

# Framework on Safety Influential Factors for the Performance of Malaysian Construction Industry

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## Abstract

The construction industry in Malaysia is one of the main contributors to the country's GDP. The construction industry also offers employment opportunities for local and foreign citizens. This paper developed a framework on safety influential factors for the performance of Malaysian construction industry. The paper reviewed relevant literature and figure out the most relevant variables coupled with the mediating variable on the developed framework. The conceptual framework in this paper depicts the relationships between Independent Variables (Management Activities on Site, Incentives, Policy Factors, Personnel Factors, Technical Factors, Process Factors), Mediating Variable (Staff Training) as well as Dependents Variable (performance of Malaysian Construction Industry). The paper show that there is a mediating effect on the relationship between factors influencing safety and performance of Malaysian construction industry.

## Keywords

Safety Influential Factors, Performance, Construction Industry and Malaysia

## 1. Introduction

Since 1999, “the construction sector has remained the fastest growing industry in the economic sector. This is because the construction industry plays a major role in the development of Malaysia. Specifically, the sector makes a huge contribution to the Malaysian Gross Domestic Product (GDP). The construction industry grew by 8.2 per cent, or RM140 billion in 2015 and 7.4 per cent, or RM166 billion in 2016. Meanwhile, in the third quarter of 2017, the industry’s growth was recorded at 6.1 per cent, and it was estimated to increase by the end of the year (Zaira, & Hadikusumo, 2017).

In developing Malaysia on becoming a developed nation by the year 2020, construction industry has been recognized as one of the major economic forces. Unfortunately, high rates of accidents and fatalities had tarnished its reputation and image. Globally, the construction industry is still considered as one of the most hazardous industries (Jaafar et al., 2018). Construction safety as a result continues to represent a problem and pose a challenge for researchers and practitioners. In Malaysia, both the society and economy have suffered human and financial losses as

a result of the poor safety performance in the construction industry. Department of Occupational Safety and Health (DOSH) in Malaysia reported that occupational accidents by sector shows that the highest number of deaths was in the construction industry as of for the 2013 incidents” (Mohammad, & Hadikusumo, 2017). Figure 1 showed the Occupational accident Statistic until December 2013.

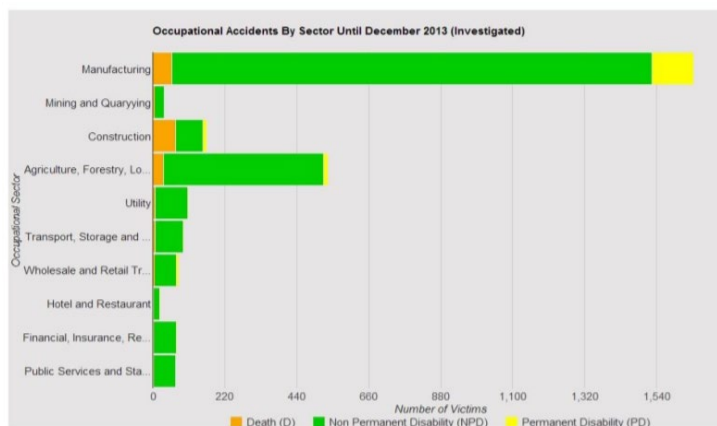


Figure 1. Occupational Accidents Statistics in Malaysia by sector until December 2013  
Source: (Hamdan 2015)

In a study carried out on Honduras constructions sites, Jaselskis and Suazo (1994) “demonstrated a substantial lack of awareness or importance for safety at all levels of the construction industry. Department of Safety and Health (DOSH) have imposed comprehensive safety regulations in the construction industry. However, the level of awareness and practicability of it are generally lower than expected over the last five (5) years (Zid et al., 2018).

According to Razak et al., (2017), good safety programs would certainly help in reducing injuries at construction site. It will also minimise construction costs, increase productivity and profitability and more importantly it could save lives of workers. Thus, these will consequently contribute positively to construction industry and nation as a whole. Besides causing delays in operations, accidents also cause directly and indirectly incur costs (Hamid et al., 2018). Therefore, as required by the Occupational Safety and Health Act 1994 (OSHA), it is mandatory for all construction companies to provide a Health and Safety Officer for project more than” RM20 million.

