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Fire Safety Management in Malaysian Higher Educational Institutions

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Abstract

Most universities and college campuses across Malaysia are engaged in developing policies, programmes, and systems to reduce fire risks, and maintain fire safety. Although the awareness of fire disasters has increased among some parts of the society, the concept of fire disaster preparedness and response in universities has not been sufficiently explored. Therefore, this paper aims to establish a conceptual framework fire safety management plan in Malaysian Higher Educational Institution. The method used by this paper is synthesizing previous articles from selected journals and conference proceedings, reports, standards on disaster risk management, higher institution contingency and fire safety plans, and existing guidelines from authorities. The key elements of fire safety variables from the previous literatures assist this study in developing a conceptual framework related to fire safety management plan. The findings of this paper include the elements of fire safety management like organizational responsibilities (mitigation/prevention), emergency preparedness including emergency facilities, emergency contact details, information, and communication training, and testing and reviewing (response & recovery). The establishment of this conceptual framework of fire safety management can guide the management teams at higher educational institutions in delivering information to Emergency Response Team (ERT) to ensure its effectiveness. Moreover, this framework will help the management team to adopt, validate, and evaluate, which enhances the ability to detect crisis signal that will minimize losses.

Keywords: Fire safety management framework, emergency management plan, effective fire safety management, higher educational institutions (HEIs)

1.0 INTRODUCTION

Higher educational institutions (HEIs) provide the students and the entire institutions' community with an environment that is attractive, and conducive to learning, for academic success (Hassanain, 2008). According to a statistic from the Ministry of Higher Education Malaysia in 2021, there are nearly 600 tertiary institutions in this country, comprising of 20 public universities, 36 polytechnics, 104 community colleges, and 434 private HEIs. The total number of student enrollment in 2020 was 161,113 students, as stated in Table 1.

Table 1 Total number of student enrollments in HEIs in year 2020
(Source: Ministry of Higher Education)

Total number of student enrollments in HEIs in 2020	
Public University	68,112
Private Institutions	76,786
Polytechnics	13,174
Community Colleges	3,040
Total	161,113

In comparison with other types of disaster, fire poses a crucial threat to life and property (Aziz et al., 2020). Fire and Rescue Department of Malaysia (FRDM) attended to 51,458 fire cases in 2019 all over the country, or an average of 140 cases per day. This figure was the highest annual figure recorded, with the percentage increasing by 24.1 percent compared to 2015. The Department of Statistics Malaysia (through the Public Safety statistics) reported that the total number building fire breakout in 2019 was 5439 cases, showing an increase of 125 cases compared to 2018. Moreover, the statistical data from FRDM drawn that fire cases for academic institutions contribute to 149 cases from 2018 to 2019.

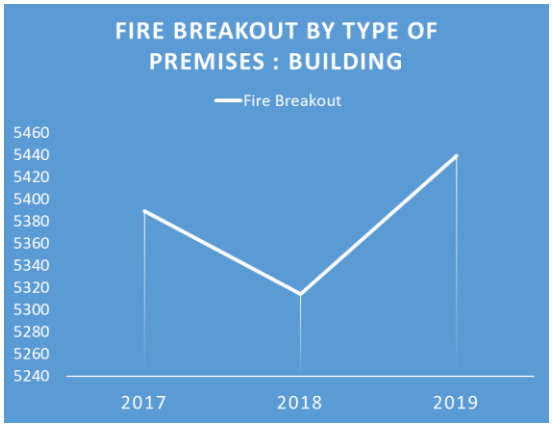

Figure 1 Fire breakout by type of premises: Building (Year 2017-2019)
(Source: Fire and Rescue Department Malaysia)

Several fire incidents involving higher educational institutions were captured in the newspapers. Reported in July 2021 by many local newspapers, fire incidents happened in students' hostel in Universiti Utara Malaysia, causing ninety percent damages (see Bernama, 2021). In August 2019, flames were spotted at a building in the university Faculty of Economics and Administration (FEP) in University of Malaya (UM) (see Kaur, 2019). The lecturer offices were almost destroyed as the third floor was nearly hundred percent damaged by the fire. The fire had also inflicted damage to the second floor of the building. Five years earlier, a fire broke out in the male dormitory of the International Islamic University of Malaysia (IIUM) campus, as reported by The Star in Jun 2014 (see Cheng, 2014). The blaze damaged a storeroom used to keep mattresses and chairs. No injuries were reported but the room where the fire took place was badly damaged. Moreover, a fire had also completely destroyed Dewan Tunku Canselor, University of Malaya with total losses estimated at RM12.4 million. It also destroyed 1,800 graduation robes, audio-visual aids, and chairs for 3,000 students (see Bernama, 2001).

According to the US National Fire Protection Associations research, from 2015-2019, there were 3,840 estimated annual averages of structure fires, 29 civilian injuries, and 11 million dollars in direct property damage in dormitories, fraternities, sororities, and other related properties. Another example of fire fatality in HEIs included the GlaxoSmithKline Carbon Neutral Laboratory for Sustainable Chemistry at the Nottingham University, UK, that was destroyed by fire attributed to electrical fault in September 2014, a clubhouse fire at Nelson Mandela Metropolitan University South Africa in October 2016, and the University of Jos Nigeria Library fire on October 10, 2016. Therefore, it is important to adequately protect buildings from fire destruction, as well as the life of the users through appropriate Fire Safety Management (FSM) implementation (Nadzim & Taib, 2014).

