
A REVIEW OF RISK AND HAZARDS IDENTIFICATION AND ASSESSMENT IN MODERN CONSTRUCTION

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ABSTRACT

The research paper review risk and hazard identification and assessment in modern construction with the aim of examining ways risk and hazard can be managed in modern construction. The team carrying out risk and hazard evaluation must be able to recognize potential sources of hazards that workers may be exposed to, document it and rank the hazards in order of priority, those hazards with the highest potential to cause an injury, illness or death are to be addressed first and where a hazard cannot be assessed, administrative changes can often be used to reduce the amount of exposure a worker has to the danger. Therefore, risk and hazard identification and assessment on construction sites cannot be over emphasized, it is a good step to achieving environmental friendly construction site. Supervisors should make sure that control measures are put in place to abate any identified risk and hazards, disciplinary measures on abuse of risk control measures should be established for workers, supervisors and contractors by the relevant professional body.

Keywords: Hazard control; Worksite inspection; Hazard evaluation; Risk assessment matrix; Potential exposure route.

INTRODUCTION

Identification of hazards at a work site is one of the most complex and time consuming parts of a health and safety management system and one of the most important step (Torner, 2009). During this phase of health and safety system, all equipment, machineries, work processes and procedures should be carefully evaluated. The team carrying out this evaluation must be able to recognize potential sources of hazards that workers may be exposed to, the knowledge and involvement of a well-trained health and safety committee will also assist in this process. When each hazard is identified, document it and rank the hazards in order of priority, those hazards with the highest potential to cause an injury, illness or death are to be addressed first (Torner, 2009). Look at every situation and ask "What harm could this do to a worker?" "How is the workers protected from the harm?" "Can the hazard be removed?" "Can the workers exposure be reduced or eliminated?" workers must be involved during this evaluation as they often have answers to these questions (Hofman & Stetzer, 1998). Information from this part of the programme forms an essential part of workers training and can be used as hazard control measures of health and safety management system. A list of hazards identified in this step also forms the basis of an inspection checklist to be used during the work site inspection.

AIM AND OBJECTIVES OF THE STUDY

The aim of this research is to review ways risk and hazards can be managed in modern construction.

Based on the aim of the study, the specific objectives are as follows:

- i. To develop the steps involved in hazards and risk identification and assessment.
- ii. To examine how risk and hazard can be control on construction sites.
- iii. To identify risk and hazard potential exposure routes.

Risk and Hazard Identification Procedure

According to Ihenketu (2014), these are seven steps involved in risk and hazard identification:

Step one: put together a hazard identification team, two or more employees who are experienced enough to know where to look, what to look at and how to identify potential hazards. Brief the team on what is expected of them. The team should develop an inventory of every workers and ask questions to identify where the greatest risk of harm exist in each area.

Step two: all of the hazards including those that have a current control mechanism in place must be identified in order to ensure that physical, ergonomic risks, exposure to chemicals, noise, heat, working alone are addressed.

Step three: the team should make notes regarding the hazards and potential harmful situations they find in a clear, systematic format. To evaluate the risk, look at these three factors:

- i. Consequences; if the hazard is not controlled. Determine how severe the loss could be.
- ii. Probability of an accident occurring. How dangerous is this task?
- iii. Frequency of exposure to the hazard. How often is this task performed? How difficult is this task to complete?

Step four: using information from the team's evaluation, rank each hazard in order of priority. The more likely workers are to be exposed to the hazard and/ or more severe the consequences of exposure, the more important it is to act quickly to control the hazard.

Step five: involved the workers wherever possible in this process through health and safety committee meeting, general meetings, safety representatives, project and pre-job planning.

Step six: this element is very critical to the success of your programme. Make sure that the team leaders are trained in the process. Training in hazard identification and assessment is available from certifying partners and other training agencies.

Step seven: set up a system to re-evaluate hazards whenever there are changes to the operation or work being done and should be review annually.

Systematically evaluate the risks from identified hazards against accepted screening criteria, taking into account the likelihood of occurrence and the severity of any consequences to employees, asset, the environment and the public. These include the risks associated with deviation from limits set for environmental and occupational health hazards.

