ANALYZING THE THEORIES OF CONTRIBUTING FACTORS TO PUBLIC ACCIDENTS IN THE MALAYSIAN CONSTRUCTION INDUSTRY: A BRIEF OVERVIEW OF CONSTRUCTION WORKERS

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ABSTRACT

In Malaysia, the construction industry faces a wide range of challenges, one of which is the public accident and injuries at the construction sites. Construction is well known as a labor-intensive industry, thus the need to provide awareness to construction workers regarding public accidents should be the main consideration during the project implementation. On the other hand, the unsafe acts of construction workers were also considered major contributors to public accidents and injuries at construction sites. Therefore, this study aims to analyze the factors that are related to the construction workers which contribute to public accidents in the Malaysian Construction Industry. The researcher has devised two (2) objectives to accomplish the study's purpose; (1) to explore public accident cases in the construction industry, and (2) to identify the factors related to construction workers that contribute to public accidents in the Malaysian construction industry. A snowballing technique was applied through the reference list of reviewing previous papers and the findings reveal thirty-one (31) factors that are related to the construction workers which lead to public accidents and injury. The contribution of this study can therefore be a mechanism for construction workers to manage safe conditions at the workplace and raise awareness in comprehending factors that emerge in the construction industry.

Keywords: Contributing Factors, Construction Site, Public Accidents, Safety.

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1. INTRODUCTION

The construction sector has been playing a significant role in the aggregate economy of the country in terms of its contribution to revenue generation, capital formation, and employment creation, which ultimately supports the gross domestic product (GDP) and the socio-economic development of Malaysia. Considering the substantial role of the construction sector in the economic development of Malaysia, the Malaysian government has given due attention and focus to the construction sector to qualify for the title of a developed nation (Khan, Liew, & Ghazali, 2014). According to a study conducted by Khan, Liew, and Ghazali (2014), the Malaysian economy must perform efficiently and play an effective role in making true the dream of developing nation status. Therefore, due to these facts' construction activities can be seen everywhere especially in the urban area to contribute greatly to the economy.

The common construction types can be categorized into building and infrastructure, generally, the building involves residential, commercial, and industrial, meanwhile, infrastructure involves roads, bridges, airports, sewer systems, etc. The construction of a building that consists of architectural, structural, electrical, and mechanical work exposes to various hazards in the workplace and leads to a high likelihood of accidents, thus affecting public citizens too (Gharamanzadeh, 2014). At the same time, companies in the construction industry often target projects to be completed on time, which will lead to compact work schedules and therefore make the daily construction site operations riskier.

A construction site is hazardous to the public because it is a place for large pieces of machinery, heavy objects, and moving vehicles (Collier, 2018). Construction activities involved hazardous situations and unpredictable incidents during construction (Radzi, Alauddin, & Derus, 2021). Most of the construction sites are usually located in congested areas which are crowded with public activities. The geographical conditions and technical requirements of congested areas make them potentially unsuitable for construction activities that will lead to public accidents if severe precautions are not taken into consideration. Inadequate safety practices may allow incidents to occur; one common example is falling objects on innocent passersby (Ambegaonkar, 2020).

According to the investigation conducted by Yi, Shunjiang, and Wenguo (2017), public safety is regarded as an interdisciplinary research field with the core capabilities of protecting life and safeguarding property for the public while maintaining economic development at the construction sites. To build a well-off society that is powerful in science and technology, it is urgent to improve public safety at all levels and to carry out research on a public-safety science and technology development strategy (Yi, Shunjiang, & Wenguo, 2017). On that count, a group of individuals from Goodwin University (2019) also came up with their definition of public safety which means safeguarding people from crimes, disasters, and other potential dangers and threats. From the construction industry's perspective, public safety is the dedicated responsibility of construction organizations to protect innocent people from any kinds of hazards and threats at construction sites (Goodwin University, 2019).

