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A STUDY ON LABOUR SAFETY IN CONSTRUCTION INDUSTRY

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Abstract - *Construction is the second largest economic activity in India after agriculture. For a construction project to be successful, safety of the structures as well as that of the personnel is of utmost importance. The safety issues are to be considered right from the design stage till the completion and handing over of the structure. Construction industry employs skilled and unskilled labourers subject to construction site accidents and health risks. A proper coordination between contractors, clients, and workforce is needed for safe work condition which is very much lacking in Indian construction companies. A large number of construction workers are exposed to the risks of workplace accidents and occupational health problems. Accidents and illness can be extremely costly for a construction firm.*

Though labour safety laws are available, the numerous accidents taking place at construction sites are continuing. Management commitment towards health and safety of the workers is also lacking. A detailed literature study was carried out to understand the causes of accidents, preventive measures, and development of safe work environment. This project presents the results of a questionnaire survey, which is being distributed among various categories of construction workers in Coimbatore region. The project examines and discusses in detail the total working hours, work shifts, nativity of the workers, number of accidents, and type of injuries taking place in small and large construction sites.

Key Words: Accidents, risks, labour safety, safety laws, preventive measures, questionnaire survey.

1. INTRODUCTION

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. Pitfall in legislation combined with lack of proper implementation is also a significant contributor.

In Indian construction sector, the number of people dying in construction could be anywhere from 11,641 to 22,080. Indian construction section alone adds 24.20% of occupational fatality occurring annually in India. The safety performance of construction is poor in comparison to UK, Singapore and Taiwan [5].

1.1 Various Techniques

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

Hazard Analysis: Before any construction work takes place, management should assess job site condition to identify potential areas of serious injuries. Many serious injuries are attributed to workers falls, collapse, being struck by vehicles, trench cave-ins and electrical lines. The analysis should address the sequence of work, the hazards of each activity and control measures to eliminate or minimize the hazard.
Safety Training: Training should be at the core of every safety program. It is important to identify the areas in which training is required. All employees should be trained on hazard communication; other training may include electrical lock out, confined space entry, trenching, back-injury prevention, fall protection, fire protection, equipment safety and other safety concerns.
Safety organization: The organization of safety on the construction site will be determined by the size of the work site, the system of employment and the way in which the project is being organized. Safety and health records should be kept which facilitate the identification and resolution of safety and health problems on the site.
Safety officer: One commonly accepted prerequisite for administering a successful safety program is the designation of a safety officer at the project level. It is standard practice on many large projects to require a safety officer. Safety provisions requiring a safety officer should be included in the construction contract.

2. LITERATURE REVIEW

Lingard, (2013) studied the construction sector in industrial countries which employed between 6 and 10% of the workforce but accounts for between 25 and 40% of work-related deaths**.**

Alkilani et.al, (2013) stated that poor H&S performance in the industry accounts for approximately 30–40% of the world's related fatal injuries. He found a number of constraints or barriers to implementing good H&S practice on construction sites.

Fatih Yilmaz et.al, (2015) found that preventing accidents in building sites must be done by improving physical conditions in the site, increasing the preventive health service quality and educating the workers periodically and expediently.

Othman et.al, (2017) said that the first factor affecting effective/improper safety management in construction is "Safety training and awareness", "Worker's attitude towards safety" is graded the second, safety inspections and organization safety policy are ranked the third, fourth and fifth respectively.

Chong et.al, (2016) quoted the most risky types of fall hazards that occurred on construction site nowadays are roof falls and scaffolding falls. Based on his study, workplace inspection on construction site is suggested as the most effective to reduce the fall hazards on construction site.

Kumar and Bansal, (2012) conclude in their project that while completing high quality work within specified time and cost, safety of workers requires significant attention. 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 listed as the main causes of accidents.

3. METHODOLOGY

The methodology is designed to reflect the different aspects of construction sites with regard to labour safety and to reflect overall project objectives. A detailed study was carried out in construction sites. The labourer safety was tested using grading system.

The methodology consists of the following steps:

1. Collection of literary reviews
2. Designing of questionnaire
3. Questionnaire distribution and collection
4. Safety interviews
5. Analysis and results

In the first step, collection of literature review was done to find out the construction safety performance and also to collect base knowledge to develop observation, performance for survey.