Many big disasters, including fires, in recent decades have been marked by the lack of management, whether before or during the occurrences (Ebenehi et al., 2017). FEMA (2003) also found that students are generally unaware of the risks they face, and that post-secondary institutions have trouble targeting and creating action plans for this population. The compliance to Uniform Building By-law 1984 was not entirely practiced (Zakaria et al., 2019). Not only awareness to the building itself, it is also related to human competencies. When a fire occurs, appropriate actions planned well in advance should be initiated to provide all the help and assistance for the occupants to reach places of safety inside or outside the building involved in the fire. These include fire drills and staff training in the use of first aid firefighting methods such as fire extinguishers (Subramaniam, 2004). Therefore, human involvement element is important to achieve a higher standard of fire safety management in local universities.

■2.0 LITERATURE REVIEW

2.1 Introduction to Fire Safety Management

A fire safety management plan indicates the arrangements for implementing, controlling, monitoring, and reviewing fire safety standards as well as ensuring that the standards are maintained. The plan provides a description of the arrangements for managing fire safety effectively to prevent the occurrence of fire, and to protect both property and people (Subramaniam, 2004). Fire safety management is the manager's application of policy, standards, tools, information, and practices to the task of analyzing, evaluating, and controlling fire safety. (Howarth & Kara-Zaitri, 1999).

Beard and Santos-Reyes (1999) observed fire safety management as a series of five systems: System 1- implementation of fire safety policies on all relevant installations, System 2 - coordination of installation operations in System 1, System 3 - maintenance of an acceptable level of day-to-day fire risk in System 1 including a system of auditing fire safety, System 4 - developing future fire safety solutions, and System 5 - careful consideration and promotion of fire safety policies.

Fire protection system and emergency plans are the fundamental guarantee of campus fire safety. It is essential to improve the personnel of faculties, colleges, departments, and individual responsibilities at all levels regarding the fire regulations so that each location has the responsibility for fire supervision (Meng et al., 2016). Fire emergency plan should be made based on a comprehensive investigation of the actual situation of the building, to carry out a scientific analysis and demonstration of the characteristics of the relevant

buildings, for major fire hazards and possible fire or explosion of key positions and locations, to prepare a complete fire emergency plan to ensure that the construction of fire management can be quickly and effectively conducted as an emergency response (Zakaria et al., 2019).

Subramaniam (2004) explained the variables influencing fire safety behavior and lifestyle of students in a local university as indicated in Figure 2. The definitions of these variables are as follows:

- The predisposing factors are the characteristics of the individuals such as their beliefs, attitudes and values that facilitate or hinder self-protective behaviours. Predisposing factors are conceptualized as providing the motivation for a specific behaviour.
- Reinforcing factors involve any reward or punishment that follows or is anticipated because of the behaviour. Performance feedback and the social approval or disapproval received from occupants; residential college management would qualify as reinforcing factors in residential college settings.
- Enabling factors that refer to objective aspects of the environment or system either inhibit or promote self-protective action. Enabling factors are defined as factors antecedent to behaviours that allow motivation or aspiration that is to be realized. Availability of firefighting resources, fire policies and having the required skills in firefighting would enhance self-protective behaviour.

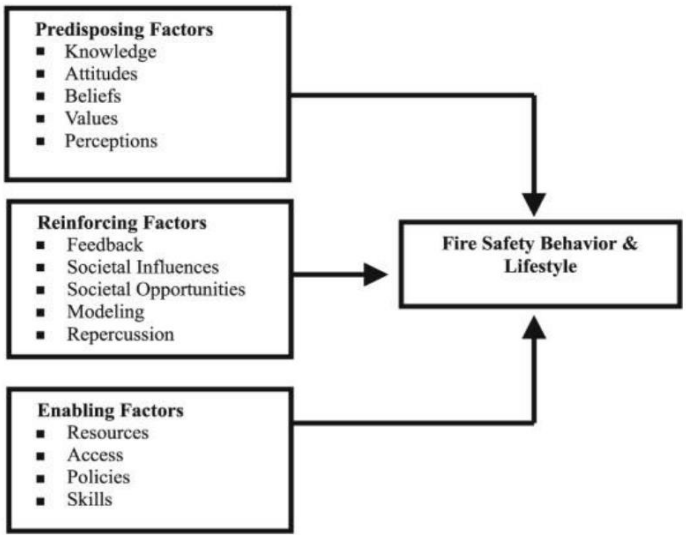

Figure 2 Fire safety behaviour and lifestyle
(Source: Subramaniam, 2004)

Another way to understand how individuals respond to fires is to gauge four socio-psychological propositions – as postulated by Proulx (1994). These concepts are avoidance, commitment, affiliation, and role.

- Avoidance: People believe that avoiding unpleasant circumstances will protect them mentally. When people find soothing and benign explanations for the cues they see, smell, and hear during the opening moments of a fire, psychological denial is common. Avoidance explains why people take longer to recognize a threat and ignore it for long periods of time.
- Commitment: When people first notice a fire, they are often engrossed in their current activity (for example, standing in line at the store, watching television, or working at a desk). People will continue to do what they are doing despite risk signals because they are committed.
- Affiliation: Frequently, no one begins to flee until the entire group (family or friends) is ready. Once a group has begun to evacuate, the slowest individual decides the group's overall moving speed. Regardless of the threat, parents will not leave without their children; children are reluctant to go without their siblings. People will wait for their coworkers, friends, or anyone they feel responsible for.
- Role: An occupant's role or status in a building determines their response to a fire or other emergency. For example, visitors to a building will be more passive during an emergency than residents or employees. Simply because they are unfamiliar with a building.

