

IMPROVING SAFETY MANAGEMENT SYSTEM BY IMPLEMENTING EFFECTIVE SAFETY SYSTEM IN CONSTRUCTION SITE

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Abstract: Risk management is a concept which promote as safety practice in the work place. Many companies often establish a risk management procedure in their projects for improving the performance and increase the profits. Inadequate or the lack of occupational health and safety not only negatively affects the traditional construction project parameters of cost, quality and schedule, but the sustainability of the environment. Occupational fatalities, injuries and disease constitute defects as they are not project requirements. They also contribute to the cost of construction and development as workers' compensation insurance is included as a labour overhead and the cost of accidents is integrated into the cost structure of contractors. Health and safety at construction sites deals with both physical and psychological well-being of workers on construction sites and other persons whose health is likely to be adversely affected by construction activities. It is of primary concern to employers, employees, governments and project participants. Health and safety therefore is an economic as well as humanitarian concern that requires proper management control. Projects undertaken in the construction sector are widely complex and have often significant budgets, and thus reducing risks associated should be a priority for company. This master thesis presents an application of risk management in the early stage of a project life cycle of a construction project. Undertaking survey of safety aspects used in construction site and identify the lack of risk and safety management system to improve them and analysis the result with newly implemented hierarchy of risk control system.

Keywords: safety practice, improving the performance, management control.

1.INTRODUCTION

Inadequate or the lack of occupational health and safety not only negatively affects the traditional construction project parameters of cost, quality and schedule, but the sustainability of the environment. Occupational fatalities, injuries and disease constitute defects as they are not project requirements. Occupational fatalities, injuries and disease result in considerable human suffering and affect not only the workers directly involved, but their families and communities and contribute to the national cost of medical care and rehabilitation. However, occupational disease, fatalities and injuries also contribute to variability of resource which increases project risk. This risk is manifested in increased cost of construction, damage to the environment, non-conformance to quality standards and schedule overruns. Another aspect is that of contractor and client image which is negatively affected by accidents.

2. LITERATURE SURVEY

Based on the findings of both the literature and descriptive surveys, the following conclusions are drawn. The level of construction fatalities and injuries in South Africa in construction is unacceptable, and a partnering approach is likely to have a positive effect due to the holistic effort of all project stakeholders, project managers included. Health and safety complements cost, environment, productivity, quality, schedule and customer satisfaction.

Health and safety reduces variability and consequently project risk. Health and safety should be both an organizational and project value, as opposed to a priority, as priorities may change. Various processes, strategies, systems and practices, such as suitable procurement systems, constructability management, pre-qualification, partnering, and TQM complement health and safety. PMs are in a unique position as they influence health and safety both directly in their

capacity as project leaders and coordinators, and also indirectly through design, detail and specifications. PMs currently contribute to health and safety, which contribution can be used as a foundation for increased consideration.

International research indicates that internal health and safety organizations (HSO) and health and safety committees (HSC) do not have the intended impact on companies' safety performance. The aim of this case study at an industrial plant was to test whether the HSO can improve company safety culture by creating more and better safety-related interactions both within the HSO and between HSO members and the shop-floor. Methods: A quasi-experimental single case study design based on action research with both quantitative and qualitative measures was used.

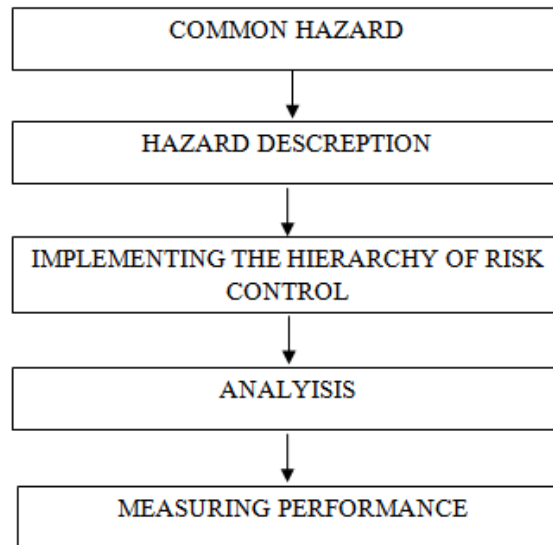
Intervention: Based on baseline mapping of safety culture and the efficiency of the HSO three developmental processes were started aimed at the HSC, the whole HSO, and the safety representatives, respectively. Results: Results at follow-up indicated a marked improvement in HSO performance, interaction patterns concerning safety, safety culture indicators, and a changed trend in injury rates. These improvements are interpreted as cultural change because an organizational double-loop learning process leading to modification of the basic assumptions could be identified. Practical applications: The study provides evidence that the HSO can improve company safety culture by focusing on safety-related interactions.

