

STUDY ON HEALTH AND SAFETY ASPECTS OF DEMOLITION PROJECTS IN PENANG

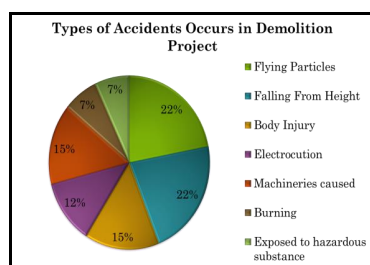
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Graphical abstract



Abstract

As a developing country, there are new developments undertaken to achieve the various goals set for developing countries. There are a lot of buildings being torn down to replace them with new buildings. The aim of this study is to see what kind of accidents and precautions to prevent or minimize accidents and also to find the cause of the accident in a demolition project. This study uses the interview in which the respondent can share more information about the experience in depth. Information gathered revealed that, the types of accidents that occur in demolition projects are similar to ordinary construction projects such as falling objects, falls from height, bodily injury and accidents caused by machinery. If precautions are ignored, various types of accidents may occur at demolition sites and potentially cause death. This study had been carried out in Penang, Malaysia.

Keywords: Health and safety, demolition, accidents on site

Abstrak

Sebagai negara membangun, terdapat pembangunan baru yang dijalankan untuk mencapai pelbagai matlamat yang ditetapkan kepada negara-negara membangun. Terdapat banyak bangunan yang dirobohkan untuk menggantikannya dengan bangunan-bangunan baru. Tujuan kajian ini adalah untuk melihat jenis kemalangan dan langkah berjaga-jaga untuk mengelakkan atau mengurangkan kemalangan dan juga untuk mencari punca kemalangan dalam sesebuah projek perobohan. Kajian ini menggunakan kaedah temubual di mana responden boleh berkongsi lebih banyak maklumat berkenaan pengalaman secara mendalam. Maklumat yang diperolehi mendapati bahawa, jenis-jenis kemalangan yang berlaku dalam projek-projek perobohan adalah sama dengan projek pembinaan biasa seperti kejatuhan objek, jatuh dari tempat tinggi, kecederaan badan dan kemalangan yang disebabkan oleh jentera. Jika langkah berjaga-jaga yang diabaikan, pelbagai jenis kemalangan mungkin berlaku di tapak perobohan dan berpotensi menyebabkan kematian. Kajian ini telah dijalankan di Pulau Pinang, Malaysia.

Kata kunci: Kesihatan dan keselamatan, perobohan, kemalangan di tapak

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1.0 INTRODUCTION

As one of the developing countries, there are massive constructions or new development being conducted to achieve many goals being set upon the title of developing countries. Apart from exploring new places, rapid development also occurs in the urban areas where there are old buildings which is still

operate and abandoned being renovated, refurbished, given new life or even demolished. There are many buildings being demolished in order to replace it with new building.

Demolition of any structure is a ground to earth technique which means the process of destroying down or falling down or collapsing down of a building with the help of some equipment and

method of demolition [1]. Besides than given new life of a building, certain building has to be demolished because of the safety factor as most of the building designed for a certain life. Demolition is a simple method for a small building or houses but it has to take seriously proper safety measures when it comes to a big building or complex structure.

Demolition project often regarded as a dangerous, complex in nature, require greater skill, experience, precision and well planned procedures [2]. Besides, demolition inevitably associated with lot of extremely high risks including accidents during its process. Since the demolition work possess a lot of high risk and hazard, thus the safety measure in the demolition work should take into account as it is a very important issue in construction industry. The purpose of this study is to determine the types of accident and method of precaution to avoid or minimize accidents and also to find the root of accidents in a demolition project

2.0 DEMOLITION PROJECTS

Demolition work is a very complex and high risk activity so the safety measures have to be taken into account as it is a very important issue involved in the process of demolition work. Nowadays, enforcement by authorities and government bodies observing strict adherences the safety of everyone involve in the construction to each sites is progressing. The government even provides incentives to the construction companies to encourage more construction personnel to undergo training programs and also encourage construction related organizations to play active role in promoting occupational safety and health in construction industry [3].

Therefore, the department of Occupational Safety and Health has issued policies to provide a safe and healthy work environment for all its employees and protect others who may be affected by its activities.