To avoid delays of this type, Sactor (2002) stressed that, during fire drill, a committee from the university department of public safety must observe the deterioration of fire safety facilities which could result in calamity in the event of fire. According to Comeau (2003), fire safety involves three components: (1) prevention – the need to ensure protocols in a place to avoid fire from occurring, (2) detection - smoke detectors are necessary factors in alerting the occupants and send a signal to the fire department, (3) suppression – if fire occurs, it must be controlled. Therefore, fire safety management plans should include efforts to reduce false and nuisance alarms. This can be done by utilizing new technology, by systematically cleaning and maintaining detection devices, and by carefully taking parts of a detection system offline during times of construction, heavy dust, or production of other non-fire contaminants (Meacham, 1999).

2.2 Implementation of Fire Safety Management Plan in Higher Educational Institutions

The impact of fire fatality on HEI campuses could be very serious due to the homogenous nature of the students' population with respect to age and experience (Taub & Servaty-Seib, 2008). Furthermore, substantial fire loads such as books, papers, and other documents in the lecturers' offices in HEIs could contribute significantly to fire severity (Kong, 2009). The loss of buildings and infrastructures due to fire also poses significant risks to the continuing research and teaching functions undertaken within the HEIs. Therefore, HEIs must make fire safety as their priority.

Aligned with the objective Occupational Safety and Health Act 1994 to secure the safety, health and welfare of employees at work against any workplace hazard and risk-activities involved, Universiti Teknologi Malaysia (UTM) also established Fire Safety Management and Fire Emergency Plan as part of their safety regulations. The comprehensive plan includes Fire Safety System Maintenance, Fire Warden Management, Fire Evacuation Drills, Fire Safety Inspection and Audits, and Building Design and Alterations.

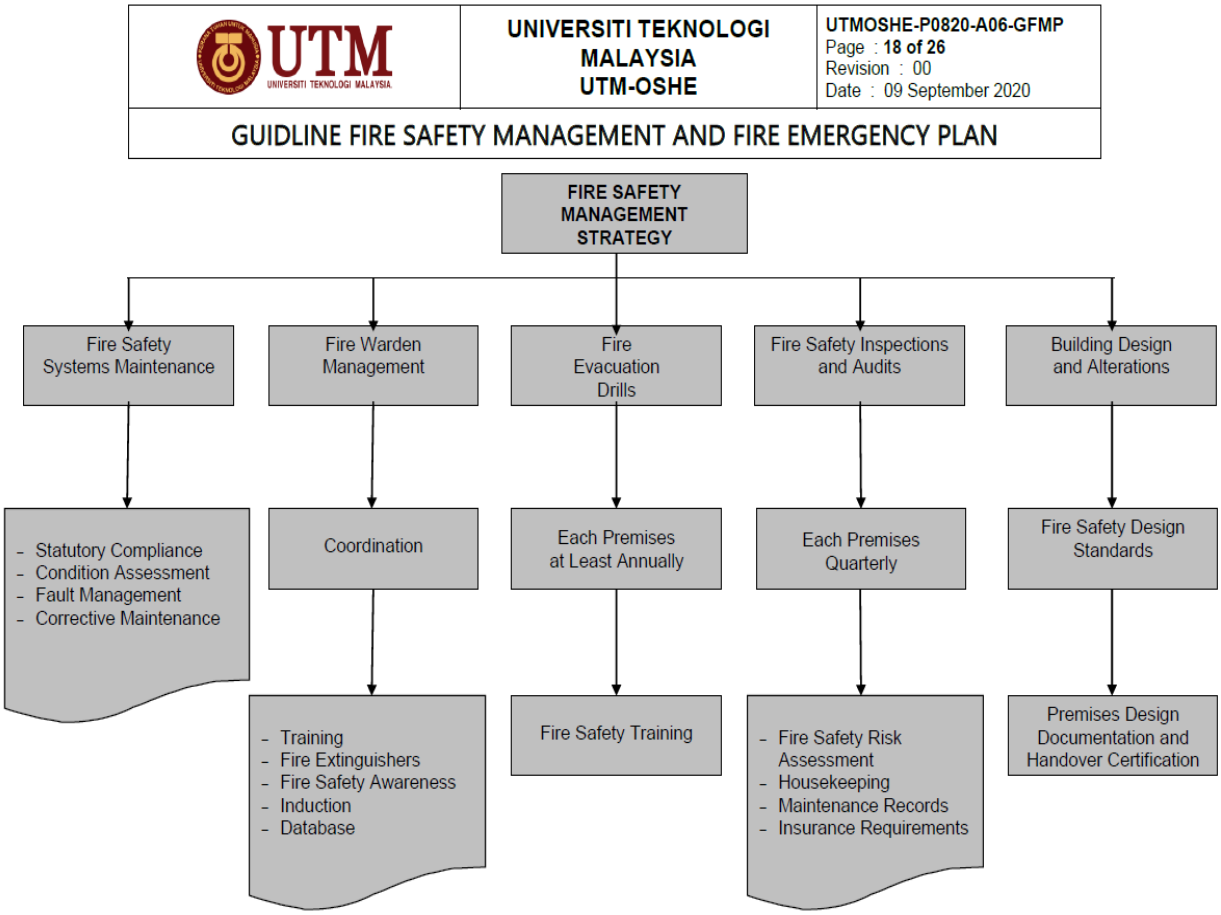

Figure 3 UTM guidelines of fire safety management and emergency plan
(Source: UTM-OSHE, 2020)

Apart from that, private HEIs also established Fire Safety Management Plan in their organizations. University of Reading Malaysia (UoRM) in Johor Bahru, for instance, produced its Fire Safety Manual (First Edition) in April 2017. The safety policy of this university emphasizes to maintain high standards of fire safety to protect its employees, students, visitors, and any other relevant people who are lawfully in their buildings, or those who may be affected by the activities. The university will take precautions to reduce the risk of fire by eliminating and reducing those risks where reasonably practicable, then managing and controlling the remaining residual risks.

