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A Review on Safety Management in Malaysian Construction Industry

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Abstract: The construction industry has been recognized as one of the most hazardous industries. It has a poor safety record when compared to many other industries. Although there is an improvement on the safety performance in industry, the injury rate of the industry is still one of the highest compare to other industries. Besides causing human tragedy and economic losses, construction accidents also affect the productivity and reputation of the construction industry. The aim of this study is to review on safety regulations, challenges and strategy for improving the safety management in the construction industry. The attributes and requirements to achieve effective safety management right from the design stage to execution and operation must be identified and addressed appropriately through a structured program. The new strategy approach needs to be identified for the development of an integrated safety management to achieve zero accidents in Malaysia.

Key words: Safety, management, strategy, construction project, Malaysia

INTRODUCTION

Construction industry plays a very important role in the economy of a developing country like Malaysia. Constructions contributing an average of over 3% to the overall gross domestic product over the last 5 years from 2008-2012 (BNM, 2013) that contributed RM34.9 billion to the overall gross domestic product (GDP) of RM 937.5 billion in 2012. The total value of construction projects awarded in Malaysia in 2014 amounted to RM 120.0 billion (CIDB, 2007, 2014) and has created a lot of job opportunities to help boost the country's economy.

However, construction is one of the highest contributing industries to occupational accidents by sector in Malaysia. Statistics have been drawn from year to year that show an increasing number of cases of accidents by industry sector. According to Dayang and Gloria from the year 2005 till 2008 major accidents such as stepping on, striking or being struck by objects, caught in between objects, over-exertion or strenuous movements and falls occurred in the Malaysian construction site annually. Records of DOSH (2005, 2007, 2011) indicated there is a total of 187 construction workers died due to accidents at construction sites in Malaysia during the period of 2011-2013. It has been proved that the main reasons for accidents in the construction industry are resulted from the unique nature of the industry, human behaviour, difficult work-site conditions and poor safety management which result in unsafe work methods and procedures (Farooqui *et al*., 2008).

Employees in Malaysia preferring not to complain when exposed to unsafe and appalling work conditions. Few seemed to be brave enough or willing to let their supervisors know when they experience poor ventilation and lighting, extreme temperatures (hot or cold) and given defective and poorly maintained electrical appliances and equipment (Tay, 2013). However, besides the unsafe conditions and work processes, one of the major causes of occupational injuries and illnesses identified in research is the unsafe acts and behaviours of the employees themselves; some are careless, ignorant, arrogant or simply disobedient (Dessler, 2010). When employees refuse to comply with their company's safety rules and regulations and they fail to participate in safety training sessions and safety campaign activities, they run the risk of making mistakes that could lead to physical injuries, permanent disabilities, psychological trauma and even deaths (Yule *et al*., 2006). Unsafe employee behaviours, unsafe work conditions and hazardous practices are positively related to occupational problems and illnesses at the workplace (Dorji and Hadikusumo, 2006). Among some of OSH incidents that they have identified are the personalities and work attitudes of individuals (employees and the supervisors), safety climate, safety culture (the organization's norms, beliefs and roles), safety motivation, safety behaviour, job characteristics, work design, communication and ineffective leadership and management support.

Neal and Griffin (2006) found that safety climate and safety behaviours are significantly correlated and that

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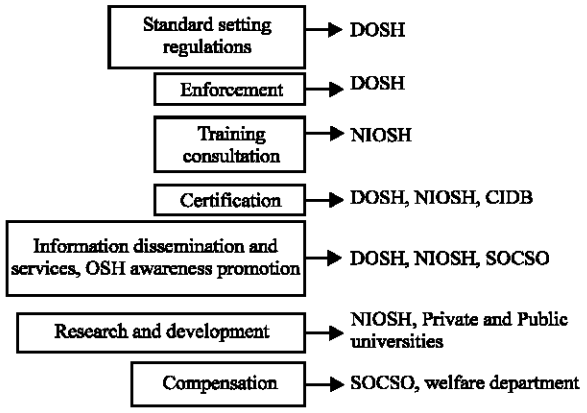

Fig. 1: OSH activities in Malaysia by each agency

both are negatively related to occupational accidents. They used a 5 year longitudinal study to establish that safety climate (management's safety priorities) and safety motivation (employee's perceptions of the importance of safety at work) are significantly related to safety outcomes like employee's compliance to safety rules and their participation in safety campaigns and activities. A poor work climate would lower employee's compliance to safety rules and procedures as well their participation in organizational safety activities, resulting in higher rates of workplace accidents. It is therefore important that organizations create a work environment and climate that promotes positive safety behaviours and attitudes of their stakeholders.

