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Fire Safety Management Plan Implementation in Heritage Building

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Abstract: Heritage building that were constructed before Uniform Building By-Laws (UBBL 1984) were formulated, rise concern in aspect of fire safety management, moreover when the management are still in poor condition seeing some building such as Fort Renee, Kuching, Sarawak involved in fire accident. Therefore, the purpose of the study was to examine current practices, challenges and ways to improve fire safety management plan implementation in heritage building. This study adopted qualitative method by conducting interview to the museum management division under Melaka Museums Corporation (PERZIM) for the selected heritage building which is Museum Stadhuys Complex. All data from the interviews were distributed by using virtual method, which are Mobile phone, Email and Whatsapp. The data collections were transcribed using Microsoft Word software. This research discovered the current practices used in the heritage building by PERZIM Safety and Health Committee (JKKP) carried out fire safety risk assessment and fire safety management plan in aspect of emergency planning, emergency action and maintenance. Also, the main challenge in conducting the fire safety management plan was the cost of the fire safety equipment's maintenance. Meanwhile, few ways to improve the fire safety management plan were make basic fire safety training more effective and spread more awareness on fire safety awareness among the building occupants. Through this study, it is hoped to provide useful and beneficial relevant information on fire safety management plan to the related parties and building that have poor fire safety management plan implementation.

Keywords: Fire Safety, Fire Safety Management, Heritage Buildings, Museums

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1. Introduction

In Malaysia, there are numerous of heritage buildings of architectural and historical significance. According to Salleh & Ahmad (2009), there are some of heritage buildings that have been influenced by a number of architectural styles, including traditional Malay architecture, Portuguese architecture, Dutch architecture, and British architectural styles (e.g. Moorish, Tudor, Neo-Classical and Neo-Gothic). Those buildings are worthy being listed or gazette as a heritage building or National Heritage Building under the 2005 National Heritage Act (Act 645) (Salleh & Ahmad, 2009). However, due to poor standard and practices of fire safety management, a lot of valuable historic buildings were badly damaged and burnt down by fire. Compare to a new constructed building, a heritage building requires a lot of attention in term of fire safety approach not only limited to protect people but as well as to protect historical contents, fabrics and structures of the building.

Historical buildings are representative of a particular community's cultural identity and heritage. People can relate to and learn about not only lives of their ancestors but also the building development made in the past by understanding the characteristics of buildings (Harun, 2011). In Malaysia, heritage buildings demonstrate the fascinating aspects of its history and evolving culture. According to Idrus, Khamidi & Sodangi (2010), cities such as George Town, Ipoh, Kuala Lumpur, Kuching, Malacca and Taiping have many historic buildings constructed during colonial period (1511-1957) with various architectural styles and influences. However, most of the heritage building were constructed before Uniform Building By-Laws (UBBL 1984) were formulated (Salleh & Ahmad, 2009). Therefore, the structures are not subject to the fire safety provision given by the By-Law (Roslan & Said, 2017).

Fire is the biggest threat to any building and its contents whether it is historical or modern building. According to Salleh & Ahmad (2009), heritage buildings are irreplaceable but susceptible to burn, as there is a combination of several factors such as large scale buildings, flammable contents, large numbers of visitors and low current fire resistance systems. Therefore, a fire risk assessment is one of the effective method to terminate the risk of fire with close monitoring and reviewing; 'prevention is better than cure' (Salleh & Ahmad, 2009). However, Salleh & Ahmad (2009) figure out through their survey that most of the museums in Malaysia are still having poor fire safety management. Therefore, this study was carried out to investigate the implementation of fire safety management in heritage building.

In Malaysia, there are building with age more than 100-year old such as The Stadhuys that consist of Museums of History and Ethnography in Malacca, Penang Islamic Museum, Perak Museum, Sarawak State Museum and Kelantan Royal Customs Museum (Salleh & Ahmad, 2009). Unfortunately, those heritage buildings are exposed to the fire threat due to the low fire resistance structure that raise concerns in protection of conservation of historical buildings. The fire cases in Malaysia during 2016 had the highest record with 49,575 cases that have caused total loss RM2,866,742,975. Meanwhile, in 2017, the fire cases were 29, 356 cases but it recorded the highest number of people die which is 165 people compared to 2016 that recorded 107 people. The total loss that caused by fire in 2017 was approximately RM5,211,971,591. There are also various of heritage building related to the fire incidents including 7 unit of shops in heritage building at Jalan Kuala Kangsar, Prangin Estate, Penang (Mohamad, 2019), 32 buildings including Lembing Public Library in Sungai Lembing, Pahang (Yunus, 2019) and Sarawak's century old historic building, Fort Renee, Saratok in Kuching (Kawi, 2020).

