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Safety Issues, Problems and Recommendations to Indian Construction Industry

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ABSTRACT: Construction, which was basic to developmental activities provides vital infrastructure such as transport, communications, power, water, and accommodation. This research evaluates existing regulations, and assesses the suitability of these regulations and procedures for construction environment and workforce. It also discusses problems associated with enforcing safety regulations at construction sites. So in order to identify the safety issues and problems, a comprehensive safety climate questionnaire survey was conducted with sites and employees of the construction companies by categorizing it into three levels namely; high-level, medium-level and low-level. From the collected data, we identify several factors which define the safety issues prevailing in the site. A detailed secondary study was conducted to view about the various problems associated with enforcing safety regulations at construction sites. The results of a questionnaire survey were used for the analysis.

A significant relationship between the company's attitude towards safety and the employee dedication towards the same is identified. These results will be helpful for improving the safety and developing a new safety culture inside the organization.

KEYWORDS: Construction safety, Safety culture, Issues, Problems

I. INTRODUCTION

Throughout the world, the construction area of civil engineering is the most hazardous industry. The major causes of accidents are related to the unique nature of the industry, human behaviour, difficult work – site conditions and poor safety management, which results in unsafe work methods, equipment and procedures. Safety is considered as an important function to be used against un-necessary loss of property, injury or death. Preventing occupational injuries and illness should be a primary concern of all employers. The concept of safety culture is especially done in dangerous industries, such as the nuclear industry and off-shore oil industry. The construction industry is regarded as a dangerous industry due to two characteristics; primarily, employees are separated by sites. Although regulations and plans are available, they still have to make decision by themselves when facing specific problems. Secondly, employees in the construction industry move among the companies, sites, and positions more frequently than those in their traditional industries. Because of these two characteristics, while the promotion of safety management and working condition is achieved in a manner that is used by several industries to consciously improve safety performance, they are inadequate in the construction industry. This is due to the two above said characteristics of the work force. One of the reasons is that in the construction industry, safety performance is more relevant to the human factors.

II. RELATED WORK

- National Safety Council (NSC) defines safety as “the control recognized hazards to attain an acceptable level of risk”.
- National Safety Council (NSC) defines accident as an “occurrence in a sequence of events that produces unintended injury, death, or property damage. Accident refers to the event, not the result of the event”.

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III. OBJECTIVES

- To explore the existing safety policies and employee values, attitudes and perception towards safety climate of the construction companies
- To identify the safety problems that occurs in the construction
- To give suggestion and recommendation to enhance the safety procedures

IV. SIGNIFICANCE OF THE STUDY

Construction industry in India, according to a survey conducted by the NSSO in 1999-2000, employs a workforce of about 13 crores people, but occupational health and safety concerns for the workforce are extremely poor. While industries dealing in explosives and highly inflammable substances boast little fatalities, the figures in the construction industry are shockingly high. In addition, accidents, injuries, work related diseases such as asbestosis, silicosis and repeated stress conditions have all made construction industry a most hazardous one. Considering most of these go unreported, makes the management of safety much more difficult than any other aspect. Despite the fact that safety has a direct bearing on productivity and quality, employers relegate personal safety to the back burner and resort to contracting out even large and high profile works. Considering all the above factors, the necessity of study is established.

V. METHODOLOGY

From the literature survey it had been concluded there are many issues about safety considerations in construction industry. The methodology adopted in this thesis is the collection of data by the method of survey. Several methods for collecting information from the industry were evaluated from various literatures. Several companies were selected for the questionnaire survey. Survey is carried out in the construction sites of several companies by ranking the companies into three groups,

- ❖ High level construction company – Rank 1
- ❖ Medium level construction company – Rank 2
- ❖ Low level construction company – Rank 3

The questionnaire was framed and the pilot survey was carried out with few selected personnel in construction companies. According to their suggestion the questionnaires were modified based on the results of pilot survey. The detailed survey was carried out with various selected construction companies. The questionnaire was sent to the persons concerned with the request to answer the questions and return the questionnaire. A questionnaire consists of number of questions printed or typed in a definite order on a form. Based on the literature study done and the codes and regulations studied, following parameters were established for study and analysis which in turn would determine the issues and problems behind enforcing safety in the construction sites. The two separate questionnaires were prepared in this study, The Questionnaire – I deal with the questions which were limited to Managers and Engineers and Questionnaire – II deals with the questions which was limited to labours.

