

A Review on Safety Improvements in Malaysian Construction Industry

Siti Fatimah Hanif, Hasnora Jafri

Faculty of Chemical Engineering, Universiti Teknologi MARA

Abstract— The construction industry is one of the most hazardous industries in the world. The importance of safety in the construction industry is often overlooked, as people tend to focus more on getting the job done in time rather than getting it done safely. Malaysia's construction industry is no different, as represented by the amount of accidents related to construction that has occurred in the past year. The purpose of this research paper is to review the safety improvements in Malaysian construction industry. The main objectives of the study is to review the development of safety in the local construction industry as well as analyze the safety improvements used worldwide that can be implemented in the Malaysian construction industry. The statistics of the accidents relating to construction was reviewed, along with the causes of fatalities and high number of injuries resulting from accidents in the construction industry. Several accident causation theories were also discussed in order to gain an in-depth understanding the causes of accidents and consequences of hazards, as well as accident prevention measures. Interviews and questionnaires were conducted in order to obtain an in-depth understanding of the safety practices in the Malaysian construction industry. The questionnaires were designed to evaluate the safety performance of the construction industries by studying them through four main aspects; safety climate, safety culture, safety attitude, and general safety measures. The variations of the safety performance practice by different sized companies as well as different levels of employment in the organization are compared and analyzed according to the four aspects. From the results obtained, the responsibility of the management towards the involvement of their employees as well as self-awareness in safety greatly affects the safety performance of an organization, thus, facilitates the improvement of high safety performance in the construction industry.

Keywords— construction accidents, construction industry, safety, safety behavior

I. INTRODUCTION

The construction industry contributes a great deal to the economic growth and development of a country. However, despite its wide practice around the world, the construction industry currently holds the highest number of death cases for 6 consecutive years (throughout 2011 up to 2017). Based on the Occupational Accidents Statistics from the Department of Occupational Safety and Health, fatalities in the construction industry include falling from a height, being struck by machineries, getting caught in equipment, exposure to hazardous materials, or being buried alive. (Ministry of Human Resources, 2017)

The worryingly high rate of construction accidents is a major concern in the context of industrial safety. These accidents are the result of a number of factors, such as lack of safety laws,

insufficient enforcement on safety rules in companies, inadequate training, or even cultural divergences among different levels of construction personnel. Implementing safety regulations has no longer become relevant as no amount of enforcement can bring a majority of the workers to obey and practice the safety rules. For many cases, an analysis on the aftermath of an accident is prioritized over focusing on the root factors, such as the safety behavioral culture of the organisation. Moreover, employers also tend to overlook the importance of safety in the construction industry due to the extra cost it would result in.

Numerous research studies were conducted on the safety of the construction industry in different countries, mainly focusing on the major causes and factors of the occurrence of accidents as well as strategies in accident prevention. Although the factors of accidents are endless, this research project emphasizes on the behavioral analysis of employers and workers.

A parameter used to evaluate the safety improvements in Malaysian construction industry is by analyzing the safety performance of a company. The traditional approach in evaluating safety performance is by correlating it to accident frequencies, severity of accidents, and cost of accidents related to the company. However, this method has not been effective, as it focuses on the afterwards analysis rather than the internal factors of the situation.

Previous studies have focused on the qualitative and quantitative methods of evaluating safety performance by using an innovative Structural Equation Modeling (SEM) based approach. The application of SEM in systematic safety performance model shows that the safety performance can be composed of four dimensions: organization-oriented, management-oriented, control-oriented, and behavior-oriented. These four dimensions were found to be very closely related, and is used as a basis for the questionnaires constructed for this study.

II. METHODOLOGY

A. Materials

Relevant data was obtained from journals, online articles, newspaper clippings, and textbooks. Case studies based on the construction safety in other countries were analyzed. Statistical data was extracted online via the official database of the Malaysian Department of Occupational Safety and Health. Construction site visits were conducted to interview safety officers and workers on their perspective of construction safety. Questionnaires were handed out for an in-depth understanding of the construction industry. The same questionnaires were also distributed online via Google Forms. All information obtained was focused on safety behaviour in construction industries in Malaysia. Hence, the collected data was analyzed.

