UNIVERSITI TEKNOLOGI MARA Cawangan Perak

KUTAI

GRESAFE_CITIES
Green Safe Cities, Research Group

6th UNDERGRADUATE SEMINAR ON BUILT ENVIRONMENT AND TECHNOLOGY (USBET) 2023

SUSTAINABLE BUILT ENVIRONMENT

25 - 27 SEPTEMBER 2023

E-PROCEEDING

USBET 2023

e-Proceeding

6th UNDERGRADUATE SEMINAR ON BUILT ENVIRONMENT AND TECHNOLOGY (USBET) 2023

SUSTAINABLE BUILT ENVIRONMENT

Published by,
Department Of Built Environment Studies And Technology
Faculty Of Architecture, Planning & Surveying
Universiti Teknologi MARA Perak Branch, Seri Iskandar Campus
usbet.fspuperak@gmail.com

eISSN 2821-3076

02 October 2023 | Perak, Malaysia
Universiti Teknologi MARA, Perak Branch, Seri Iskandar Campus

EDITORIAL BOARD

Editors-in-Chief

6th Undergraduate Seminar on Built Environment and Technology 2023

- E- Proceedings-

Organized by,

College of Built Environment (KAB) UiTM Perak Branch

CHALLENGES AND BARRIERS OF FIRE SAFETY MANAGEMENT IN HERITAGE BUILDING

Nurelisa Hamira Abdul Hamid[1], Zuraihana Ahmad Zawawi[1*]

[1]Department of Built Environment Studies and Technology, College of Built Environment, Universiti Teknologi MARA Perak Branch, Seri Iskandar Campus, 32610, Seri Iskandar Perak, Malaysia

nrelisahamira@gmail.com *zuraihana@uitm.edu.my

ABSTRACT

A heritage building must have a proper fire safety management plan in place to protect its occupants and maintain the building's historical significance. The heritage building owners and managers can ensure the safety of occupants, safeguard the structure and its historical significance, and adhere to regulations by implementing a fire safety management plan. However, the fire safety management in heritage buildings is a critical and complex issue due to the unique challenges presented by preserving historical structures while ensuring the safety of occupants and the building itself. Thus, the aim of this paper is to identify the challenges and barriers of implementation of fire safety management in heritage building. The study utilizes a survey methodology to gather data from various background of staffs and visitors of case study building in Penang. The survey questionnaire consists of Likert-scale questions to seek the respondents' opinion and agreements about the challenges and barriers statements which have been identified through the secondary data collection. The challenges of fire safety management in heritage buildings have also been identified through comparisons between public and private buildings. The findings of this study will contribute to the awareness of the relevant organizations which have responsibilities in managing the heritage building to have a good practice of fire safety management.

Keywords: c*hallenges, heritage building, fire safety*

INTRODUCTION

Unwanted fire is an issue that causes billions of worth of property damage and thousands of fatalities each year. The majority of people believe that their homes and places of employment are protected from fire damage, yet this uncontrollable occurrence can happen in any kind of structure and can have significant consequences. Building design and construction considerations for occupant safety vary widely, frequently focusing on occupant escape from burning structures. Occupant escape and firefighter access are only possible if a building or a section of a building will not collapse in a fire or permit the fire to spread. (Andrew Buchanan & Östman, n.d.)

Heritage buildings must implement a fire protection plan that complies with the fundamental standards of fire safety while minimizing damage to the building's historic construction. It means that all mechanical and electrical installations related to fire protection should be minimized while yet being able to meet the building's fire safety criteria. (Kincaid et al., n.d.)

The concept of fire safety management is when a manager applies policies, standards, tools, information, and processes to the task of analysing, evaluating, and controlling fire safety. Managing fire safety entails putting a disciplined plan into practice to lower the danger of a fire. Effective fire safety management can offer the required level of fire safety with fewer adjustments. As a result, the effects on the building's historic contents will be lessened. (Salleh & Ahmad, n.d.)

