructive Executive says that, because construction site accidents are considered common, there is a great deal of responsibility to maintain a safe worksite and to take care of their workers. Some of the most common hazards are:

- Falls from height.
- Falling objects.
- Exposure to dangerous substances.
- Dust inhalation.
- Working in confined spaces.
- Motor vehicle accidents.

### SCOPE OF THE PROJECT

In Construction many accidents takes place which causes human tragedies and disorganize the construction process. Construction injuries will always have broad and adverse impact, which includes the personal suffering of the injured workers, construction delays and productivity losses incurred by the construction contractor, higher insurance premiums that result from costly injuries and possible liability suits for all parties involved in the project. Their prevention and even marginal reduction in their cost will have significant human and financial impact. The number of injuries and fatalities can be reduced by encouraging and reinforcing behavioral change. Human error is complex topic and is directly linked to the cognitive process and one's ability to judge responsibility. Occupational Safety and Health Act (OSHA) with its regulations has had a profound impact on the construction industry. Prevention of construction accidents requires predicting future accidents and their nature in given circumstances. Making such predictions must be based on knowledge about past accidents and can be estimated using about various decision support tools. The objective of this thesis is to investigate

the feasibility in knowledge acquisition about construction accidents and their prevention.

## II. LITERATURE REVIEW

- Carter and Smith, (2006) investigated the hazard identification levels of three construction projects in the UK. These authors observed that construction projects within the nuclear industry identified 89.9% of all hazards, while projects within a railway context identified 72.8%. The research revealed that knowledge and information barriers, in addition to process and procedural barriers, prevented effective hazard identification.
- Xingu Huang and Jimmie Hinze, (2003) analysed the construction worker fall accidents and the result shows that most fall accidents take place at elevations of less than 9.15m (30 ft) occurring primarily on new construction projects of commercial buildings and residential projects of relatively low construction cost.
- Edward et.al., (1996) had done safely related research, which tends to be more qualitative in nature, addressing “what” factors are important for success as opposed to “how much” is appropriate to achieve successful safety outcomes. Osama Ahmed Jannadi and Mohammed S.Bu-khamsin, (2002) had conducted a questionnaire survey, which was distributed among industrial contractors in the Eastern province of Saudi Arabia and formal interviews were taken with the contractors, officials responsible for construction safety. 72% of the companies participated in this survey were the general building construction companies. The paper identifies 20 main factors and 85 sub-factors and determines their level of importance based on the survey results and the analysis.
- Pheng and Shiua, (2000) emphasized that quality and safety should be integrated to achieve better co-ordination and utilization of resources.
- Wilson and Koehn, (2000) suggested that safety practices vary with construction sites. All construction sites have unique aspects of safety to be considered. Larger construction projects are better organized to manage safety aspects. The larger construction firms have one person responsible for keeping the team members informed about possible safety problems. Small to medium firms do not have an adequate safety program or person to oversee safety criteria. Implementation of their safety management is with project superintendent.

- Kumar and Bansal, (2012) conclude in their project that while completing high quality work within specified time and cost, safety of workers requires a significant attention. The paper sensitizes construction professionals regarding the importance of safety aspects and their consequences. The review suggests that there is a lack of responsive tools and resources to assist designers in addressing construction safety. Unsafe acts, unsafe conditions, and failure of management to anticipate hazardous situations are the main causes of accidents.
- In the past, industry has concentrated its efforts on reducing injuries by focusing on physical conditions such as the guarding of equipment or other factors that exposed employees to energy sources. Industry has also focused on addressing primarily those issues that OSHA and other agencies regulate and are likely to check during an inspection at a facility. Exhaustive inquiries into the major disasters of recent years, e.g. the escape of gas at Bhopal, the King's Cross Underground Station fire, the sinking of the Herald of Free Enterprise, the Clapham Junction rail accident, the Chernobyl nuclear accident, the Piper Alpha oil rig fire etc. came to the same conclusion that, despite the adoption of the full range of engineering and technical safe guards, complex systems broke down calamitously because the people running them failed to do what they were supposed to do.

### III. SAFETY MANAGEMENT SYSTEM

In India the construction industry is the largest among the non-farming sector to generate jobs. But it also is a large contributor of grievous injuries and deaths of its workers in the country. The construction area of civil engineering is one of the most hazardous industries worldwide. The 'fatal four' causes of disastrous incidents in the construction industry are falls, electrocutions, being struck by objects and caught in between.

The rapid growth of construction industry in India today is out of proportion to practical developments in terms of safety and health aspects of the construction workers. Pitfalls in legislation combined with lack of proper implementation is also a significant contributor. The Indian construction workers form 7.5% of the world labour force, but it contributes to 16.4% of fatal global occupational accidents.