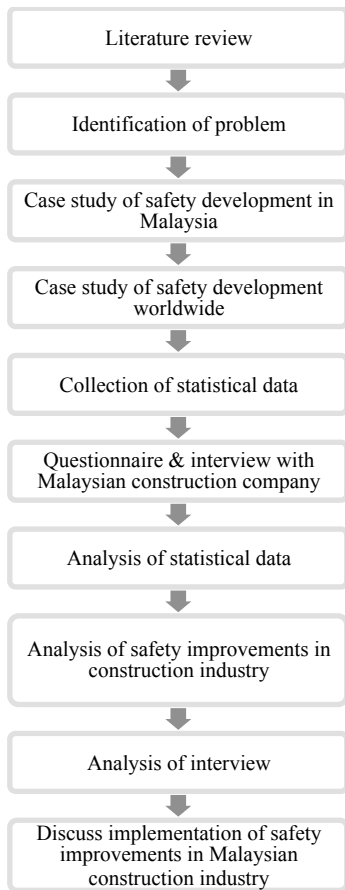


Figure 1: Flow diagram of research methodology

III. RESULTS AND DISCUSSION

A. Research Findings

The construction industry in all parts of the world has proven to have the highest fatality rate reported. According to the Department of Occupational Safety and Health, the construction industry has held the highest number of deaths for many years. Figure 2 shows the industrial fatality rate of according to sector up to April 2017.

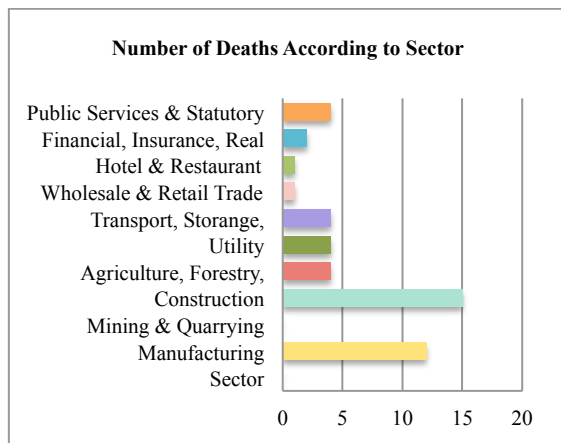


Figure 2: Number of deaths in 2017 according to sector

The National Institute of Occupational Safety and Health (NIOSH) revealed the top three high-risk industries, which contribute to the workplace accidents in Malaysia. Similar to Figure 2, the stated industries were construction, manufacturing, and transportation. (Hamudin, 2016).

Among some of the causes are unsafe working conditions, which include falling from a height, walking over, tripping, or being struck by objects, poor lighting conditions, or being buried

from a collapse during excavation. These are all immediate causes of accidents in construction industry (Teo, Ling, & Chong, 2004).

Based on the statistics collected from research as well as DOSH in Figure 3, falling from a height is an obvious and most common accident to occur in the construction industry, followed by being struck by machinery. The Construction Industries Development Board (CIDB) had identified the 6 most common construction accidents to occur; falls from height, hit by objects, pinned by building materials or machinery, buried under collapsed holes, fires, and electrocution (CIDB, 2013). These accidents are commonly due to unsafe acts or conditions such as not wearing the appropriate personal protective equipment (PPE) or carelessness. Due to this high number of accidents, CIDB-registered construction contractors were required to attend the Green Card course as an exposure to the common accidents as well as its prevention. However, the root cause of accidents normally leads back to the management controls and poor company culture, which brings the subject to behavioral analysis.

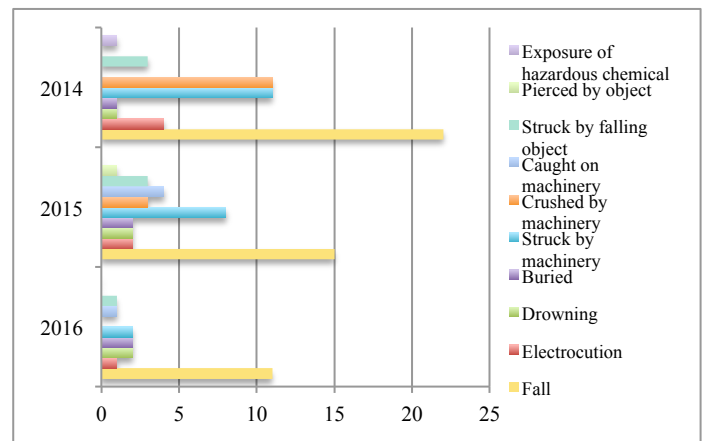


Figure 3: Causes of accidents based on DOSH

Upon examining data regarding accidents, injuries, and deaths involving the construction industry in Malaysia, it is safe to say that construction sites in Malaysia lack safety standards and a major improvement in the present construction practices regarding safety is well overdue.

A recent crane accident in a construction site was investigated and the reported cause of accident was due to an illegally hired crane operator. Upon research, it was found that this is not uncommon, and certain construction firms often hire illegal foreign operators without certificates. This is done to cut on the cost of providing safety training. According to the Master Builders Association Malaysia (MBAM), the local construction industry lack in competent crane operators.