Therefore, fire safety management are very important in order to protect the heritage buildings that filled with priceless and precious content to our country. According to Kidd (2010), fire safety management is the application of a disciplined plan to make sure that risks of and from fire are minimized. One of the fire safety management aspect is fire risk assessment which carry out hazard identification, prepare preventive measures and document all of the plan of the assessment for future review. Despite spread awareness among employee, the assessment practically acts as guideline for the employees to acknowledge the importance of fire safety management. As a result, this study is carried

out to investigate the current practices implementation of fire safety management plan, the challenges of fire safety management implementation and the ways to improve the fire safety management plan implementation in heritage building.

2. Literature Review

The literature review section describes all relevant literature related to the research and critically discussed. This section can be structured based on the stated objectives and focus of the study or any logical order as deemed appropriate.

2.1 Heritage Building

According to UNESCO in 1972, cultural heritage is defined as monuments, architectural works, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, and cave dwellings. Therefore, there are classification of heritage of heritage building in defining its term.

(a) Classification of Heritage Building

As follows is the classification of heritage building by UNESCO (1972) and Hua (2010:

(i) Monuments: Architectural works, works of monumental sculpture and painting, elements or structures of an archaeological nature, inscriptions, cave dwellings, and combination of features, which are of outstanding universal value from the point of view of history, art or science.
(ii) Group of buildings: Groups of separate or connected buildings which, because of their architecture, their homogeneity or their place in the landscape, are of outstanding universal value from the point of view history, art or science.
(iii) Sites: works of man or combined works of nature and man, and areas including archaeological sites which are of outstanding universal value from the historical, aesthetic, ethnological or anthropological point of view.

Both tangible and intangible cultural heritage existed in each of these clarification. Despite that this research focus was on monuments and buildings. Museums is one the adaptation of historical buildings as an act to preserve the historical value of a building. According to UNESCO (2012), the museum is a permanent institution that was opened to the public and disseminates the tangible and intangible heritage for education, research and recreation purposes other than preserves and exhibits. Therefore, it is important to implement right and legal fire safety management in those cultural heritage; museum in order to protect the valuable heritage.

2.2 Fire Safety Management

(a) Fire Safety Risk Assessment

Fire safety risk assessment is an assessment that should be done regularly within the building to check on any possible hazard or threats. According to Dawkin (2001), fire risk assessment is not the only solution to help the building owner identify hazards, but it also helps to illustrate the remedial approaches to be used. The assessment of building risk is critical in order to identify the effect of fire risk on the level of fire protection in individual buildings (Watts & Kaplan, 2001). There are five stages of fire risk assessment prescribed by Department for Communities and Local Government (DCLG) as shown in Table 1.

Table 1: Fire safety risk assessment (Akashah, Teh & Baaki, 2016)

Fire Risk Assessment Stages	Description
1. Identify Fire Hazards	• Sources of ignition • Sources of fuel • Sources of oxygen
2. Identify People at Risk	• People in and around premises • People especially at risk
3. Evaluate, Remove, Reduce and Protect from Risk	• Evaluate the risk of a fire occurring • Evaluate the risk to people from fire • Remove or reduce the hazards • Remove or reduce the risk to people
4. Record, Plan, Inform and Train	• Record significant finding and action taken • Prepare an emergency plan • Inform and instruct relevant people; co-operate and co-ordinate with others
5. Review	• Keep assessment under review • Revise where necessary

2.3 Fire Safety Management Plan

(a) Managing Fire Safety Plan

Fire management strategy is important in order to provide emergency action that should be taken in the occurrence of accidents for future guidance. According to Wong & Xie (2014), fire protection strategy describes how the fire safety is handled and how the owner controlled it in the building in the context of planning, emergency procedures and maintenance purposes. Wong & Xie (2014) also stated that the aim of fire safety management plan should include:

(i) Ensure that all employees are mindful of their day-to-day duties and obligations with respect to fire safety;
(ii) Understand the description of fire prevention activities;
(iii) Ensure that all employees know what to do in the case of a fire emergency;
(iv) Describes clearly the emergency measures for ensuring the secure evacuation of occupants and obstructed access by the fire authority;
(v) Defining specifically the maintenance regime for fire service installations;
(vi) Document any changes to fire protection arrangement or procedures (e.g. due to refurbishment works or change in personnel or management hierarchy).