According to the World Bank's Human Capital Index, Malaysia ranks 55th out of 157 countries as developing countries (The World Bank, 2022). Malaysia has been categorized as a group of countries that have the potential to create new technologies on their own (Ahmed E. M., 2015). For instance, a literature review conducted by a study in 2017, identified 30 factors that affect the safety and health performance of the construction industry in developing countries. These factors included among the listed findings in this study such as lack of training, reckless operations, poor equipment, lack of skilled labor, and lack of personal protective equipment (Durdyev, Mohamed, Lay, & Ismail, 2014).

2. LITERATURE REVIEW

In Malaysia, the construction industry has an important role in the development of the economy. Although the construction industry is not the main sector that contributes to Malaysia's economic growth, it acts as a catalyst for other sectors of the economy such as education, finance, manufacturing, and others. This reflects that the construction industry can be represented as one type of economic engine in Malaysia. Besides, the construction industries in Malaysia have an important role in producing wealth and improving the quality of living in this country. In addition, from the establishment of this industry, many jobs can be offered to the public and this can help the growth of other industries in Malaysia (Othman, Majid, Mohamad, Shafiq, & Napiah, 2018). However, despite the importance of the construction industry to the national economy, construction activities sadly pose serious safety risks to workers, users of construction facilities, and the public (Boadu, Wang, & Sunindijo, 2020).

The construction industry has one of the highest incidences after the manufacturing industry and is also the third biggest contributor to accident cases in Malaysia which makes the industry deemed unsafe (Aziz, Nordin, Ismail, Yunus, & Hashim, 2019). Therefore, the need for safety awareness among construction companies has greatly increased. This is due to the high cost associated with work-related injuries, workers' compensation, insurance premiums, indirect costs of injuries, and litigation (Shamsuddin, Ani, Ismail, & Ibrahim, 2015). Lack of awareness about safety practices such as disliking wearing Personal Protective Equipment (PPE) was identified as the main course of injuries at the construction site (Vitharana, Silva, & Silva, 2015). According to Ponnusamy (2019), a lack of general safety awareness in a working environment is prone to failure and causing an accident or incident. Adherence to general safety awareness is the most important key factor for all individuals to live healthily and to be safe in all environments (Ponnusamy, 2019). Additionally, contractors' lack of knowledge about Occupational Safety and Health (OSH) management systems in construction can lead to public accidents on construction sites (Kamar, Lop, Salleh, & Mamter, 2014).

According to Othman, Majid, Mohamad, Syafiq, and Napiah (2018), there are a few theories regarding the causes of accidents that could happen at construction sites. One of the theories mentioned management systems rather than individuals (Othman et al., 2018). The theory is called the Multiple Causation Model by Petersen. Petersen developed this theory of accident causes in the year 1971 but anyhow this theory is still valid today because it contributes to both the unsafe act, the unsafe condition, and, finally, the occurrence of an accident. Unlike in another theory, some causes and sub-causes contribute to an accident. Through the identification of these multiple contributing causes of an accident, unsafe acts, and unsafe conditions should be prevented. It is extremely difficult to explain construction safety management in the absence of an understanding of the causes of accidents. Before embarking on effectively and efficiently improving safety practices on the construction site, the theory of accident causation and prevention must be understood.

Malaysia is currently one of the most urbanized countries in East Asia, and one of the most rapidly urbanized regions around the world (Plecher, 2020). According to statistics, the total urban population in Malaysia has increased from 70.08% in 2009 to 76.61% in 2019 and this growth is expected to continue as people from rural areas migrate to urban areas due to the economy and employment factors (Plecher, 2020). At present, the largest area in terms of population in Malaysia is Klang Valley, which is home to around 8.3 million populations, representing about a quarter of the country's population (Worldometer, 2021). Due to this increasing urban population, the construction industry in Malaysia must come up with development plans to fulfill the needs in urban areas, especially housing needs (Ibrahim & Esa, 2018). On the other hand, this phenomenon also raises the accident rate in construction sites which has a great impact on the public nearby. Figure 1 shows the statistics of accident rate in the Malaysian Construction Industry from 2017 until 2021 Department of Occupational Safety and Health (DOSH).