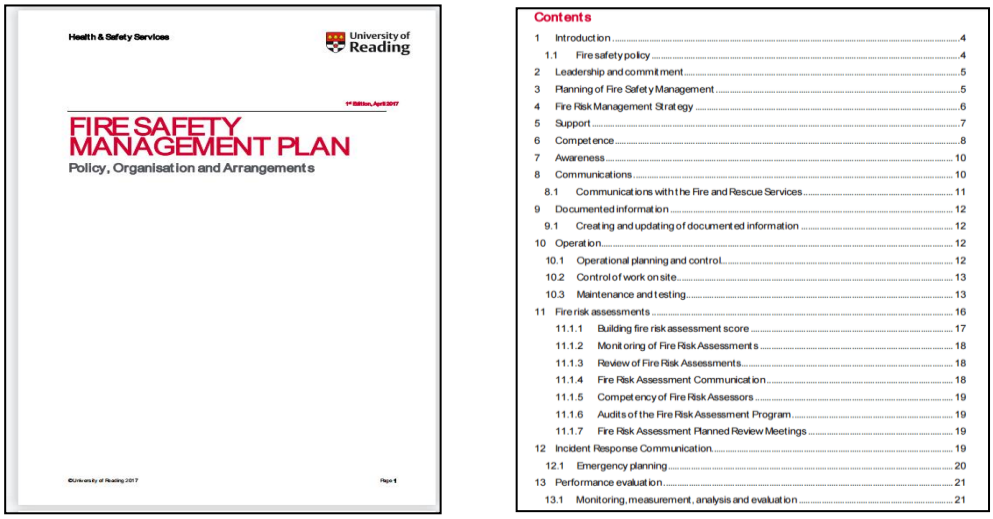

Figure 4 UoRM fire safety management plan
(Source: University of Reading)

The value of establishing the Fire Emergency plan also supported by Baker et al. (2013) who studied the categorization of fire safety management according to the degree of importance. They divided fire safety management into 10 categories: (1) emergency plan and fire procedure, (2) risk assessment, (3) fire training, (4) maintenance of fire equipment and standards, (5) organizational arrangement, (6) audit, (7) communications and information, (8) reporting and investigation of fire, (9) budget and (10) compliance with legislation. The result from the survey shows that the emergency plan and fire procedure are the most important elements in Fire Safety Management in an organization.

Figure 5 The degree of importance of fire safety categories
(Source: Baker et al., 2013)

2.2.1 Benefits Fire Safety Management Plan

The objectives of Fire Safety Management components include the maintenance of fire safety measures and fire prevention, staff training, emergency action plan, and assessment on building alternative. FSM programmes consist of inspection, education and training, fire suppression, emergency service, evaluation of fire probability, fire prevention, report and record keeping, as well as communication (Tsui & Chow, 2004). Thus, as stated by Chow (2001) the following benefits can be accomplished when an effective FSM is developed and implemented: (1) reduction of property insurance premiums, (2) continuity of business operation, (3) enhancement of public images and customer service, (4) promote an efficient work environment, (5) quality gain realization, and (6) influence an organization profitability. This also supported by Yeung (2012), whereby an adequately managed building reduces the chances of fire outbreaks, and increases the possibility of successful occupants' evacuation in the event of an emergency.

According to Scottish Government (2008), effective FSM requires identifying all potential risks associated with the premises, and effectively carrying out an assessment of the adequacy of the measures provided or needed to resist the risk. Furthermore, Furness and Muckett (2007) indicated that if an organisation can create and sustain a positive safety culture for each member of staff, they will be competent and committed to work safely, and business and individual losses will be minimised. They also summarized the benefits of fire safety management as shown in Table 2.

Table 2 The benefits of fire safety management to the organisation
(Source: Furness and Muckett, 2007)

Benefits to the organisation	Less time lost through accidents Reduced risk of civil claims for compensation Reduced risk of enforcement action Enhanced company image Greater efficiency Less production downtime Minimised insurance premiums Having a competent and committed workforce Making better quality decisions as a result of involving the workforce
Benefits to the individual	Less risk of injury Less risk to work-related ill health Less risk of work-related stress Increased chances of continued employment Working for a competent and committed team with competent and committed management Being clear and confident about what is expected from management Increased job satisfaction from being empowered to contribute to safety management

2.3 Elements of Emergency Plan in Higher Educational Institutions

National Center for Campus Public Safety (2016) emphasized that the emergency management at institutions of higher education is largely reactive instead of proactive, often requiring an emergency or the appearance of a threat before it receives attention and current emergency management staffing levels at institutions of higher education are inadequate.