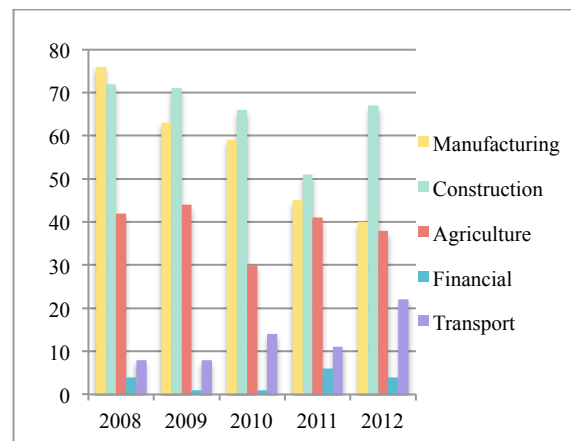


Figure 4: Occupational Fatalities by Sector in Malaysia (Ministry of Human Resources, 2008)

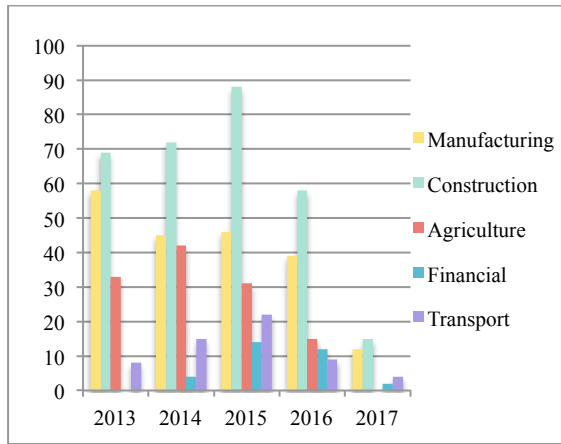


Figure 5: Occupational Fatalities by Sector in Malaysia (Ministry of Human Resources, 2013)

Figure 4 and Figure 5 show the occupational fatality rate by sector in a 5-year period, 2008 to 2012, and 2013 to 2017. It is important to note that the statistics for the year 2017 has only been updated up until April 2017. Statistics from years before 2008 were not provided by the Department of Occupational Safety and Health on their website. It is clear to see that the trend of the graph shows that the construction industry remains to have the highest fatality rate among the other industries in all but one year, which was 2008. The highest number of fatalities caused by the construction industry was in 2015 with a total of 88 deaths. The second highest rate was a total of 72 deaths in the years 2008 and 2013. Despite the high rate of reported cases, there are an even larger number of unreported cases, whether they are accidents or near misses. A review carried out by NIOSH stated that a total of 31,347 accident cases from 2009 – 2014 were unreported, whereas only a third of the cases were reported, which was a total of 787 (Kim, 2017).

B. Recent Cases of Construction Accidents in Malaysia

A recent construction related accident in Malaysia occurred on November 30th 2016, where a pedestrian bridge under construction had collapse in Kuala Lumpur. The accident had killed one person, and injured 5 others. One of the five people injured, a Pakistani construction worker, was driving a forklift as the bridge collapse onto him. He was then trapped for 4 hours, until which he had to have his leg amputated as he lost too much blood (New Straits Times, 2016).

In Petaling Jaya, a crane was found overturned and hanging over a multi-story building at the Empire Damansara Perdana construction site on December 5th 2016. It was eventually brought down by the Department of Occupational Safety and Health (DOSH) and removed from the construction site as soon as all safety methods were agreed upon. Fortunately, the accident did not result in any injuries. According to the Master Builders Association Malaysia (MBAM), the local construction industry lack in competent crane operators, which had caused the overturned crane.

Despite the regulation of certification of crane operators only obtained by Malaysians, it is possible that the contractors on the site may have illegally hired some foreign operators. According to Tan Sri Lee Lam Thye, chairman of National Institute of Occupational Safety and Health (NIOSH), the incident had caused negative publicity for the local construction industry (New Straits Times, 2016).

According to director-general of DOSH, Datuk Mohtar Musri, it may have also been caused by an overload and imbalance in the crane. The Star newspaper stated that the DOSH director-general also emphasizes on the importance of attitude of personnel on site and how commitment towards safety is vital in construction (The Star, 2016).

In Kuala Lumpur, August 2016, the hook of a crane in a construction site had detached from the crane and fallen onto a car nearby the construction site. The accident resulted in immediate death of a woman driving the car. The hook was from a

construction site for a nearby mall, Pavilion. The case was classified under negligence for causing death under Section 304A of the Penal Code (New Straits Times, 2016).