VI. SURVEY DETAILS

Development of questionnaire along with factor conditions for quantification of construction safety. These questionnaires were distributed among the construction sites and the collection of data was carried out. Out of 205 Questionnaires given for receiving data, 126 were returned (response rate of 61.46%).

From the survey, the results of Questionnaire – I are out of 79 questionnaires sent, 44 were returned. Out of 44 samples, 12 were returned from low-level construction companies, 35 from medium-level companies and 20 from high-level companies.

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Non-respondents were 35. The response rate - 55.69%. From the survey, the results of Questionnaire – II are out of 126 questionnaires sent, 82 were returned.

Out of 82 samples, 19 were returned from low-level construction companies, 33 from medium-level companies and 30 from high-level companies. Non-respondents were 44. The response rate -65%.

VII. SAFETY ISSUES

Safety Policy & Procedures

The safety policy is available with some contractors for their particular site. In some cases the safety program is incomplete, that is, there is no safety engineer or any other person responsible for safety at site and some doesn't have formal organisation for safety. It is unhappy to notice that some sites do not have their insurance for the labourers and the person working at site. It shows the lack of awareness among the person working at site.

Safety training and Program

From the analysis results, it was found that the basic training is at minimum level, Few of the most respondents claimed that they have safety program at the company level; however, they also have attached a copy of it with their reply as was requested, orientation program like protection for head, ear, respiration, fire, housekeeping & scaffolding were not carried out to greater extent. Safety posters do not play a major role. Safety tool-box meetings were one of the major safety programs which were conducted weekly, monthly; annually for the various stages of workers. Only 75% of the high level companies conduct regular safety meetings by safety personnel to job employees. Safety incentive program & drug testing program is uncommon in the construction industry. It is found that the safety programs are not efficiently implemented at the site. Training to staff regarding the safe working condition is not provided.

Safety Record-keeping

Safety record-keeping is urged to be maintained at the construction sites, to make awareness of safety in construction sites by the way to reduce the occupational accidents and illnesses. From the results of Questionnaire it is found that the most of the companies maintain record keeping only annually. The record keeping for accident frequency rate, Number of fatalities and dangerous occurrence happened.

Safety Measures

The safety measures are very important consideration in enforcement of safety in construction sites. The safety inspection carried out in some of the surveyed companies; inspection was made half-yearly in few and annually in most of the companies. Safety measures were made for major activities only. Insurance was one of the most concerned safety measures to be adapted to make welfare and compensation to the labours. The procedures, training and statutory regulations for the usage of personal protective equipment were not sufficient.

Cost Related to Safety

The managers and engineers think that safety procedures substantially increase the cost of construction. This may explain the "No answer" reply to the safety expenditures requested in the questionnaire. Accident costs and safety procedures are not considered in the contractor's bid and but only the insurance cost is considered. Accident costs are kept for the entire company. However companies with annual recording of accidents experienced more accidents and claims. Managers estimate the cost of implementing safety procedures and regulations to be less than 2% of total project value. High – level companies, have better safety performance and fewer accidents than smaller companies.

Awareness towards Safety

From the analysis it was found that the respondents disagreed that they were aware of welfare measures, health and safety risks associated with activities. However they have little idea to react on emergency situation. The workers are sometimes pressurized to work unsafe at situation, which clearly says that productivity was seen more important. There was inadequate display of the safety programs and policies through posters. The sites where the client was more committed towards safety was giving safety awareness program to the staff and labourers. Awareness among the workers regarding safety was very low.

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Welfare Measures

From the analysis, it was clear that 85% of the sites are available with first aid kits. Regular medical check up is given about 28%. The welfare measures like labour colony ranks 21%, sanitary facilities like availability of good drinking water, latrines, lighting, etc., are provided about 21%. Insurance provided was about 33%. Even though education for children ranks zero, the welfare measures like recreation arrangement is surveyed to be minimal. In overall half of the respondents agreed that they were provided with basic amenities required for their day-today activities.