Fire management is crucial in heritage buildings with valuable historic assets to protect future generations. Fire risk assessment identifies hazards, offers preventive actions, and documents plans for future evaluation. Staff awareness is generally limited, but the assessment serves as a guideline for understanding the importance of fire safety management. As a result, this study was carried out to investigate the challenges and barriers to implementing fire safety management in historic structures. (Idrus et al., 2010)

When it comes to fire safety in heritage buildings, several critical issues need attention. One major concern is the lack of awareness among building owners, which can lead to tragic incidents and jeopardize the safety of visitors and the preservation of the sites. Another problem is the absence of proper fire management plans, leaving the responsibility in the hands of owners who may not prioritize safety measures. Additionally, the lack of support from local authorities hinders the implementation of comprehensive fire management plans, crucial for safeguarding these culturally significant structures and their occupants. Overall, addressing these issues is vital to protect heritage buildings and ensure the safety of everyone involved. (Ishmah et al., 2021)

Overview of Heritage Building

A significant trait that may be passed down from generation to generation is heritage. It comprises traditions, cultures, places, structures, historical records, and artwork, as well as the creation of relevant books and papers. Heritage is also known to play a significant part when it comes to preserving the history, traditions, and qualities of a community or nation.

Building heritage refers to significant historical buildings requiring ongoing maintenance and protection to preserve their historical, aesthetic, spiritual, social, political, and economic value.

Types of Heritage Building

i. Shophouse

Terraced shophouses were introduced in 1884 by British resident Frank Swettenham, requiring permanent structures, materials, and structural design, inspired by southern China and European architecture.

Figure 1: Shophouse

ii. Religious Building

A religiously themed place, such as a temple, mosque, or synagogue, may include amenities like ashrams, bathing ghats, and gaushalas.

Figure 2: Church

iii. Administrative Building

Administrative structures are chosen based on location and political ideologies, typically large-scale structures for administrators and government lawmakers, promoting pluralist society.

Figure 3: Administrative Building

Fire Safety Management Plan in Heritage Building

A fire management plan is crucial for implementing emergency measures and ensuring building safety. It outlines maintenance, emergency preparedness, and planning. Heritage buildings have been influenced by building managers, renters, and government organizations, with suggestions for improvement. (Fatiha et al., 2021)

Table 1: Fire Safety Management Guidelines (Laman Portal Rasmi PORTAL RASMI JBPM, n.d.)

No	Fire Safety Management	Guidelines Explanation
1.	Identify hazard	To find potential fire hazards in the building and its surroundings, conduct a fire risk assessment.
2.	Install fire detection and alarm system	Installation of fire alarm system is important to alert the occupant. about the fire situation. All the fire detection system must be properly maintained.
3.	Install fire suppression	To help contain and extinguish fires, install fire suppression systems like sprinklers, fire extinguishers, and fire hoses.
4.	Keep flammable material away from heat sources	Flammable's material should be kept properly and avoid it from exposed to the heat sources.
5.	Practice fire escape	Create a fire emergency plan that outlines the precise steps that staff and residents should take in the event of a fire. Access to fire escape routes and exits must be clear and secure. Make sure they are well-lit and free of obstructions.

METHODOLOGY

Research methodology is to obtain objective of the study by providing some collecting data. A research methodology describes the methods used that will be taken to obtain the data, whether it is to be categorized as quantitative or qualitative. It consists of numerous approaches, methods, and ways to accomplish the research's goal and purpose.

The method of identification and assessment is based on questionnaire analysis and observation at the Kek Lok SI Temple and Teh Bunga Mansion, two case studies on Pulau Pinang. This study employs a quantitative methodology to gather data from employees and visitors to Pulau Pinang's historic buildings via an online poll. The study uses multiple choice questionnaires that are sent via Google Forms to target respondents depending on their statements and expertise. Data is being gathered to determine how the building's fire safety management is being implemented. The data will be analysed and presented in this paper in order to meet the study objective.

Secondary data through journal, website and book also been used in this research. This strategy involves gathering information from journals, articles, books, and internet searches, using secondary data from government agencies, research institutions, and industry reports. Proper citation and acknowledgment are crucial for academic integrity.

Table 2: Methodology

Questionaries	To determine the challenges in managing fire safety in heritage buildings on Pulau Pinang, a set of questions was given to 81 respondents.
Observation	Kek Lok Si Temple and Teh Bunga Mansion are two case studies that are on the island of Pulau Pinang where observations have been conducted. To compare how fire safety management is implemented in private and public buildings, an observation is made.