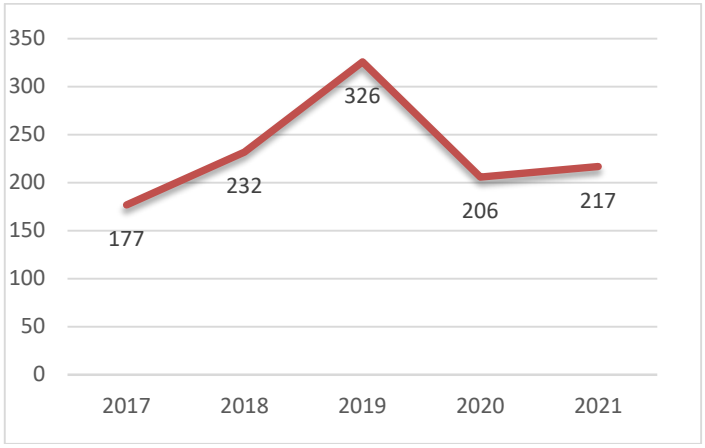

Figure 1: Accidents Rate in the Malaysian Construction Industry from the year 2017 to 2021 (DOSM, 2022).

Based on Figure 1, the accident rates are rising from the year 2017 to 2019. According to Hirschmann (2021), the accident rate starting in 2020 was lower than the previous year due to several construction projects being put on hold due to the COVID-19 pandemic (Hirschmann, 2021). According to the Department of Statistics Malaysia (DOSM), 95 accident cases in the year 2022 (January to June) have been reported and are currently in the investigation process by DOSH.

Table 1 indicates the construction site accidents in Malaysia from the year 2016 until 2021, involving the public.

Table 1: Construction accident cases involving the public in Malaysia.

Year/ Place	Accident Cases	Casualties
2021 Klang Valley	A Crane structure falls from a construction site along SUKE project, Cheras on 22nd March 2021 (Adam, 2021).	Four (4) public members were involved, three (3) reportedly died, and the other one (1) was seriously injured (Adam, 2021).
	A bridge under construction collapsed along SUKE project, Cheras on 3rd March 2021 (Adam, 2021) (Rozaidee, 2021).	Two (2) died and three (3) seriously injured. (All public members) (Adam, 2021) (Rozaidee, 2021).
2020 Klang Valley	A crane structure fell from a pass-by crane on the road and hit a car in front of it, in Kuala Lumpur, on 21st September 2020 (Zack, 2020).	One (1) public was injured (Zack, 2020).
	Fall of one-piece concrete onto public's car at SUKE project, Cheras. on 19th September 2020 (Grainger, 2017)	One (1) public was seriously injured (Grainger, 2017).
	The structure of the condominium collapsed in Taman Desa, Kuala Lumpur, on 15th February 2020 (Health and Safety, 2018).	Two (2) workers and two (2) public were injured due to being trapped below the collapsed structure (Health and Safety, 2018).
2019 Klang Valley	A crane structure from a construction site collapsed and fell onto residential areas in Bandar Baru Sentul, Kuala Lumpur, on 14th December 2019 (Ahmed S. , 2019).	Four (4) public members including a baby, were seriously injured (Ahmed S. , 2019).
2018 Klang Valley	The crane structure collapsed at the construction site in Seksyen 7, Shah Alam, on 2nd January 2018 (Hamid @ Hussain, Ariff, Sham, & Jasni, 2022).	One (1) worker was killed, and two (2) public were injured (Hamid @ Hussain, Ariff, Sham, & Jasni, 2022).
2017 Klang Valley	Crane structures fell onto a car in Kuala Lumpur, on 10th November 2017 (Wollam, 2019).	One (1) public was injured (Wollam, 2019).
	Crane collapsed at a construction site at hit a car in Kampung Baru, Kuala Lumpur, on 9th November 2017 (Wei & Yazdanifard, 2018).	One (1) worker and two (2) public were seriously injured (Wei & Yazdanifard, 2018).
2016 Klang Valley	A crane hook falls at a construction site and hit a car at Jalan Raja Chulan, Bukit Bintang, Kuala Lumpur, on 5th August 2016 (Reddon, 2022).	One (1) public was killed at the scene (Reddon, 2022).
	Piling machine structures falls and crashed a car at a construction site somewhere in Kuala Lumpur, on 5th November 2016 (Karunarathne, Young, & Guruge, 2021).	Two (2) public was instantly killed at the scene (Karunarathne, Young, & Guruge, 2021).
	A pedestrian bridge under construction collapsed at Abdullah Hukum Apartment, Bangsar, on 30th November 2016 (United States Department of Labour, 2021).	One (1) was killed and five (5) injured (All public member) (United States Department of Labour, 2021).

