

Health Safety and Risk Management in Residential Building

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Abstract— This project concerns at the construction and the safety management projects. Most construction projects suffer from unnecessary activities on site which indicates the need for improving construction safety, health & risk management. Hence the purpose of this project was to investigate, through site observations, the current health and safety situation on the construction site and to suggest possible solution for improving construction safety. The main focus of this project was on material deliveries and time that craftsmen spend on handling materials. The project concludes that skilled craftsmen are transporting the third part of all incoming interior materials by their selves. Due to poor health and safety planning workers are also doing lots of rework and extra work. The project shows that, by implementing other logistics solutions, it is possible to reduce the costs and also to shorten the time.

Keywords: Risk Management, Health and Safety Management System, minimize, PPE Hazards, OSHA Act 2003, CRB 1997

I. INTRODUCTION

Health and Safety and Risk Management System involve the introduction of processes designed to decrease the incidence of injury and illness in the employer’s operation. Successful implementation of the system requires management commitment to the system, effective allocation of resources,

and a high level of employee participation. The scope and complexity of a Health and Safety Management System will vary according to the size and type of workplace. Implementation of an effective Health and Safety Management System is a proactive way to prevent injuries and illnesses. While it cannot guarantee that incidents will never occur on a work site, an effective Health and Safety Management System will minimize both the number and the severity of workplace incidents, and will help eliminate and duty of care in the event that an incident does occur.

II. SAFETY MANAGEMENT IN CONSTRUCTION INDUSTRY

Safety management is a professional discipline applied to construction planning, design, and process. Professional construction managers (CMs) address the needs of owners by providing management services and expertise tailored to the project, independent of the chosen contract format or project delivery method. CMs apply comprehensive project controls to help manage the critical issues of time, cost, scope, quality, and safety. They can help improve worker safety by integrating safety and health into all aspects of the construction process, from the design phase to jobsite management. Hazards in construction management are addressed in specific standards for the construction industry.

Summary of areas of health and safety hazards and its consequences on construction sites:

Sr. No.	Type of health and safety hazards	Hazards Consequence	Possible source of health and safety hazard consequences
1.	Working at a height	Falling from height	Carelessness of the workers (reluctant to use safety belts) Improperly fixed scaffolding Not using PPE (not supplied by management or supplied but workers not wearing it) Collapse of the formwork Unprotected Edge Ignorance of workers about of risk Weather, exposed too much to the sun for a long time.
2.	Falling object, poor housekeeping	Hit by falling object Trip and fall	Overcrowded sites, Confined sites, Unprotected feet (safety shoes) Culture and ignorance (most workers have very low education level) Unreliable income (willing to risk no matter what) lighting might be a problem, sometimes car lights have been used to light up the sites)
3.	Manual handling	Muscles pain, back pain	Manual handling Working for long time, twisting, bending Crowded sites for movement/equipment Carrying heavy loads.
4.	Equipment/Plant/Tools	Crushed/hit/cut by object such as equipment, car, working tools and plants	Wrong operating attitude of the users, improper maintenance.
5.	Chemicals	Health problems such as headaches, eye irritation, dizziness, faintness, sleepiness and affect judgment and coordination	Material specification, cement and paints, fumigation pesticide, timber treatment chemicals.
6.	Dust	Health problem such as respiratory disease	Present on sites where demolition, excavation, concrete mixing takes. Plastered walls scored ready for painting.

7.	Noises	Health problem such as hearing loss.	Equipment noise, activity noise such as excavation, drilling, welding, piling, roofing. Most of the workers (concreting) Grinding, cutting, mixing concrete, piling and workers noise workers (concreting).
8.	Bending and twisting	masculo-skeleto disorder	Manual handling.
9.	Fire	Injuries due to fire	Poor housekeeping.
10.	Bullying, Stress	Health problems due to stress and bullying	Stress works, management, working time, pressure from the work.

A. Finding from Site: [Mulund Construction Site]:

This chapter presents the results of the data collected from MULUND construction site in Mumbai. The results focused on the process of health and safety risk assessment and communication at the MULUND construction site, and how legal factors, organization factors, individual factors and the work environment influence the process. Since there are a number of health and safety risks on construction sites, the results focused on only major hazards, working at height and manual handling. The case study findings will be discussed in relation to each case, specifically focusing on the following sub-headings:

- Brief description of the project
- Key project actors and site organization
- Legal system for health and safety risk assessment, communication and control
- Organizational factors concerning health and safety risk assessment, communication and control
- Individuals role in risk assessment, communication and control at the sites
- Work environment factors concerning risk assessment, communication and control site observation and documentary sources on health and safety risk assessment and communication are reported alongside each other.