Hazard Control

The next phase in developing a health and safety management system is to ensure that control measures are in place to eliminate or reduce the risk of harm to workers (Torner, 2009). This is considered the best method since it involves the removal or engineering out of hazards. Examples of hazard control measures include:

- i. Build a cat walk with handrails and a permanent access ladder for maintenance procedures in hazardous areas instead of using a portable ladder.
- ii. Enclose a piece of loud equipment to reduce noise exposure to workers.
- iii. Install local exhaust ventilation
- iv. Change a process that involves a harmful chemical to one where a less hazardous product is used.

Where a hazard cannot be assessed, administrative changes can often be used to reduce the amount of exposure a worker has to the danger. Examples of such administrative changes are; changes in work practice and procedure, changes in purchasing decisions, job rotation, development of safe work practice and procedures for hazardous work (Illodiuba, 2011). As a last resort, workers are provided with personal protective equipments (PPE) to lessen the potential harmful effects of exposure to a known hazard. Examples of such protective equipments are; safety glasses to protect the eye from flying debris, hard hats (helmets), to protect the head from falling objects, safety boots to reduce the risk of injury to feet, respiratory protective equipment to protect the lungs against harmful dust and chemical vapours. Workers must be formally trained in the care, use and maintenance of the protective equipments. Whatever method of control is used, it is necessary to have an ongoing system to check the effectiveness of the method. Hazards on construction site can be controlled as follows:

Step one: use the information obtained in the hazard identification and assessment to determine which hazards are already effectively under control. Make note of these hazards to see if they can be eliminated in the future through some form of engineering method. Address the high priority hazard first and develop a plan of action to eliminate or control the hazards that pose the greatest harm to workers.

Step two: involve worker in the development, review and implementation of control measures. This can be accomplished through health and safety meetings, health and safety committee, team or safety representatives.

Step three: provide training for workers on the safe work practice and procedures or other control methods. Check that the control measures are been used properly. Include the use care of personal protective equipments where required. Pay special attention to any health and safety hazards that have been identified and cannot be readily controlled. Ensure that only well-trained and experienced workers are assigned to these areas for example, using dangerous chemical and working in a confined spaces.

Step four: develop a system for maintaining equipment and preventing use of damaged or defective tools or machinery.

Step five: ensure that employees and others are trained in the use of control methods. For example, turning the ventilation system on before welding air moving equipments in confined spaces, guards are properly installed on machinery, safe work procedures and practices are followed and that PPE are used appropriately.

Step six: make sure that PPE appropriate to hazard is available. Employees should be trained in use, care, and maintenance of the PPE. Make sure that employees are wearing the proper PPE on a regular basis whether hazards are present or not.

Ongoing Worksite Inspection

One of the important parts of health and safety programme is to make sure that hazard control measure continue to be effective. A system of inspection both formal and informal will make looking or assessing hazards a normal part of everyday work (Torner, 2009). Managers are usually responsible for making sure regular inspection tours are completed and that actions are taken to correct problems found. Inspection tours are usually done as a team, which will vary in size depending on the size and nature of the work site. It is important to talk with workers in order to get input on the hazard associated with their jobs. If there is a health and safety committee on site, their involvement will be useful. Workers training is an essential phase of the health and safety programme, workers need to know how to do their work safely and without risk to their health. They must understand that the company considers health and safety to be an important part of the work process. Well trained and competent workers not only perform their work safely but are more productive. Doing the job safely means doing it right (Illodiuba, 2011). If the work been carried out is accessed and evaluated to be dangerous, the employer must make sure that workers involved are competent or under direct supervision of competent workers (Albert Occupational Health and Safety Legislation, n.d.). New workers orientation and training is important since new workers generally experience the highest rate of injuries usually within the first six weeks of employment (Williamson & Feyer, 2007). New workers orientation should be completed within the first week of the job. A knowledgeable qualify workers should conduct the workers orientation training. In some cases,

special training is required on first aid, defensive driving, transportation of dangerous goods, fork-lift during heavy equipment operation. Record showing the training given to whom and by who should be accurately maintained.

Hazard Evaluation and Control Measures

In 2009, Torner carried out an investigation on some contaminants that may be present in a particular soil at a higher concentration. Some of this contaminants are; metal (lead), carcinogenic polycyclic aromatic hydrocarbons, diesel-range, or motor oil range petroleum hydrocarbon. Based on the underground water investigation, 4-methylphenol may be present in ground water in project vicinity. Arsenic, bis (2-ethylhexyl) phthalate and ammonia have been detected in groundwater used for construction purpose and hydrogen sulphide may also be present at the site. These chemicals may have potential toxic effect on human if chronic exposure occurs. This type of planned work activities and use of monitoring procedures and protective measures will further limit potential exposures at the site.

