

Minimization of Rate of Accidents on Construction Site by Effective Safety Model

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Abstract— The largest employees in India after agriculture is in the construction industry and there is a very fast development in construction industry. In construction industry, during working the safety of a human life is very important rather than anything else. In construction sector the lot of crowd is comes or connected from rural area, so there is a lack of knowledge regarding the safety and regarding the training and these are two main factors which are cause for the accidents. Accidents in construction sites are unplanned incidences involving movement of persons, objects or materials which are result in injuries, damages and losses to properties or people and to reduce these proper safety and emergency management is needed in construction industry. This study helping to develop a new guideline model named SMEM. For this the data is collected by visiting the number of sites and by preparing the questionnaire. A questionnaire survey was conducted on large Construction by visiting the number of sites and the collected data was analyzed to rank the safety performance and to develop a new model.

Keywords— Safety Management, Emergency Management, Accidents, SMEM

I. INTRODUCTION

In India, construction industry stands at second place next to agriculture. Construction job is dangerous job. The number of fatalities occurring from construction work in the industry is quite disturbing and the knowledge regarding the work even the training or the safety during the work are the major causes for serious accidents. The construction industry is risky for its employees and the number of injuries and fatalities is high. Over 3.5 crore people are working in construction industry of India. Even all over the world the safety of workers during work is the matter of worry. In India also this is a major issue. As per international labor organization (ILO), last year more than 1200 workers got injured and near about 350 workers died at construction site. During working on construction site human life and safety is most important. so systematic safety and emergency management is essential at construction site. For the safety management the proper care should be taken by the construction industry as well as, the government should take energetic contribution to complete this route. Construction accidents can be condensed just by identifying the root causes of accidents, which is possible by accident investigation techniques such as theories of accident causation and human errors. As per the survey in India the most of construction industries specially in rural areas are do not have safety and emergency department in there firm. In some construction industries safety and emergency responsibilities is just given to individuals who do not possess proper knowledge and experience in this field also there are safety and emergency provision made but

implementation of these provisions are not found which can prevent accidents. The safety graph of construction industry is always poor.

II. ISSUES OF SAFETY MANAGEMENT

Safety is the state of being safe. Safety defines zero loss of property, process, and people. Safety management is an organizational function, which ensures that all safety risks have been identified, assessed and satisfactorily mitigated. Safety management is commonly understood as applying a set of principles, framework, processes and measures to prevent accidents, injuries and other adverse consequences that may be caused by using a service or a product. It is that function which exists to assist managers in better discharging their responsibilities for operational system design and implementation through either the prediction of system's deficiencies before errors occur or the identification and correction of system's deficiencies by professional analysis of safety occurrences. Safety management implies a systematic approach to managing safety, including the necessary organizational structure, accountabilities, policies and procedures. To develop the rank of safety in construction and avoid accidents and, various safety management systems are implemented during project-execution phases. There are some tasks of safety management consist of safety measure planning, Effective control of the main contractors on site maintaining safe work conditions, hazard identification, control, and training for achieving a less accident target. Apart from those lacks of Motivation, Lack of knowledge about safety in workers, No use of Personal protective equipments, Communication problems are some main safety management problems occurred in small scale even in large scale construction industries.

A. Technique for Safety Management

To reduce to all above problems, factors and information regarding safety and emergency management with their major data can be used for develop a guideline model named SMEM by visiting the number of sites and by preparing the questionnaires and collecting the answers of it by the site engineers. The SMEM include rules for safety on site, chart of organization and the precautions for the each activity or for the conditions available on site. The main objective of SEME is to mention the construction site accident free.

B. Methodology

According to methodology questionnaire was prepared. The questionnaire was prepared to see how many companies were carried out safety management process on site and to analyze the present practice of safety process. The companies were selected based on the references and those are ready to share data. Four construction companies were carried out for safety and data was collected. After

collection of data analysis and conclusion has been completed for the pre work regarding the SMEM.

C. Salient Features of Questionnaire Survey

- The four companies which are selected for questionnaire survey were having experience more than five to six years in construction of residential.
- Only one company did not carry the any safety management process other two companies carry safety manage process. One company carries better safety management process.
- Three construction companies are not satisfied their safety management. According to safety manager of unsatisfied there should be a good and new method should be develop and motivation of workers towards the safety was most important problem.
- Three sites having a separate department for safety.