There are numerous ways in which the safety in the construction industry can be controlled. According to a study based on construction safety in Kuwait, maintaining a safe working environment in construction sites include three main challenges. Firstly, safety is a subjective issue, thus it is perceived differently through different cultures, companies, and surroundings. Next is the factor of human error. Mistakes are commonly made due to negligence and controllable circumstances within one's responsibility. Construction projects are composed of many different disciplines who work together in order to reach the goal of the project, thus, connecting each responsibility to the circumstances is found to be strenuous. Finally, no one project is similar to another, therefore no same standardized safety rules and regulations can be used for all construction projects. This makes controlling the safety environment of the construction site intricate, as implementation on previous accidents may not be relevant to future projects, resulting in the nonfulfillment to envision possible hazards (Al-Humaidi & Hadipriono Tan, 2010).

Based on behavior model studies, the high rate of fatality in the construction industry may be the cause of human error, systemic causes, and overload factors; whereby systemic causes involve management, culture and design, and overload factors include overtime, shift work and their duration (McCabe & Karahalios, 2005). According to (Loosemore, 1998), there had been many incidents whereby investigations were prematurely ended, thus stunting the development of the safety in the construction industry. This shows the unwillingness of the investigators or worker involved in the risks of the accident.

The association of behavior and safety performance can be represented by laziness or demotivation of workers (Dedobbeleer & Beland, 1991). For example, a negative outlook towards safety behavior or lack of knowledge to the consequences of neglecting safety may result in workers omitting their personal protective equipment while doing work. A positive outlook on safety with the aid of proper training would encourage and promote the use of PPE in the construction industry.

In order to survive in the construction industry, one of the major industries that is constantly developing, the organizations involved tend to become competitive and their focus shifts to being profit-driven rather than considering the safety aspects of a project (Mayhew, Quintan, & Ferris, 1997).

It is also found that smaller organizations generally do not maintain satisfying safety performance, as they lack the financial support to provide training and safety officers (Stiles, Golightly, & Wilson, 2012). For this reason, they tend to result to the practice of informal safety arrangements, which do not guarantee a safe working environment. This leaves a major difference in knowledge of occupational safety and health between bigger, well-established companies and the smaller companies (Abidin, 2010).

C. Questionnaire Results

The data collected from the questionnaires aim to gather and measure information on variables of interest. The questionnaires enable on to answer the stated research questions and evaluate outcomes of the research. This method provides a baseline in which the analysis of the research can be made.

A total of 100 questionnaires were distributed via Google Form as well as to construction sites in Kuala Lumpur with 62 responses returned, representing a response rate of 62%. Both handout surveys and online forms are used for data collection.

The questionnaires were designed according to a research study on safety performance evaluation on construction site. According to the research paper, the following four aspects are the main factors of the level of safety performance on construction sites: namely safety climate, safety culture, safety attitude, and general safety measures.

Table 1: Questionnaire for influential factors of safety performance

List of Questions	
Section I	
1.	Size of company
2.	Years of service by the company
3.	Number of projects involved
4.	Position in current project
5.	Level of education
Section II	
1.	You are educated on construction site safety
2.	Appropriate PPE is provided on site
3.	Safety signage is clearly presented on site
4.	Safety inspections are regularly conducted
5.	Safety training is provided by the company for all workers
6.	Safety training is compulsory for all workers
7.	Safety meetings are held regularly
8.	You are/have been directly involved in/contributed/given ideas on safety improvements during meetings
9.	Action is taken regarding issues discussed during safety meetings
10.	All accidents that occur on site are reported
11.	All accidents that occur on site are investigated
12.	The management implements new rules based on investigated accidents
13.	Your immediate boss assists you regarding safety issues
14.	Your immediate boss takes action upon any unsafe behaviour
15.	Management places priority on safety over productivity
16.	All safety procedures/instructions are useful/applicable to you
17.	It benefits you if safety procedures were not implemented
18.	You often take risks by neglecting safety procedure to complete jobs
19.	Management penalizes workers for safety violations
20.	You would still practice safety behaviour if violation of safety procedures were ignored
21.	Safety violations are significantly reduced after management takes action
22.	Management rewards/praises your contribution or compliance to safety behaviour
23.	You feel encouraged by seeing your workmates being rewarded
24.	You feel encouraged by the management's commitment to safety
25.	You respond positively to the enforcement of safety procedures
Section III (Short answer questions)	
1.	What impacts the safety of construction industry
2.	Preventive safety measures taken by the company
3.	Common accidents in the construction industry
4.	How does the company overcome this accident and effectiveness
5.	Common issue when dealing with foreign workers

The survey was answered completely anonymously and voluntarily. Out of the returned responses, 55% of the respondents are among the management, supervisory, and leaders construction sites located in Kuala Lumpur and Petaling Jaya.