#### VARIOUS TECHNIQUES

There are several techniques that can be adopted for labour safety,

- Hazard Analysis
- Safety Training
- Safety organization
- Safety officer

### SAFETY HAZARDS IN CONSTRUCTION SITE

- SLIPS OR FALLS FROM HEIGHT
- CAUGHT IN MACHINERIES AND TRENCHES
- FIRE AND EXPLOSION.
- ACCIDENTS USING VEHICLES
- EFFORTS PUT IN INDIA

### IV. ANALYSIS FOR SAFETY MANAGEMENT

The last element of Safety Management System regarding to Oregon OSHA is Reviewing and evaluating the safety program that you have by gathering data and information from previous accidents or near misses and comparing with current data in order to evaluate the safety program and getting information about the strong and weak point of the program by asking employees, external experts or safety supervisors. Reviewing the program periodically is necessary in order to know whether you are in a right direction toward safety objectives or not. According to implementing a SMS, IHSS provide a checklist which is a guide that attributes of a SMS are implemented

- Management Plan
- Safety Promotion
- Document and Data Information Management
- Hazard Identification and Risk Management
- Occurrence and Hazard reporting
- Occurrence Investigation and Analysis
- Occurrence Investigation and Analysis
- Safety Assurance Oversight Programs
- Safety Management Training Requirements
- Management of Changes
- Emergency Preparedness and Response
- Performance Measurements

### PROCEDURE OF MAKING SAFETY SAMPLING

1. Prepare a list of unsafe acts: In each specific job site there are list of unsafe acts that contains act that occur in the job site which can lead to accidents, we should have a complete list of unsafe acts in order to go through safety sampling. Each unsafe act should have number or code in order to report it easily.

2. Taking the sample: we should assign an inspector to take the sample by using the list of unsafe acts in his/her hand and go through the line and observe and monitor each employee separately and wait until you can determine whether he/she is performing their job safe or not. When you write down any unsafe act for each employee the determination could not be changed.

3. Validating the sample: for validating the sample we should have minimum number of observation which is obtained by this formula;  $N = \frac{4(1-p)}{y^2}$ , which N is total number of observation required, p is percentage of unsafe observation and y is the desired accuracy

As an example if we want to have + or - 10% accuracy and we had 126 observation and the total amount of unsafe acts which were observed is 32, so based on this equation we should have minimum of 1200 observation to get that accuracy.

4. Reporting to management: safety sampling report should include total percentage of unsafe activities by each department separately. Report should contain percentage of unsafe activities by supervisor and foreman. It should also contain the types of unsafe activities which were observed.

List of unsafe acts in safety sampling List of unsafe acts in safety sampling could be items like: incorrect gripping, improper footwear, improper pouring, wearing rings, standing in front of machines, walking under the load, improper lifting, improper material handling, feet under loads, improper and unsafe loading, loosing material and falling material from hand, improper dumping, lack of PPE, repairing moving machine, ladder not tied, unbraced forms, working in height without support, uncovered rebar, it should be considered that list of unsafe acts should be detailed in depth, instead of just mentioning general items and any additional unsafe item that the observer cannot find that in the unsafe acts list should add that to the list that for future observing that unsafe act has specific item for itself. In front of each unsafe act in safety sampling worksheet, there are columns for department names that each unsafe item could be related to department associated with that easily. Measurement is divided into two broad categories which are micro measures and macro measures which is obvious that micro measurement is related to middle management, supervisory and line employees and macro measurement is related to measurement in whole organization and give general status of the organization which is upper management concern.

Based on Dan Peterson the key driver at the lower level of organization is performance to goal and there are several categories in order to set goals:

1. Routine Goals
2. Project Goals
3. Creative Goals

#### 4. Personal Goals

The first thing for setting an objective is identifying and measuring our objective that whether they are good or not.

Good objective should be in below criteria based on Dan Peterson:

1. Zeroing of Objectives.
2. Individuality of Objectives
3. Measurability of Objective
4. Reality of the objectives

#### Macro measures

As we discussed before, the macro measurement is exclusively for top management within an organization and at top level of management all of the results that could be a concern is result measures instead of performance measures which is related to middle management, line managers and supervisors. There are three kind of methods for measuring safety within organization which are: incident and accident rate like what should be reported to OSHA which was discussed completely before in this report. The other two methods for measuring safety in organization from macro level standpoint are audit and perception surveys.

- Management's Credibility
- Employee involvement and participation
- Hazard Control

## V. CONCLUSION

The building business in India is one of the most important and significant industries. However, this business is one of the most dangerous industries in terms of the risks it poses to employees' lives. Workers at construction sites are often put in dangerous situations where there is a possibility of workplace accidents as well as occupational health issues. Despite the fact that there are several legislation in India that address the working conditions of construction workers, the vast majority of organisations and corporations have failed to put these policies into effective practise. OSHA stands for the Occupational Safety and Health Administration, and it is a government organisation in the United States that ensures that employees are provided with safe working conditions.

Several elements of worker safety in the construction industry that were provided by a variety of writers were examined and assessed here. An in-depth review of the data reveals the factors that contribute to deaths in the construction business. The single most prevalent cause is falling, followed by being hit by anything, becoming entangled in/between something, and finally being electrocuted. According to a number of studies, problems such as low-quality work, dangerous working circumstances, and a lack of environmental control may be ameliorated by the

implementation of various safety laws and regulations. Insufficient safety education, insufficient training, bad housekeeping, and "wilful transgression" were some of the major factors that contributed to occupational and safety failures. According to the findings of one research, every single building site has its own individual safety concerns that need to be addressed. When it comes to managing safety concerns, larger construction projects tend to have greater organisation. Larger construction companies often designate a single employee as the point person for communicating any potential safety concerns to the rest of the crew. The lack of an effective safety programme or a person to manage safety standards is a common problem among small and medium-sized businesses.