In the next two steps, the questionnaire is designed and filled in order to quantify the criteria based on safety.

In the final step, based on the questionnaire and interviews, the safety performance of the construction industry is evaluated.

4. RESULTS AND DISCUSSION

4.1 Labourer Information

Data collection was done by collecting 127 questionnaires from 52 sites. These included 28 small industries and 24 large industries. In small industries, only G+0 and G+1 building construction was found on sites. Data was collected from 11 number of G+0 building site and 17 number of G+1building sites. In large industries, data collection was done from 8 residential buildings, 12 commercial buildings and 4 educational buildings, 9 numbers of ≤ G+2 buildings, 9 numbers of G+3 ≤ G+6 buildings and 6 numbers of ≥ G+7 buildings. Only day works were found on small industries sites.

4.2 Accident Evaluation

Details of labour accidents that happened in previous year were collected and rate of accidents in each site was calculated

Table -1: Keywords to represent accidents.

TI=Type of Injury	RI= Reason of Injury
*a= Lack of training * b= Lack of care of labourer (injured person) *c = Lack of care of another labourer * d= Unsafe scaffolding, ladder, machines, vehicles. *e= Didn't use PPE, *f = Environmental factor. *g = Lack of site inspection *h = Safety symbols are not used. *'i = Lack of safety arrangements * 'j = Unsafe site planning and layout. *k = Improper labour facilities. *L = Electrical shock *m= Failure of structure *o= Other reason	I = Death of person II = Loss of body parts. III = Body fracture. IV = Injury of the body. V= Skin infection. VI= Injuries to ear, eye. VII = Other reason

4.2.1 Small Industries

The total number of accidents that happened in 28 sites was 142, the number of accidents in each category and their reasons are shown in table 2.

Table -2: Overall accident details (small industries)

RI \	*a	*b	*c	*	*e	*f	*g	*h	*i	*j	*k	*l	*m	*n	*o	N
I	√	√	√	√	√		√	√	√	√		√	√	√		2
II	√		√	√									√			5
III	√	√		√		√	√		√					√		15
IV	√	√		√	√		√		√					√		86
V					√				√		√					30
VI		√		√										√		4
	Total															142

Chart 1 shows the percentage of accidents in each category. Death of persons was 0.48%, loss of body parts was 3.68%, bone fracture was 7.35%, injury to the body was 33.46 %, skin infection was 12.87%, and injuries to ear, and eye were 3.31%

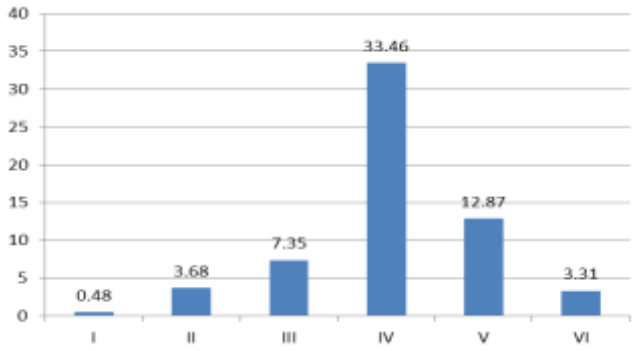

Chart -1: Percentage of accidents (small industries)

I = Death of person II= Loss of body parts.

III=Body fracture. IV = Injury of the body.

V = Skin infection. VI= Injuries

Chart 2, Shows the total number of accidents in each site. Site No 14, 18 1nd 23 showed more number of accidents and site no 1, 10 and 15 showed less number of accidents.

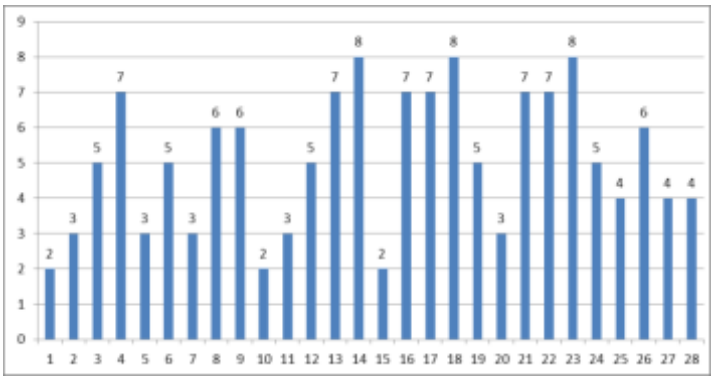

Chart -2: Number of accidents in each site (small industries)

4.2.2. Large Industries

The total number of 105 accidents that happened in 24 sites, the number of accidents in each category and its reasons are shown in table 3.
The rate of accidents in each type of injury is represented in chart 3.