Therefore, a typical emergency management programme that encompasses of (1) the full range of leadership and governance structures designed to prevent, prepare for, respond to, and recover from any threat, emergency, or disaster, including a pandemic, that could disrupt operations; (2) policies, procedures, plans, internal and external outreach strategies; and (3) multi-year strategic planning are needed. The model in Figure 6 illustrates six elements of this emergency management model: (1) Program Management, (2) Prevention, (3) Preparedness, (4) Response, (5) Recovery, and (6) Training. These elements are widely used, as stated in the National Center for Campus Public Safety (2016), that the cycle of elements repeats itself as emergency events occur, and HEIs are constantly learning from their experiences to prepare for the next event.

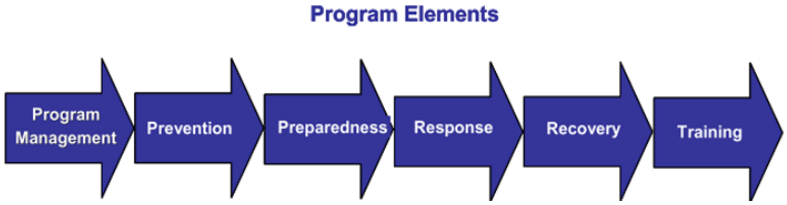

Figure 6 Six elements of an emergency management plan
(Sources: National Center for Campus Public Safety, 2016)

a. Program Management - This element provides the program framework to identify, and apply where appropriate, Organizational Responsibilities; laws and established and accepted standards and practices (local authorities, staff, and student); internal and external outreach activities; and a multi-year strategic plan to maintain and strengthen the program.

b. Prevention - The absence of recent prevention training lead to inadequate safety behaviors (Aziz et al., 2020) including activities designed to reduce risks and loss of assets (e.g., people, vital records, facilities). This includes the identification and analysis of key assets and the development of a business impact analysis, risk assessment, and facility and perimeter vulnerability assessments to identify gaps and mitigation strategies (Tkachuck, 2016).

c. Preparedness - This element emphasizes the information or preparation of Emergency Facilities and Emergency Contact Details, Information & Communication. Knowledge does not merely refer to the regurgitation of information but to the ability to apply the information in a variety of different and evolving situations (Kupietz, 2011). Preparedness plans and procedures are designed to establish emergency authorities and leadership structures, assign resources, and define roles and responsibilities for the execution of the plans once an event triggers their use (National Center for State Courts, 2007).

d. Response - Prepare a report about preparedness information package to a project as a plan of disaster management. Emergency Response includes protecting life, ensuring safety and health of library staff and users, limiting and containing damage to

collections, facilities and equipment, stabilizing operational, service, and public impacts of an event, and managing and communicating information about the emergency (The Hartford Loss Control Department, 2002).

e. Recovery and Training - The important elements of a plan for Emergency Recovery include recovery analysis and planning; damage assessment and salvage operations; recovery communications; and employee support (National Center for State Courts, 2007; The Hartford Loss Control Department, 2002).

Indeed, the six elements of emergency plan are the essential keys to produce the framework of Fire Safety Management plan for HEIs. This approach is a development of capabilities to prevent, prepare for, respond to, and recover from a broad array of disruptions. The significance of these elements to the paper is the emergency management model described in the programme elements that provide a guidance that is flexible and can be applied to any size building or organizational structure. In addition, the findings from the previous literatures have revealed numerous potential variables to be associated with fire emergency plan to reach safety has been listed and categorized in Table 3 and Table 4.

Table 3 The elements of emergency plan from previous research

Criteria	Element	Hartford (1999)	Breeding (2007)	Zdziarski et.al (2007)	Evan D.D (2007)	Jusoh.M & Bahari.A (2008)	Tigges . J .M (2008)	FEMA (2008)	Reuters .S (2009)	Arkansas (2009)	DOE (2009)	Connolly.M (2012)	Pennsylvania (2012)
Organisation Responsibilities	Establish Emergency Preparedness Plan	√	√	√	√	√	√	√	√	√	√	√	√
	Establish Emergency Response Team	√	√	√		√	√	√	√	√	√	√	√
	Person responsible for the Emergency & Evacuation		√		√		√	√	√	√	√		√
	Distribute Building Evacuation Plan	√		√		√	√	√	√	√	√	√	√
	Define the student & staff response during the event	√			√	√	√	√	√	√	√	√	√
	Develop cooperation with local authorities such as Ambulance Services, Fire & Rescue, Emergency State Services, Police	√	√	√		√	√	√	√	√	√	√	√
	Provision of special needs for students & Staff during emergency					√	√					√	√
	The University has enough supplies for basic needs (water, foods, batteries, personal care) for students & staff during emergency					√				√			√
Emergency Facilities	Mechanism for alerting emergency	√		√				√	√	√	√	√	√
	Functional Emergency Lighting, Emergency Generator & Fire Fighting System	√				√			√	√		√	√
	Functional First Aid equipment	√				√				√		√	√
	Mobile vehicle to transport people during emergency					√			√	√			√
	Emergency shelter					√		√		√	√		√
	Emergency Operation Centre					√		√		√	√		√
Emergency Contact Details, Information & Communication	Display & announced emergency contact detail such as Security Department in Campus,Ambulance Services, Fire & rescue, Emergency State Services , Police	√			√	√	√		√	√	√	√	√
	Emergency Communication System	√	√	√	√	√	√		√	√	√	√	√
	Emergency Sirens and announcement in acceptable language									√	√		√
	Use Pictograms, Audible pre-record instruction (vision impaired staff) & tactile guides for evacuation routes (visually impaired)									√			√
Training, Testing & Review	Practices Emergency Drills and review the Emergency Preparedness Plan regularly	√	√	√	√	√	√		√	√	√	√	√
	Conduct Tabletop Exercise (staff discussion of specific design roles in the event after emergency), Simulated events (fire drills, shelter in place) and After Action Review (review the effectiveness of communication procedures during event		√	√	√					√	√		√

Table 3 summarizes the elements of emergency plan from previous researchers to form a conceptual framework of Fire Safety Management Plan. These criteria had been categorized by referring to the six elements of emergency management plan in Figure 2. Many experts proposed the key elements that should be addressed to ensure the feasibility of an emergency plan in the event of a fire disaster that comprise of Organisation Responsibilities, Emergency Facilities, Emergency Contact Details, Information & Communication and Training, and Testing & Reviewing. In the sense of emergency response, the idea of providing a guideline to an emergency response team during the preparedness phase would help them perform better during the response phase by easing their decision-making process (Aziz et al., 2019).