However, in the case of India, even if there are certain organisations available to provide welfare for employees, it is not being managed very successfully. When it comes to ensuring that a high level of safety is maintained in the building sector, the government need to take a more visible role. The well-being of the employees is of the highest importance, and both the owners and the contractors have a responsibility to ensure this. The contractors and organisation in question need to make it possible for the employees to voice their concerns and emotions, and they also need to take corrective action in order to address the issues that have been raised by the workers.

The concern for people's safety need to start right from the beginning of the procedure. Construction businesses that are striving towards the establishment of a safer workplace have the opportunity to tap into the enormous expertise of risk management professionals who are well versed in their sector.

Even if all of the employees are in pristine condition, this will still have an impact on how quickly the task is done. Every single worker who is employed at the construction site is required to have their own personal protection equipment (PPE) on them at all times.

There is a lack of knowledge on the usage of personal protective equipment among the semi-skilled and unskilled employees, as well as among the women and children. Workers' unions are often to blame for putting their members in life-threatening situations. The present state of safety in the construction industry reveals that safety has not been a concern up to this point, despite the fact that almost one out of every five employees sustains an injury on a yearly basis. This is despite the fact that there have been no significant advancements in safety measures. For effective safety and health management, it is vital to do ongoing reviews and

upgrades of the relevant safety standards, health risks, and training programmes.

## REFERENCES

- [1] Kulkarni G.K (2007). 'Construction industry: more needs to be done', Indian Journal of Occupational and Environmental Medicine, vol.11, No.1,pp. 1-2.
- [2] Seetharaman . S (2008). Construction Engineering and Management, fourth edition. Umesh Publications, Delhi.
- [3] Sawacha. E, Nabum, and Fong. D (1999). 'Factors affecting safety performance on construction sites'. International Journal of Project Management. vol.17. No.5, pp.309.
- [4] Everett J.G and Frank P.B (1996), 'Costs of accidents and injuries to the construction industry'. Journal of Construction Engineering and Management. vol.122, No. 2, pp.158-164.
- [5] Wilson Jr J.M., and Koehn .E. (2000). 'Safety management: problems encountered and recommended solutions'. Journal of Construction Engineering and Management vol. 126. No.1. pp. 77-79.
- [6] Anumba. C. and Bishop .G. (1997). 'Importance of safety considerations in site layout and Organization', Canadian Journal of Civil Engineering and Management, vol. 24, No. 2, pp. 229-236.
- [7] Lingard . H. (2013), 'Occupational health and safety in the construction industry'. Construction Management and Economics, Vol. 31, No.6, pp.505-514.
- [8] Toole, T. (2002), 'Construction Site Safety Roles'. Journal of Construction Engineering and Management'. Vol.128, No.3, pp. 203-210. Alkilani .
- [9] Nishgaki . S., J. Vavrin, N. Kano, T. Haga, J. Kunz and K. Law. (1994). Humanware, Human Error, and HiyariHat: 'A Template of Unsafe Symptoms'. Journal of Construction Engineering and Management. Vol.120, No.2, pp. 421-441.
- [10] Abudayyeh, O., T. Fredericks, S. Butt and A. Shaar. (2006). 'An Investigation of Management's Commitment to Construction Safety'. International Journal of Project Management. Vol.24, No.2, pp. 167- 174.
- [11] Levitt, R. and H. Parker. (1976). 'Reducing Construction Accidents – Top Management's Role'. Journal of the Construction Division. Vol.102, No.3, pp. 465-478
- [12] Carter, G. and S. Smith. (2006). 'Safety Hazard Identification on Construction Projects', Journal of Construction Engineering and Management. Vol.132, No.2, pp. 197-205.
- [13] Xingu Huang and Jimmie Hinze (2003), 'Analysis of Construction Worker Fall

- Accidents', *Journal of Construction Engineering and Management*, Vol.129, No.3, pp. 262-271.
- [14] Edward J.Jaselskis, Stuart D.Anderson and Jeffrey S.Russell (1996), 'Strategies for Achieving Excellence in Construction Safety Performance', *Journal of Construction Engineering & Management*, Vol.122, No.1, pp.61-70.
- [15] Osama Ahmed Jannadi and Mohammed S.Bukhamsin (2002), 'Safety Factors Considered by Industrial Contractors in Saudi Arabia', *Building and Environment* 37, pp. 539-547.
- [16] Pheng .L.S. and Shiua .S.C.(2000). 'The maintenance of construction safety: riding on ISO 9000 quality management systems'. *Journal of Quality in Maintenance Engineering*. vol. 6. No. 1, pp. 28—44.
- [17] Kumar. S and Bansal V.K,(2013)'Construction safety knowledge for practitioners in the construction industry' \p. 229-236.