Besides, the fire management plan also consists of three major components which is fire management team plan, fire emergency procedures and maintenance plan (Wong & Xie, 2014). Wong & Xie (2014) describe the summarization of those components as below:

(i) The fire management team strategy outlines the tasks that will take place to ensure that the personnel are clear about duties and are kept informed also well prepared to carry out their responsibilities (e.g. training and fire drills). It defines the roles of employee both during day-to-day activities and in the sense of emergency situation. The personnel shall include those committed to the implementation of fire protection and those that have a temporary role in the event of an emergency.
(ii) The fire emergency protocols identify the actions that will take place in accordance with duties of duty holders in an emergency situation.
(iii) The maintenance plan sets out the components to be maintained and the maintenance frequency to ensure that the fire protection requirements are kept in working order. It also

contains concerns that will be checked on a regular basis by the management team due to their effect on fire safety and fire prevention, e.g. housekeeping.

(b) Fire Emergency Procedures

Training plans and maintenances shall ensure that fire safety measures are available where appropriate and that personnel in heritage buildings are fully aware of their roles in the event of a fire situation. Fire emergency plan which is the final component of the fire management plan in an emergency situation is described by Wong & Xie (2014) consists of fire control centre, fire control, evacuation control and crowd control. However, for the focus of this study, which is based on heritage building that, have been existed a long time ago, the explanation will only focus on fire control. Fire control is an action that should be taken by the employee when detected fire in the building. The actions described by Wong & Xie (2014) are:

(i) Locate the nearest fire hose cabinet and turn on the manual call point to activate the fire alarm system.
(ii) Attempt to put out the fire with hose reel or fire extinguisher
(iii) If the fire continues to spread, leave the area and close the door.

2.4 Challenges of Fire Safety Management Plan Implementation in Heritage Building

(a) Awareness

According Roslan and Said (2017), the main reason of fire disaster in heritage building is because of lack of fire safety awareness among the building owners and public. The awareness is critically significant in order to manage the fire hazard or fire risk assessment to provide more understanding among the employees in the building. The fire safety management requires more attention than anything else in heritage building as it is filled with a lot of sensitive contents whether it is flammable or valuable.

(b) Cost

In order to ensure the fire protection in the building operate in good conditions, maintenance or inspection need to conduct. Despite that, the maintenance requires cost consumption and it is one of the highest cost in process of providing fire protection measures. According Kodur, Kumar and Rafi (2019), active fire protection systems such as sprinkler necessitate ongoing maintenance and water resources, both of which may be difficult to come by in impoverished nations with scarce water resources. It signifies that the cost of fire protection measures are far more than the actual direct or indirect losses caused by fire hazard, emphasizing the necessity for cost-effective fire protection solutions (Kodur, Kumar & Rafi, 2019).

(c) Fire Safety System

Installation of fire-fighting water systems can save the building from destruction, but in some circumstances, the uncontrolled activation of these system can cause more damage than fire would cause (Scientific Department, 2020). In Columbia, during October 1st, 2019, an incident of malfunctioning sprinkler head reduced some historical document that was keep at that time by the Missouri State Historical Society to waterlogged paper and soggy cupboard (Scientific Department, 2020. This situation conveys that usage of fire protection system such as water sprinkler could create unexpectable worse situation meanwhile trusting on it to protect the historical content.

2.5 Ways to Improve Fire Safety Management Plan

Fire safety management in heritage building requires a lot of cooperation among parties involved such as fire department, MBMB, and PERZIM itself in order to ensure the safety of the occupants in

the heritage building. Therefore, Salleh & Ahmad (2009) have summarized some action that could be taken by those parties to improve the fire safety management plan as follows:

(i) The building owner or administrators:
- Appoint a fire safety officer with specific responsibility for the implementation of fire safety policy;
- Make a schedule meeting at least once a year to review fire risk management by forming a central fire safety committee to ensure the implementation of fire safety policy statement;
- Ensure all of fire safety signs and procedures are adequate and they are properly displayed and located;
- Identify major risks and hazards of fire spread and eliminate unnecessary hazards.

(ii) The building occupants:
- Comply with all requirements of the fire safety policy formulated by the building administrator;
- Enhance personal awareness and knowledge of fire safety continuously.
- Do not smoke in the building;
- Inform the building administrator or employee immediately if saw or encounter any sign of fire hazards.