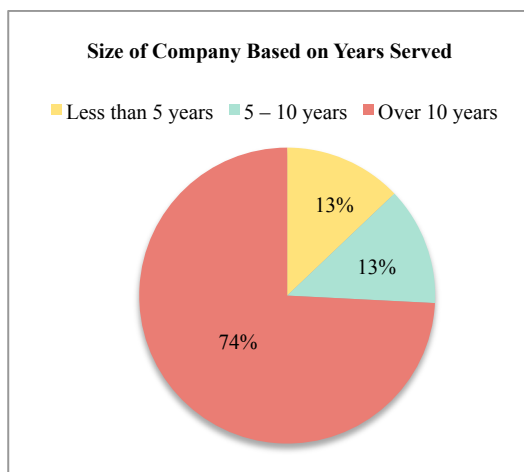


Figure 6: Years of service by respondent's respective companies

The first part, Section I, of the questionnaire is designed to identify the project type the respondents are currently involved in,

and their personal characteristics, including position in the company and education level. Overall, the results of the questionnaires display a positive outcome on safety performance. However, this is partly due to the fact that 74% of the respondents are employed from larger companies, thus having better facilities and safety programs.

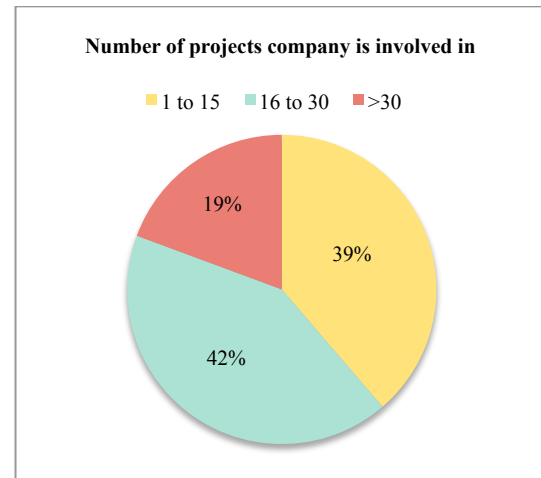


Figure 7: Number of projects involved in

The positive result obtained from the responses is also a factor of the number of projects the company is involved in. This is due to the experience obtained from accidents occurring in previous projects, thus showing an improvement in the safety system of the management.

The questions were divided according to the four categories; safety climate, safety culture, safety attitude, and general measures. The first factor, safety climate, is comprised of 7 questions. These questions are based on the respondent's supervision and guidance at work, reward system, coworkers' influence towards safety behaviour, and communication between superiors and colleagues.

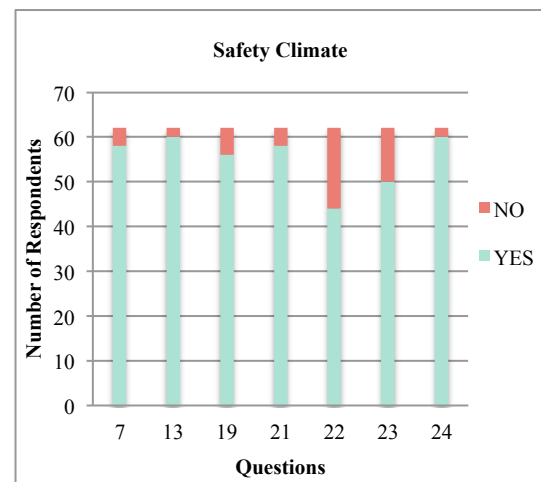


Figure 8: Responses to questions relating to safety climate

For Section II of the survey, the analysis was done based on the four factors involved in the safety performance of the construction industry. The questions were divided according to the four categories; safety climate, safety culture, safety attitude, and general measures. The first factor, safety climate, is comprised of 7 questions. Safety climate is the combination of common perceptions regarding safety shared by employees. These questions are based on the respondent's supervision and guidance at work, reward system, coworkers' influence towards safety behaviour, and communication between superiors and colleagues. (Han, Saba, Lee, Mohamed, & Peña-Mora, 2014) stated that the reward system, work pressure, and intensity were critical factors affecting the

safety climate on a construction site. When work pressure or workload over exceeds the workers' capacity, they tend to disregard safety when performing tasks in order to complete tasks in time.

Based on Figure 8, majority of the respondents responded positively to this, which shows that in most companies, safety climate is not an issue. The questions include safety climate is not an issue. The questions include items on supervision and guidance by the immediate boss, to which most respondents answers yes. On the contrary, item number 22 displays a significant amount of respondents whose company management do not reward or praise the safety behavior or compliance of the employee. However, the respondents who answered No are mainly composed of high-ranking engineers and executive or supervisors of the firm. Thus, explaining the lack of encouragement or rewards for safety compliance.