The next section will discuss on focusing on the safety practices and problems in relation to safety practices at construction sites.

Literature review: Under the Ministry of Human Resources, various safety activities have been developed according to each agency. Figure 1 presents OSH activities in Malaysia by each agency.

According to Soehod and Laxman (2007), Malaysia is the first Asian country to have enacted safety and health legislation covering all occupations. The main goal of safety and health legislation is to ensure that the employers provide safe working condition to the employees. It promotes for workplace free from any hazards such as exposure to toxic chemicals, excessive noise levels, mechanical dangers, heat or cold stress or unsanitary conditions

MATERIALS AND METHODS

Occupational Safety and Health Act 1994 (OSHA): In the year 1994, the Occupational Safety and Health Act 1994 was introduced in Malaysia. It heralded a shift from the traditional command and control method of enforcement in which the government through the Department of Occupational Safety and Health (DOSH) (before the year 1994 it was known as the Factories and Machinery Department) assumed a huge responsibility in regulating the safety and health of workers at the workplace to one of self-regulation. All stakeholders at the workplace were responsible for promoting self-regulation with the ultimate responsibility vesting in the employer as an alternative regulatory system.

This meant enabling legislation in the nature of non-prescriptive regulation was emphasized as prescribed solutions were perceived to impede the development of creative ways of managing hazards (Farouk *et al*., 2011). OSHA 1994 provides where appropriate, approved codes of practice which have a special legal status. OSHA 1994 contains provision for formulating regulations and Codes of Practice (COPs) which indicate 'what should be done' and thus assist the employer to conform to the Act. Industry codes of practice may be in the form of gazettes providing guidance in compliance with the Act. Although, codes of practice are not statutory requirements, they may be used in criminal proceedings as evidence that the statutory requirements have been contravened. Promulgation of industry codes of practice can be initiated by the industry, the government or other interested parties (Fernandez-Muniz *et al*., 2007).

Malaysia is now moving away from the traditional approach whereby it is believed that all occupational hazards can be controlled through detailed regulations (Abdullah *et al*., 2007). However, regulations alone do not and cannot ensure safety in the workplace. Although, OSHA (1994) was an improvement over earlier pieces of legislation and quite comprehensive, the level of awareness and practicability are generally lower than what was supposed to come into force, especially within the society of the construction industry (DOSH, 2005, 2007, 2011).

Department of Occupational Safety and Health (DOSH): The Department of Occupational Safety and Health (DOSH) which was known originally as the Factories and Machinery Department, was established under OSHA 1994. The goal of DOSH is to ensure a safe and healthy work culture among all employers and employees. It protects the safety, health and welfare of workers and others exposed to hazards associated with working activities (DOSH, 2005, 2007, 2011).

The main activity of DOSH is to draft and study policies, legislation, practices and guidelines associated with occupational safety, health and welfare. DOSH is responsible for conducting activities to encourage a safe and healthy work culture among employers, the

