

The Study on Impact & Improvement on Construction Safety Management Related Project Planning and Scheduling in India

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Abstract:- The construction industry is considered as one of the very often hazardous industrial sector where the construction workers are more led to accidents. However, occupational safety in construction industry is very poor in developing countries like India countries because lack of safety regulations and standards, lack of safety training, lack of safety awareness and safety management systems which leads to delay in construction project planning and scheduling process. Project planning and scheduling plays a very critical role in construction industry to prove the worthiness of any firm and to attain objective and goal through management principles. Hence a project could not be completed at correct time and accident occur due to hazards creating loss of lives, time and money eventually. This paper studies and summarizes how the planning and scheduling process gets affected by various lack of safety and dangerous site hazard conditions in India.

Keywords:- Planning, Scheduling, CPM, PERT, Safety, OSHA, Fatalities, Accidents, Personal Protective Equipments (PPE).

I. INTRODUCTION:

Construction work is a dangerous job. Some construction site jobs are: building houses, roads, workplaces and repair and maintenance of structures. This work includes many hazardous conditions such as working with height, excavation, noise, dust, power tools and equipment. The most common injuries and deaths are caused by the fatal four which are shocks, fall, caught in machine and collapse. Construction work has been increasing in developing and undeveloped countries over the past few years. With an increase in this type of work occupational fatalities have increased (i.e) individuals that pass away on the job or performing work related activities. Planning is a general term that sets a clear path that should be followed to reach a objective. Planning, scheduling is the important part of the construction management. Planning and scheduling of construction activities helps to complete the project in time and within the financial budget. Hazards are the dangerous situation by which works can get affected and let to severe illness or injuries at the site. In India construction site maintenance are very poor in most of the projects which cause accidents to occur and thus is the cause for affecting the plan and schedule of the works. Several acts regarding employee welfare are devised by the government of India like workmen's

compensation act and child labor act to ensure certain range of safety in work.

II. LITERATURES

Occupational Health and safety has gained attention following the OSH Act in 1970, which assigned substantial safety responsibility to employers. According to the this, employers must provide workers with a workplace free from hazardous substances or places . In addition, management should provide workers with training to identify hazards in the workplace, thus making them to behave safely and make safety-conscious decisions. Thus, hazard identification has become a very important element of an effective safety program.

Gray and Jones (1991) In their book of the effect of health inspections on hazard exposures Gray and Jones found a decrease in hazard exposures on subsequent inspections. The effect of inspections on exposures was greatest for the first inspection. They also found that a decrease in citations for violations of regulations during a period when the US admin was opposed to business regulation was related with an increase in hazard exposures.

Burby and Paterson (1993) Burby and Paterson found cooperative inspections that mainly viewed on relationship building were more effective than securing compliance with performance-based standards. Anyways, both approaches are equally effective for getting compliance with specification based standards. This study can lead to understanding the mechanism leading to changes in outputs as a result of inspections.

Nielsen (2007) This study implies to the understanding how the approach taken by inspectors to inspections can influence the outcomes. The outcome of this study shows that more communication between companies and inspectors improves the effectiveness of inspections in terms of conforming that safety issues are solved. More communication between the business and the inspector was also related with businesses receiving more easier outcomes. The authors also suggest that the effect of communication between the business and the inspector may be due to inspectors providing more advice on how

businesses could improve their safety practice rather than just focusing on compliance. Why there is less communication with some businesses than others is not explored in the paper.

Hammad AlNasseri found that the study of planning and scheduling are to be found more. The study in this paper has been investigated on a set of factors identified as enablers and barriers to a successful project planning and scheduling on the construction projects.

Rhuta joshi analysed and found that resources are the main part in any project. They are been used and allocated using techniques like CPM and PERT so that the project can be completed on time with limited funds.

Olusegun found in his research that allocation of optimum resources will help for the betterment of project and beyond a point will lead to deterioration of project.

Selvam A found and analyzed the ways of which safety can be involved to minimize accidents. The field survey indicates the various control measures taken for safety by questionnaire.