Based on Table 1, the total of 12 accidents cases involving public members has been reported from year 2016 until 2021. All these accidents occurred in Klang Valley which is the most populated region in Malaysia. 34 victims were involved in these accidents in 6 years' period, with 10 reportedly died and killed at the scene, while 24 reportedly injured including a baby. This result reflexed improvement should have been done for betterment in safety culture in Malaysian Construction Industry thus it needs an investigation on what factors contributed to these accidents.

3. METHODOLOGY

The first stage in the data collection is done through the previous literature studies focusing on public-related accidents on construction sites. A total of 97 related studies were collected, spanning from 2000 to 2022. The next stage is filtered the literature based on their objectives and specifically concentrates on factors that contribute to public-related accidents at construction sites by focusing the papers in between 2014 and 2022 to produce significant results. A snowballing technique was applied through the reference list using the keywords "Malaysian Construction Industry AND factors AND construction sites accidents" scaling a further 40 papers for removal as they do not match the objective of this study. As a result, only 57 papers were considered for the final analysis. The data collected from past research by various authors include journal articles, theses, books, government publications, and reports from official websites.

4. RESULTS AND DISCUSSION

Many theories in past studies about the causation of accidents have been developed over the years, some of which are very complex. Using a straightforward approach, the causes of accidents can be divided in two main categories, 'direct' or 'primary', and 'indirect' or 'secondary'. Grainger (2017) stated that a direct cause is the result of physical contact with an object or hazardous substance. While indirect cause refers to poor management policies and decisions or more to environmental factors (Grainger, 2017). Simultaneously, according to Health and Safety in 2018, accidents have primary causation and secondary causation. The primary causes are unsafe acts and unsafe conditions. The secondary causes usually take the form of system failures. The primary cause of an accident is not fundamentally the most prominent feature. Secondary causes will persist unless action is taken to correct them (Health and Safety, 2018). Similar to the theory Principle of Construction Safety book by Allan St John Holt in 2001, the causes of accidents in construction works were also divided into two - primary causes and secondary causes (Othman et al., 2018). Each of the causes of accidents is supported by various authors. Diagram 1 shows the category of accident factors.