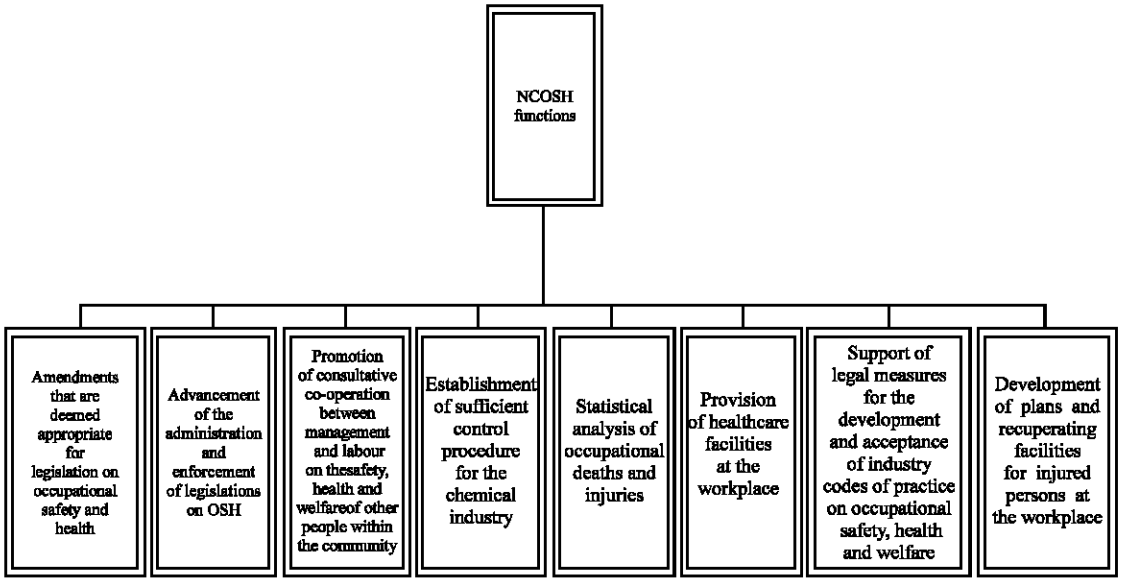

Fig. 2: NCOSH functions

self-employed, designers, suppliers, importers and workers. Some examples of such programmes are seminars and advisory services (DOSH, 2011).

DOSH provides assistance and support in the form of expert services for training, information dissemination and research conducted by government agencies, private agencies, institutions of higher learning as well as employer's associations, workers associations and professional associations in line with its efforts to improve occupational safety, health and welfare standards.

DOSH identifies and checks safety reports, provides preventive measures for health hazards and emergency action plans and also conducts inspections and audits of large hazardous installations. DOSH also performs technical analysis and determines the steps required to control safety and health hazards in the workplace.

In addition, the Department also provides competency accreditation examination syllabi and evaluation for individuals and organisations as well as conducting the examinations. Officers in each state, through periodic inspections as well as security, carry out enforcement and health audits on factories, machinery and other relevant workplaces.

Officers from DOSH will conduct checks to ascertain whether recommended machinery designs are acceptable. The machinery comprises steam boilers, unfired pressure vessels, machines for lifting goods and electrical lifts. Machinery associated with the use of petroleum substances, industrial hygiene equipment and protective gear for workers as well as restoration and transmission systems are also included. DOSH officers are trained to investigate occupational accidents, illnesses and poisoning. Complaints of hazardous occurrences and accidents in the workplace will lead to prosecution. At the same time, a few officers will be assigned to the secretariat which provides input on occupational safety and health to the National Council (DOSH, 2005, 2007, 2011).

National Council for Occupational Safety and Health (NCOSH): Under OSHA (1994), the National Council for Occupational Safety and Health (NCOSH) was established. NCOSH is a body established within the scope of the Ministry of Human Resources that discusses, studies and investigates through a tripartite process and makes recommendations to the Minister on matters that are consistent with the objectives of the Occupational Safety and Health Act 1994 (DOSH, 2005, 2007, 2011).

NCOSH performs its functions by means of discussions, studies and investigations on matters related to Act 514 for the purpose of raising the level of OSH in all sectors of the industry whilst not restricting the breadth of scope contained in the provisions of Act 514 in matters relating thereto as shows on Fig. 2 (DOSH, 2005, 2007, 2011):

Construction Industry Development Board (CIDB): Another important body that caters for safety which is involved directly in the construction industry is the