Case Study

The case study was conducted in two locations which are Kek Lok Si temple (figure 4) and Teh Bunga Mansion (Figure 5) where all two-case study are located in Pulau Pinang. Case studies are chosen depending on the sorts of buildings, which include private and public buildings. These buildings are suitable for selection as the case study based on the criteria.

Figure 4: Kek Lok Si Temple

The Kek Lok Si Temple is situated in the town of Air Itam, which is situated in the centre of Malaysia's Penang Island. It is located on Crane Hill, also referred to as "The Hill of Supreme Bliss" in Chinese. This building was chosen because it is home to priceless historical treasures and was vulnerable to the October 2021 fire because of a shoddy fire-resistant construction. Kek Lok Si Temple has been selected to demonstrate how fire safety management has been implemented in historical structures. The buildings also have unique architectural and cultural characteristics.

Figure 5: Teh Bunga Mansion

Teh Bunga Mansion is in the centre of George Town, the Malaysian island of Penang's capital. It is specifically situated on Jalan Sultan Ahmad Shah, one of the major thoroughfares that passes through the heart of the city. Many of George Town's most well-known attractions, such as the historic Fort Cornwallis, the stunning Penang City Hall, and the vibrant street markets of Little India and Chinatown, are accessible by foot from the hotel. This building protected by heritage preservation laws and regulation by the

RESULT AND DISCUSSION

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 experience. Based on these questionaries, there have total 81 number of

respondents who are involved in this survey. Table 3 and Table 4 present the respondent's background and working experiences.

Table 3: Profession of Respondent

		Frequency	Percent
Valid	Fire Officer	14	17.3
	Conservator	10	12.3
	Owner	1	1.2
	Contractor	14	17.3
	Others	42	51.9
	TOTAL	81	100

Table 4: Working Experience of Respondent

		Frequency	Percent
Valid	1-2 years	19	23.5
	3-5 years	33	40.7
	5 years and above	29	35.8
	TOTAL	81	100

RESULTS

The challenges of a fire safety management strategy in a heritage structure are presented in Table 4. The respondents' perspectives are shown in this table. For each challenge, the means, and standard deviations for all 81 respondents were calculated and are shown in Table 4. The results demonstrate that all the challenges that respondents evaluated had mean scores that were higher than the standard deviation of 3.00. This shows that, in the respondent's opinion, all five criteria are significant obstacles to managing fire safety in historic buildings.

Table 5: Data Analysis

Questions	Average Means Score

Factor 1	Heritage structure consist of flammable material such as timber.	4.51
Factor 2	The historical structure of a building may be impacted by the installation of a fire protection system.	4.26
Factor 3	Fabric and material of historic building are impacted by modern development	4.19
Factor 4	It is hard to apply active fire protection with historic buildings	4.15
Factor 5	It is hard to apply passive fire protection with historic buildings	3.93

The results show, the challenges and barriers in fire safety management of heritage plan. The table illustrate five critical challenges to implement fire safety management in heritage building. The flammable material in heritage structure become a challenge to increase the fire safety management of the building. It's possible that older structures weren't built with fire-retardant elements like those used in more recent constructions. There may be a shortage of fire-rated assemblies or insulation in structural components like walls, floors, and roofs, making them more prone to fire damage and jeopardising the building's overall fire safety.

It also shows that it is difficult to apply active and passive fire protection in historic building. Modifying the building's infrastructure may be necessary for the integration of active fire control systems, such as fire sprinklers or improved smoke detection, which might be technically challenging. Older electrical systems, limited installation space, or brittle structural components that cannot withstand the added weight or stress may all be problems in historic structures.