(iii) The authority bodies:
- Ensure that all heritage buildings comply with current fire safety requirements;
- To ensure effective and efficient enforcement, to carry out spot checks on a regular basis.
- Comprehensive fire safety guidelines specifically for heritage buildings are formulated;
- Every heritage building is required to have a fire safety manager with proper training and full authority to control all fire safety decisions;
- Fire safety campaigns are conducted regularly to increase public awareness.

Based on the actions that were suggested by Salleh and Ahmad (2009), it shows that the fire safety management plan should be practiced by every layer in the organization. The building owner or administrator related to the fire safety management of the building which is in this study would be focus by PERZIM. The actions that should be taken by the building occupants were focused on employee or the visitor in the building. And the authority bodies related to the suggested action were the most important role which is the fire department.

3. Research Methodology

A research methodology is a procedure on how the data will be collected whether it is in a quantitative or qualitative categorization. It is comprised of various way, method, or approach to achieve the objective and purpose of the research. Carefully conducted research methodology can facilitate and complete the data collection process in more details (Kamarudin, 2012). Therefore, this study using qualitative methods to seek for understanding or to achieve an explanation from data that is not prior knowledge or theory.

3.1 Research Design

(a) Qualitative Research

This research using qualitative method by using semi-structured interview that involves two-way conversation between the interviewer and the respondent as well as being able to interact face-to-face

for the purpose of collecting study information from respondents orally. The collection of the data is to determine on how the implementation of fire safety management plan works in the building to help for room of improvement and solution to any problem that will occur. To reach out the objectives and successful of this research, the data will be analyzed and presented in schedule and writing which is the last phase for this research.

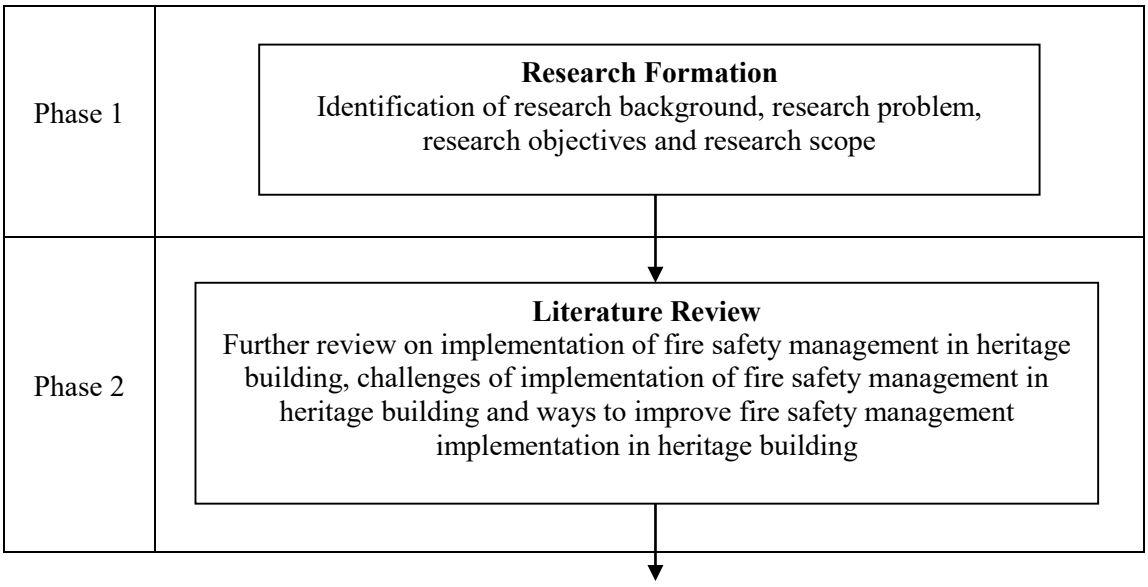
(b) Research Population and Sampling

Sampling involves two aspects namely study population and study sample. Sampling is related to the process of selecting a number of subjects from a population to be used as study respondents. Sampling is an important aspect of research because the use of inappropriate samples will reduce the validity and reliability of the research (Chua, 2006). Therefore, the study sample of this research are museum management division under PERZIM who have the authorities in this scope of the research which is Stadhuys Complex in Malacca.