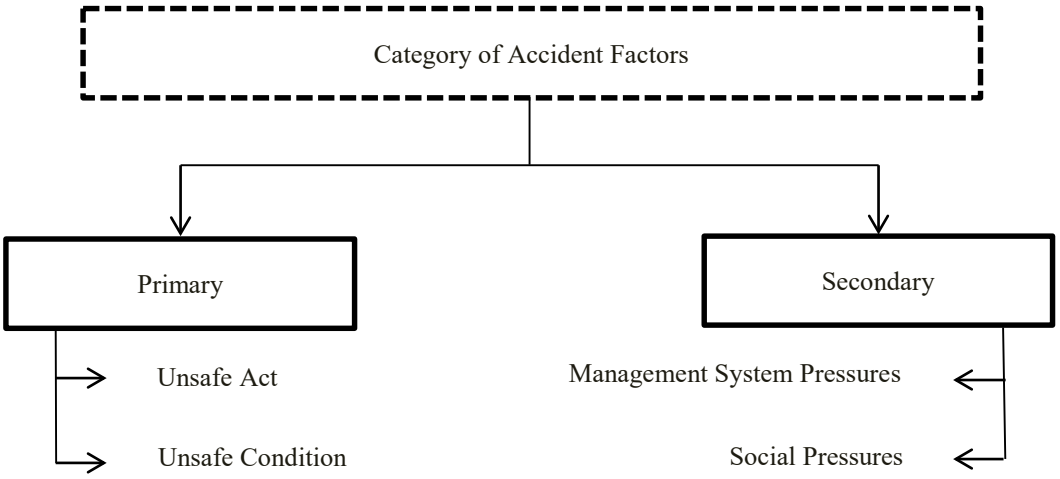

Diagram 1: Category of accident factors

Table 2: Primary causes

Categories	Causes
Unsafe Act	Working without authority
	Failure to warn of the danger.
	Leaving equipment in a dangerous condition
	Using equipment at the wrong speed
	Disconnecting safety devices such as guards
	Using defective equipment
	Using equipment, the wrong way, or the wrong tasks
	Failure to use or wear personal protective equipment (PPE)
	Bad loading of vehicles
	Failure to lift loads correctly.
	Being in an unauthorized place
	Unauthorized servicing and maintenance of moving equipment.
	Smoking in areas where this is not allowed.
	Drinking alcohol or taking drugs
Unsafe Condition	Inadequate or missing guards to moving machine parts.
	Missing guardrails
	Defective tools and equipment
	Inadequate fire warning systems
	Hazardous conditions
	Ineffective housekeeping
	Excessive noise
	Lighting issue

Table 3: Secondary causes

Categories	Causes
Management System Pressures	Financial restrictions
	Lack of commitment and policy
	Lack of standards
	Lack of knowledge and information
Social Pressures	Group attitude
	Industry traditions

4.1 Unsafe Acts

Among the causes under unsafe acts are working without authority, which is also known as unacceptable working conditions and failure to warn the dangers to other workers (Othman et al., 2018; Health and Safety, 2018, Ahmed S., 2019), leaving equipment in dangerous conditions (Othman et al., 2018), and using equipment at the wrong speed (Othman et al., 2018; Health and Safety, 2018, Ahmed S., 2019). As mentioned by Wollam (2019), a good construction environment is built through teamwork. A concerned worker is one who is attentive to the other. Once workers think they have a role in safety standards, then their advice is valued (Hamid @ Hussain, Ariff, Sham, & Jasni, 2022). Not only will productivity and quality improve the project, but the overall safety will increase, as well (Wollam, 2019). Disconnecting safety devices such as guards, using defective equipment, using equipment the wrong way or the wrong tasks and failure to use or wear personal protective equipment (PPE) (Othman et al., 2018; Ahmed S., 2019) are also recognized as unsafe acts in construction industry. Wei and Yazdanifard (2015) stated that one of the issues in hiring foreign workers is language barriers. Most of them cannot understand or speak the local language with their team, which causes a breakdown in team cohesion due to inability to communicate. Workers also find it difficult to understand work orders which in the end leads to issues such as bad loading of vehicles (Othman et al., 2018; Ahmed S.,2019) and failure to lift loads correctly (Othman et al., 2018; Reddon, 2022) due to being in an unauthorized place as well as unauthorized servicing and maintaining of moving equipment (Othman et al., 2018). Based on the study conducted by Karunarathne et al (2021), factors related to the workplace such as availability, nature of the work, individual characteristics, and work culture may influence alcohol drinking among workers as well as smoking in areas where it is not allowed (Othman et al., 2018). Further, the construction industry is a largely growing industry where male lay workers are highly vulnerable to the consumption of smoking and alcohol (Karunarathne et al., 2021).