The current project adds to the safety literature, not only in providing a rare case study on safety culture intervention, but also by showing some evidence for the link between leadership, safety climate, and culture. The study shows that the HSO can improve company safety culture by creating more and better safety-related interactions both within the HSO and between HSO members and the shop-floor. Results indicated a marked improvement in HSO performance, interaction patterns concerning safety, safety culture indicators, and a changed trend in injury rates.

These improvements are interpreted as cultural change because an organizational double-loop learning process leading to modification of the basic assumptions could be identified. However, due to the single case design of the study it is not possible to infer causality.

3. HAZARD AND CONSEQUENCES IN WORKPLACE

- Workers should familiarize themselves with all potential fall hazards on a job site. Never work in an area where fall protection systems have yet to be installed. Workers using personal fall arrest systems should inspect them before each use to ensure they are working properly and are free of damage
- Hard hats should be worn when working on, under or around a scaffold. Workers should also wear sturdy, non-skid work boots and use tool lanyards when working on scaffolds to prevent slips and falls and to protect workers below. Workers should never work on scaffolding covered in ice, water or mud.
- Always maintain three points of contact while ascending and descending a ladder, that's both feet and at least one hand. Portable ladders should be long enough to be placed at a stable angle extend three feet above the work surface.
- Workers should be able to recognize the hazards of falling and know the procedures to follow to minimize hazards and prevent falls.
- When wearing eye and face protection, workers should make sure that they don't interfere with their movements and fit snugly on their faces. Eye and face protection should be kept clean and in good repair. Workers should inspect face and eye protection before use to ensure it is free of cracks, chips and other damage.
- Workers are required to wear head protection wherever there is the potential for being struck in the head, which is basically the entire time you are on the construction site.
- Workers should be able to read and use Material Safety Data Sheets (MSDS) for any hazardous chemical being used at the construction site. Employees should wear proper PPE when handling hazardous chemicals and should clean up any spill when they occur.
- The key takeaway from this standard for workers is that they should know that there are protections in place for their safety while working on the construction site.

4.METHODOLOGY**Figure.3.1 Methodology**

1. Hazard Involved In Workplaces
2. Excavation Hazards
3. Shuttering Hazards
 - 4Falls
 - Materials handling
 - Struck against
 - Struck by
 - Electrical contact
 - Collapses
 - Health hazards
 - Environmental conditions
 - Dust and concrete
 - Access equipment
4. Concrete Work
- 5.Height Work Hazards - Scaffolding Hazards
 - A)Accident hazards
 - B) Physical hazards
 - C) Chemical hazards
6. Height Work Hazards -Ladder Hazards
7. Demolition
8. Hot Work Hazards
9. Electrical Hazards
10. Manual Handling Hazards

4.1 Health and Safety Measures In Construction

- Site Layout and Planning
- Personal Protective Clothing (PPE)
- First aid Kits and Accident Reporting
- Health and Safety Warning Signs
- Health and Safety Training in Construction Sites

4.2 Pre-Work Planning A health & safety plan

- An OH&S policy displayed
- An accident report book
- Induction training records

- Workplace inspection records
- Documented safe working procedures or method statements
- Protective clothing & equipment records
- Health & safety system manual
- Health and safety representatives appointed including management safety representative
- Contract-specific risk assessment conducted
- Emergency procedures and necessary training records

For small worksites or construction projects, look for the dangers on site (not as a substitute for a full risk assessment) and take the following preventive actions:

- Ensure that dangerous substances on site are being properly stored and used
- Provide and ensure that all persons on site wear proper personal protection equipment
- Identify ways that a risk can be controlled without using personal protective equipment (PPE)
- Ensure that workers are using the right and fit PPE for the job. 54
- Check all plant, machinery and equipment (including PPE) are marked and correctly labeled, e.g

Working Load

- Fence the site against unauthorized entry
- Take measures to prevent objects from falling from height and to take measures to protect members of the public (such as persons passing by the site)
- Provide and keep safe egress and access to the place of work, such as access to scaffolding
- Put up appropriate signs including traffic routes, authorized personnel only etc.
- Provide sufficient welfare and first aid facilities
- Provide adequate fire precautions such as fire extinguishers, escape routes
- Ensure that existing power lines (buried or overhead) are identified and associated safe systems of work in place
- Take necessary precautions to ensure that electrical systems are well maintained in a safe condition
- Ensure that vehicles and people are kept apart, especially slewing vehicles, with traffic routes maintained in a safe condition
- Ensure that hoists and lifting appliances are properly installed and checked by competent persons
- Ensure that scaffolds are erected, altered and dismantled by competent people only
- Take measures to stop workers from falling and ensure fall protection
- Take all measures to reduce exposure to noise and vibration
- Ensure that holes are protected, with clear marking and fixed covers to prevent falls.