I.F Mohdkumar found that OSHA is the guideline to the overall management of safety. This includes the organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the organization's OS&H policy. Calss A contractors are well aware of safety.

Rafiq. M. Choudhry; Dongping.Fang, Sherif .Mohamed This study revealed a conceptual model that recognizes human, technical, situational, and organizational elements as well as their interactions. The model is based on three fundamental conceptual categories, namely safety climate, behavior based safety, and safety system. The results of this study clearly indicate that the model serves as the logical basis for finding what and how to analyze and assess the different aspects of safety culture. It gives us the opportunity to adopt a goal-setting nature by pursuing multiple sub goals. This gave them the conclusion that Employee perceptions, safety behaviors, and environmental or situational features could be accessed through safety climate surveys, peer observations, and systems audits/inspections.

Sherif. Mohamed discusses empirical research aimed at examining the relationship between the safety climate and safe work behavior in construction site environments. A research model was developed and tested using a survey, which contained multiple measurement items relating to each of the constructs in the model. A questionnaire survey was used in order to facilitate the collection of information from construction sites. This resulted and concluded that the empirical results indicate a significant relationship positive association between the safety climate and safe work behavior. Contrary to the expectation, this study indicated that work pressure has no significant direct relationship with the safety climate. The results corroborate

the importance of the role of management commitment, communication, workers' involvement, attitudes, competence, as well as supportive and supervisory environments, in achieving a positive safety climate.

Tony baxendale found that the main requirements of the Construction Regulations are studied together with enforcement by the Health and Safety officers. Client involvement is discussed in relation to the timing of appointments and the review of competence for principal contractors. Designer involvement is analyzed in relation to awareness and assessment of risk, the knowing of the planning supervisor's role and change of requirements to operational safety on site.

Nikhilroy & Jeeven Jacob found that absence of safety factors in a site can cause accidents. The PPE was tested using a BIM modeling and proved the value of safety. Based on fall protection the values are submitted to the authorities.

John wanberg found that the safety, quality, cost and time are the four essential factors for the project. These four factors have direct static relationship based on the hypothesis and can make the project to complete in time if they are managed properly.

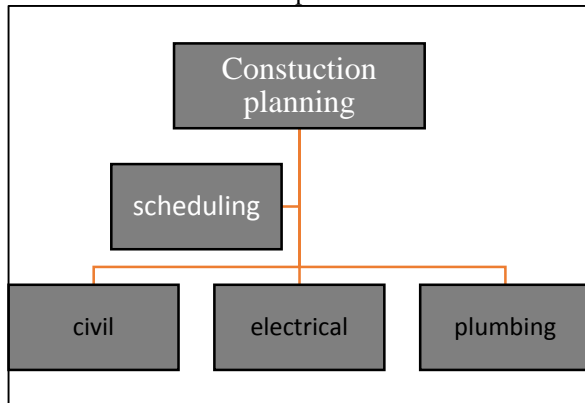
Site management seemed to be non-interested in emphasizing the need of personnel safety practices among their workers (Ahamadet al), although this might not be very common in nowadays. In some cases, safety is considered as part of Total Quality Management (Husin et al). In addition, Hassana et al have revealed that good organizational commitment and communication are highly associated with effective accident reporting, high line management commitment and active personal role. Active personal role to safety and health resulted in greater influence among workmates, and low obstacles to safety behavior according to the Hassana et al .

Farooqui et al have found that, workers and other staff members are sometimes under the influence of alcohol, and drugs possibly because they are not tested for drugs and alcohol before starting and during activities in the construction sites. However, these previous studies were limited to collecting opinions of professionals, based on their experience related to accidents at building construction sites. Workers' views on causes for accidents will also be helpful to enhance safety practices in construction sites.