Relationship between Management & Labours

Rapport here perhaps one of the major tasks to be performed by the management. Without carefully synchronized work tasks on the projects, confusion will develop between expertise and sub-contractors. Motivation towards safety and the outcome of conducting safety meetings results towards the “disagree” level. The companies do not take much effort to punish the workers who break safety or act against safety procedures. The degree of co-ordination provided project level from questionnaire survey is found to be minimal.

Emergency Plan

Majority of the sites have scored well in this criterion. Most of the sites surveyed have fire extinguishers available at the sites and have emergency numbers which have been displayed in some of the sites as well. Even though, the physician arrangement is low and the arrangements for ambulance, where workforce are more than 300, is found to be very minimal.

Use of Personal Protective Equipment

Usage of personal protective equipment was very minimal. Helmets are not familiar in most of the sites. Awareness among the workers regarding the usage of PPE was lacking. The contractors / employers are not providing the PPE to the labourers at their site. In some sites, even though workers were provided with PPE, workers are not using it properly. For example, workers are using their helmets for storing and carrying oil which is required for applying on the formwork at the time of shuttering process. At the time of interview with the workers, they said that they feel discomfort while working with the PPE. This shows the lack of management commitment towards safe working environment and their lack of motivation for safe work practices. Contractors said that the labourers do not use PPE even they provide them and so they are not buying PPE for their site and some said they are quite expensive.

Safety Problems Identified From the Survey:

Construction work places tend to have several employers working on them simultaneously; making safety co-ordination in such a dynamic environment a very complex process. Construction industry has many special features that adversely affect the safety to its workers. These special features and problems arise from the following:

Contractors often feel that their bids will be considered even if they do not make provisions for safety costs. The Questionnaire distributed to construction companies, most contractors do not consider safety costs in their tender unless it is recognized by the contract documents.

Lack of safety regulations:

The absence of a set of safety regulations adversely affects the enforcement of safety on the job site. National standards have not been updated to comply with the new technology and constructability methods.

Small size of the construction companies:

The open trade and commercial lease given to its citizens by the Indian government encourages many to establish small businesses, which are especially concentrated in construction. The high proportion of small undertakings is a handicap to the spread and adoption of safe working practices. Most small & medium firms use temporary labour and may not assure continuity of work, so investing money in training and equipment for them is considered an unnecessary cost.

Extensive use of subcontractors:

The specialization of activities on building sites has been a main factor leading to extensive employment of subcontractors. Many companies look for safe and fast profit, selling their projects to subcontractors for a certain percentage of the profit. This causes many problems in coordination, safety planning, allocation of safety responsibility, and communication. Proper provision is permitted for the subcontractors to consider safety in their bid, it is doubtful whether they will take safety seriously.

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Lack of Relevant accident data:

The lack of official safety data and records of construction accidents of work places makes safety the last issue to be concerned by the contractor and owner. The problem on-site is not aware by the management, since they are not informed by the statistics or figs, of serious and fatal accidents that have occurred at sites, and the number of disabilities that resulted from such accidents.

Extensive use of migrated labour:

The employment of migrant labour has always been a special characteristics of construction sites in developing countries like India. Different labour cultures and traditions reflect on human relations, different work habits, and communication problems. Most construction workers are unskilled, untrained, and inexperienced, especially after the liberation. They come from poor communities of other countries and are ready to work in any job to establish a reasonable life of their families; many do not see their families for 2-3 years in order to save some money for the future. The workers are emotionally vulnerable and pre-occupied with their problems since most of them are working in unsecured conditions and not on their sponsor's bail. All of these above conditions can affect the concentration of the workers and may contribute to mistakes.

Disorganized labour:

The construction industry depends mainly on a foreign labour force that has no union or community to defend its rights and secure it work. Hence workers are not aware of their rights to safe working conditions. Labour groups feel alone with no organization to defend them and them to accept the company's policies and rules.

High labour turnover:

Construction has a particularly high labour turnover when compared with other industries. This is partly due to the mobility required of construction workers, who may be engaged on several widely separated sites in any 1 year, and partly to the short duration of most jobs. On many sites, training programs for new entrants and identification of job hazards do not exist; therefore employees are required to learn from their own experience and mistakes.