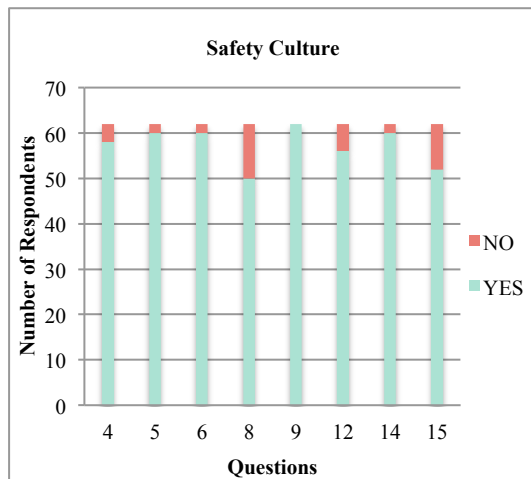


Figure 9: Responses to questions relating to safety culture

Safety culture is considered as the root of safety management, as it is a combination of the corporate outlook on safety value and its safety behaviour guideline. A study by Arboleda et al. (2003) shows that leaders are responsible in creating a safety culture in their organizations, as managers are in producing a safety culture in high-hazard industries. The outcome of the study indicated that both leadership and a quality management system are vital determinants of a safety culture.

It is important to know that safety climate and safety culture are two independently related concepts. The factors affecting the safety culture of a construction site are leadership, safety management system, continuous improvement, education and training, and employee involvement. These factors are included in the questionnaire in a total of 6 questions, which is then analyzed.

Similar to safety climate, Figure 9 shows that the safety culture in majority of the responses positively affects the safety performance of the company. Item 8 is regarding the voluntary involvement of the respondent in meetings. 20% of the respondents had not been involved in meetings, which may be the cause of lack of encouragement from the management. By actively involving other employees and workers in regular safety meetings, the company is able to evolve and improve in safety performance. The more ideas and input is put into a regular meeting by different opinions, the wider the perspective and scope the topic becomes.

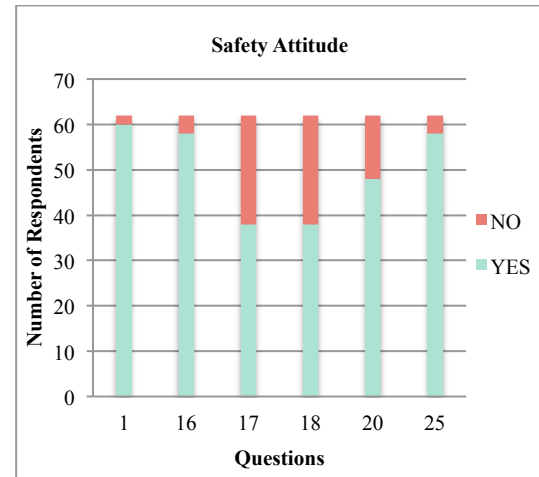


Figure 10: Responses to questions relating to safety attitude

Safety attitude is defined as a psychological tendency of evaluating by favor or disfavor towards a particular subject. It is closely related to the mental process of an individual as safety attitude can foresee one's intention and behavior. Safety attitude is heavily dependent of how one perceives accident risks. This varies immensely from one person to another, as the experience and perspective of one individual on a certain occurrence may be different than that of a second individual going through the same occurrence.

The items in the survey related to safety attitude are regarding safety awareness, risk-taking, rule compliance, emotional state, and job satisfaction.

According to the survey responses, roughly 39% of the respondents answered positively towards the taking risks in order to complete tasks at work. These are regarding items 17 and 18, in which 61% of the respondents believe productivity and effectiveness at work would increase if safety procedures were not implemented. The same amount of respondents also claimed to often take risks at work by neglecting safety procedures in order to complete a job.

This brings a negative impact towards safety attitude in the workplace, as a significantly large portion of the employees disregards the importance of safety in the workplace. Instead, they put a higher priority on productivity over completing a task according to the safe standards.

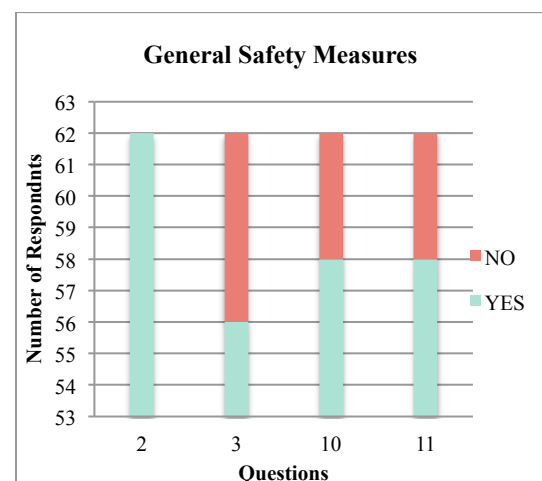


Figure 11: Responses to questions relating to general safety measures

General safety measures refer to the standard operating procedure for a construction site and fundamental requirements for the safety in a construction site. This includes PPE provided by management, emergency measures taken in the event of an accident, safety compliance, and enforcement of safety legislations.