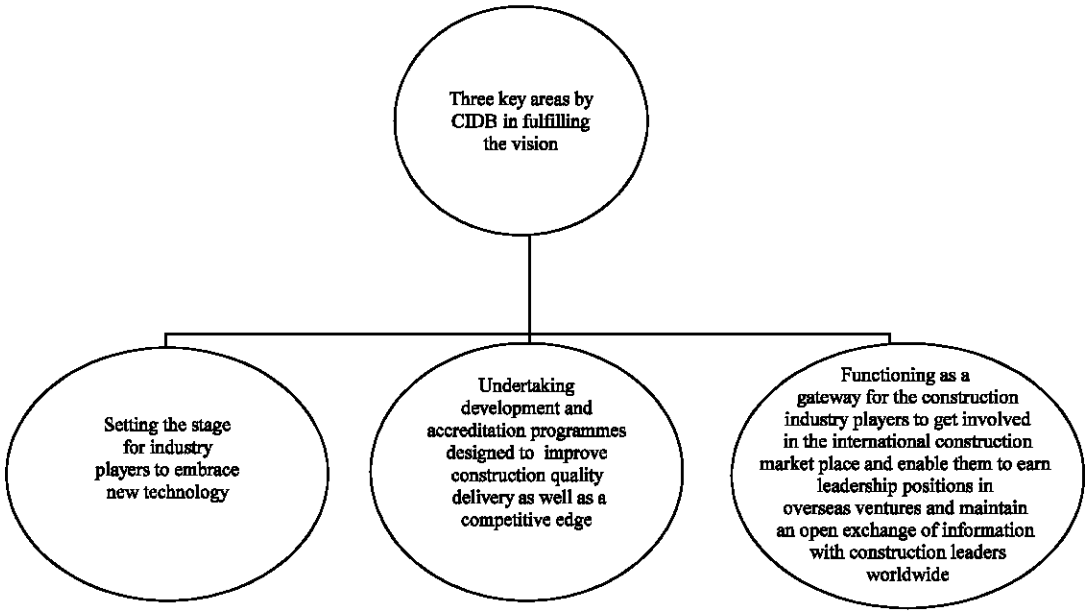

Fig. 3: Three key areas by CIDB in fulfilling the vision

Construction Industry Development Board (CIDB). CIDB started its operation on 1 December 1994 with the main objectives of developing, promoting, improving and streamlining the growth and expansion of the construction industry.

CIDB upholds the vision of "to nurture and mould the Malaysian Construction Industry to become a respected leader in the global construction market by the Year 2010". In fulfilling this vision, three key areas have been identified shows in Fig. 3 (CIDB, 2007, 2014).

Social Security Organisation (SOCSO): Apart from CIDB, another important establishment that acts as a compensation body for employee's safety is Social Security Organisation (SOCSO). SOCSO was established in 1971 under the Ministry of Human Resources to implement and administer the social security schemes under the Employee's Social Security Act 1969 (Act 4), for instance the Employment Injury Insurance Scheme and the Invalidity Pension Scheme. Under this scheme, workers are protected against industrial accidents including commuting accidents, occupational diseases, invalidity and death.

SOCSO's main aim is to provide benefits to employees in the case of invalidity and employment injury and includes occupational diseases. It also acts as a compensatory organisation, whereby in the event of mishap, SOCSO provides monetary security for beneficiaries and employees. SOCSO function includes the registration of employers and employees, collecting contributions, processing benefit claims and making payments to the injured workers and their dependents. SOCSO also provides vocational and physical rehabilitation benefits and enhances the occupational safety and health awareness of workers.

However, under the Social Security Act of 1969, SOCSO covers only certain employer and employees. Only industries employing five or more employees make mandatory contributions to SOCSO. SOCSO is available only to employees with the earning capacity of RM2000 and below (Mansor and Awang, 2002). SOCSO is the only scheme that follows the internationally accepted social security norms. SOCSO is based on social insurance principles and the pooling of risks (International Labour Organization, 2005).

National Institute of Occupational Safety and Health (NIOSH): To mark the new era in the promotion of OSH in Malaysia, a private agency, National Institute of Occupational Safety and Health (NIOSH) was established on 1 December 1992. NIOSH was established as a Company Limited by Guarantee under the Malaysian Companies Act 1965. As a company, NIOSH is expected to operate efficiently and with minimal administrative bureaucracy. NIOSH was launched to improve the safety and health of workers at the workplace and with the vision of being the leading centre of excellence in NIOSH. NIOSH serves as a backbone to create self-regulation on safety. NIOSH's role is to ensure that organisations in Malaysia operate in a safe working environment