(c) Research Instrument

In qualitative research, the interview conducted between researchers and respondents is to gather information on fire safety management plan implementation Stadhuys Complex which is one of the heritage building in City of Malacca. Recording the conversation and collecting photos of visitation are crucial pieces of evidences in conducting fieldwork for this study. Also, researchers need to ensure that the instruments used must be valid and reliable to keep the research process running smoothly and avoiding any mistakes. Therefore, the interview questions are the data collection instrument used to derive info from the respondents.

(d) Research Methodology Process



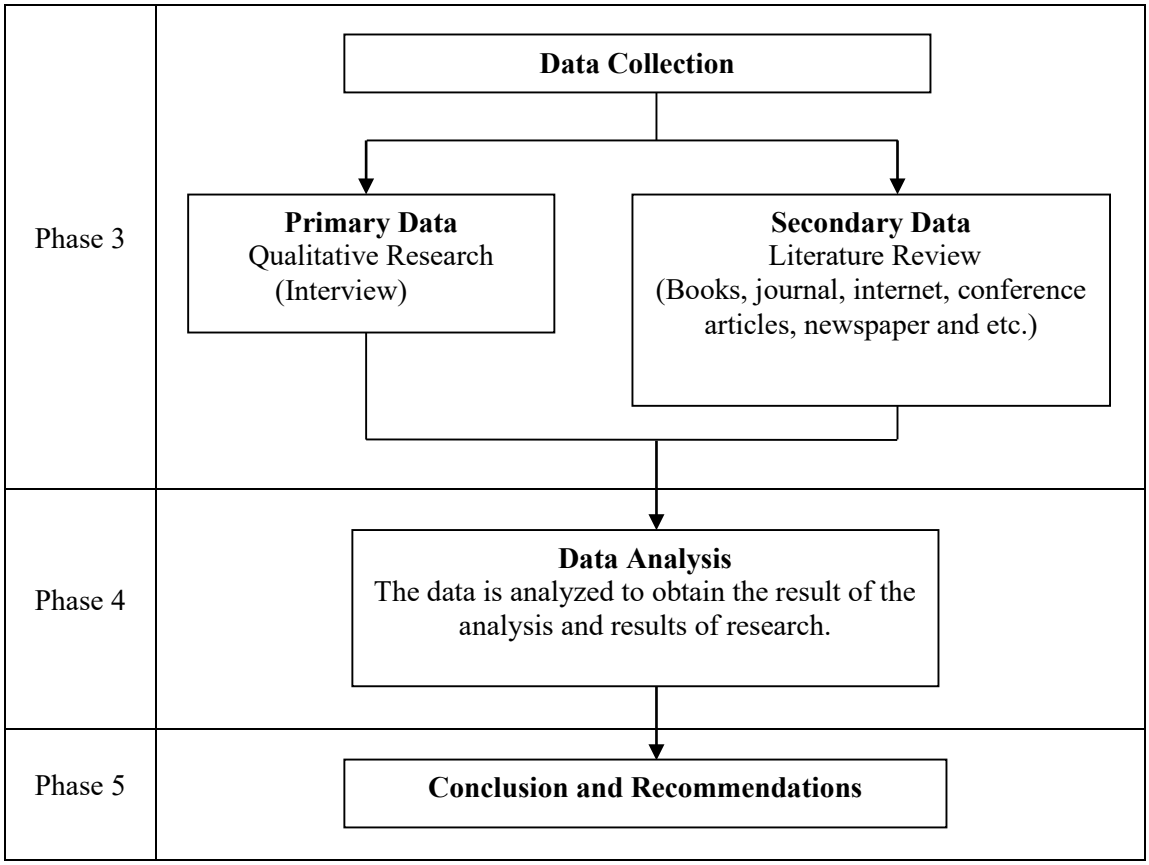


Figure 1: Research methodology process

3.2 Data Collection

Primary data played an important role in order to construct successful research. Cooper & Schindler (2014) stated that primary sources are authentic works of research or raw data without pronouncement or clarification reflecting an official view or opinion. The primary sources are often the most reliable since a second party has not filtered or interpreted the information. Thus, through this research, included in the primary data is set of questions of the current practices of fire safety management plan implementation in heritage building, the challenges and the ways to improve the fire safety management plan. Secondary data is considered as a secondary information sources. According to Cooper and Schindler (2014), the interpretations of primary data are secondary sources. The medium used in this collection data comprised of books, articles, journals, newspaper are to strengthen all of the information that have been discussed in this research and for further strengthen the validity of primary data.