Similarly, the “construction industry needs to develop its Occupational Safety and Health (OSH) policy. The OSH policy is enforced by the government as a rule that should be followed at construction sites. The OSH policy is important as it facilitates the investigation of the causes of serious occupational accidents and work-related diseases, engages in product control, and is responsible for occupational safety and health enforcement at the initiative of the customer and other players (Marhani et al., 2018). Safety is a very crucial issue, especially in the construction industry. However, many construction firms ignore and do not take serious action on the safety issues. The construction industry has one of the highest accident occurrences, which makes the industry deemed unsafe (Jaafar et al., 2017). There are high injury and death rates in the construction industry (Mohd et al., 2019) while the construction site is one of the most dangerous workplaces due to the high accidents” rates.

Since 2016, several accidents were reported at the construction sites and the number has been increasing every year. For example, in an accident at a construction site in Hulu Selangor, one person died, and four were injured after a metal scaffolding at the site fell on the workers (Yap, & Lee, 2019). Besides, the number of accidents at construction sites is rising, according to the statistics from the Social Security Organization (SOCSO), 7,338 accidents were reported in the construction industry in 2016 “compared with 4,330 cases in 2011, showing an increasing trend of 69 per cent over five years (Khan et al., 2019).

Many Scholar have discussed about the awareness factor that affects safety performance (Gitinavard et al., 2020), time barriers factor (Borkovskaya et al., 2019), and management commitment factor (Loosemore, & Malouf, 2019). However, there is a lack of research focusing on the safety factors that influence the performance of Malaysian construction industry, therefore, this research aimed to fill this gap and develop a safety influential factors model for the performance of Malaysian construction” industry.

## 2. Factors Influencing Safety Performance on Construction Industry

The “construction industry is mainly considered as the most fraught with danger in related to personal safety. Therefore, there is a negative stereotype concerning safety in the construction industry. Occurrence of accidents and injuries can bring major losses to individuals’ lives, organizations, and societies. From another aspect, accidents not only cause horrible human disasters but also create substantial economic losses. These financial losses are due to the impact of accidents and damages on plant equipment and workers. Moreover, there is also a loss of productive work time until the normal site working environment and morale return to the initial state (Mohammadi et al., 2018).

The construction workers are one of the most vulnerable members in a project and are faced with potential risks and exposure throughout the construction process. According to the Social Security Organization (SOSCO) (2001), the number of construction accidents has increased by 5.6% from 4,406 cases in 2003 to 4,654 cases in 2016. In addition, the fatality rate has increased by 58.3% from 60 cases in 2003 to 95 cases in 2016. The statistic of accidents at construction sites give us a picture that Malaysian construction industry is one of the critical sectors that need a huge and fast overhaul from the current site safety practices (Awolusi, & Marks, 2017). Therefore, this research aims to develop a safety influential factors model for Malaysian construction industry. The factors employed in this research” work is discussed in table 1:

Table 1. Factors Influencing Safety Performance on Construction Industry

Major Factor	Factor Elements	Discussion
Management Activities on Site	Safety Inspection	Alarcón, Acuña, Diethelm, & Pellicer, (2016) suggested 5 valid elements safety management activities, such as safety inspection, safety meeting, safety regulation enforcement, safety education and safety communication. Safety on sites can be improved effectively provided that safety inspection can function as a continuous improvement tool to benchmark safety at workplace. Coupled with regular safety meeting on sites, safety issues can be properly reconciled (Lu, Cheung, Li, & Hsu, 2016). Nevertheless, effective governance of safety on sites highly demands strict regulation enforcement. Workers will utterly comply with safety regulations if the management insists on issuing warnings and fines for safety noncompliance. Failure of doing so will result in high accident rates as a result of noncompliance of safety procedures on sites (Probst and Estrada, 2010). To ensure all personnel are aware with the safety matters and acquainted with the nature of working environment on sites, management should emphasize on giving adequate training and education that will equip them with appropriate safety knowledge to mitigate future accidents (Gunduz, Birgonul, & Ozdemir, 2017) . Propagation of safety information require management commitment in providing a robust channel of communication between workers to participate in joint problem solving processes that would enhance safety performance on sites.
	Safety Meeting	
	Safety Regulation	
	Enforcement	
	Safety Training and Education	
	Safety Communication	
	Monetary Incentives	Incentives factor is one of the determinants that motivate workers to behave in a desired manner to safety regulations on site. It can be viewed a psychological approach that rewards workers for their adhered routine on site (Abas, Yusuf, Suhaini, Kariya, Mohammad, & Hasmori, 2020). Teo et al (2005) suggested that incentives programs consist of 3 main
	Non-Monetary	

