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Safety Management and Accident Control Measures in Construction Industry

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ABSTRACT: Construction activities have made a great breakthrough in the last two decades on the back of increase in development activities, and public demand. Still occupational health and safety issues have become major concern to construction organisations. The world society and economy have suffered financial and human losses as a result of poor safety management in the construction industry. The impact is however more in developing countries. The purpose of this study is to explore major safety provisions and also a detailed study has been conducted on safety management procedures in construction sites. Different types of accidents occurring in construction sites and measures taken to control these accidents are also analysed in this paper. Datas have been collected through various site visits, literature review and from various construction safety standards including BIS and OSHA (Occupational Safety and Health Administration). The paper has been concluded after putting forward a set of recommendations for construction organisations to improve the occupational safety in the construction sites.

KEYWORDS: Safety Management, Construction, OSHA, Safety parameters, Accident control measures.

I. INTRODUCTION

Construction industry is considered as one of the most hazardous industries in the world. There has been an increase in the number of buildings which are built for commercial, residential and office purposes every year. The construction market continues to expand due to the day by day increase in need of infrastructure facilities, homes, office spaces etc. The construction industry is very complex and hence it is prone to numerous health hazards. Therefore safety is a vital concern in the construction industry to result in a hazardous free environment. Safety professionals have analyzed that the major workplace accidents are initiated by unsafe behaviours and that their control is one of the keys to successful accident prevention resulting in low accident rate in construction sites. The number of fatal accidents in construction sites is not easy to quantify as information on this issue is not available for most countries. The main concern is completing projects at the required quality with minimum time and cost. Carelessness has been considered as the major reason for accidents and hazards happening in construction sites. With the change in timings and schedules along with the change of men themselves combined with the nature of the construction jobs makes the construction industry as one with accident risks. Hence the major aim of this research is to minimise the accidents occurring in construction sites. More than 3 million working days were lost due to hazards and accidents in the sites. Falls from elevated positions is the major cause of accidents and deaths in construction sites. Unexpected accidents which occur affect the overall plan of the projects which leads to production loss, lagging of works and interruption of production flow. Even though accidents cannot be completely erased, the affects of those accidents on workers can be controlled. Occupational health and safety issues have become a major concern in construction organisations. Due to lack of enforcement of applicable legislations, most of the construction organisations are forced to opt for implementation Occupational Health Safety Assessment series (OSHAS) to improve safety performance. It has been accepted that the construction workers have a high risk of work related illness and accidents than in any other public sector. Therefore there is an urgent need to reduce risk reduction by implementing a site safety management.

Construction safety management is a method which is used to control safety activities in order to ensure a safe working environment in the construction site. Safety during the construction project is also influenced to a great part by decisions made during planning and design process. Construction safety can be branched into

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four groups which are panning for safety, employee training for safety, first aid and medical measures and safety policies by the management.