Table 4 Safety requirement stated in various standards

	Requirement	NFPA 1600: 2016	ISO 22320	MS 1722: 2011
Mitigation	Hazard identification Identify the source, condition, and situation of hazard that may cause injury to people, and damage to property Risk	✓		✓
	Risk assessment Evaluate the level of risk of identified hazard	✓		✓
	Risk Control Control the source of risk through engineering measures	✓		✓
Preparedness	Establish Disaster Risk Management Plan (DRMP)	✓	✓	✓
	Procedure to response	✓	✓	✓
	Evacuation procedure	✓	✓	✓
	Building evacuation plan			✓
	Location of the assembly point			✓
	Contact number people within and outside of organization Rescue		✓	✓
	Rescue and medical duties			✓
	Alternative communication center		✓	✓
	Responsible person to shut down any critical plan operation	✓		✓
	Establish Emergency Response Team	✓	✓	✓
	Distribute appropriate equipment to the personnel	✓		✓
	Train workers with the evacuation process and response procedure	✓		✓
	Provide workers with knowledge of responsibilities, procedure, planning, and common terminology	✓	✓	
Response & Recovery	Response and evacuate from the building	✓	✓	
	Communication between staff	✓	✓	
	Inform safety agencies such as police, fire department and medical services	✓	✓	
	Management of resource	✓	✓	
	Search and rescue, mitigate fire	✓		
	Investigate the cause of the disaster	✓		✓
	Assessment damage in economic and environmental impact	✓		
	Assessment of personnel and equipment required after disaster	✓		
	Manage resource and financial	✓		
	Planning for reconstruction	✓		
	Reconstruction	✓		
	Review the post-disaster impact	✓		✓
	Review and reconstruct the ERP	✓		✓

The standard guidelines listed in Table 4 provide a new requirement for building owners when it comes to incorporating fire emergency prevention in their premises. The adoption of these principles, on the other hand, is entirely optional. The Occupational Safety and Health Act 1994 (Act 514), OSHA 1994, makes it mandatory to develop a Disaster Risk Management Plan (DRMP) and an Emergency Response Team (ERT) in Malaysia. National Fire Protection Association (NFPA) also produced the safety management

requirement standard procedure in their guidelines. In summary, the elements in Table 3 and Table 4 will be combined to produce a comprehensive framework of Fire Safety Management Plan in HEIs.

■3.0 METHODOLOGY

The method used for this paper is synthesizing previous articles from selected journals and conference proceedings, reports, standards on disaster risk management, higher institution contingency plans and fire safety plans, and existing guidelines from authorities. There were Eighty-two papers were reviewed, however only 27 papers were selected as they were found to meet the selection criteria. Thus, they were reviewed to synthesize the evidence. The articles that the research studied covered a 10-year time horizon. Moreover, to provide the key element of fire safety management plan, the articles were selected based on four criteria: (1) Organizational Responsibilities, (2) Emergency Facilities, (3) Emergency Contact Details, Information & Communication, and (4) Training, Testing & Review. The purpose of reviewing these papers was to quantify the emergency plan elements that can be adopted. In addition, scholarly articles were studied to establish the best practices and delineate the required key elements to create a conceptual framework of Fire Safety Management Plan for HEIs.

■4.0 DISCUSSION ON FRAMEWORK OF FIRE SAFETY MANAGEMENT PLAN FOR HEIs

The objective of producing the framework of fire safety management plan is to establish a comprehensive safety management system that will ensure the higher educational institutions' safety from fire disasters, with minimal losses. The proposed conceptual framework for fire safety management was constructed from the combination of emergency management elements from National Center for Campus Public Safety (2016) and variables of elements from the thoroughly reviewed of literature in previous section (refer Figure 6, Table 3, and Table 4).