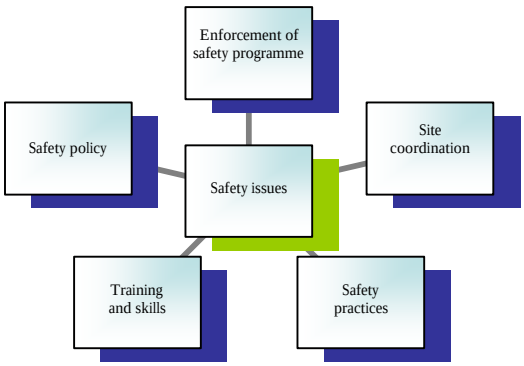

Fig. 4: Safety issues

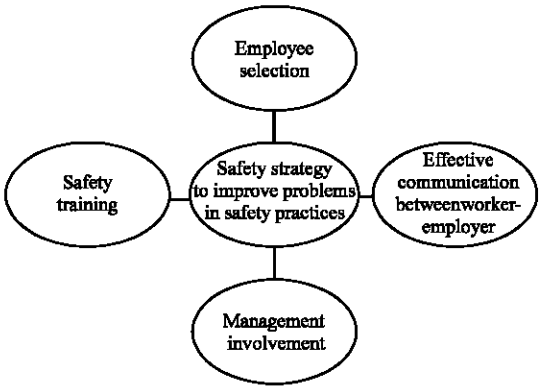

Fig. 5: Four safety strategy to improve problems in safety practices

(Abdullah *et al*., 2007). To upgrade the level of OSH in Malaysia, NIOSH has developed curricula and training programmes for employers, employees and others in compliance with the Occupational Safety and Health Act (OSHA) 1994 and its regulations. Employees, by themselves, cannot do much to improve safety and health. It is the managers and supervisors who hold the key. Managers must show their commitment to OSH while supervisors should implement and monitor the management of OSH in line with the Occupational Safety and Health Act 1994.

Employees will play their role by complying and showing their co-operation towards these efforts. For this reason, most of NIOSH's training courses are designed for management and supervisory personnel, especially those directly involved in OSH such as Safety and Health Officers and Safety and Health Committee members (International Labour Organization, 2005).

Safety Issues: To keep abreast with development, particularly in relation to the issue of occupational safety and health, construction players should play their roles in consolidating the industry to reach greater heights. Safety in construction must be a priority among the construction fraternity during pre-construction, construction and post construction. A holistic approach of safety must be introduced to the construction industry as a strategic way for construction stakeholders to move up to the greater height in future. The safety issues stated in Fig. 4 and 5.

Safety policy: The safety policy must define the organization's corporate philosophy towards health and safety matters, in the context of its business activities. It must be clearly presented in the form of a policy statement and originating from the organization's board of executive management. Furthermore, Kin and Bonaventura did a study on safety management practices in Buthanese construction industry explained that safety policy is a written statement of principles and goals which can demonstrate top management's commitment to ensure safe working methods and environment at the construction sites. Similarly, Ahmadon *et al*. (2006) stated that safety policy is a requirement of the safety and health policy that reflects the management commitment towards the organization's safety and health

Training and skills: According to Paringga (2010), education and training are designed to prevent human error that may cause the accidents and to enable workers to perform a repetitive task with skill. It should involve the repetitive performance of the task until it becomes automatic. Lai *et al*. (2011) stated that safety training is the most effective tool to mitigate hazard since training helps to improve worker's skills and abilities to identify azards.

Safety practices: Paringga (2010) did a study on safety practices in Batam, Indonesia and through his findings; he discovered that one of the safety practices is education and training. The safety inspection has been the main tool for maintaining safe conditions and monitoring unsafe practices at workplace. Other than that, the safety management systems created the requirement for the safety audit, which is a detailed examination and evaluation of all components of the system to ensure that they comply with prescribed standards. Safety audits include safety inspections, inspection of documents and interviews (Giovanis, 2010; Paringga, 2010) affirmed that safety inspection is one of the important safety practices based on the study he did in Batam, Indonesia.

Site coordination: Safety meeting is a gathering at workplace which involves all the construction team

members to discuss on the health and safety matters. The purpose of safety meeting is to ensure that all the construction team are aware about the safety matters (Holt, 2001; Heng, 2006) included morning safety meeting for all workers and safety meeting on danger prediction as safety activities at construction site. Supervisors play a critical role in setting the expectations for safety on sites (Roelofs *et al*., 2011; Heng, 2006) stated that one of the important practices at the construction site is guidance and supervision during work progress.

Wallace and Chen (2006) studied Hong Kong safety culture and he found one of the practices implemented in Hong Kong is pink tickets scheme. The scheme was introduced by the sub-contractor whereby their safety staff and managers carried a pad of small pink forms printed in English and Chinese version. The details of the failure and the offender's name were entered when there is any offense found. The original copy was handed to the worker and a copy was placed on his or her employment records.