<p><b>Incentives</b></p>	<p>Incentives</p> <p>Disciplinary Action</p>	<p>elements such as monetary , non-monetary, and disciplinary action. A reward system that utilizes money, coupled with non-monetary incentives in the form of holidays, recognitions, promotions can encourage workers to monitor their own safety behaviour and performance is capable of improving safety behaviour. Workers on site tend to establish their behaviours consistent with the organizations goal, opting for both forms of rewards at the end of the specified compliance of rules. Disciplinary action on the other hand is a form of punishment to the personnel who violates established sets of safety rules and regulations on site. It can take the form of hefty fines and compounds for violators. Combination of reward and punishment can be regarded as a strategy that inculcates safe behaviours among workers on site.</p>
<p><b>Policy Factors</b></p>	<p>Formulation of Safety Policies</p> <p>Well-written and High standard Policies</p> <p>Comprehensible and explicit policies</p> <p>OHSAS 18001 certification</p>	<p>Safety policy is an illustration of the organization’s expression in prioritizing safety in workplace (Patel, &amp; Jha, 2016). Depicted in Malaysia OSHA (1994) act, it is the duty of the employer to formulate safety policies to his employers in workplace. Notably, having high characteristics standard policies will harness positive management attitudes, formal conditions, collective values and individual attitudes that will foster better safety performance (Torner and Pousette, 2009). However, on another contention, if safety management systems on sites are complimented with a comprehensible policies that is well versed by all personnel on sites, employees will be able to execute any safety system in parallel with their nature of work (Teo, &amp; Love, 2017). Clear cut policies are however inadequate without having a unified international standard to govern how the policies are carried out. OHSAS 18001 certification standards comes in handy when it is able to help organization to control risks related to occupational health and safety event. It is proven that companies with OHSAS 18001 certification in firms perform better in terms of safety than those who do not (Vinodkumar and Bhasi, 2011).</p>
<p><b>Personnel Factors</b></p>	<p>HQ-Management Attitude towards Safety</p> <p>Supervisors and Workers attitude towards safety</p> <p>Constant Monitoring of Human Errors.</p>	<p>Various studies have denoted personnel factors as any related issues concerning human aspects in workplace. Teo et al (2005) suggested that personnel factors consist of both management attitude towards safety, and supervisors and workers attitude towards safety, where both significantly shape the organization on sites. Direct support and involvement in safety by head quarter’s management is a sign of management positive attitude towards safety (Jahangiri, Zadeh, Bashar, &amp; Zadeh, 2017).). Similarly, a high safety attitude among supervisors will yield a positive safety culture on site. However, this can only be done with continuous safety competence training and seminars (Tam et al., 2004). Nevertheless, constant monitoring of human errors on construction sites can be a proactive way in improving personnel safety</p>

		performance. Human errors on sites are commonly a result of faulty judgment and failure to follow safety rules and regulations (Hetherington et al., 2006). By taking this human touch into consideration, personnel errors can be assessed and modeled, preventing any future possibilities that will trigger accidents on site (Sorenson, 2002).
<b>Technical Factors</b>	Organized Technicalities  Risk Response and Risk Management System  Adequate PPE that is aligned with the nature of work	Technical aspects comprise layout of work, equipment, degree of automation, design of work environment, maintenance and also safety related systems such as risk control systems, personal protective equipment and emergency control system (Sgourou et al., 2010). Effective and organized technicalities should be employed on site that will ease the complexity of construction works to hinder any unsafe conditions and unsafe behaviours. To cope with hazards, risk effective risk response and risk management system are vital to manage, eliminate and enhance safety. When hazards cannot be completely eliminated, priorities must be given towards the effort of encouraging technical competence and hazards awareness through appropriate prevention methods such as the use of personal protective equipment (Olson et al., 2009). Adequate technicalities will gradually improve safety performance on site.
<b>Process Factors</b>	Identify Hazards  Assess Risks  Contingency Plans for Works  Safety Standard of Procedure for Work Processes	Process factors can be defined as the way of doing a particular task in the effort to achieve objective, goals or producing final product. The focal point in process factor is the effectiveness of control measure towards personnel due to the vast variation of construction activities (Sertyesilisik, Giritli, Gunaydin, Deniz, Nadar, Gurcanli, & Sertyesilisik, 2016). Hence, safe way of working has been the main priority on construction sites. DOSH (2008) in Malaysia has bring forth a standard guideline known has HIRARC(Hazard identification, Risk Assessment and Risk Control ) to assist safety personnel on sites to assess hazardous works, evaluate risks and develop a standard procedure for each and every detail of construction works on site.