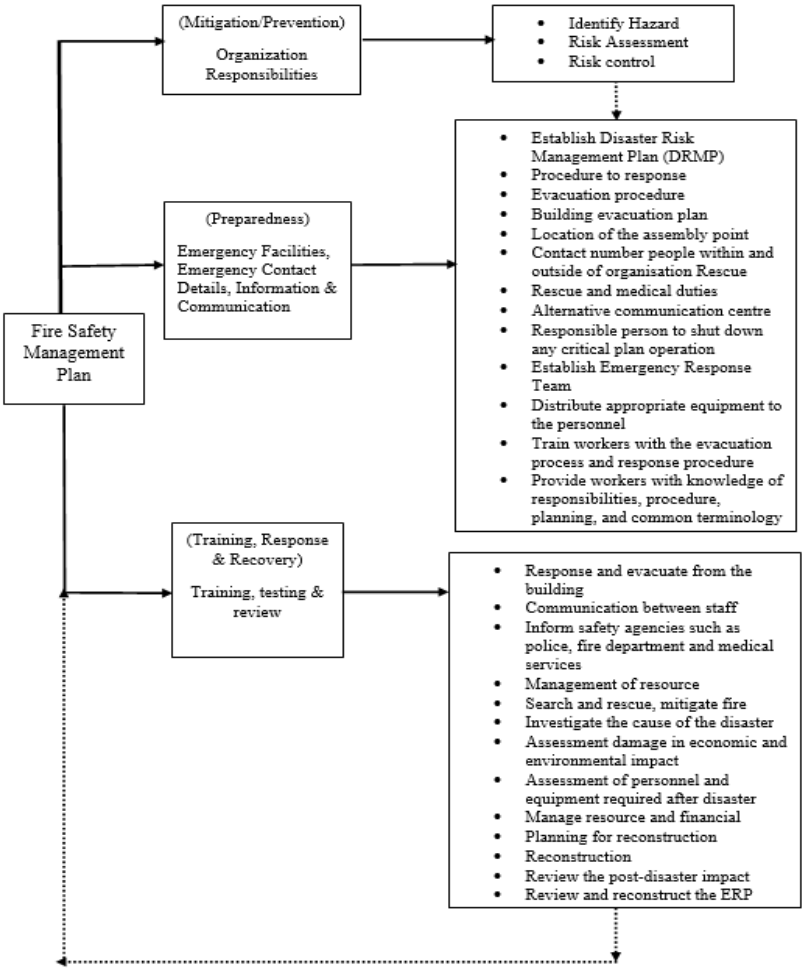

Figure 7 Framework of fire safety management plan in higher educational institutions

The conceptual framework for fire safety management plan is established in this paper. The first component is Organizational Responsibilities (Mitigation/ Prevention) that consist of hazard identification, risk assessment, and risk control. Organizational responsibilities is generally determining the degree of fire response. The Organizational Responsibilities has gone to great lengths to create a detailed and comprehensive mitigation plan that includes risk assessment, information about hazards of concern to the university, an assessment of vulnerabilities, options for natural hazard mitigation, details of the prioritization and implementation projects, and finally, hazard plan maintenance.

The second component is Emergency Preparedness that is divided into two categories: (1) Emergency Facilities, and (2) Emergency Contact Details, Information and Communication. Besides mitigation, preparedness phase is also important in making sure institutions reduce and eliminate the impact. This stage provides activities such as the development of evacuation and critical incident plans designed to establish emergency response procedures, authorities, and leadership structure, and assign resources. Preparedness plans and procedures are designed to establish emergency authorities and leadership structures, assign resources, and define roles and responsibilities for the execution of the plans once an event triggers their use.

Lastly, the third component is Response and Recovery that includes activities that response team should be ready to perform, as in when to react. While recovery procedures typically include the considerations for: (i) utilities, (ii) facilities, (iii) infrastructures, (iv) communications, (v) records, (vi) human resources, (vii) voice, (viii) data and information systems, and (ix) administrative activities. Planning for recovery ensures a coherent, scalable approach to return personnel, the public, and systems to normal court operations. In dealing with all humanitarian aspects of emergencies, the element of response and recovery are the activities that should be run at the same time (Jaradat et al., 2015).

This framework integrates the organizational responsibility in terms of mitigation and prevention, emergency preparedness including emergency facilities hence training, testing, and reviewing. These elements may be able to improve the risk of communication effectiveness. The management team's persuasion and motivation to instil a safety culture among the ERT is also important. The effort made by the management team in providing safety information by knowing people's views on risks and their needs from telecommunications comes from inspiration and persuasion.

Moreover, this framework will help the management team to adopt, validate and evaluate – enhancing the ability to detect crisis signals that will minimize losses. During the emergency stage, however, the priority is on evacuation and communication to ensure prompt response and cooperation to address the crisis. Following the crisis, the emphasis will shift to rehabilitation and learning, which will assist an organization in regaining and retaining its occupants (Paraskevas & Arendell, 2007).

By using this proposed framework, the management of HEIs can evaluate or update the elements in their Fire Safety Management Plan. For example, The National University of Singapore (NUS) has focused on three elements in their Fire Safety Management System namely prevention, emergency preparedness and awareness (refer to Figure 5). The elements that are highlighted in the proposed framework such as emergency facilities and emergency contact details can be added into NUS Fire Safety Management Plan.