Enforcement of safety programme: Elbeltagi and Hegazy (2002) affirmed that the major cause of accidents in the construction is due to falls. Therefore, proper safety zones around the construction areas should be provided to prevent harm from falling objects. According to them, some of the regulations were described by the uniform building code including at least 10 feet clearance from buildings or structures shall be kept clear from using, driveways between and around open yard storage shall be at least 15 feet wide and free from accumulation of rubbish and materials stored inside buildings under construction shall not be placed within 6 feet of any hoist way or inside floor opening. Other than that, Ahmad (2008) mentioned that the construction site will be divided into two zones which are 'green zone' (non-fabrication area) and 'red zone' (fabrication area). It is separated by installing boundary fences and putting safety signboards. 'Green zone' includes offices, car parks, surau, canteen, clinic and yard resting shades. It is considered as safety zone since it is non-fabrication area. Besides, in red zone or fabrication yard, it requires the workers to wear Personal Protective Equipment (PPE) because it can cause danger. Minimum PPE required in this area are safety boots, glasses, helmets and long-sleeved jacket.

DOSH (2005) explained PPE as any equipment worn by a person at work to protect him against risk to safety and health and any additional accessory designed to protect him while performing task. Ahmad (2008) stated that it is important to provide PPE at construction sites. Similarly, Paringga (2010) agreed that in order to have a safe and healthy condition at construction sites, it is essential to PPE to the workers. There are several types of PPE that workers need at the construction site such as head protection equipment, face and eyes protection equipment, ear protection equipment, hand protection equipment, foot protection equipment, respiratory equipment and body protection. According to Ahmad (2008), there will be an emergency drill conducted once in every three months. All the workers will be given a briefing on emergency procedure. They are reminded not to be panic and required to leave their workplace once an emergency siren is activated. They need to gather at designated assembly areas where their attendances will be recorded by appointed safety wardens and they will be briefed by the chief warden. Once the emergency situation subsides, they will be instructed to return back to their workplace and resume work.

Paringga (2010) identified that emergency support and safety measuring devices include work accident record, medicine and first aid, further medical treatment and emergency devices such as fire extinguisher, safety nets and hydrants. All of these items are important at construction sites when there are any emergency cases. It will reduce the risk of hazards at construction sites. Ahmad (2008) revealed that the most common type of accident at the construction site is due to fall. This is supported by Ohdo *et al*. (2011) which also stated that the frequency of accidents due to fall is the most critical problems in the construction industry. Therefore, DOSH (2007) emphasized that fall protection systems shall be supplied and used in any place where an employee is at risk of a fall of 2 m or more. The employer can select the fall protection systems that are most compatible with the type of work being carried out.

Safety strategy to improve problems in safety practices: A measure of safety management could be used to identify those areas of safety that need more attention and improvement. The dynamic nature of safety management which has the ability to change on daily basis, means there is a great need for reliable tools that can measure safety climate. Safety management is a leading performance indicator that can provide insight into safety performance before accidents have occurred. There are four safety strategy to improve problems in safety practices as showed in.

Employee selection: Employee selection is one of the most significant predictors of injury rates by carefully screened and hired (Vredenburgh, 2002). The behavioural type of interview methods as well as psychometric and dexterity tests would be useful selection tools to ensure that only individuals with low propensities of taking

extreme risks and those who are least likely to do substandard work are hired for site workers (Tay, 2013). The big five personality test, for instance could profile potential employees to enable employers to match their personalities with the organizations and job types. Hamid *et al*. (2003, 2008) recommend that the adoption of good managerial practices such as high involvement managerial systems could motivate employees to be more proactive and to behave safely. By empowering and engaging employees to participate in safety campaigns and training activities and by allowing them to make decisions concerning their work activities as well as by linking rewards to the extent of their safe behaviours and actions, these could minimize the rates of employee injuries, illnesses and deaths. Empowered employees also tend to trust their management more and this could result in a better work climate that encourages self discipline to comply with the high safety standards (Conchie *et al*., 2011)

Safety training: Another effective preventive OSH measure is to conduct safety training regularly for both the new hires and existing employees (Lauver, 2007). He added that continuous re-education and retraining on safety procedures and practices could minimize employee's exposure to occupational accidents and health problems.

Organizations could also implement the buddy or mentor scheme to enable young and new employees to emulate the safe behaviours of their exemplary senior colleagues. Alternatively, employees could be personally involved by joining their organization's safety committee to contribute ideas on how to improve the OSH conditions and safety standards (Dessler, 2010).

It is also crucial that management informs their employees early (such as during their orientation programme) of the rewards and benefits for behaving safely and for complying with their organization's OSH policies and procedures (Zacharatos *et al*., 2005). They should make it very clear right from the start of the penalties and disciplinary action that would be taken against employees if they violate the company's safety rules and procedures.