4.2 Unsafe Conditions

Inadequate or missing guards to moving machine parts is listed as unsafe conditions in workplace. Construction work is inherently dangerous, and these dangers are sometimes caused by defective tools and equipment (Othman et al., 2018; Health and Safety, 2018). Due to the nature of such work, working on construction sites can be dangerous because of the hazardous conditions which one wrong move can lead to public accidents to occur (Othman et al., 2018; Health and Safety, 2018; Ahmed S., 2019; Reddon, 2022). On the other hand, working at height with no catch platform is one of the hazardous conditions, which object may fall to the innocent bystanders and cause an accident to occur. Besides that, housekeeping in the construction industry is not just about cleaning. Poor and ineffective housekeeping is one of the unsafe conditions such as dangerous storage of materials, dirty floors, and broken equipment (Othman et al., 2018; Health and Safety, 2018). Excessive noise at construction sites can create physical and psychological stress, reduce productivity, interfere with communication and concentration, and contribute to workplace accidents and injuries by making it difficult to hear warning signals (United States Department of Labour, 2021). Similarly, lighting issue (Othman et al., 2018; Health and Safety, 2018; Ahmed S., 2019; Reddon, 2022) such as inadequate lighting can make one difficult to see clearly and may contribute to hazards, while excessive lighting can cause discomfort and headache as well as lead to workers make mistakes during deliver their jobs (Waris, 2017).

4.3 Management System Pressures

Management issues such as lack of commitment and policy, lack of knowledge and information contribute to work pressures to the construction workers, restricted training and selection for tasks also can cause pressures in the workplace issue (Othman et al., 2018; Health and Safety, 2018; Ahmed S., 2019). Creating work more in an already intense schedules influence workers to not participated in the job or not get the job done properly (Hutchinson, 2021) are the example of poor-quality control system (Othman et al., 2018; Ahmed S., 2019) in construction industry which lead to accident to occur. Tight project schedules are a leading factor in this sector as well. Construction schedules can impose “unrealistic time constraints and time pressure in projects”, which is then passed on to workers thus lead to the accident on-site (United States Department of Labour, 2021)

4.4 Social Pressures

Generally, a construction worker holds multiple identity-defining memberships while working on a project and their performance is influenced by the group attitude. Further, the industry traditions which is long and inflexible work hours are also a substantial contributing factor to work-family conflict and cause an imbalance between work and non-work life lead to workplace injuries, mental illness, suicide and lack of diversity (Othman et al., 2018; Health and Safety, 2018; Ahmed S., 2019; Culture in Construction., 2021).

5. CONCLUSION

Literature research shows that there are 31 factors that contribute to public accidents by construction workers’ overview and have been categorized as primary and secondary causes. Based on the literature, there are 22 primary causes and 9 secondary causes listed in past studies. This statement shows that the listed unsafe acts and unsafe conditions are riskier and tend to contribute to public-related accidents on construction sites. Therefore, it is suggested that the construction workers must be exposed to a good working environment with training provided regarding the factors that contribute to public accidents on construction sites.

Despite what might be expected, all parties, including regulators, contractors, consultants, and workers, must be totally committed to safety and health to reduce the pattern of accidents in the construction industry. Following the rules and regulations will reduce accidents and, as a corollary, positively affect Malaysia's economy and quality of life. Because there are numerous workers and that number is indeed rising, it is essential and challenging to raise worker understanding of safety and health. To limit the factors that cause accidents, which include human, workplace, management, and external elements, an appropriate safety and health management program must be implemented.

Even though most of the analysis made from the worldwide literature, however, from the theoretical perspectives, the findings also can be applied to the Malaysian Construction Industry as the characteristics and foundation upon which the construction industry in developing countries is built and operates for safety and health management within the industry (Boadu, Wang, & Sunindijo, 2020). Therefore, this study corroborates with the findings in worldwide literature as Malaysia listed as one of the developing counties.

Additionally, this study reviewed factors that contribute to public accidents in the Malaysian Construction Industry by construction workers' overview. The highlighted factors will act as a base for the construction workers in determining the complexity and avoiding potential hazards. The outcomes of this study are expected to raise awareness and assist construction workers regarding the factors that emerge in the construction industry.

Nevertheless, this study focused primarily on qualitative analysis. Hence, a future study could investigate a similar topic but employing a quantitative method or use various theoretical models or frameworks to investigate different research areas in safety and health at workplace that could further inform and improve the Malaysian Construction Industry.