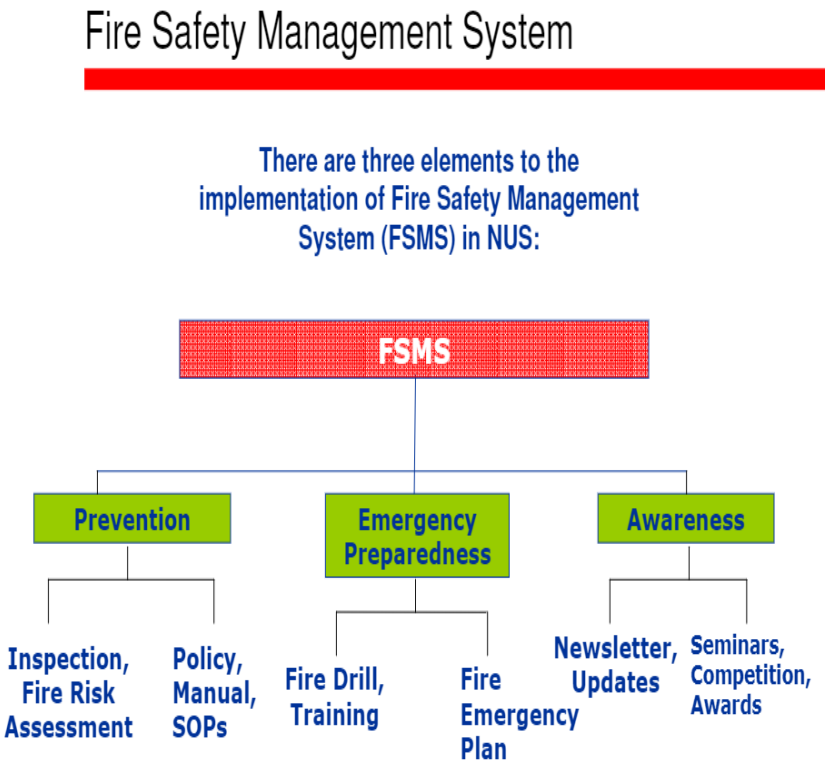

Figure 8 Fire safety management system in the National University of Singapore
(Source: National University of Singapore)

Apart from that, Monash University Malaysia also established its Emergency Procedure Booklet in year 2014. Hence, the university's Emergency Procedure Booklet still need be updated to produce the comprehensive fire safety management plan. The basic assurance of campus fire safety is a fire protection system and an emergency plan. At all levels of the fire service, it is critical to develop the personnel of faculties, colleges, departments, and individuals. Clarify and improve the fire regulations so that each place is in charge of fire safety (Meng et al., 2016).

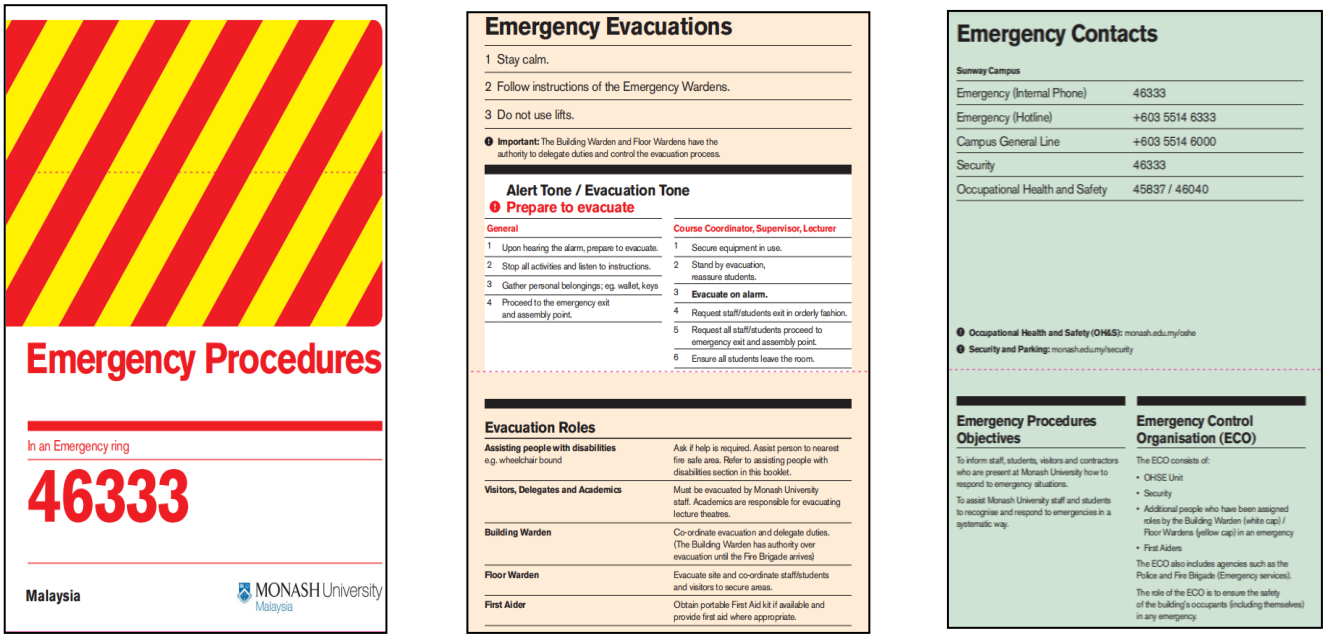

Figure 9 Emergency procedure of Monash University Malaysia
(Source: Monash University Malaysia)

■5.0 CONCLUSION

The core element of Fire Safety Management Plan is derived as organizational responsibilities that fall under the elements of mitigation and prevention, and emergency facilities. The emergency contact details, information, and communication are categorised under the element of preparedness. Lastly, training, testing, and reviewing fall under the element of training, response, and recovery. The implementation of the conceptual framework fire safety management in Malaysian higher educational facilities could help the management teams to plan an effective information delivery to the organisations' managements. This paper can also help the managements of the institutions to ensure the safety of their occupants as well as enhancing their levels of fire safety measures, respectively. Improvements in this context is where all education personnel and students work together in performing a good practice of fire safety measures and behaviour practice. Hence, to strengthen the findings, empirical research is suggested to be carried out. The current research is in conceptual terms which are limited to the review of past literatures that provided valuable inputs for scholars and practitioners. Therefore, future studies can replicate the proposed conceptual framework to become a structural model for statistical analyses and provide a model for emergency preparedness plan in higher educational institutions. This conceptual framework will be validated by the facilities management team in its future research stage.

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