3.3 Data Analysis

Generally, data analysis is an analysis of written content or photos derived from books, newspapers, reports, journals, and articles. According to Jasmi (2012), document analysis is done by analyzing the content that is a description of the communication message that has been printed, broadcast, or illustrated with reference to words, the meaning of pictures, symbols, ideas, and so on. Data gathering using this method of document review can provide researchers with appropriate and relevant knowledge. The paper includes data that is accessible and impossible to cheat since it is the organization's official record of survey. There are examples of papers that can be analyzed (Jasmi, 2012):

(i) Journal or diary

(ii) Textbooks and reference books
(iii) Minutes of meetings
(iv) Evaluation records or organizational reports
(v) Administrative system
(vi) Infrastructure and technology
(vii) Pictures

Thus, in this research, the data analysis is to provide significant information on implementation of fire safety management in heritage building and the challenges of the implementation in order to find ways of solution in improving any weakness in the fire safety management implementation.

4. Results and Discussion

4.1 Respondent Background

In this research that using qualitative approach, respondents and their feedback are important to ensure the accuracy of their answer on the question based on their work's experience. Table 2 present the respondent's background comprised of positon, year of working experience and museum management division.

Table 2: Respondent's background

Respondent	Museums Management Division	Position	Working Experience
Respondent 1 (R1)	Unit A	Curator	10 year
Respondent 2 (R2)	Unit B	Curator	8 years
Respondent 3 (R3)	Unit C	Assistant Engineer	8 years

4.2 Results

(a) Results Objective 1: Current Practices of Fire Safety Management Plan Implementation in Heritage Building

Table 3 present the current practices of fire safety management plan in heritage building is PERZIM shows that they prioritize the building and occupant's safety by implementing the fire safety risk assessment and fire safety management plan; emergency planning; emergency action; and maintenance. They encourage their employees to join the fire risk assessment such as fire drill by using unique which is they would provide certificate or award to the employees who join the fire safety training. In addition, the staff are aware with the task that were outline by fire safety committee for the emergency planning which include hazard identification, preventive measure, action plan, recovery procedures and emergency plan report. Besides, the company provided good knowledge for the staff on emergency action during emergency situation such as fire outbreak. According to Wong and Xie (2014), during emergency situation such as fire outbreak, employee should attempt to put out the fire with hose reel or fire extinguisher and if the fire continues to spread, leave the area and close the door. This is due to the exposure to the initial steps of fire through training that were organized by PERZIM Safety and Health Committee (JKKP) with the cooperation of nearest fire department. Besides, PERZIM also has appoint security company to control the safety of the building, fire extinguisher maintenance company and fire alarm system maintenance company for the inspection process in the whole museums. Maintenance plan set outs the components to be maintained and in set time of frequency to ensure the fire protection requirements are kept in working order (Wong & Xie, 2014). This study was conducted to find out how

PERZIM carried out the practices of fire safety management for the museums. It shows fire safety management is important and requires cooperation from all parties to succeed.

Table 3: Summary on respondents' experiences on current practices of fire safety management plan implementation in heritage building

Fire Safety Management Plan Implementation	Question	R1	R2	R3
Fire Safety Risk Assessment	Practices of fire safety risk assessment that have been implement by PERZIM in heritage building	In museums, we identified risk that could bring any harm to building occupants, collections and building	PERZIM Safety and Health Committee (JKKP) registered under the state of Melaka JKKP. The committee acts as joint program with firefighters, hospital and others to provide exposure to employee in the event of an emergency	Once a year, PERZIM would carry out fire risk assessment in the museum for the audit under PERZIM Safety and Health Committee (JKKP) and state of Melaka JKKP audit
	PERZIM ensure the employees take part in fire risk assessment such as fire drill	Every program or training would require the list of employees who join the program. Therefore, it is important for employee to take part in the fire drill training	PERZIM would give certificate or award to the employee that join any program related with fire safety training and other program too. This method encourage employee to join program that established by PERZIM	All of the employee must take part in fire drills training to gain knowledge and know how to act during emergency situation
Emergency Planning	Task that have been outline by the fire safety committee in emergency planning	Task in emergency planning include identify potential emergency and potential damage from emergency, identify priority	The emergency planning has prevention measures such as eliminate or minimize hazard that could cause harm to the people,	Emergency planning consist of hazard identification, preventive measures, action plan, recovery procedures and emergency plan report