5.IMPROVEMENTS IN HEALTH AND SAFETY

5.1Employeeinvolvement/Influence

- Employees are involved in the process of creating safe work instructions. 55
- Employees can influence STOP work criteria.
- Employees are involved in devising solutions to incidents that resulted from human error.
- Employees are involved in performing safety observations of other employees.
- Employees are involved in conducting accident investigations.
- Employees are involved in the hiring for safety of their peers.

5.2 Pre and Post Task Safety Reviews

- How often are pre-task safety reviews done (i.e. planning and reviewing the safety considerations of the task)?
- When pre-task safety reviews are done, a review of critical steps is conducted.
- When pre-task safety reviews are done, error likely steps/situations are addressed.
- When pre-task safety reviews are done, the worst thing that could happen is discussed.
- When pre-task safety reviews are done, special safe work procedures including PPE is discussed. When pre-task safety reviews are done, energy sources requiring isolation are addressed.
- When pre-task safety reviews are done, STOP work criteria are discussed.
- After finishing a task, employees participate in reviewing the safety aspects of their task.

5.3 Safe Work Procedures

- Percent of routine tasks that safe work procedures have been developed for.
- Percent of high risk jobs for which hazard analyses have been completed.
- Hazard analyses previously performed are thorough and robust.
- Safe work safe work procedures are reviewed and updated when necessary.
- Safety “lessons learned” are considered when reviewing and updating safe work procedures.
- Safe work procedures contain a warning about the potential consequences of deviation.

5.4 Hiring For Safety

- The safety values and beliefs of this organization are discussed in the interviews with potential employees.
- Only the best people are hired to work in this organization.
- Number of interviews a job applicant goes through prior to a job offer.
- Job applicants go through background checks.
- Job applicants have to pass a physical stating that they can physically do the job.
- Job applicants undergo a drug test prior to being hired.

5.5 Cooperation Facilitation

- Employees are encouraged to cooperate with each other on resolving safety issues.
- Formal communication mechanisms among co-workers are robust enough to ensure that information being shared covers all necessary safety information.
- Formal mechanisms are utilized to ensure that key safety information is communicated between off-going and on-coming shifts.

5.6 Safety Training

- Employees are formally trained on the safety aspects of their job.
- Number of hours of formal safety training.
- Throughout the course of the year, how often employees are formally trained on the safety aspects of their job. (seven point scale, Never to Always).
- Employee safety training incorporates elements of hazard recognition and avoidance.

5.7 Communication And Information Sharing

- Employees are informed of new or revised safety rules and safe work instructions. 58
- Employees are informed about potential hazards in the workplace or their tasks.
- Information about the importance of working safely is communicated to employees (e.g., print media, posters, and payroll staffers).
- Employees are informed about safety incidents experienced in other similar organizations.
- Employees are informed about safety incidents and/or near misses experienced by other employees.
- When safety incidents do occur, the results of the investigation are shared among the workforce.

5.8 Accident Investigation

- Incident investigations seek to uncover potential reasons why human error might have contributed to the incident.
- How soon accidents are investigated.
- Accident investigations are conducted by a team of individuals consisting of employee representative(s), a safety representative, and the injured employee's immediate supervisor.

5.9 Detection and Monitoring

- Safety checklists have been developed corresponding to possible workplace hazardous conditions.
- Safety checklists have been developed which correspond to possible workplace at risk behaviors.
- Safety observations target behaviors that deviate from safe work instructions.
- Safe work instruction deviations result in negative consequences for employees.
- Deviations from safe work instructions are tracked and monitored.

5.10 Safe Task Assignment (Task-Employee Matching)

- Supervisors Are Provided with the flexibility to assign the right employee to the task. 59
- When flexibility is allowed, past experience with the task is considered.
- When flexibility is allowed, the physical demands of the task are considered.
- When flexibility is allowed, the risk of fatigue or extended work hours is considered.
- When flexibility is allowed, the risk associated with stress or distraction is considered.