According to the survey, around 10% of the respondents claim that safety signage are not clearly presented on the construction site, and a total of 7% claim that not all accidents that occur on site are reported. This proves an earlier statement by NIOSH, whereby 80% of construction accidents are not reported in Malaysia. This becomes an issue, as unreported accidents go uninvestigated, thus limiting room for improvements or safety developments in the construction industry.

The last section of the questionnaire, Section III, consists of open-ended questions. However, the respondents mainly provided very short answers with little information on how safety in the construction industry may be improved or developed. However, through interviewing the respondents and by observation from the site visit, a better insight was gathered to support the research.

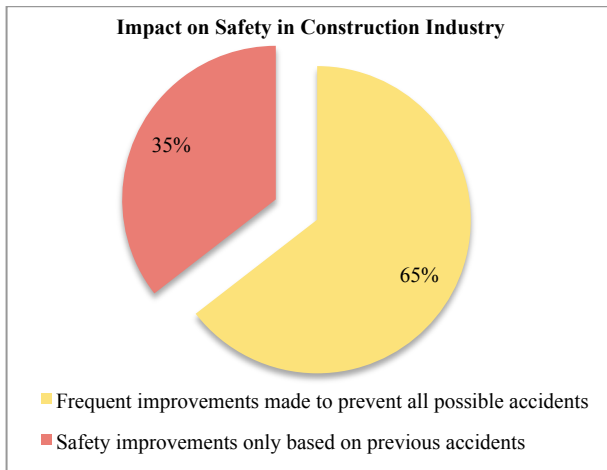


Figure 12: Responses for Item 1 of Section III

As shown in Figure 12 a total of 65% respondents agree that in order to improve the safety in the construction industry, frequent improvements should be made for the possible occurrence of an accident rather than to only implement new improvements after an accident has occurred.

Table 2: Responses for Item 2 of Section III

Preventive safety measures	
1.	Safety briefing every morning
2.	Provide PPE and a safe pathway to walk
3.	Pre-task discussion before starting a new task
4.	HIRARC
5.	Initial safety measures
6.	18001 OHSAS qualified company

Table 2 represents the main responses for the final section of the survey. The responses are rather vague, as it seems respondents are less motivated and less interested to answer lengthy, informative responses. However, upon the construction site visit that was made, there were a few observations that could be made from roaming the site.

Firstly, the HSE Executive Manager of the construction site often made rounds through the whole site to ensure that all the workers are wearing PPE and the construction work was carried out as schedule. Throughout the site, clear signage of who was in charge of each area or floor as well as how to contact them was useful, as in the event of an emergency or an accident, the person responsible for the area affected is easily identified.

Furthermore, as most of the construction workers were foreigners and did not understand the local language or the English language, communication becomes an issue between a superior and the construction workers. In order to overcome this, the management provides graphic briefings on each task instead of verbal or written briefings and instructions, as most of them are illiterate.

Table 3: Responses for Items 3 and 4 of Section III

Common accidents		Ways to overcome
1.	Minor injury	Rotating jobs
2.	Broken bones	PPE and safety harness
3.	Slip, trip, and fall	Initial safety measure
4.	Falling objects	PPE
5.	Falling crane	Report directly to JKKP
6.	Lifting failure	Training, repetitive reminders, safety toolbox, JSA
7.	Machinery and tools accident	Investigation, report, and apply control measures

The common accidents that occur on the construction sites of the respondents are not different from the statistical data obtained for the causes of fatalities in the construction industry as shown in Figure 1. The suggested ways in overcoming these accidents have proven to be effective as the respondents stated that the reoccurring accidents reduce over time.

Table 4: Responses for Item 5 of Section III

Common issue when dealing with foreign workers	
1.	Not wearing safety helmet during work
2.	Do not wear PPE on site
3.	Do not obey instructions
4.	Hard to communicate as they have a different perspective
5.	Language barrier
6.	Communication

Based on Table 4, the foreign construction workers are difficult to work with as they struggle to understand the presumable verbal or written instructions given to them. Furthermore, they also tend to disregard the importance of PPE and continue to complete the task without PPE. This is a common issue, as it was also observed during the construction site visit where the Site Manager was seen reminding the construction workers to be equipped with PPE.