The table above shows the factors influencing safety performance on construction sites together with their factor elements. These factors play a very vital role in influencing safety performance in construction industry, these factors if properly employed by construction industry would undoubtedly lead to the reduction of accident in the construction industry in Malaysia.

### 3. Staff Training

Training both physically, socially, intellectually, and mentally are very essential in facilitating “not only the level of productivity but also the development of personnel in any organization. However, knowledge is the ability, the skill, the understanding, the information, which every individual requires acquiring to be able to function effectively and perform efficiently. Human resources are the most valuable assets of any organization, with the machines, materials, and even the money, nothing gets done without manpower. Bachrach, & Goodman, (2019) submitted that: Training is a systematic development of the knowledge, skills, and attitudes required by employees to perform adequately on a given task or job. It can take place in a number of ways, on the job or off the job, in the organization or outside the

organization. Soon et al., (2017) observed that staff training is a work activity that can make a very significant contribution to the overall effectiveness and profitability of an organization. He, therefore, provides a systematic approach to training which encases the main elements of training.

The effectiveness and success of an organization, therefore, lies in the people who form and work within the organization. It follows therefore that the employees in an organization to be able to perform their duties and make meaningful contributions to the success of the organizational goals need to acquire the relevant skills and knowledge. In appreciation of this fact, organization” like construction industry, conduct training programs for the different levels of their manpower (Gulliver et al., 2018).

After the training program, an evaluation is carried out to ascertain the effectiveness of the “program in line with the need, which had been identified. It is worthy of mention that organization development follows the development of individual who form the organization. It follows that no organization becomes effective and efficient until the individual has and apply the required skills and knowledge. Training has been observed as part of human development, human development is a process of enlarging people’s choices. In principle, these choices can be infinite and change over time. But at all levels of development, the three essential ones are for people to live a long and healthy life, to acquire knowledge through training, and to have access to resources needed for a decent standard of living. If these essential choices are not available many other opportunities remain inaccessible. According to the concept of human development, income is only one option that people would like to have, albeit an important one. Development must, therefore, be more than just the expansion of income and wealth (Spector et al., 2016) and since administering involves the creation and maintenance of an environment for performance, working closely or in isolation towards the accomplishment of common goals, it is obvious that administrators cannot be successful without well-skilled and well-trained people (Spector et al., 2016). The importance of incorporating training into organizational or institutional roles the staffing of these roles and the entire process of direction and leading people must be premises on knowledge and skills (Nimmo, & Clapham, 2016).

The need for improved productivity in organization has become universally accepted and that it depends on efficient and effective training. It has further become necessary given the advancement in the modern world to invest in training. Thus, the role played by staff training can no longer be over-emphasized. However, the need for organizations to embark on the staff development programme for employees has become obvious. Absence of these programme often manifests tripartite problems of incompetence, inefficiency and ineffectiveness. Oehler et al., (2017) submitted that training and development aim at developing competencies such as technical, human, conceptual and managerial for the furtherance of individual and organization growth, also Isyaku (2000) postulated that the process of training and development is a continuous one. Man is dynamic, the need to be current and relevant in all spheres of human endeavor’s make staff training” a necessity, to keep track with current event and methods. Kim-Soon et al., (2016) have drawn the attention of the entire sundry to the inestimable value of staff training. It is an avenue to acquire more and new knowledge and develop further the skills and techniques to function effectively. Scholars, experts, social scientist and school administrators now recognize the fact that training is indispensable not only in the development of the individuals but also facilitate the productive capacity of the workers. Training is not coaxing or persuading people to do what is wanted but rather a process of creating organizational conditions that will cause personnel to strive for better performance.

Among other schools that highlighted the usefulness of training are Dillenburger et al., (2016). They identified the functions of training as follow: increase productivity, improves the quality of work; improves skills, knowledge, understanding and attitude; enhance the use of tools and machine; reduces waste, accidents, turnover, lateness, absenteeism and other overhead costs, eliminates obsolete in skills, technologies, methods, products, capital management etc. It brings incumbents to that level of performance which needs the performance for the job; enhance the implementation of new policies and regulations; prepares people for achievement, improves manpower development and ensures the survival and growth of the enterprise. Hassiotis et al., (2018) is of the opinion that the objectives of training are to provide the skills, knowledge and aptitudes necessary to undertake required job efficiently develop the workers so that if the worker has the potentials, he may progress, increase efficiency by reducing spoilt work, misuse of machines and lessening physical risks.