The Risk Assessment Matrix

Risk assessment matrix is a tool that standardizes qualitative risk assessment and facilitates the categorization of all threats to health, safety, environmental and reputation. A scale of consequences from 0-50 is used to indicate increasing severity (Adigo, 2010). The consequences are those of credible scenarios that can be developed from the release of hazards. The potential consequences rather than the actual one are used. These are defined as the consequences that could have resulted from the released hazard if circumstances have been less favourable. The probability on the horizontal axis is estimated on the basis of historical evidence or experience that the identified consequences have materialized within the industry, the company or a smaller unit. The consequences of the release of hazard are identified in each of the four categories (harm to people, asset damages, environmental effects and potential impact on the reputation of the company) by selecting an appropriate row description on the vertical axis of the matrix (Gigloiti & Jason, 1984). The assessment based on the experience and is indicative of the likelihood of undesired consequences materializing. No matter how unlikely their occurrence may be, objective setting is at the heart of health and safety environmental management system, and the risk assessment matrix is a useful tool that can help management in the interpretation of risk and also helps in understanding how these policies and objectives are to be regarded in their day to day operations. Construction companies should consider using risk assessment matrix as a part of its implementation of health and safety environmental management system, and health and safety environmental cases. The important of risk assessment matrix are as follows:

- i. Assist in making the construction sites policies and standards and other construction company health and safety policies relevant to day to day operations via the setting of clear risk based objectives that can be cascaded into the setting of individual tasks and targets.
- ii. Provided the basis for the implementation of risk-based health and safety management system in accordance with construction sites guidelines.

Potential Exposure Routes

1. Inhalation: inhalation of dust generated during soil excavation and material handling activities could be an issue if the weather is dry, windy, or warm. Exposure via this route could potentially occur if chemicals are present in the soil been excavated and dust particles becomes airborne during site activities.

2. Skin contact: exposure via dermal contact occur if contaminated soil or ground water contacts the skin or clothing. Protective clothing and decontamination activities specified in the plan will minimize the potential for skin contact with the contaminants.

3. Ingestion: exposure via this route could occur if individuals eat, drink or perform other hand to mouth contact in the contaminated zones. Decontamination procedures should be clearly established in the plan to help minimize the inadvertent ingestion of contaminants.

Other Physical Hazards

Slip/fall: as with all field work sites, caution will be exercised to prevent slips on wet surfaces and stepping on sharp objects. Work will not be performed on elevated platforms without fall protection. It is very essential to recognize and avoid areas with low traction (muddy areas or slick metal surfaces), surfaces obstructions or unguarded areas elevated above ground surface.

Heavy equipment's and machineries: the earth equipment may be equipped with various winches, motors, booms and other machines. These present general physical hazards. Personnel will stand clear of machinery at all times unless specific instructions are given by the supervisors since the equipment may also present physical hazards.

Confined spaces: appropriate equipment will be provided by the contractor for personnel who must enter the excavation. Personnel will not enter any confined space without approval of the project manager and corporate health and safety manager.

Noise: appropriate hearing protection (ear muff or ear plugs with a noise reduction rating of at least 20dBA) will be used if individuals work near high-noise generating equipment (>85dBA) (Torner, 2009).

CONCLUSION

Risk and hazard assessment cannot be neglected on modern construction sites since it helps reduce injuries, illness, death, and compensation. Once risk is identified, it must be assessed as to their potential severity of loss and to the probability of occurrence. Therefore, the assessment process is critical to make the best educated guesses possible in order to properly prioritize the implementation of the risk management plan. Additionally, risk and hazard identification and assessment on construction sites cannot be over emphasized, it is a good step to achieving environmental friendly construction sites.

RECOMMENDATIONS

- i. The construction sites should be made friendly, exciting, and conducive through active risk and hazards assessments by the contractors and supervisors before work begins on sites.
- ii. Supervisors should make sure that control measures are put in place to abate any identified risk and hazards.
- lii Disciplinary measures should be established for workers, supervisors and contractors on violation of risk control measures by the relevant professional body.

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