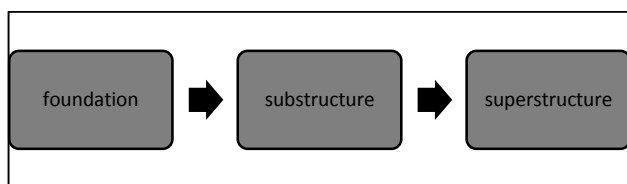
III.CONSTRUCTION PLANNING AND SCHEDULING

Planning generally refers to act of preparedness of one's work in the future to ease the execution without any difficulty. In construction several works has to be done in hierarchical order which involve several steps. Work breakdown structures must be devised for accurate step by step planning in construction projects. A typical work breakdown structure is represented below for better understanding. Planning also got several classifications with regard to any construction project. One has to plan the

management, labor, material procurement and financial needs of the project. The planning part of the structure of construction is the very initial and also the crucial part in which the tender, contract, design, procurement and other activities takes place. The safety is also preliminarily designed at this stage so that there is smooth flow in instructions and management function. The planning is generally done by the planning engineer in most cases. In some cases the contractor itself takes care of all the activities which leads to improper management with lack of skills. The safety is ensured so that the project planning does not fail at evident circumstances and create work load and confusions around the process.



Scheduling refers to assigning of activities in a particular sequence to achieve the objective in time. Scheduling consist of CPM and PERT of interpretations to schedule resources such as men, material, cash flow and monitor activities. The typical scheduling is shown below for better understandings. If anyone activity in the schedule is affected by any reasons, then the floats of the relevant activities must be modified according to the nature of completion of project and also the losses must be bared by the team of construction. There is also the chance of the contract getting void and rising of legal issues related.



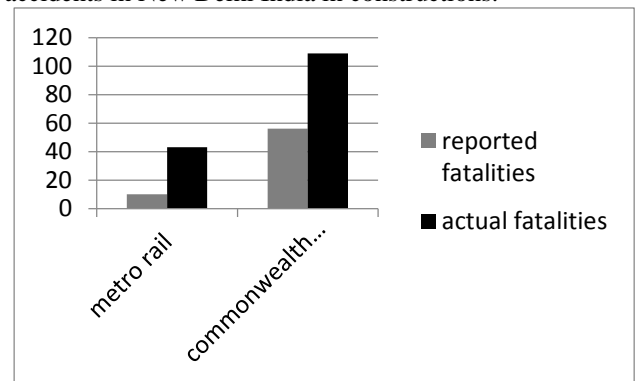
IV. IMPACT OF SAFETY MANAGEMENT ON PROJECT

According to OSHA, For construction, the 10 OSHA standards most frequently included in the agency's citations in FY 2004 were:

1. Scaffolding
2. Fall protection
3. Ladders
4. Head protection
5. Excavations
6. Hazard communication
7. Fire protection
8. Construction
9. Electrical

The above mention factors are the key factors which are responsible for accidents in constructions globally. In India awareness about safety is very low so that the workers are not provided with sufficient required protective equipments at site during work. Use of locally available materials also is one of the reasons for unsafe construction in India. The equipments and other resources used in construction are not well maintained so that its efficiency is lowered and less productivity is being observed. These mentioned facts are responsible for the delay in projects which make the schedule out of date. In Chennai June 28, 2014 the multi stories building at moulivalkam collapsed which consist of 11 floors. 55 workers were dead in the accident which is regarded as massive accident in Tamilnadu's history. So it led to the stoppage of work and also affected the entire project and ruined everything. Thus safety has to be imparted carefully in India for peaceful environment of constructions.

The safety culture must be developed in which small group of members inside the firm must monitor and help in practicing safety. The safety personnel and management teams must be deployed so that safety is ensured and the training and proper awareness is provided to the workers to educate them in safety and avoid accidents and bad happenings. The success of the project lies on the safety and performance of the workers. The below graph express accidents in New Delhi India in constructions.



V. SAFTEY IMPROVEMENTS

Like big firms in construction industries in India, all other small and middle ranged enterprises do not follow certain policies regarding safety. The main reason behind this was the lack of training and awareness about safety to workers. Use of unskilled labor with no knowledge about the work and using different locals of different language with poor understanding and culture interstates are also reasons for hazard accidents. Use of child labor must be totally abolished to protect children from doing harmful works. Proper training should be provided to workers and made knowledge of what they are doing gives sense of safety and reduces fatalities and injury rates in the country. The use of personal protective equipments must be encouraged to safeguard lives and attain perfection in safety. The officials in management must take care of safety to ensure good work progress without delay in time and planning.