Fig. 1: Mulund construction site

B. Actors Involved in the Construction Project Level and Site Organization:

The project has different actors, who include the client, architect, structural engineer, Quantity surveyor, contractor and sub-contractors (plumbing, electrical, Air conditioning and lift). All sub-contractors had a contract with the contractor and the contractual relationship is shown below.

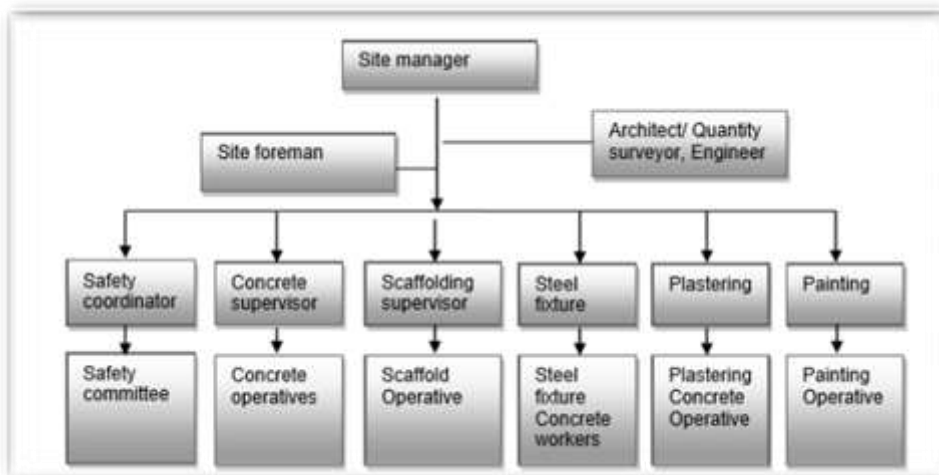


Fig. 2: Mulund construction site organizational structure.

Figure. 2 Shows that site management is made up of the site manager, gang supervisors and the site foreman. The nature of the site’s organization seems to be a vertical hierarchy and the site manager is responsible for economic and work environment issues. Communication of the site manager with workers is through gang supervisors and the safety committee.

C. Health and safety Regulations and Provisions:

There are many legal institutions regulating the construction industry in Mumbai, some of which have a more direct working relationship at the constitutional level. The first institution is the Occupational Health and Safety Authority (OSHA) under the Ministry of Labour and

Employment Relations and the second is the Contractors Registration Board (CRB) under the Ministry of Infrastructure. OSHA is the custodian of all health and safety management matter in all workplaces under OSHA Act 2003, and CRB oversees all activities performed by contractors in Mumbai under CRB Act 1997 then act 2010. Key informants from these two institutions were interviewed with a view to obtaining their opinions on health and safety risk assessment and communication at construction sites.

These key informers are inspectors who inspect construction sites. The semi-structured interview was used and supplemented by some questions during explanation. Furthermore, OSHA Act 2003 and CRB Act 1997 were reviewed to arrive at a good understanding of their provisions. These two acts were used by the researcher to guide the interview. The main issues discussed under legal factors include the existing regulations, the roles and responsibilities of institutions and their challenges concerning health and safety risk management.

D. The Roles and Responsibilities of Institutions concerning Health and Safety at Construction sites:

The interview revealed that the main tasks of the two institutions are to make sure that regulations are complied with at workplaces, including construction sites. They monitor compliance through regular inspections of the sites and they proactively promote workplace health and safety through workshops and seminars. They also provide occupational health and safety information, as well as registering workplaces, examining the occupational health of workers, offering advice on ergonomics and scrutinizing workplace drawings. The institutions also issue guidelines, regulations and standards on occupational health and safety to enhance implementation.

E. Influence on Health and Safety Risk Assessment and Communication Process:

It was noted that the OSHA and CRB Acts have identified some health and safety hazards and control measures at construction sites. Working at a height is the one of the major hazard and some control measures have been provided by the regulations, such as wearing full PPE, scaffolding being erected by a competent person, and edges, holes, lift shafts and wall edges should be barricaded to prevent falls. Furthermore, the regulations emphasize the importance of the contractor having a competent person familiar with health and safety issues who can foresee all risk, implement control measures and communicate with employees on health and safety risks and control measures. The regulation (OSHA act 2003) requires all employers to have in place an effective Health and Safety policy, to appoint health and safety officers and health and safety representatives at workplaces with more than 20 employees and to establish health and safety committees where there are more than 50 employees.