2.1 Accidents Occurrences in Construction Industry

There are many areas contribute in construction industry starting from the foundation to the roof covering of the building including the demolition of the building itself. Accident that happened in the construction industry is about similar to each scope of work and the construction industry as a third sector led to the highest accident statistic. To further strengthen the statistic, Occupational Accidents Statistics by Sector taken from the Department of Occupational Safety and Health (DOSH) Ministry of Human Resources until June 2014 are recorded and shown in Figure 1 [4].

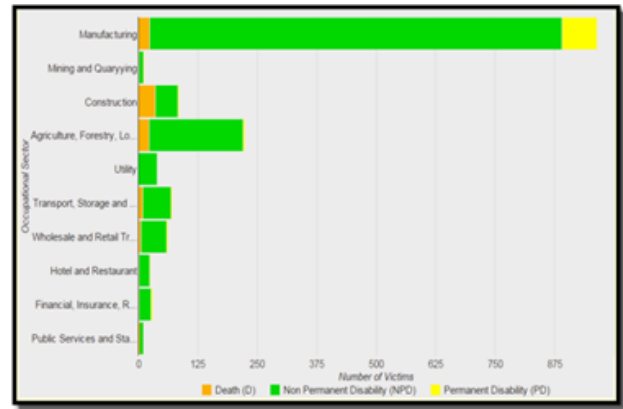


Figure 1 Occupational accidents statistics by sector until June 2014 [4]

The statistic of accident occurrence in the manufacturing sector shown the higher dominated statistic followed by Agriculture, Forestry, Logging and Fishing and the third occupied by construction sector include the demolition work.

2.2 Methods of Precaution to Avoid or Minimize Accident

In order to avoid or minimize accident occurs in construction industry such as demolition work, several methods of precaution need to be considered and emphasized.

2.2.1 Safety Manuals or Procedure

Basically, before demolition take part, a few steps or method statement has to be prepared for workers to follow [1]. Then, a safety personnel will come out with the safety precaution while undergo the job or work specifies in the method statement. Thus, workers have to follow the procedure and safety precaution stated in the documents. The purpose of the safety manual is to communicate a firm's safety policy, identify the safety factors, define responsibility and control the safety management system [6].

2.2.2 Provision of Personal Protection Equipment

Personal Protection Equipment (PPE) is recommended to all the personal involved with the construction industry when necessary to use. All personal involved with the demolition operation must be provided with the full personal protective equipment or those with protective equipment only will be allowed on site [2]. However, many workers consider that hard hats are not convenient for their operations [6] and also worker has not realized the importance of wearing PPE for the safety of his own life and health instead of worker wearing PPE due to as a job requirement and do not want to lose their job [8].

2.2.3 Safety Meeting and Trainings

Regular safety meetings are necessary for communicating safety information to all parties [6]. Besides that, with respect to identifying hazards, the Occupational Safety and Health Association provide 30-hour training for supervisor for safety competence is a good training tool and a research made to identify the necessary knowledge-based safety competencies that are most important for the front-line construction supervisor. Construction organizations who utilize the 30-hour training for supervisor safety competence must recognize its limitations and ensure supervisors are equipped with these additional competencies to effectively manage site safety [18].

2.3 Factors Caused Accident in Construction Industry

There are a lots of factors that might cause accident either fatal or injury in the construction industry. However, these factors are variable as depend on the types of accident occur or by the impact of safety behavior within industry [9].

2.3.1 Lack of Safety Awareness of Firms

A study of 'Occupational Accidents with ladder in Spain: Risk Factor' show that the size of the firm influence the factor of accidents happened [11]. The micro-firm (employees 1-5) registered the highest percentage of serious and fatal accidents and that the percentage of serious accidents was reduced as a function of the size of firm such as small firm (employees 6-50), medium firm (employees 51-250) and large firms (over 250 employees) [11].

Moreover, from a study held in China in 2007 through questionnaire and structured interview, it shows that the existing occupational health and safety in construction industry is not satisfactory [12]. About 40% of respondent explained that low health and safety awareness of firms as a major reason for the existing poor safety implementation [12] which is also reinforced by the survey from Tam *et al.* [6].