Management has a big role to play in motivating employees to act safely and in providing a safe work environment. Research findings reveal that good leadership or top management's commitment is statistically and significantly related to lowering the rates of occupational accidents, injuries and illnesses (Lu and Yang, 2010).

Effective communication between worker-employer: The role of effective communication and feedback systems should not be ignored to minimize the occurrences of occupational accidents and health hazards (Clarke, 2006) He suggest that employees be regularly informed via internal circulars, newsletters and other forms of electronic media about the organization's latest statistics on the number of accidents, near misses and deaths.

The objective is to create greater awareness among employees and to ensure that they would not add to the occupational accident and death statistics in their organizations. The digital economy provides excellent opportunities for management and employees to use the social media such as twitters and facebook to communicate freely with one another on the potential OSH hazards and to discuss practical preventive measures for the benefit of all stakeholders in the organization.

Management involvement: Organizations are morally obliged to ensure that their employees are safe and free from extreme physical, mental and emotional stresses. High involvement managerial practices by engaging, motivating and rewarding employees to adopt safe practices would have more enduring effects than the control systems (Zacharatos *et al*., 2005). Self-awareness and the discipline that comes from within the employees themselves would have a stronger impact in minimizing OSH problems.

Therefore, the sooner employers and employees acknowledge their respective responsibilities and support one another in making safety their priority the sooner they would succeed in preventing the occurrences of major OSH disasters at their workplace. While OSH prevention measures demand serious planning and strong support from the top management and other stakeholders in organizations, they can be very challenging and costly. However, in the long run, it would make good business sense to prevent than to correct careless and irreversible mistakes and accidents at the workplace.

RESULTS AND DISCUSSION

Accidents still keep on increasing although OSHA 1994 had implemented in our construction industry. According to Begum *et al*. (2009), there may have another legal loophole in Malaysia. In Malaysia, safety and health officer do not have autonomy power therefore they cannot strictly implement the regulation in the construction site. Moreover, the safety and health officer is employed by the contractor. The contractors may tend to hide the accident occurrence on site and do not comply with reporting the accident which occurred on their site or even threatened their safety management staff to not report to DOSH that is because the accident of worker

may make lost productive time. The construction site accident rate has been increasing simply because of these unhealthy practices in Malaysia (Begum *et al*., 2009). Although safety and health officer of construction site have effective reduce the risk of accident rate. But according to Norman (2010) many contractors are not aware of the important role for appointed safety and health officer at the construction site. Therefore, many contractors neglect to appoint a safety and health officer to the construction site (Norman, 2010).

Furthermore, investment in safety and occupational health programs is a sound business strategy, for any company regardless of size and will lead to having a positive impact on the financial bottom line. This should not be regarded only as a requirement under the law but should become and remain a core business strategy. Solid safety and health management plans with senior management commitment will improve productivity and employee's moral hence should be encouraged. Most contractors have no safety and health programs despite the fact that, the majority claim to understand its importance (Mwombeki, 2005). Therefore, several ways have been identified and should be done by :

Contractor: Planning for accident prevention and occupation health should be in a way to fit needs of the concerned construction site or particular on-going works. 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. Contractors should 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 relevant Authorities; failure to report is an offence. Contractors should ensure that work environment is improved and work places should be kept well for employee's comfort and convenience. Inspection of plants and scaffolding at least once a week should be carried out. Contractors should be conversant with OSH and should share that knowledge with co-workers. Accommodation in case of bad weather, safe drinking water, washing facilities including toilets and accommodation for meals should be provided and properly maintaine

Workers: Workers should be assigned to work with machinery after being trained to acquire necessary skills. Most accidents happen because jobs requiring the use of machinery are assigned to workers with insufficient skills to operate them (Mwombeki, 2005).

CONCLUSION

Organizations are morally obliged to ensure that their employees are safe and free from extreme physical, mental and emotional stresses. High involvement managerial practices by engaging, motivating and rewarding employees to adopt safe practices would have more enduring effects than the control systems. OSH prevention measures demand serious planning and strong support from the top management and other stakeholders in organizations; they can be very challenging and costly. However, in the long run, it would make good business sense to prevent than to correct careless and irreversible mistakes and accidents at the workplace. Therefore, the employers and employees should acknowledge their respective responsibilities and support one another in making safety as their priority. Sooner, they would succeed in preventing the occurrences of major OSH disasters at their workplace. Thus, a continuing search for innovative and effective safety management plans or precaution methods is necessary for the whole construction industry.

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