Fire Safety Management Plan Implementation	Question	R1	R2	R3
		of assets, carry out preventive measures and record the emergency plan	collection and building	
	PERZIM ensure all of the employee clear about their responsibilities during emergency situation	Through training of fire safety and health program	All of the employees have been exposed to initial steps of fire through training and standard operation procedure of fire and safety is put up on walls as awareness	JKKP has set up training program with fire fighters to give exposure on action that should be taken during emergency situation
Emergency Action	Action that should be taken by employee or building occupants during emergency situation such as fire break	Raise the fire alarm, empty the building and make an emergency call to the fire station	Employee need to calm down and try to put out the fire using fire extinguisher according to the standard operation procedure of fire safety. Besides, the employee need to empty the building and gathered at assembly points. At the same time, make an emergency call to the nearest fire station to inform the situation	If in fire minor situation, trained staff should try putting out the fire with the relevant equipment such as fire extinguisher. But if in serious situation and need to empty the building, shut down all hazardous operations and leave quickly by the nearest safe exit according to the escape routes. The door must be shut as all of the employee have empty out the building. Lastly, during the fire alarm has been sounded, the designated fire safety committee must contact the fire brigade

Fire Safety Management Plan Implementation	Question	R1	R2	R3
	Important aspect that can help emergency action would be conduct properly	From the aspect of building, the sign of exit and escape route play a big role to help building occupants clearly see and know the way out	As an employee, the most important aspect is the basic knowledge of fire safety to help visitor and other building occupants went through the emergency safely	The list of contact number of important person in charge of fire safety must be up-to-date regularly (if happen any changes), so the employee knew who they can contact to inform the emergency situation in order to conduct any preparation and take a preventive measure.
Maintenance	Maintenance in the aspect of fire safety management that was conducted in heritage building	inspection of fire safety system, internal audit and others	PERZIM perform periodic monitoring on fire extinguisher and internal audit	PERZIM has appoints a security company to control the safety of the building at night, appoints a fire extinguisher maintenance company and appoints a fire alarm system maintenance company
	Frequency (in year) of fire safety management maintenance carried out in the heritage building	Once a year	Annually	Once a year

(b) Results Objective 2: Challenges of Fire Safety Management Plan Implementation in Heritage Building

Table 4 present the challenges of fire safety management plan in heritage building. Based on the curator's explanation, the fire safety committee, JKKP manage to conduct awareness for the employee by established a program of fire safety training and fire prevention. This is related to the past research

by Nadzim and Taib (2014) that stated in fire safety management, it refers to the combination or coordination of number of activities or programs aimed at preventing fire damage. Public visitors were also exposed to the emergency procedures explaining on emergency exit and others information before enter the museum. It shows that PERZIM does not have any challenges in term of awareness. Fortunately, it is the same with fire safety system. The museum management gave none feedback on the challenges of using the fire safety system in the heritage building. Instead, it would be advantage for them if the fire safety system is upgrading to the better version. The only challenges in the fire safety management implementation the building is maintenance cost. There is different type of maintenance in the museum and some of it are fire extinguisher maintenance and fire alarm emergency maintenance. On the other side, the cost of fire protection measures is far more than the actual direct or indirect losses caused by fire hazard, emphasizing the necessity for cost-effective fire protection solutions (Kodur, Kumar and Rafi, 2019). This challenge need to be overcome by the management by set on the budget require accurately and propose effective maintenance with affordable prices.

Table 4: Summary on challenges of fire safety management plan implementation in heritage building

Challenges	Question	R1	R2	R3
Awareness	PERZIM take an initiative to provide fire safety awareness campaign for the employees	Safety and Health Committee of PERZIM make a program of safety training and fire prevention for employee with the cooperation fire department	There are campaign that hosted with fire department to learn about fire safety for employees	PERZIM hosted a theory and practical safety training and fire prevention with fire department at PERZIM
	PERZIM spread awareness on fire safety to visitor	Briefing on emergency procedure will be given by employee that in charge of the museum before visitor enter the museum	Before visitor went into the museum, the museum staff will give a briefing on emergency procedures that explain about emergency exit and others for 2 minutes	No answer
Cost	Cost is one of the factor to the barrier of implementing fire safety management plan in museums	Yes	Yes	Yes
	Aspect that consume the highest cost in implementing	No answer	The most consumed cost is the maintenance	Maintenance is the highest cost in fire safety management.