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7. REFERENCES

Adam, A. (2021, March 22). *Crane falls from construction site along SUKE in Cheras, three Chinese nationals dead.* Retrieved from MalayMail: https://www.malaymail.com/news/malaysia/2021/03/22/crane-falls-from-construction-site-along-suke-in-cheras-three-chinese-natio/1959922

Ahmed, E. M. (2015). Factors Determining Malaysia To Be A Developed Nation. *Conference: 2nd IDR Annual Research Seminar.* Ipoh, Perak.

Ahmed, S. (2019). Causes and Effects of Accident at Construction Site: A Study for the Construction Industry in Bangladesh . *International Journal of Sustainable Construction Engineering and Technology, 10*(2), 18-40.

Ambegaonkar, R. (2020, February 13). *The Importance of Safety on Construction Sites*. Retrieved February 7, 2021, from New York Engineers: https://www.ny-engineers.com/blog/the-importance-of-safety-on-construction-sites

Aziz, N., Nordin, R., Ismail, Z., Yunus, J., & Hashim, N. (2019). Occupational Safety and Health (OSH) Concept Towards Project Performance. *Built Environment Jounal (BEJ), 16*(2), 55-68.

Boadu, E. F., Wang, C. C., & Sunindijo, R. Y. (2020). Characteristics of the Construction Industry in Developing Countries and Its Implications for Health and Safety: An Exploratory Study in Ghana. *International Journal of Environmental Research and Public Health, 17*(4110), 1-20.

Collier, E. (2018, April 25). *Protecting the Public During Construction Projects*. Retrieved February 7, 2021, from Hub from High Speed Training : https://www.highspeedtraining.co.uk/hub/public-safety-during-construction/

Culture in Construction. (2021, September 9). *Construction industry's cultural issues cost $8 billion annually.* Retrieved August 16, 2022, from https://cultureinconstruction.com.au/2021/09/construction-industrys-cultural-issues/

DOSM. (2022). *Accident Rate Statistic by Sector.* Retrieved from Department of Statistics Malaysia.

Durdyev, S., Mohamed, S., Lay, M. L., & Ismail, S. (2014). Key Factors Affecting Construction Safety Performance in Developing Countries: Evidence from Cambodia. *Construction Economics and Building, 17*(4), 48-65.

Gharamanzadeh, M. (2014). *Managing Risk of Construction Projects: A Case Study of Iran.*

Goodwin University. (2019, August 28). *What is Public Safety and Where Do You Fit in?* Retrieved 2022, from https://www.goodwin.edu/enews/what-is-public-safety-and-where-do-you-fit-in/#:~:text=At%20a%20high%20level%2C%20public,government%20organizations%20and%20local%20departments.

Grainger. (2017, September 1). *Incident Investigation.* Retrieved from Know How: https://www.grainger.com/know-how/safety/safety-management/safety-management-systems/kh-accident-investigation-qt-189

Hamid @ Hussain, S., Ariff, A., Sham, A., & Jasni, M. (2022). Implementation of Safety Performance Using Safety Culture in the Oil. *Journal of Administrative Science (JAS), 19*(1), 189-209.

Health and Safety. (2018, March 26). *What Causes Workplace Accidents?* Retrieved from HSEBlog: https://www.hseblog.com/what-causes-workplace-accidents/#:~:text=The%20Accidents%20have%20primary%20causation,fundamentally%20the%20most%20prominent%20feature.

Hirschmann, R. (2021, August 2). *Number of construction accidents in Malaysia 2014-2020.* Retrieved from Statista: https://www.statista.com/statistics/965651/total-number-of-construction-accidents-malaysia/

Hutchinson, B. (2021, July 12). Production pressures in the building sector of the construction industry: a systematic review of literature.

Ibrahim, F., & Esa, M. (2018). The Implementation of Risk Management Plan: Towards Safer Hillside Development Projects. *International Conference on Applied Science and Technology (ICAST) 2017: Malaysian Construction Research Journal (MCRJ) Vol.3 No.1* (p. 1). Penang: Scopus Elsevier.