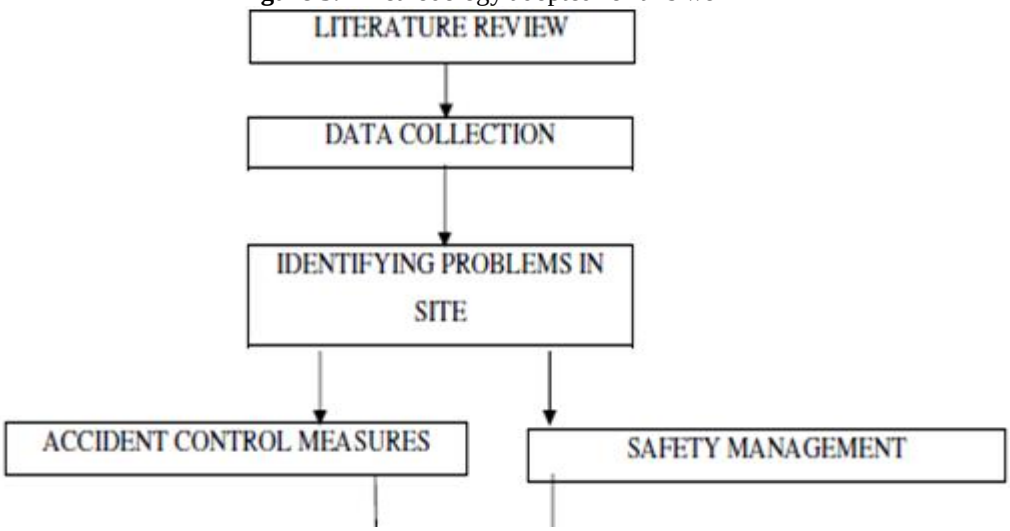
II. LITERATURE REVIEW

Various literatures were studied in order to gain a clear view on safety management and safety practices in construction industry. The study examined safety management in construction industry including organizational safety policy, safety training, meeting, inspection, penalties and workers attitude towards safety. The study concludes that a focused dedication inwards safety is needed and also the owners of large projects can more actively participate in construction safety management. [13]**.** Implementation of various safety management strategies in construction sites was studied. The proper practice and evaluation of safety management can improve the occupational safety in construction site. [1]**.** The study investigate how effective is the safety policy taken by the Australian organisations. A relationship between safety management and safety practices was found out. [11]. This paper aims at exploring current safety practices in the construction industry of Lebanon. The study found out the existence of construction safety law but the safety problems are due to the absence of its enforcement. Even though the laws are maintained the proper practice of these laws in the construction sites are missing. [3] The study examines how the project owners, contractors and sub contractors are related in safety management. They concluded that for proper implementation of safety management in construction sites, the owner, contractor, sub contractors and labours should work together and follow the safety practices. [4]. This study examines the effect of three types of institutional pressure on safety environment in construction [2]. This journal propose that at the planning stage itself the major issues on safety should be erased completely. Early planning of construction processes can be promoted in order to improve safety. [6].This paper explores the importance of workplace risk assessments (WRA). The implementation of WRA is considered strictly in European Union countries. The implementation and practices of WRA were studied in this paper [7]**.**In this paper a multi criteria analysis was done in order to make a mathematical model. It has a hierarchal structure with four phases of lifecycle of buildings. The paper concludes that the implementation of proper health and safety criteria can improve the sustainable value of projects [12]

III. METHODOLOGY

The methodology adopted for this study was identifying real time problems in sites through site visits and also various datas were collected from literatures and safety standards. A clear pictorial representation of the methodology and safety assessments have been shown in Figure 3.1

Figure 3.1 Methodology adopted for this work



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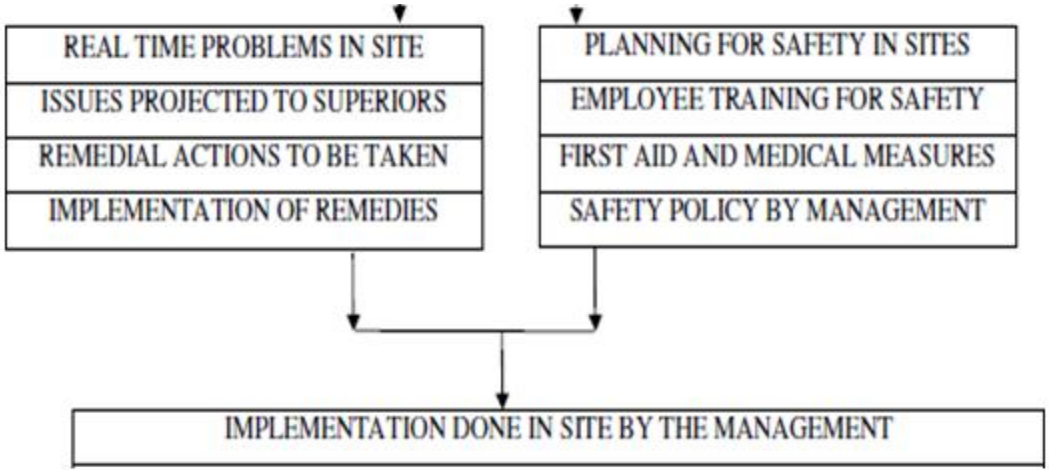

IV. RESULTS AND DISCUSSIONS

A. Major Accidents in Sites and Control Measures

I. Accidents from Scaffoldings

Scaffolding is considered as one of the most dangerous jobs in construction due to the heights involved in it. Accidents can happen to the workers constructing the scaffolds, workers using the scaffolds and any people who may pass by the scaffold. The major reason for occurrence of hazards in scaffolds is its improper erection. Falls from elevation is the most common scaffolding hazard. Injuries related with scaffolds also include chance of being struck with falling objects or debris. Electricity is another major risk in scaffold related works as electrical lines are usually elevated making the scaffold user prone to contact with those electric lines.

CONTROL MEASURES

1. Rigid and strong scaffolds must be ensured and it should withstand its own weight and four times the maximum estimated load without any sway or settlement.
2. Scaffolds should not be supported on concrete blocks, bricks or any other unstable substances.
3. Safety belts and nets should be used for works from heights.
4. Erection, movement and dismantling of scaffolds must be done only under the supervision of a qualified person.
5. A minimum distance of 10 feet must be maintained from electric power lines to prevent electrocution.
6. In regular intervals the scaffolds must be inspected by a competent person.

Slip, Trip and Falls

Slip, trip and falls (STFs) are one of the most considered factors considered in safety manage management. Slip can be defined when there is very little friction between feet and walking surface and the body balance is lost. Whereas, when the upper body continues its movement even after the lower leg or foot hits an obstacle, trip occurs. Falls can be of two types, first is the fall at same level and the next type is fall to a lower level.