F. Inspectors' Views on Why Accidents Happen and what was the Cause:

Regarding why accidents happen on construction sites regardless of the control measures, this question was asked

in line with the investigation report on the four accidents that happened at Mulund construction site. The interview revealed that the accidents were falls from a height, being injured by equipment and fire. However, falling from a height was the leading accident, accounting for two out of the four. The accidents were the fault of both the site management and individual workers.

G. The Way to Improve Health and Risk Assessment and Communication on Construction Sites:

To improve the situation of health and safety risks on construction sites, inspectors stated that a campaign is needed as most contractors, workers and consultants are ignorant of health and safety regulations. OSHA and CRB also have several programs aimed at educating contractors, workers, clients and the general public through workshops, short courses, TV and radio programs and newspapers on safety observation, to prevent the occurrence of diseases and accidents, and to make sure all people on construction sites, visitors and passers-by are protected.

H. Company System for Risk Assessment and Communication:

Concerning whether the company has a specific method or software for risk assessment and communication on construction sites, it was revealed that it does not. However, responsibility for health and safety risk assessment and communication is given to the site manager, who is assisted by the safety coordinator and safety committee. It was noted that consideration of the health and safety aspect had been given at the time of the employment of the site manager. Thus site managers must have good construction experience and educational background as well as health and safety knowledge. Furthermore, in addition to construction experience safety committee members were required to have attended a health and safety training course. Sometimes the company sends some of the experienced workers for health and safety training, after which they become safety committee member on the sites.

I. Hazards Identification, Risk Estimation and Risk evaluation at Mulund site:

Concerning how they identify hazards at the site, it was revealed that the safety team goes around the site every time to see if there are potential hazards that could cause accidents of falling and to put in place control measures. Those hazards include open holes and edges, and any obstacle on the routes. After a hazard has been identified, they have to barricade it as the control measure. The knowledge they got from the health and safety training helps them do this. Figures show some hazards which can cause accidents and the control measure implemented.



Fig. 3: Falling hazard which has been barricaded



Fig. 4: Falling hazard on the stair edges which has been barricaded

III. RISK ASSESSMENT AT MULUND SITE:

Concerning communicating risks to workers, it was revealed that the main health and safety communication method is the toolbox meeting. Workers normally have a toolbox meeting every day to deal with logistics issues before they start work in the morning, but health and safety matters are discussed three days a week. Apart from toolbox meetings, posters, signs and symbols were also used by the safety team to

communicate health and safety issues at the site. It was observed that a lot of information and instructions have been posted on wallboards of routes and offices at the construction sites. Some examples of instructions were simple and practically written in easily readable letters and with eye-catching colors, urging the personnel to use PPE. Apart from communication with workers at the toolbox meetings, the safety committee team has monthly safety meetings with the site management where they discuss all health and safety issues, the challenges and how they can resolve them. The safety team is also required to keep all documents concerning health and safety risks and to present any required documents to the inspectors or employers. Some of the documents include the accidents register book, in which they register all accidents and incidents that happen on the sites. The registration is on daily basis which they have to submit to the regulatory boards monthly. In the case of accident, they have to report it immediately to site manager and to OSHA.

IV. RISK CONTROL MEASURE:

Regarding the health and safety control process, emphasis is placed on workers wearing PPE and having edges barricaded. After communicating with workers in the toolbox meeting, the safety team goes around the sites to check for potential hazards, whether workers are wearing PPE and to make sure that tasks are done in a safe manner. As the safety team is aware that falling from a height has different causes, such as unprotected edges, scaffolding not well erected and non-use of the safety harness, it has to make sure all scaffolding is properly erected and well protected and it must be tested before any worker climbs on it. From the observation and interview, it was revealed that special attention has been given to the scaffolding workers as they are at great risk of falling. One of the safety team members is working full time with the scaffolding team. Furthermore, the issue of employment of the scaffolding team members was also important. They make sure that workers in the scaffolding team are well physically fit and are of a specific age (between ages 25 to 35).



Fig. 5: Warning tape for an open hole.



Fig. 6: Use of PPE



Fig. 7: Use of Posters



Fig. 8: Proper Helmet and safety jacket



Fig. 9: Use of Safety Nets



Fig. 10: On-site Sanitary Conditions

V. CONCLUSION

The results indicate that the location and site size of MULUND site was good enough and most of the activities took place during the day. Meanwhile risk was assessed based on experiences, educational background and existing regulations. Health and safety committee were main player of communication risk to the workers assisted by site managers. The main risk control was on using PPE and engineering control such as isolation of the hazards. Through observation it was revealed that workers were subjected less on manual handling with many mechanical aids were used.

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