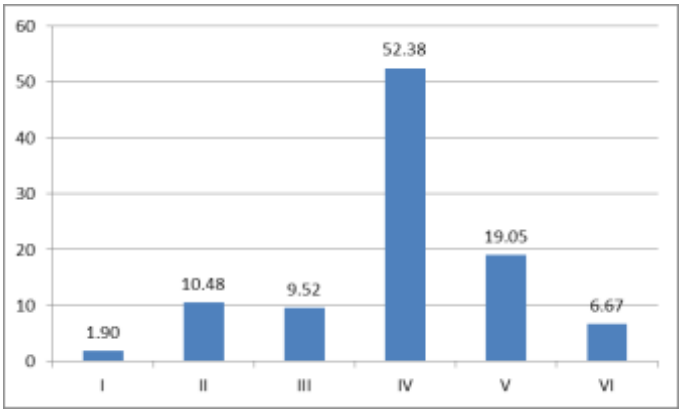

Chart -3: Percentage of accidents (Large industries)

I = Death of person, II= Loss of body parts, III=Body fracture.
IV = Injury of the body. V = Skin infection. VI= Injuries

Table -3: Overall accident details (Large industries).

RI	*a	*b	*c	*d	*e	*f	*g	*h	*i	*j	*k	*l	*m	*n	*o	N
I	√	√	√	√	√		√	√	√	√		√				2
II	√			√									√			11
III	√			√		√	√		√					√		10
IV	√	√		√			√		√					√		55
V					√				√		√			√		20
VI		√		√										√		7
	Total															105

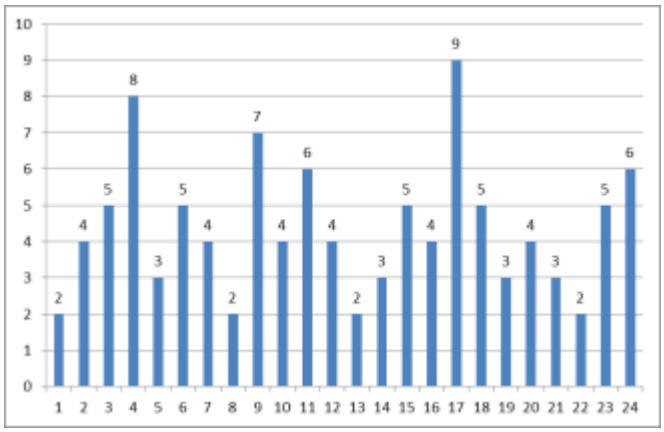

Chart -4: Number of accidents in each site (Large industries

5. CONCLUSIONS

With growing global increase in complexity of operations, the construction industry has become more dangerous. Construction management is faced with the challenge of having to closely monitor their labour safety management systems to minimize occupational hazards. This project was concluded with the following observations-

S.No	Study criteria	Small Industries	Large Industries
1	Number of sites	28	24
2	Number of questionnaires collected	48	79
3	Rate of occurrence of accidents with respect to number of persons	33.97 %	15.41 %
4	Safety performance	17.08 %	31.48 %

1. Safety is a management initiative. Due to various reasons, this was found lacking on majority of the sites surveyed.
2. The rate of occurrence of accident in small industries is 33.97%.
3. The rate of occurrence of accident in large industries is 15.4%
4. Overall, all aspects of safety are neglected at construction sites. In particular, it can be seen that the most critical factors like safety policy, awareness among the workers and falling hazards are neglected.
5. Although personal protective equipment was being used at some sites, hand gloves were used mainly for concreting operations.
6. Proper stacking of material was not done.
7. Majority of the sites did not have their access ways clear from obstruction.

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