2.3.2 Lack of Training

In interviewed with some workers revealed that training is just waste of their time because they did not understand the contents and it does not represent actual working environment [8]. On the contrary, some workers consider training as one of the key elements to prepare workers to avoid accidents [8]. Besides, some accidents such as "falling from height" and "hit by falling materials" in construction could easily be prevented from implementing training programs to their employees [6].

A study of 'Characteristic Analysis of Occupational Accidents at Small Construction Enterprise' state that Taiwan's Labor Safety and Health Act prescribes that

employers must provide workers with at least six hours of training and the workers also have to pass a health and safety test before working [14]. Also, the firm should appoint the safety management personnel, determine working rules, perform training, and implement health and safety self-inspection program in order to prevents problems included not to value the importance of safety measures implemented on the workplaces, not to practice sufficient safety education for new workers, not to hire well-trained safety and health personnel to implement safety measures.

2.3.3 Workers Behavior

A research on 'Why Operative Engage in Unsafe Work Behavior: investigating factors on construction sites' [8], state various reasons that explain why workers engage in unsafe work behavior such as:

1. Ignorance and lack of safety knowledge
2. Failure to follow safety procedure and attitudes towards safety that include not wearing safety helmets or working when tired or with insufficient sleep.
3. Work environment that supports unsafe behavior such as performance pressure.
4. Financial incentives offered at the cost of safety such as production incentives without giving necessary time and resources for completion of an activity in hand.
5. Psychological factors such as poor living conditions, social or domestic pressure.
6. Exhibiting 'tough guys' in performing risky jobs on-site and co-workers encouragement to undertake tasks that are unsafe. This also includes engaging in behavior that goes against safe procedures with a view to gain a promotion or to become prominent in the eyes of the boss.
7. Lack of skill or safety training or absence of job-specific training and incompatible training to site conditions.
8. The nature of the task in hand including the workers failure to identify an unsafe condition that exists or develops after a task was started. This includes the design of work that did not consider human limitations and for that management is responsible to identify the unsafe conditions in advance for each new task.

Besides, in order to achieve the safely environment in construction site, a behavior base safety management technique such as an effective measure of safety behavior properly applied by committed management, can be applied to any country's culture, showing that it would be a good approach for improving the safety of front-line workers and that it has industry wide application for ongoing construction projects [19].

3.0 METHODOLOGY

A qualitative method used in this study. An interview session conducted in order to explore the view, experienced of individual on specific matter discuss during the session and to provide a deeper understanding of the studies. This study used semi-structured interview since the respondent can share more experience and go deeper in particular studies. Besides that, a literature based method is used to strengthen the finding in the studies. Studies from a previous research, case study, experimental and etc. are also importance to gain an idea and to produce detailed explanation on the studies conducted. Moreover, an observation on photograph taken whilst on demolition project area also included in the study. A set of photograph are observe and taken from the demolition project. Along with the topic of research on Construction Safety and Health measure in Building Demolition Project in Penang, a study area selected are within Penang area.

4.0 RESULTS AND DISCUSSION

4.1 Types of Accidents Occurs in Demolition Project

Figure 2 reveals that, flying particles and falling from height are the most repetitive types of accidents occur in demolition projects which represent 22%. This was followed by body injury and machineries caused representing 15% and electrocution by 12%. The least among them are burning and exposed to hazardous substance which amount to 7% only.

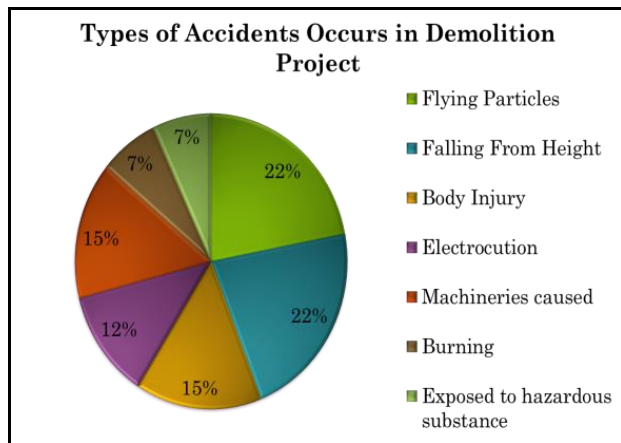


Figure 2 Types of accidents occurs in demolition project

From Figure 3, it comes to light that the types of accidents occurrence in demolition projects are similar with the normal construction project. Among 7 types of accidents mention by the interviewees, four are the highest frequency which are flying particles, falling from height, body injury and machineries caused. From a previous study, it shows that the

types of accident involve in a construction projects are fairly similar such as falling from height and falling object [5], [6].