6. RECOMMENDATIONS

Employers and contractors should provide suitable programs that are consistent with national Laws and Regulations to ensure the health and safety of workers. This includes maintaining a workplace that has minimal risks and accidents that can result in injury or death. They should also ensure that a competent person inspects the construction project at suitable intervals to ensure safety guidelines are adhered to.

Employers must make an assessment of the health and safety risks to which employees and others are exposed on construction sites. The significant findings must be recorded where five or more people are employed. Since managing health and safety is different from managing any other aspect in construction there need to do a risk assessment to find out about the risks, and to put sensible measures in place to control them, and make sure they stay controlled.

Contractors must keep accident registers at sites, and make record of all kind of accidents from minor bruises

to major and fatal accidents, and submit reports to Directorate of Occupational Health and safety services. All employees must be given health and safety induction training when they start work, which should cover basics such as first aid and fire safety. Training must also be provided if risks change, and refresher training when skills are not frequently used.

Contractors should make provision for safety and health when preparing bids. The provision for safety and health must be made competitive with the aim to compete with other bidders and to avoid a monetary loss. Costs for Personal Protective Equipment's measures should be explored and explicitly be part of tendering and costing for the project implementation.

Site supervisory staff should be sensitized with Occupational Health and Safety and should share that knowledge with co-workers.

Workers at a construction site have a right to proper information regarding their safety before commencement of a project. This information should be presented in a language that they understand.

Workers must wear their personal protective equipment properly and as directed by their employer or comply by the person in control of the site. They should take care of the equipment, not misuse them and report any defects and problems to the supervisors.

Massive education campaigns be launched to arouse awareness among all parties with direct or indirect bearing on accidents occurrence and their prevention. The Directorate of Occupational Health and Safety services should incorporate an information and education wing in which a data bank of educative materials on health and safety measures can be kept and practical methods of disseminating them to relevant parties developed. The Directorate of Occupational Health and Safety services must ensure that the construction sites are inspected regularly for health safety as provided in OSHA.

In order to enhance the role of management in health and safety the existing legislation should be amended to put more emphasis on role of management. Provisions should be made to make it a statutory duty for every contractor to have a safety management program on site. Contractors should be compelled to draw up safety responsibilities and authority structure which should be available in every site to inform all parties as to their responsibilities as far as health and safety is concerned.

7. RESULT AND DISCUSSION

Occupational fatalities, injuries and disease constitute defects as they are not project requirements. In fact, completing an activity without injury or disease constitutes successful completion. As health and safety also complements the successful completion of a project which includes completion on schedule, within budget, to quality requirements without damaging the environment and without incurring disease, fatalities or injuries, it is an indispensable parameter.

The performance standard for health and safety is 'zero injuries' as with 'zero defect' for quality. The system for health and safety and quality is prevention, as medical care, rehabilitation, pensions payable in the case of fatalities, and rework, all result in increased cost of resources. The system of measurement for quality is the cost of non-conformance (CONC), the cost of doing things wrong, and for health and safety, the cost of accidents.

Inadequate or the lack of occupational health and safety increases project risk, and negatively affects cost, productivity, quality, schedule, the environment, and client satisfaction; procurement systems, project duration, design, detail and specification influence occupational health and safety, and project managers influence occupational health and safety during all phases of a construction project.

Increasing worldwide concern for healthy and safe workplaces and work processes amplifies the need for the inclusion of occupational health and safety and the environment as best practice criteria benchmarked against, among others, zero injuries, disease and defects, and ultimately client satisfaction.

Occupational fatalities, injuries and disease result in considerable human suffering and affect not only the workers directly involved, but their families and communities and contribute to the national cost of medical care and rehabilitation.

CONCLUSION

Many construction company has no proper safety management system. Inadequate safety causes health related issues to the workers and economically high risk to the organization. This construction site have adopted Safety systems, but due to non-implementing the same, the system is ineffective. Initially discuss with management about health and safety management system and non-compliance in current safety systems and procedures which includes, inadequate training and motivation for both supervisors and labours, lack of awareness about hazard, risk, property damage, time loss, indirect cost, etc.

Finding the alternative training methods instead of existing method and implemented in construction site. All staffs and



labours were trained by classroom training and mock drill training at the site and they should be educated about the importance of safety systems, which is a life protector and also safe guards the economic status of the firm. After the creating awareness about the importance of safety to workers, possible alternative work procedure, training, and to employ a Safety person to implement, to monitor and update the Safety culture at site.

Implementing the alternative training methods instead of existing method in the construction site and to give motivation to staff and workers will also improve the safety culture.

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