Challenges	Question	R1	R2	R3
	fire safety management plan in heritage building		cost. The maintenance cost involved the fire extinguisher maintenance cost and the fire alarm emergency cost	This is because the maintenance is perform annually and to identify any potential threat to the building, collections and building occupants
Fire safety system	Barrier to upgrade or change the fire safety system in the heritage building	None	None	None
	Impact that will be rise from upgrading fire safety system in heritage building	It will bring benefit to the fire safety committee that handle fire safety management, building, collections and building occupants	The safety of the museum will be more improve and the number of visitor will increase	It would help the fire safety management to control the safety of building occupants and the collection of artifact in the museum

(c) *Results Objective 3: Ways to Improve the Fire Safety Management Plan Implementation in Heritage Building*

Table 5 present the ways to improve the fire safety management plan implementation in heritage building there are a lot of initiative to practices from different types of parties; administrator; building occupants; and authority bodies. The application of fire safety management in the building gave the museum management various opinion on how to improve it in the future. According to Salleh and Ahmad (2009), appoint a fire safety officer with specific responsibilities for the implementation of fire safety policy is one of the step to improve the fire safety management. The curator explained that this idea would be a great help to guide employees or building occupants to make any correction on fire safety management. Besides, fire safety training is one of the usual procedure and repetitions action in a program for the employee or building occupants. In order to make it more effective, new approach need to be taken to make it more realistic and challenging. Plan on missing person and block some escape routes to sharpen their problem solving skills and fast response in this new environment of training. On the other side, the authority bodies in this field especially fire department need to ensure the fire safety management in a building is conducting in rightful way. They should make enforcement on fire safety management especially for building that have high risk to possible threat to implement fire safety management plan followed by the guideline.

Table 5: Summary on ways to improve the fire safety management plan implementation in heritage building

Improvement	Question	R1	R2	R3
Building Owner or Administration	Appoint fire safety officer for museums could help with fire safety management plan to work better	Yes	Fire safety officer can be a great help to guide employees or building occupants and improve or make any corrections on fire safety management plan	Yes
Building Occupants	Make basic fire safety training more effective for the employees or building occupants	To make it more effective, make an employee missing during the training to show that each employee should take care of each other	Block specific escape route to make the employee think on other ways to get out. This could help the employee improve their quick thinking skills.	Block escape route to make employee give a fast response in that situation
	Spread more awareness on fire safety among the building occupants in the heritage building	Put up poster about fire safety awareness at notice board or place that can be clearly seen	Distribute poster about tips on handling emergency situation such as fire breaks to the employees	Make a short morning briefing about safety and health before start working for once a week or twice a month
	Ensure building occupants do not smoking in the heritage building	Put up a sign of "No Smoking" in strategic places in the heritage building	There are security or employee that ensure visitor or building occupants do not smoking in the building	Fire safety system such as sprinkler system would detect smoke in the building. Therefore, building occupant or employee know that they cannot smoke in the building
Authority Bodies	Ensure that the fire safety	Authority body such as fire	Authority bodies can carry	No answer

Improvement	Question	R1	R2	R3
	management in the building always complies with the rules that have been set	department can make an inspection regularly towards museum under PERZIM	out effective and efficient enforcement for the fire safety management in a building	

5. Conclusion

In conclusion, this research analysis was carried out in a successful way and all of the research objectives, which understand current practices of fire safety management plan implementation in heritage building, identify challenges of fire safety management plan implementation in heritage building and propose ways to improve fire safety management plan in heritage building were achieved. The data derived from this study is perform with the qualitative method by conducting an interview session with the selected respondent. Respondents to this research include those who involved in fire safety management in the selected heritage building under PERZIM. Based on the respondent's experiences, there are various methods used to manage the fire hazards in the building. It is very important because fire safety management is a serious issue that require many responsibilities. Based on the data analysis, it can be concluded that the main challenge of fire safety management is the maintenance cost. In order to provide safety to the building occupants and historical contents, there were various of fire safety equipment that were set in place in the heritage building. As a result, the cost of fire protection maintenance became one of the barrier in conducting fire safety management in the building. Building owner or administrator can appoint a fire safety officer to guide the management and propose any possible room of improvement for the fire safety management. Building occupants must raise their awareness and alert with any changes of fire safety management. Fire safety training is one of the effective way to improve skills and knowledge in fire safety. Even though there are some difficulties and limitations during conducting this research, the data derived is adequate in order to achieve the research goals. Optimistically, the data collected will help the parties that involved with fire safety management to make any room of improvement for more effective and efficient fire safety management.

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