Schenkel et al., (2020) submitted that training aim at developing competencies such as technical, human, conceptual and managerial for the furtherance of individual and organizational growth. Also, Knotter et al., (2018) postulated that the process of training is a continuous one, the need to perform one’s job efficiently and the need to know how to lead others are sufficient reasons for training and the desire to meet organizations objectives of higher productivity, makes it compulsory. Therefore, this is the reason why Malaysian construction industry employed training to develop the capacity of” their staff, thus, in this paper, staff training is employed as a mediator between dependents and independent variables.

## **4. Conceptual Framework**

### **4.1 Relationships between Factors Influencing Safety and Performance of Malaysian Construction Industry**

Factors influencing safety and performance of construction industry have been investigated extensively in different “countries all over the globe and it is assumed that a relationship exists between the two variables (Islam et al., 2016). The belief is such that sound factors influencing safety generally lead to high level performance of construction industry (Javed et al., 2012). Many researchers have investigated empirically the effects of factors influencing safety on construction performance (e.g., Khanna & Sehgal, 2016; Oyenyi et al., 2014; Ray & Ray, 2011; Werku, 2015 ) and generally found a positive impact. For instance, Ray and Ray (2011) examined the influence of safety practices on construction performance of 17 construction companies in India. The study revealed that safety practices have a positive impact on performance of construction companies.

Another study, Oyenyi et al., (2014) examined the influence of safety practices on construction companies in Nigeria. The study shows the positive relationship between safety practices and construction companies. In a later study, Niazi (2014) investigated the influence of “safety practices in construction site in Pakistan, the results indicated a positive relationship between safety practices and construction companies.

In Ethiopia, Werku, (2015) examined the effects of safety practices on construction industry. The regression result shows that all safety practices dimensions have a significant positive impact on construction industry performance. In a recent empirical study Khanna and Sehgal (2016) examined the effects of safety practices on the performance construction sector in India, the result showed that the safety practices have significant impact on” the performance construction sector in India.

Although different researchers have studied different sets of safety “practices, most of them agree that certain practices are important in generating high performance. (Khanna & Sehgal, 2016; Oyenyi et al., 2014; Werku, 2015).

### **4.2 Mediating Effects of Staff Training on the Relationship between Factors Influencing Safety and Performance of Malaysian Construction Industry**

Staff training plays a very vital role in developing staffs’ capacity to achieve organizational objectives. Any organization that lack proper training among its staff would undoubtedly lagging because of competitions. Many researchers are of the view that staff training mediate the relationship between Factors Influencing Safety and Performance of Malaysian Construction Industry. A research by Kumar and Khair (2018) titled influence of training on Safety practices and Performance of Construction Industry, in which they employed quantitative methodology and they used 315 respondents for their analysis, they found out that staff training built the ability of the employees to work perfectly with the new technology that is associated with Safety practices to achieve Performance in Construction Industry. Similarly, a research conducted by Shehu and Faisal (2016) with the title an influence of staff training between safety practices and performance of construction industry, they employed quantitative methodology in their research and they collect data from 211 respondents, they used Statistical Package for Social Science (SPSS) and Analysis of Moment Structure (AMOS) for their analysis, their findings shows significance influence of staff training in the relationship between safety practices and performance of construction industry.

Shariff and Faheem (2018) conducted a research on a mediating influence of staff training between construction safety factors and performance of construction industry in the north-eastern part of Nigeria, they collect the relevant data from the 345 respondents and analysed it using SPSS and AMOS software, their findings shows strong influence of staff training between construction safety factors and performance of construction industry. Similarly, Karyan and Ranjed (2015) conducted a research in India to investigate the influence of staff training on safety practices and the performance of construction industry, they employed quantitative methodology in their research work, their collected data was analysed using SPSS and Smart-PLS, their findings shows that, staff training tremendously influence the safety practices and the performance of construction industry in India.

However, with the support of the relevant literature, its clearly show that staff training tremendously influence safety practices and the performance of construction industry in many countries. Thus, therefore, staff training is employed in this research as mediating variable on the relationship between Factors Influencing Safety and Performance of Malaysian Construction Industry.

However, the conceptual framework below depicts the relationships between Independent Variables (Management Activities on Site, Incentives, Policy Factors, Personnel Factors, Technical Factors, Process Factors), Mediating Variable (Staff Training) as well as Dependents Variable (performance of Malaysian Construction Industry). Figure 2 showed the conceptual Framework as propose for this research.

