

## **FACTORS CONSIDERED FOR SAFETY PRACTICES IN CONSTRUCTION INDUSTRY**

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*Abstract- Construction, which can be stated as basis for development of any country, in form of infrastructure etc. This work has mainly been carried out with the help of a questionnaire, extensive literature study and the present condition of safety practices in construction industries. The main goal of the study was to present a scenario about the present safety practices in construction industry. The questionnaires were sent to many project managers of construction companies and a feedback was taken and analysed. The questionnaire was drafted such that it provides with an idea about the present safety situation in construction industry keeping in mind different parameters of safety such as excavation work, electricity, ladder safety etc. The available literature of various studies and surveys were analysed.*

*Keywords- Safety, construction, safety practices, construction safety, safety issues etc.*

### **I. INTRODUCTION**

Construction in developing countries is more labour intensive as compared to developed countries, workers are unskilled mostly. Construction is a dangerous occupation. In India it is both demanding as well as dangerous. Workers get exposed to new hazards almost every day due to the changes in construction projects. Construction work is a physical task and requires stamina, work in cramped spaces carry and work with potentially dangerous tools and equipment's. Construction workers face harsh weather conditions also as they have to work mostly outside or in partially enclosed places. Accidents at construction sites are caused mainly due to the poor management of safety procedures and difficult nature of work. It has been reported that construction work has a high rate of injuries and accidents. In a report that The Bureau of Labor Statistics details in 2006, cases of work-related injury and illness were 5.9 per 100 full construction workers. This is significantly higher than the 4.4 rate for the entire private sector. Further steps need to be taken which include identifying causes of accidents on job sites and find out the ways to eliminate them. The means to improve safety performance in construction industry are inadequate. Safety is never counted as a parameter whenever a construction project is drafted just like time, money safety should also be considered as a parameter. The main safety hazards at construction site include falls, being caught between objects, electrocutions, being struck by objects etc. In developing countries like India, the regulatory authority is usually weak which makes it hard for them to implement rules effectively and the work hazards are either not perceived at all or less perceived. The other factors that contribute to poor safety performance at construction projects are:

- Safety not being an integral part of job.
- Non accountability at many levels.
- Not talking safety into account during project planning process.
- Contractors not pre-qualified for safety.
- Workers not properly trained.

Apart from factors that contribute to poor safety performance at construction the factors that cause accidents at construction site are:

- Working at height.
- Moving objects.
- Slips trips and falls.
- Collapse, Electricity etc.

Benefits in costs by implementing good safety practices in relation with worker injuries reduce costs. Costs of project rise whenever there is an injury on work site, these costs are both direct and indirect which are rarely estimated by construction firms. It has also been stated that the indirect costs consist of many costs that are incurred due to injuries that relate to lost productivity, damaged materials, equipment, and the commitment of administrative time. The study of any accident at construction site reveals that the accident leads to major or minor injuries or at times death of workers it also leads to loss of equipment's goods and machineries.

## II. LITERATURE REVIEW

### A. *CONDITION OF CONSTRUCTION INDUSTRY IN THE WORLD*

The global construction industry currently represents about 13% of global GDP and this number will increase to 15% in 2020. In this study health means being free from illness, injury or pain which can be caused by construction activities has been considered. Also the second aspect considered is safety, which means freedom from danger, harm, and injury to the person involved in construction activities.

The third aspect considered is accidents and injury. It consists of a list of the possible injuries of construction workers resulting from construction site accidents like head injury, spinal cord injury, closed head injury, paralysis, concussions, severe cuts, burns, etc. [1-3]

Over the next 7 years the global construction industry will grow from \$7.2 trillion to over \$12 trillion.

### B. *RISK MANAGEMENT AND PROCESS*

Risk management is an activity which integrates recognition of risk, risk assessment, developing strategies to manage it, and mitigation of risk using managerial resources. Risk management is done by following some steps as establishing goals and context, identify risks, analysing the identified risks, assessing the risks, treating or managing the risks and monitoring and reviewing risks [3, 4].

Meltz (2009) in his paper concluded five major safety techniques which will highly contribute to excellent safety performance were identified in this study. Their study identified effective safety techniques (Five High-Impact Zero Accidents Technique) to allow companies with good construction safety programs to advance in safety excellence [5]. The Five High-Impact techniques identified are:

- (I) Pre-Project/Pre-Task Planning,
- (II) Safety orientation and training,
- (III) Safety Incentives,
- (IV) Alcohol and Substance Abuse Program, and
- (V) Accident and Near Miss Investigation are presented in more detail for clarification:

Brace (2004) has discussed the questionnaire design: How to plan, structure and write survey material for effective market research [6]. He has provided a method of developing a questionnaire to conduct a survey of any construction site which is stated under.

Once the two preceding studies were defined, the identification of ways to write an effective survey was needed in order for quality data to be collected. By establishing an effective survey, the goals of this study will be clearly understood by the participants resulting, in the best, most accurate, answers. Surveys are often conducted simply because it's the only way to get information needed. The role of a survey can be described as a medium for conversation between two people in a way which the researcher articulates questions to which he or she wants to know the answers. Different types of questions will help determine the information that is obtained. The survey should pose questions that are relevant to the objectives of the study and stay away from questions that are not relevant. The best way to be sure that a question is focused directly on the objectives of the survey is to ask as precisely as possible exactly what the goal for the survey is. In addition, the questions need to be stated in plain, and easy to understand language. If the question is not clear then there is a good chance that the respondent may interpret the question differently than intended.