CONCLUSION

In conclusion, the research analysis was successfully completed, and all the goals of the study—understanding the difficulties and obstacles associated with managing fire safety in historic buildings—were met. By performing an observation and administering questionnaires to workers and building owners, the data from this study was obtained using both qualitative and quantitative methods. The study discovered that attempting to establish fire safety management in practices is fraught with

difficulties. As the result, the building structure that consist of flammable material become one of the challenges in conducting fire safety management in heritage building. The implementation of passive and active fire protection systems can be complex, and structures made of flammable materials and historical buildings may be affected by these changes. Based on the finding, the researcher recommend to there should be adequate provision of fire alarm/warning systems in historic buildings to prevent fire outbreaks, as well as enforcement of fire policies among building owners, sanctions against building owners who disobey fire safety regulation laws, regular education and training for residents and employees, and enforcement of these policies. Along with any modifications in fire safety management, building occupants must also become more informed and aware. One of the best ways to advance the knowledge and abilities in fire safety is via fire safety training. Although there were several challenges and restrictions throughout the research's execution, the data obtained was sufficient to meet the objectives of the study. Ideally, the data gathered will assist the parties engaged in managing fire safety to make any necessary improvements for more effective and efficient management of fire safety.

ACKNOWLEDGEMENT

The College of Built Environment, Universiti Teknologi MARA is acknowledged by the writers for its assistance.

REFERENCES

Andrew Buchanan, E., & Östman, B. (n.d.). *Fire Safe Use of Wood in Buildings: Global Design Guide*.

Fatiha, N., Yusof, M., Rina, F., Roshdi, M., Saharuddin, S., Aishah, S. N., & Noor, M. (2021). *International Journal of Real Estate Studies INTREST Fire Safety Management in Malaysian Higher Educational Institutions*.

Idrus, A., Khamidi, F., & Sodangi, M. (2010). Maintenance Management Framework for Conservation of Heritage Buildings in Malaysia. *Modern Applied Science*, 4(11). www.ccsenet.org/mas

Ishmah, N., Zainal, H., Kasim, N., Zainal, R., Meryam, S., Musa, S., & Noh, H. M. (2021). Fire Safety Management Plan Implementation in Heritage Building. *Research in Management of Technology and Business*, *2*(2), 443–459. https://doi.org/10.30880/rmtb.2021.02.02.033

Kincaid, S., Lewis, A., & Belfast, P. (n.d.). *Introduction to Fire in Heritage*

Buildings and Emergency Planning for Fire.

Salleh, N. H., & Ahmad, A. G. (n.d.). *Fire Safety Management in Heritage Buildings: The Current Scenario in Malaysia*.

Pejabat Perpustakaan
Librarian Office

Universiti Teknologi MARA
Cawangan Perak
Kampus Seri Iskandar
32610 Bandar Baru Seri Iskandar,
Perak Darul Ridzuan, MALAYSIA
Tel: (+605) 374 2093/2453 Faks: (+605) 374 2299

UNIVERSITI TEKNOLOGI MARA

Surat kami : 700-KPK (PRP.UP.1/20/1)
Tarikh : 20 Januari 2023

Prof. Madya Dr. Nur Hisham Ibrahim
Rektor
Universiti Teknologi MARA
Cawangan Perak

Tuan,

PERMOHONAN KELULUSAN MEMUAT NAIK PENERBITAN UiTM CAWANGAN PERAK MELALUI REPOSITORI INSTITUSI UiTM (IR)

Perkara di atas adalah dirujuk.

2. Adalah dimaklumkan bahawa pihak kami ingin memohon kelulusan tuan untuk mengimbas (*digitize*) dan memuat naik semua jenis penerbitan di bawah UiTM Cawangan Perak melalui Repositori Institusi UiTM, PTAR.

3. Tujuan permohonan ini adalah bagi membolehkan akses yang lebih meluas oleh pengguna perpustakaan terhadap semua maklumat yang terkandung di dalam penerbitan melalui laman Web PTAR UiTM Cawangan Perak.

Kelulusan daripada pihak tuan dalam perkara ini amat dihargai.

Sekian, terima kasih.

"BERKHIDMAT UNTUK NEGARA"

Saya yang menjalankan amanah,

SITI BASRIYAH SHAIK BAHARUDIN
Timbalan Ketua Pustakawan

nar

Setuju.

27.1.2023

PROF. MADYA DR. NUR HISHAM IBRAHIM
REKTOR
UNIVERSITI TEKNOLOGI MARA
CAWANGAN PERAK
KAMPUS SERI ISKANDAR