VI. PPE PERSONAL PROTECTIVE EQUIPMENTS

Personal protective equipment are the compact and safety devices which are given and used by the individuals for their own protection in construction works. These PPE are very useful to prevent small and even sometime large injuries to the workers. It is also a part of safety management and criteria. The PPE includes:

- Helmets
- Goggles
- Masks
- Overcoats
- Gloves
- Boots
- Ropes, belts etc

VII. CONCLUSIONS:

The study indicates that the safety is very important in construction industry and the safety must be maintained in construction industry to save risks and a healthy construction environment. The safety also decides the duration of project and planning & scheduling. Reducing safety accidents save time and helps in successful project management.

VIII. REFERENCE

- [1] Rafiq, M. Choudhry; Dongping. Fang, Sherif. Mohamed; "Developing a Model of Construction Safety Culture", Journal of Management in engineering © ASCE, pp: 207-212; October 2007.
- [2] Keith. R. Molenaar; Jeongll. Park; Simon. Washington; "Framework for Measuring Corporate Safety Culture and its Impact on Construction Safety Performance", Journal of Construction Engineering and Management, Vol. 135, No. 6, pp: 488-496; June 1, 2009.
- [3] Sherif.Mohamed; "Safety Climate in Construction Site Environments"; Journal of Construction Engineering and Management, Vol. 128, No. 5; pp: 375-384; October 1, 2002.
- [4] Rafiq, M. Choudhry; Dongping .Fang; Helen. Lingard; "Measuring Safety Climate of a Construction Company"; Journal of Construction Engineering and Management;Vol.- 135, Issue- 9; pp : 890-899; September 1, 2009.
- [5] Aviad. Shapira; F.Asce, Beny Lyachin; "Identification And Analysis Of Factors Affecting Safety On Construction Sites With Tower Cranes"; Journal of Construction Engineering And Management; Vol.- 135; Issue 1; pp:24-33;January 1;2009.
- [6] Alexander .Laufer; M. Asce; William B. Ledbetter; F. Asce, "Assessment Of Safety Performance Measures At Construction Sites", Journal Of Construction Engineering; Vol. 112; No. 4; pp:530-542;December, 1986.
- [7] Suchismita.bhattacharjee; somik. Ghosh, "Safety Improvement Approaches in Construction Industry: A Review and Future Directions", 47th ASC Annual International Conference Proceedings.
- [8] Qian. Chen; A.M.Asce, Ruoyu. Jin; "Safety4site Commitment to Enhance Jobsite Safety Management and Performance"; Journal of Construction Engineering and Management; Vol. 138; Issue- 4; pp: 509-519; April 1; 2012.
- [9] Agwa, M. O., MNIM and MNISP (2012), Total Safety Management: A Strategy for Improving Organisational Performance in Selected Construction Companies in Nigeria, International Journal of Business and Social Science, Vol. 3.
- [10] Antonio, L. A, Juan, C. R, and Gribb, A., (2012), Analysis of Construction Accidents in Spain 2003-2008, Journal of Safety Research, Vol.43 (5-6) 2012, pp 381- 388.
- [11] Almen, L., Larsson, T. J., and Thunqvist, E. (2012), "The Influence of the Designer on the Risk of falling from Heights and of Exposure to Excessive workloads on Two Construction Sites", Safety Science Monitor, Vol. 16, Article 6.

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2 Mr. M. Chinnasamy was born in Chennai in 1976. The author did his under graduation in Civil Engineering at Adhiparashakthi Engineering College & M.B.A in Madras University in 2001 and Masters in Construction Engineering in 2008. He joined as Assistant Professor in Panimalar Engineering College and then joined at Sree Sastha college and has total experience of 14 years altogether. He has published Many Journals and Books for Ciil Engineering Students.