CONTROL MEASURES

1. Waste materials should be disposed immediately from the site.
2.Working floor must be maintained clean and dry.
3. Spillage on site should be cleaned immediately.
4. The walkway on the site must be maintained without any materials or obstacles.
5.Debris, concrete, broken blocks or any other obstacle must be cleared off from the site
6.Safety shoes or traction footwear must be used in the construction site.
7.Cables or littering binding wires must be kept 1at proper allotted places in the construction site.

I. Crane Accidents

Cranes are often the largest equipment used in a construction site. Therefore they are highly dangerous too. Mostly crane accidents occur when they are being overused without considering the specifications. If the maximum weight on the crane is exceeded then buckling can be caused or the boom may be collapsed. Another common reason for crane collapse is improper assembling of the crane. A crane must be maintained properly by oiling the crane parts especially the joints in a regular basis. The cranes which goes in contact with the overhead electric lines is another key cause of crane accident which leads to electrocution. Improper inspection of the crane and presence of unskilled crane operators also can lead the cranes to hazardous failures.

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CONTROL MEASURES

1. It should be ensured that the load on the crane is not higher than the maximum carrying capacity of the crane.
2.Chains, wire ropes and hooks must be regularly inspected by competent people.
3.The load should never be moved over a worker.
4.Before using a crane all the controls of the crane must be inspected and ensured to be perfect for proper operation of the crane
5.Overhead electrical transmission wires must be watched to prevent contact of crane with the wires.
6.The crane should never be operated by an unskilled operator and a well efficient person should only operate a crane. This must be ensured by the management.
7.All riggings must be fully checked before using the crane.
8.Assembling of the crane must be done under the supervision of professionals.

II. LADDER ACCIDENTS

Ladder accidents or ladder falls is one of the most concerned safety problems in construction site. Fall from a height more than one meter is more dangerous. Using a wrong ladder can lead to accidents. Ladder accidents occur more when the worker climbs the ladder with his tool in the other hand. The ground on which the ladder is placed should be rigid and the ladder fails when it is placed on an unstable object like brick, blocks etc.

CONTROL MEASURES

1.The correct ladder must be used for the particular work.
2.Defective of damaged ladder should be marked or tagged and must be kept away from the workers in the site.
3.A ladder should never be loaded more than its load carrying capacity.
4.Metallic ladders must be avoided for doing electrical works.
4.Length of the ladder must be ensured to be longer than the climbing height.
5.Workers must be given safety training about the usage of ladders in construction sites.

A. Safety Management Procedure

I.Planning for Safety

Every construction organisation should develop a performance oriented safety programme. A safety management procedure is briefly shown in fig.1.

A document including information about personnel protection equipments (PPE), hazardous substances in site, use of power equipments, safety practices, safety policies, emergency procedures in site, responsibilities of workers etc should be made. This safety document should be made available to all the workers in the construction site.

II.Training for Safety in Sites

Proper training about safety should be provided for workers. It is a major component of safety management. Workers should be made aware about different hazards that can occur in sites and control of those hazards. By this training the workers should be able to handle any emergency situation of safety in sites without panic and also they should understand the relevance of safety practices in sites.

I.Medical Services and First Aids

First aid and medical facilities should be made readily available in sites according to the size of site and number of workers in the site. The employer must be responsible for this and should ensure the availability of medicines and first aids in the sites.

II.Safety Policy by Management

The safety policy of the management is very relevant in maintaining workplace safety. Apart from the safety plans and training programmes, the management must ensure that the workers are following the safety standards in the site. Regular safety inspections must be conducted by the management in the sites.

The basic accident preventive measure outlined by Occupational Safety and Health Administration (OSHA) are:

1.Safety helmets for head protection
2.Hearing aids for ear protection
3.Safety shoes with steel toe for foot protection
4.Safety glasses or goggles for eye protection especially for welding works and in sunlight.
5.Clothes should be worn according to the climatic conditions.
6.Use of high visibility clothing should be ensured especially for works during night shifts.
7.Safety training programmes should be conducted occasionally by the safety department.
8.Medical services and first aids should be ensured in site always.

V. CONCLUSION

It has been identified that safety management is the most important area in a construction work which ensures sound health of the workers in the construction site and also prevents occurrence of different types of hazards and accidents in a construction site. In this research, the

major parameters which are considered in the safety management were discussed. The different stages of safety management have been observed and analysed. Various accidents which are occurring in a construction site were observed and remedies that are to be taken in order to prevent these accidents were sorted out. The study shows that implementation of safety measures is more important than safety planning and training. In order to ensure safety, a safety engineer or officer should always be present at the construction site to inspect the implementation of safety in the sites. The management should make safety equipments mandatory. All the workers should be provided with personnel protection equipments to ensure their own safety. Proper remedies and measures should be taken in every construction site to prevent any chance of occurrence of any kind of accidents.

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