Low-priority of safety:

The main concern of a contractor is how to save money and reduce costs. Safety is usually considered a secondary priority in the company's plans. Safety is considered a waste of money by contractors since they may be unaware of the effectiveness of safety prevention programs in reducing costs and increasing productivity.

Weather effect:

Hazards arise from extreme weather conditions in summer, when temperature is usually greater, often adversely affecting the worker's state of mind and attention. Many construction companies tend to work long hours during good weather to make up for time lost due to bad weather.

VIII. COMPARISON BETWEEN CATEGORIES OF COMPANIES

High Level companies

The following are the observations made during the survey of the site which was the best among the surveyed.

- The contractor had a safety policy and followed a safety program.
- Trained and qualified personnel were appointed to ensure the implementation of the safety program.
- Special training about safety was given to the labourers and the staff at the site on a weekly basis.
- Signboards and posters were displayed at a number of locations to create awareness among the workers about safety.
- A portion of the safety office was utilized for the display of personal protective equipments also showing its importance.
- Making benchmarks over them identifying the location of the underground cables.
- A special gang was employed exclusively for the erection of the enabling structures on site, ensuring the quality of the enabling structures.
- Special care was taken during the monsoon season to avoid electrical hazards due to short circuit.
- Lists of emergency phone numbers were maintained and a copy of it is stuck outside the main office site.
- A prior arrangement had been made with one nearby hospital to deal with emergencies.

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- All the labourers employed on the site were insured under the group insurance policy.
- Regular housekeeping was done and care was taken to see that all the materials were stacked properly after the completion of the activity.
- Sprinkling of water was done with tankers to reduce dust on the site.
- Proper illumination of the site was done during the night time.
- Personal protective equipments were provided to all the labourers working at the site and they were insisted to use those personal protective equipments compulsorily.
- Internal auditing is carried out for safety procedures followed at site and the site has got award for its safe working environment.

Low-Level Companies

The following are the observations made during the survey of the site which was the worst among the surveyed.

- There is no safety policy and there is no person responsible for safety at site.
- Personal protective equipments were not at all used.
- Only a limited care is taken for the enabling structures at the site. Also planning and designing of the enabling structures was not done.
- Housekeeping at the site was very poor.
- Site does not have a proper job layout.
- The maintenance of the machinery was not done regularly.

Contractor's Commitment towards Safety

Following are the facts that have been observed from the analysis of the survey regarding the commitment of the contractors compared with their industrial experience.

- Even though contractors are having reputation, in the industry for more than 25 years, they have started implementing the safety regulations only from the past 4 years (i.e., from 2006 onwards). It is because of the client's desire and commitment towards safety and due to the contractual agreement made with the provision for safety procedures between the client and the contractor.
- Those contractors who are starting their career fresh in the industry do not take much care about the safety environment at the sites. Moreover they do not know much about the safety practices.
- Those contractors who have less reputation are yet to focus on safety environment in construction sites.
- Some contractors are following the safety regulations only if the client is insisting to do so and this has been observed in two different sites of the same contractor where safety regulations are followed at one site and not at the other.

IX. RESULTS AND DISCUSSION

The data, 126 usable returned questionnaires collected by means of questionnaire survey were entered, coded and analysis by use of statistical software, SPSS (Statistical Package for Social Sciences). Following are detailed results of various statistical tests done using SPSS, each and every result has been punctuated with tables, figures, graphs and other representations. According to the response from the construction sites, suggestions are given and attentiveness regarding safety is developed.

X. CONCLUSION

The safety issues questionnaire survey for the selected companies has been successfully completed with 126 sample form 17 sites. The correlation analysis was used to explore the relationship between safety issues and personal characteristics for the various levels of companies. Significant relationships were found between safety issues, company's involvement in safety and individual safety behaviour. The employees who have a clear idea about the job are involved in a more positive perception of safety issues than those who do not have a clear job clarity visions. The

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results imply that with increased job responsibilities and job clarity, the employees will have better safety attitude and belief. This emphasizes the importance of awareness and training in the company.

Finally the employees who seldom break any regulation are less prone to accidents and major problems.

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