As previously discussed, one way to overcome the language barrier between employees and construction workers is by preparing graphic briefings for the foreign workers. Sign language is a single language spoken by people from all around the world, thus by using this as an advantage to communicate with the foreign workers; the language barrier issue would be eliminated.

IV. CONCLUSION

The results from the findings, interviews and questionnaires indicate that good organizational commitment and communication is highly associated with effective improvement in safety in the construction industry. Furthermore, the analysis shows that in average, safety climate, safety culture, safety attitude, and general safety measures taken by construction companies in Malaysia positively affect the safety performance of their respective companies.

This approach has some limitations. The open-ended questions of the questionnaire did not obtain the response that was expected, as it seems the respondents do not have the time to provide lengthy answers. For future references, it is advisable to prepare detailed multiple-choice questions, as they are easier to analyze.

ACKNOWLEDGMENT

Thank you to my supervisor, Prof. Madya Hasnora Jafri for the continuous guidance, encouragement, and support throughout this project. I also greatly appreciate the readily available sources and materials required in completing this research project generously provided by Universiti Teknologi Mara.

REFERENCE

- [1] Kim, C. (2017). *80% of accidents at Malaysian construction industries goes unreported: NIOSH*. (NST) Retrieved June 1, 2017, from New Straits Times: <https://www.nst.com.my/news/nation/2017/05/239755/8>

- 0-cent-accidents-malaysian-construction-sites-go-unreported-niosh
- [2] McCabe, B., & Karahalios, D. L. (2005). Attitudes in Construction Safety. *Construction Research Congress*.
 - [3] Loosemore, M. (1998). Psychology of Accident Prevention in the Construction Industry. *Journal of Management in Engineering*, 14 (3), 50-56.
 - [4] Han, S., Saba, F., Lee, S., Mohamed, Y., & Peña-Mora, F. (2014). Toward an understanding of the impact of production pressure on safety performance in construction operations. *Accident Analysis and Prevention*, 68, 106-116.
 - [5] Al-Humaidi, H., & Hadipriono Tan, F. (2010). Construction Safety in Kuwait. *J. Perform. Constr. Facil.*, 24 (1), 70-77.
 - [6] Ministry of Human Resources. (2008). *Occupational Accidents Statistics by Sector for the Category of Death*. Retrieved October 17, 2016, from Department of Occupational Safety and Health: <http://www.dosh.gov.my/index.php/en/resources/archive/archive-statistics/2008/725-occupational-accidents-statistics-2008>
 - [7] Ministry of Human Resources. (2017, April). *Occupational Accidents Statistics*. Retrieved May 28, 2017, from Department of Occupational Safety and Health: <http://www.dosh.gov.my/index.php/en/occupational-accident-statistics/by-sector>
 - [8] Ministry of Human Resources. (2013). *Occupational Accidents Statistics by Sector*. Retrieved October 17, 2016, from Department of Occupational Safety and Health: <http://www.dosh.gov.my/index.php/en/archive-statistics/2013>
 - [9] CIDB. (2013). *Board identifies 6 major causes of accidents at construction sites*. Retrieved June 2, 2017, from Borneo Post Online: <http://www.theborneopost.com/2013/01/03/board-identifies-6-major-causes-of-accidents-at-construction-sites/>
 - [10] New Straits Times. (2016). *Midvalley bridge collapse: Workers leg amputated on scene to save his life*. Retrieved December 7, 2016, from New Straits Times: <http://www.nst.com.my/news/2016/12/194975/overturnd-damansara-perdana-crane-safely-removed-investigation-ongoing>
 - [11] New Straits Times. (2016). *Overturnd Damansara Perdana crane safely removed, investigation ongoing*. Retrieved December 7, 2016, from New Straits Times: <http://www.nst.com.my/news/2016/12/194975/overturnd-damansara-perdana-crane-safely-removed-investigation-ongoing>
 - [12] The Star. (2016). *Crane may have been overloaded, says DOSH*. Retrieved December 8, 2016, from The Star Online: <http://www.thestar.com.my/news/nation/2016/12/07/crane-may-have-been-overloaded-says-dosh/>
 - [13] New Strait Times. (2016). *Woman killed after crane hook falls onto her car along Jalan Raja Chulan*. Retrieved December 7, 2016, from New Straits Times: <http://www.nst.com.my/news/2016/08/168358/woman-killed-after-crane-hook-falls-car-along-jalan-raja-chulan>
 - [14] Teo, E. A., Ling, F. Y., & Chong, A. F. (2004). Framework for project managers to manage construction safety. 23, 329-341.
 - [15] Dedobbeler, N., & Beland, F. (1991). Risk acceptance and safety performance on construction sites. *J Occup Med*, 29 (1991), 863-868.