Kamar, I., Lop, N., Salleh, N., & Mamter, S. (2014). Contractor's Awareness on Occupational Safety and Health (OSH) Management Systems in Construction Industry. *Research Gate*, 1.

Karunarathne, R., Young, M. S., & Guruge, G. N. (2021). Engaging Construction Workers in Identifying Determinants and Deciding on Measures to Address Tobacco and Alcohol Consumption: An experience from Sri Lanka. *Asian Pac. J. Health Sci.*

Khan, R., Liew, M., & Ghazali, Z. (2014). Malaysian Construction Sector and Malaysia Vision 2020: Developed Nation Status. *ScienceDirect*, 508-523.

Othman, I., Majid, R., Mohamad, H., Shafiq, N., & Napiah, M. (2018). Variety of Accident Causes in Construction Industry. *MATEC Web of Conferences 203, 02006* (p. 9). Malaysia: ICCOEE 2018.

Plecher, H. (2020, October 21). *Urbanization in Malaysia 2019*. Retrieved February 11, 2021, from Statista Website: https://www.statista.com/statistics/455880/urbanization-in-malaysia/

Ponnusamy, S. (2019). Lack of General Safety Awareness in the Society. *Android App Development, Safety & Disaster Management*, 1.

Radzi, N., Alauddin, K., & Derus, M. (2021). Improving the Effectiveness of Risk Management Among Sub-Contractors in the Northern State of Malaysia. *Built Environment Journal (BEJ), 19*(1), 23-31.

Reddon, T. (2022). *8 Common Causes of Workplace Accidents*. (ReliablePlant) Retrieved from https://www.reliableplant.com/Read/30411/workplace-accidents-causes

Rozaidee, A. (2021, March 4). *SUKE Bridge Collapses And Kills 2 People While Leaving 3 Others Injured.* Retrieved from SAYS: https://says.com/my/news/suke-bridge-collapses-and-kills-two-people-while-leaving-three-others-injured#:~:text=A%20bridge%20that%20was%20part,incident%20at%20around%205.58pm.

Shamsuddin, K., Ani, M., Ismail, A., & Ibrahim, M. (2015). Investigation the Safety, Health and Environment (SHE) Protection in Construction Area. *International Research Journal of Engineering and Technology (IRJET): Volume: 02 Issue: 06* , 624-636.

The World Bank. (2022, April 21). *The World Bank In Malaysia*. (The World Bank) Retrieved September 2, 2022, from https://www.worldbank.org/en/country/malaysia/overview#:~:text=Malaysia%20is%20one%20of%20the, Malaysia%20linked%20to%20export%20activities.

United States Department of Labour. (2021). *Occupational Safety and Health Administration.* Retrieved 2022, from https://www.osha.gov/machine-guarding

Vitharana, H., Silva, S., & Silva, S. (2015). Health Hazards, Risk and Safety Practices in Construction Sites – A Review Study. *Research Gate*, 35-44.

Waris, M. (2017, January 6). *Workplace Lighting.* Retrieved August 16, 2022, from https://www.hsmemagazine.com/article/workplace-lighting/

Wei, W. M., & Yazdanifard, R. (2018). The Review of Challenges Foreign Workers Face in. *Global Journal of Management and Business Research: A Administration and Management, 15*(4), 1-5.

Wollam, M. (2019, August 14). *The Power of Teamwork in Construction*. (Wollam Construction) Retrieved August 22, 2022, from https://wollamconstruction.com/the-power-of-teamwork-in-construction/

Worldometer. (2021, February 10). *Demographics of Malaysia: Malaysian Population (LIVE)*. Retrieved February 11, 2021, from Worldometer: https://www.worldometers.info/world-population/malaysia-population/

Yi, L., Shunjiang, N., & Wenguo, W. (2017). Development of the Public Safety System and a Security-Guaranteed Society. *Strategic Study of Chinese Academic Engineering, 19*(1), 118-123.

Zack, J. (2020, September 21). *Car damaged by crane in road collision, not falling debris, say cops.* Retrieved from The Star: Car damaged by crane in road collision, not falling debris, say cops