| Site name | Type of accidents Major, minor | Activity work | Causes of accidents |
|-----------------------------------|-----------------------------------|---|--|
| Dajikaka Gadgil developer Pvt.Ltd | Minor-4 Major-2 | Excavation | Falls from height, safety belt not use and no platform for work. |
| Vedant associates | Minor -6 Major-2 | Height work | Both did not use PPE'S (personal protective equipment) |
| Landscape Reality | Minor -3 Major -0 | Painting Scaffolding External plastering. | - Safety belt not used and good platform not provided. - Safety belt was slip. - Safety belt slipped and goo proper platform not provided. |
| S.G. Pvt. Ltd | Minor -1 Major-2 | Height work Painting | - Safety Belt Was Slip. - Slipping of Rope. |

Table 1: Type and causes of accidents with activity

From the surveys of all sites we analyze the total number of accidents. These accidents are classified into two types respectively major and minor. In major cases Permanent death, body part injury, fatal etc. and in minor cases first aid cases, temporary body part injury. By studying all these the total major accidents are 6 and minor are 14. We found out the three major conditions which are responsible for the accidents with the proper percentage is as follows:

- 1) Unsafe act
- 2) Unsafe condition
- 3) Beyond human control

The unsafe acts are comes under the conditions like due to using unsafe tool or avoiding the instruction book for the using the machinery even operating the tool without permission or by avoiding the use of personal protective equipments and near about 65% of accidents are happened due to this. The second one is the due to unsafe conditions in which the poor housekeeping, improper electrification or no proper barricading and near about 25% accidents are happened due to this one. And finally some things are beyond the human control which is happening on sites without any pre intimation, not more but 10% accidents may happen in this category so more care should taken for the last condition.

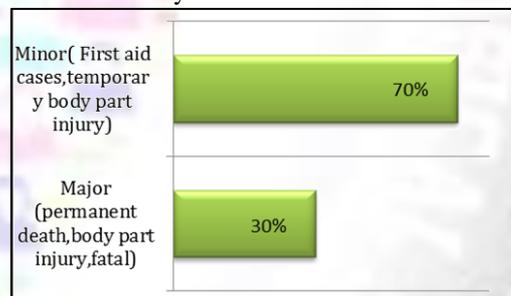


Fig. 2: Report of Accidents

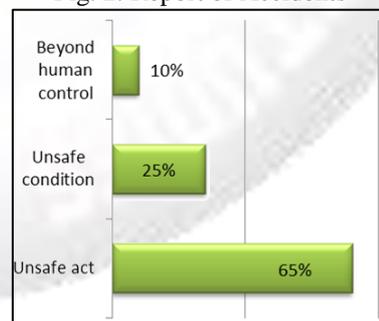


Fig. 3: Causes of Accidents

III. ANALYSIS

The analysis is done after completion of questionnaires type of survey which includes the numbers of questions regarding the safety techniques, previous safety and emergency models which are available in market and the precautions taken on site for the safety and emergency management.

A. Results

After doing above survey it was found that safety management on site is poor and there is lack of proper implementation of safety management. After this analysis we have found out the causes of accidents of all sites.

The table is prepared which contains the analysis of four surveyed construction sites.

IV. SAFETY MANAGEMENT AND EMERGENCY MANAGEMENT (SMEM)

As talk about the causes of accidents and number of accidents, safety and Emergency management is suggested which describe the organization chart along with duties and responsibilities of various safety personal.

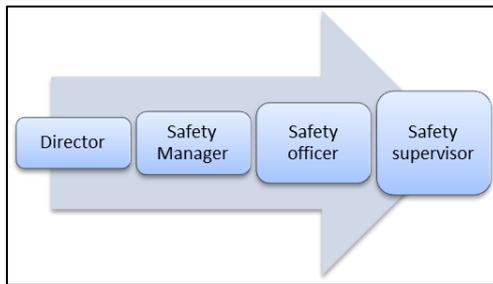


Fig. 3: Structure of organization for SMEM

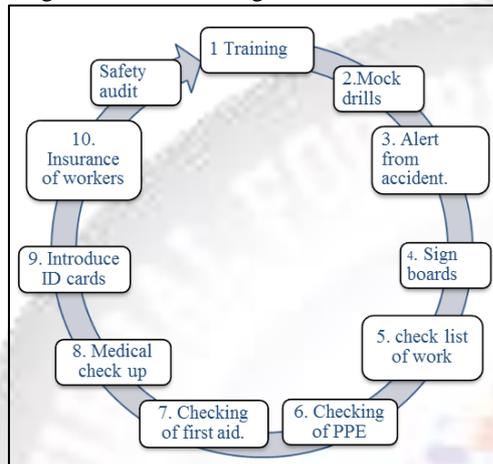


Fig. 4: Working of Safety Committee

It also describes the working of safety committee, frequency of training and safety meetings as well as use of personal protective equipment. Safety management and Emergency management is a guideline model which is developed based on questionnaire survey, data collection, interviewing safety engineers from all the four sites selected for study. It contains the organization chart, general safety rules and gives activity wise precaution on the site. The main purpose of SMEM is reducing the accidents on site and enhances safety management on sites.