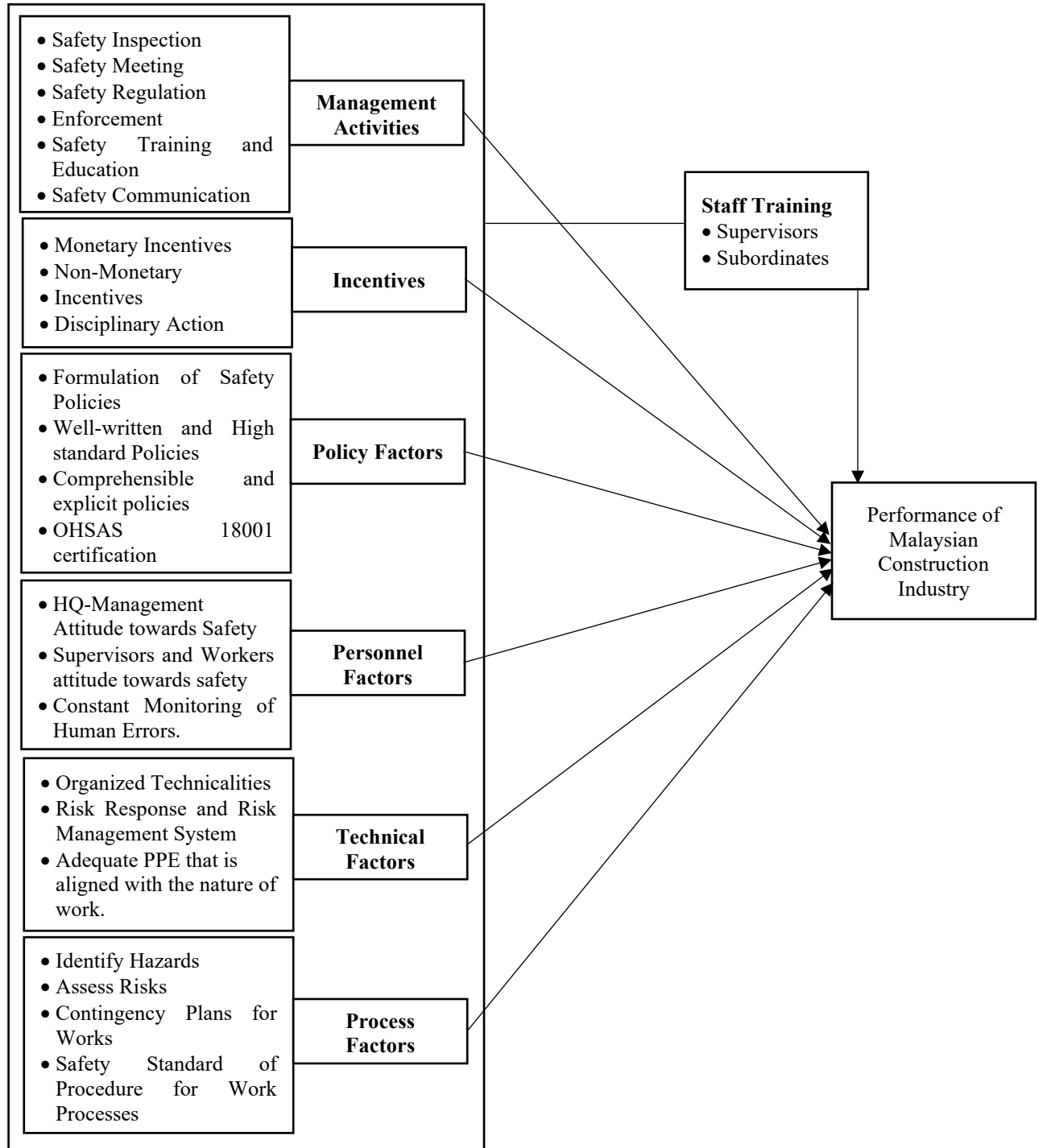


Figure 2. Conceptual Framework

## 5. Conclusions

This paper reviewed relevant literature and discussed the safety influential factors for the construction safety performance in Malaysian construction industry, conceptual framework was developed, and staff training was used as the mediating variable on the relationship between safety influential factors and the performance of Malaysian construction industry. It is figured out that, staff training tremendously influence the relationship between safety influential factors and performance of Malaysian construction industry. Therefore, the literature provides an avenue



to figure out the safety influential factors for the construction safety performance in Malaysian construction industry together with their factor elements.

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