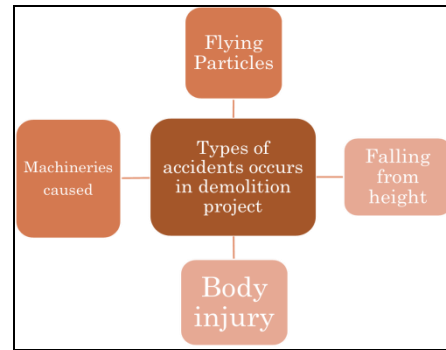


Figure 3 Summarize types of accidents occurs in demolition project

4.2 Methods of Precaution to Avoid or Minimize Accidents in Demolition Project

In finding out the methods of precaution to avoid or minimize accidents in demolition project, Figure 4 shows that the uppermost methods are proper planning of demolition project, safety plan, coordination or communication in project execution, supervision and proper PPE attire which all represent 15%. This result followed by 12% for proper housekeeping and involvement of experience or trained personnel. The lowest among the method of suggested are the violation punishment to the workers by 1% as it doesn't agreed by others interviewees as a method of precaution to avoid or minimize the accidents in demolition project.

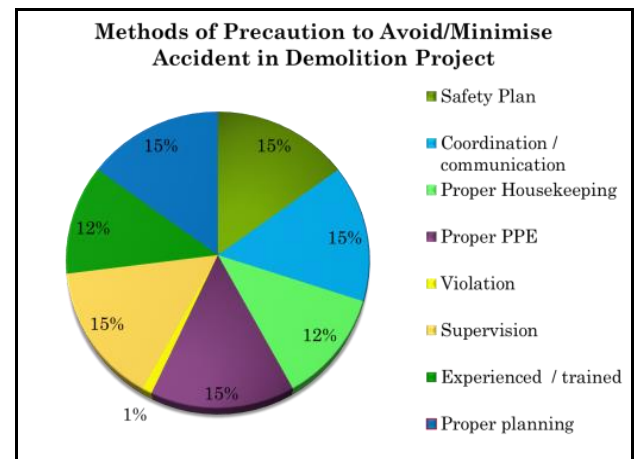


Figure 4 Methods of precaution to avoid or minimise accidents in demolition project

Figure 5 shows the analysis of a precaution method to avoid or minimize the accident in demolition projects obtained from the results' discovered in Figure 6. A proper planning before execution of

demolition project has to be prepared [1] in order to produce a safety plan as a communication tools, identification of safety, responsibilities and control the safety management system [6]. Besides that, a significant of proper PPE attire combine with proper housekeeping while demolition project is to ensure the protection of the surrounding area are harmless. Hence, continuous supervision is necessary for the reason that, workers are not aware of the risk they expose while carrying out demolition project. Therefore, the effective of labor training is a major concern in a safety management [6] as an experience and skilled workers may reduce the accidents and injury rate in construction industries [9].

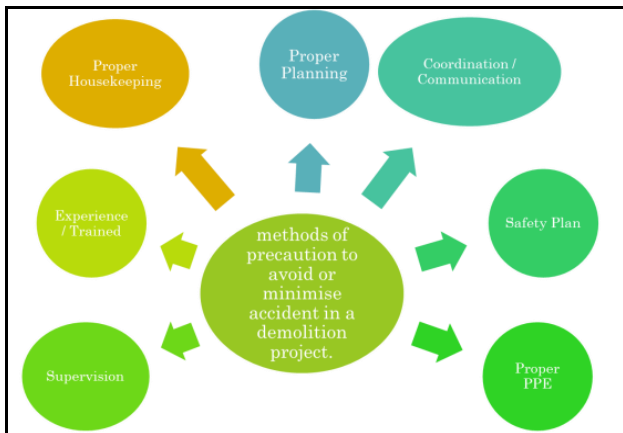


Figure 5 Summarize methods of precaution to avoid or minimise accidents in demolition project

4.3 Cause of Accidents in Demolition Project

As can be seen from Figure 6, the response received for the cause of accidents in demolition project revealed that the lack of supervision has a very high impact with 21% followed by worker's awareness with 18%. Furthermore, un-proper planning and involvement of unskilled workers also roots of accidents in demolition project which both represent 14%. The rest of them recorded are 11% for the machineries used followed by 7% both for less time and weather condition. The least of them recorded are 4% for lack of PPE attire and fewer budgets.