For the better results the checklist and the responsibilities sheets are prepared for each activity for the safety manager, safety officer and safety supervisor too. For preparing the model the lots of activities are available on construction site but from the more risk factor I have chosen some of them as following.

- Housekeeping
- Excavation
- Scaffolding
- Painting
- Welding and gas cutting
- fire
- Height of work

| Safety Activities | Safety Manager | Safety Officer | Safety Supervisor |
|-------------------------|--|--|--|
| Housekeeping | <ul style="list-style-type: none"> - Site inspection - Direct communication should be with workers | <ul style="list-style-type: none"> - Monitor hazards like serious body injury - Develop procedure for proper use of material | <ul style="list-style-type: none"> - Inspection of check list - Proper store keeping of materials - Inspection on site |
| Excavation | <ul style="list-style-type: none"> - Design checklist. - Make a direct communication with safety officer and other main person. | <ul style="list-style-type: none"> - Observe hazards like major body injury check work site. - Site introduction to new workers. | <ul style="list-style-type: none"> - Inspection of check list. - Various sign floorboards. - Examination of PPE'S like safety belt, shoes. |
| Scaffolding | <ul style="list-style-type: none"> - Design checklist. - Proper Assembly of scaffolding. - put up on solid footing | <ul style="list-style-type: none"> - Observe hazards like fall of person, materials. - Develop and procedure of safe method work. | <ul style="list-style-type: none"> - Inspection of check list. - PPE'S like safety belt, safety helmet. - Barricade the area. |
| Painting | <ul style="list-style-type: none"> - Proper design of platform. - Safety net provided. - Tool box meeting conducted - Work permit procedure. | <ul style="list-style-type: none"> - Observe hazards like fall of person, skin causes. - Inspect the availability of PPE'S | <ul style="list-style-type: none"> - Check standing platform. - Proper housekeeping. - Barricade the area. |
| Gas cutting and welding | <ul style="list-style-type: none"> - Proper connection of electrician. - Earthing provided. - Work permit procedure. | <ul style="list-style-type: none"> - Check persons working should be trained. - Monitor hazards like dangerous gases, electric shocks. | <ul style="list-style-type: none"> - Check PPE'S like safety goggles, shoes. - Proper ventilation. - Proper eye protection |
| Fire | <ul style="list-style-type: none"> - Establish a team. - A system of permit to work. - Supply of water. - Fire measures, | <ul style="list-style-type: none"> - Check persons must be trained and he knows about fire. - Maintain fire extinguishing equipment. | <ul style="list-style-type: none"> - Check PPE'S. - Schedules of daily and weekly inspections. - All combustible materials are kept away from fire. |
| Height of work | <ul style="list-style-type: none"> - Design checklist - Safety net provided | <ul style="list-style-type: none"> - observe hazards like fall of person - observe use of PPP's like safety | <ul style="list-style-type: none"> - Check standing platform - Barricade the area. |

| | | | |
|--|-----------------------------------|-------------------|---------------------|
| | - Appoint the well trained labour | belt, helmet etc. | - Check PPE'S. - |
|--|-----------------------------------|-------------------|---------------------|

Table 2: Safety Activity and Personal Responsible V

V. DISCUSSION

In construction industry lot of companies are having the safety management but every company is not using the modern techniques but just they are carry a basic safety management. By studying out my survey only one company have good safety and emergency management and one company is not using a single thing for the safety as well as for the emergency. By the opinions of all of the visited sites they need a advanced guideline model for minimizing the accidents and also it should be economical and very effective than present models. The SMEM model which is created is having more advanced things and also has lot of advantages as compared to current management models.

VI. CONCLUSION

By the survey of sites we found that the companies which are using the SM are not that much effective and only 50-55% implementation of safety method is complete on construction site. Near about 30% major and 70% minor accidents are occurs on sites. On sites the accidents are occurred due to unsafe condition, unsafe act and beyond human control. Safety management and emergency management (SMEM) is developed with advanced things and proper responsibilities of various safety things. SMEM is developed with responsibilities of various safety persons. General safety rules are helpful for workers. Working of committee will manage the safety on sites. If the SMEM is using on site then there will be the definitely change in the values of the accidents and these will be reduced because the SMEM is advanced and user friendly for each site. SMEM is useful to encourage and to motivate towards the safety and emergency. It enhance the company earnings due to a smaller amount of accidents. It can be apply from bottom to peak level of management.

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