OSHA (2005) suggested that one of the most commonly used approaches to measuring attitude is the itemized rating scale, specifically the Likert scale [7]. The Likert scale is a rating scale which utilizes an interval scale on which respondents are asked a series of attitude dimensions (a battery), for each of which they are asked whether, and how strongly, they agree or disagree, using one of a number of positions on a five-point scale [6]. A major advantage of this scale is the ability to obtain a summated value. This type of rating scale provides a straightforward way of asking attitudinal information that is easy and versatile to analyze, and that provides comparability across time.

#### C. PARAMETERES OF A CONSTRUCTION SITE TO BE COVERED DURING SITE VISIT:

The type of operations/activities carried out in a construction site are many and they vary from site to site. However, all of them should be carried out only with due regard to safe operations. The parameters that will be covered in this study are listed as:

- I. Excavation Work
- II. Scaffolding Work
- III. Crane Operations
- IV. Hoisting Operations
- V. Forklift Operations
- VI. Ladder Safety
- VII. Electrical Safety

### **III. METHODOLOGY**

From the literature survey it can be concluded that there are numerous issues about safety considerations in construction companies. Questionnaire was framed and the pilot survey was carried out with few selected personnel in construction companies.

The strategy followed in this research was first identifying various construction companies which have active projects in Noida, Greater- Noida and Delhi.

Studying various research papers and publishing regarding safety practices and different methods suggested helps in improving safety at construction site. Questionnaire was drafted and onsite visits were conducted to get the actual scenario about the ground reality of safety practices. The questionnaire was based on certain factors from various review papers, journal's etc. Like

1. Level of support the safety department receives from management.
2. Written company safety programme or plan.
3. Conduct field safety inspections or audits on jobs in progress.
4. Any change company has made that has made a significant change towards safety in past 4 years.
5. Osha 300 form containing security performance from last 4 years.
6. Safety practices at different parameters.
7. Policies of compensation in case of injury or accident on site.

Also, some personal interviews were conducted with project managers in charge of projects. The responses have been recorded and analysed.

### **IV. RESULTS ANALYSIS**

The questionnaires were distributed among 7 different construction sites in Noida, Greater-Noida and Delhi and collection of data was carried (response rate 57.14%).

The first company to respond back was SUPERTECH LIMITED. The construction company has numerous completed as well as ongoing construction projects in Noida. Their response on the given questionnaire can be analyzed as their safety performance is better as compared to other construction companies. The received responses were as follows.

1. The project manager does not hold the responsibilities regarding the safety procedures at the site. Safety Engineers hold the responsibilities to ensure safety at project site. Almost adequate safety practices are ensured during various stages of construction. So, it can be concluded that there is an amount of support that safety department receives from the management.

2. The company does not have any written company safety plan. The working site safety is ensured according to the requirement of the site.
3. Safety inspections are conducted by engineers but only regarding the site. The safety of workers is most often overlooked.
4. There have been enormous changes since past 4 years regarding the safety practices, one of them being recruitment of safety engineers.
5. The required data was not available with project manager.
6. Minimal safety procedures or the company still relies on the traditional safety factors regardless than innovating in the safety procedures.
7. No policies of compensation only in case if the injury is caused due to lapses in construction safety as the workers are linked to contractors rather than company.

The second response was received from EARTHCON CONSTRUCTION PVT LTD. The company has construction projects in Greater-Noida, Lucknow and Dehradun. Their response on the given questionnaire can be analyzed as.

1. There is minimal support from the management towards the safety department.
2. The company does have safety programme but is followed only on mega projects the role of safety programme remains limited in most of the instances.
3. They do conduct safety inspections.
4. The safety practices have significantly changed since last 4 years. Due to the awareness and the rise in accidents at work sites company has made significant amount of change towards safety but not any major change in company policies.
5. No recorded date available.
6. Safety at different parameters is considered but only that minimizes the occurrence of accident due to machinery or equipment's the safety of workers is often overlooked as the workers are the responsibility of the contractor.
7. A few instances have occurred in the history of company but no written policies regarding compensation.

The response from DYNACON PROJECTS PVT LTD and MAHALAXMI CONSTRUCTION was received in the form of either YES and NO or the response was limited.

## V. CONCLUSION

Concluding it can be said that the companies are slowly improving their safety performance and are taking safety practices seriously. The safety scenario has improved a lot if compared to past safety performances of construction industry.

*Supertech Limited* showed interest in questionnaire sent to them and gave an adequate amount of information regarding their safety performance of projects. From the answers provided to the questionnaire it can be concluded they are serious about safety performance of their projects. The safety practices are still not adequate but are improving, like the case of recruiting safety engineers can be viewed as a positive sign towards improvement of safety practices in construction industry.

Apart from some improvements the company still needs to improve their standard in matters like paying compensation to workers in case of accidents and improving safety standards for workers as well.

*Earthcon Construction Pvt Ltd* response can also be appreciated, the company apart from being a small-scale construction company still showing visible advancements in safety practices. The company gave a fair bit of response to the asked questions in the questionnaire. The company has almost zero support from the management is serious about its safety performance.

Thus, it can be concluded that the safety practices far lag behind and is not considered an important aspect in developing countries like India.

## VI. FUTURE SCOPE

Construction industry can save a great deal of money and can avoid risks by maintaining safety measures which should encourage companies to enhance safety rules and regulations.

In developing countries, safety means extra cost which can be saved by not following safety measures which ultimately results in losses due to different accidents and compensation. Reducing of costs relating to accidents and thus improving the environment of project site thereby it can be helpful to finish the construction operation within limited time and thus increase productivity

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