The analysis ended summarize that the lack of supervision, worker's awareness, un-proper planning and unskilled workers as a major factors of accidents in demolition project (Figure 7). Un-proper planning of demolition project convey harmful to workers as workers only follow the method produce. Thus, the ignorance and lack of safety knowledge and failure to follow safety procedure and attitudes toward safety engage workers in unsafe work behaviours which cause of accidents in demolition project [8]. Consequently, the root of cause influencing the accidents in demolition project due to limited education and unskilled or inexperience personnel [12] and inadequate training with fatigue of

practitioners also cause the accidents to happen [20]. Hence, supervision on site is compulsory as the lack of supervision has a high occurrence of accidents in demolition project. More enforcement by the management may reduce the likelihood of human errors that can lead to construction accidents [10].

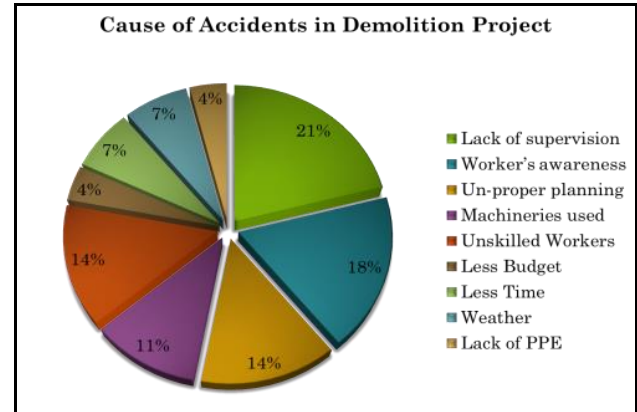


Figure 6 Cause of accidents in demolition project

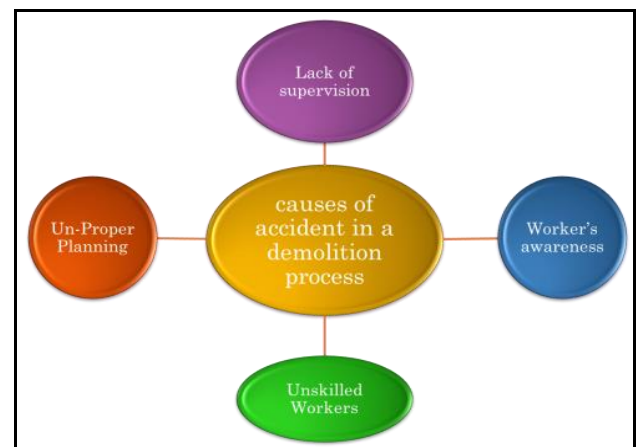


Figure 7 Summarize cause of accidents in demolition project

5.0 CONCLUSION

There are many similarities between normal construction project and demolition project. Both have the same categories of utmost accidents which are falling from height, flying particles, body's injury and accidents due to machineries use in the demolition project. Apart from that, each precaution must be taken in order to avoid or even minimize the accident from happen in a demolition work. This is because we should value human life as it is the most important mechanism. Thus, among all the precaution method suggested, it concluded that the most precaution shall be taken in a demolition project are proper planning of demolition, preparation of safety plan with a good coordination or communication between management and

workers with a great supervision on site work by means of involvement experience or trained personnel and proper PPE attire and proper housekeeping may avoid or minimize accidents from happen. If the precaution is neglected, several of accidents might happen because there are lots of roots bringing to it. Among the causes of accidents in a demolition project are due to un-proper planning of demolition work, participation of unskilled workers plus lack of supervision work and worker's behavior toward the safety and health in a demolition project.

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