



# The Appraisal of Fire Active System for Low-Cost High Rise Residential Building in Penang, Malaysia

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## ABSTRACT

Fire incidents occur in low-cost areas of residential buildings are increasing. The incidents involves life, this property will affect the residents. In addition, this study aims to evaluate management practices and compliance with safety standards in high-rise low-cost residential buildings in Penang. The objective of this paper is to assess the condition of active fire systems in low-cost high-rise buildings to comply with the standard and the law. Recommendation improvements in the fire safety aspects of low-cost residential buildings in Penang are implemented too. This research observation, fire safety audit checklist and interviews in the field. This finding emphasizes that every building's active fire system is 75 % is not working well and not maintained and some even do not follow the prescribed laws. This paper proposes to improve the active fire system, routine inspection and maintenance of the fire safety system, regular training and safety education for residents, installation of smart fire alarm systems, use of the latest technology and cooperation with the authorities to ensure compliance with regulations.

## 1. Introduction

Fire safety is a critical aspect of ensuring the well-being and security of individuals, communities and property [1]. Fire safety refers to the set of precautions, procedures and measures taken to prevent fires, minimize the risk of fire-related accidents, and ensure the safety of individuals and property in the event of a fire. Fires have the potential to cause devastating consequences, ranging from loss of life and injuries to extensive damage to buildings and the environment. Therefore, it is crucial to comprehend and put into practice efficient fire safety procedures. Due to the increased complexity and potential risks involved with such constructions, fire safety in low-cost high-rise residential buildings is of the highest priority [2]. Effective building control of fire-active systems is essential in Penang, Malaysia, where high-rise residential buildings are on the rise, to protect lives and property.

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From the changing fire cases that occur, the safety residents in affordable high-rise buildings is of the highest priority, especially given potential fire hazards. Due to the particular difficulties these structures present such as financial limitations and particular socioeconomic careful analysis of fire safety precautions, particularly fire active systems, is required [3]. The main focus of this research is on these systems' application, efficacy, and flexibility in the context of affordable high-rise residential complexes in Penang. In 2022, a total of 23,069 cases of fire that occurred in Malaysia were investigated by the Fire Investigation Division of the Malaysian Fire and Rescue Department. In Penang, there were 1675 fire cases involving 2 deaths and 21 injuries [4].

Penang, nestled on the northwest coast of Peninsular Malaysia, claims the noteworthy distinction of being the second most densely populated state, hosting a staggering 4710 individuals per square kilometer [5]. Increased economic growth has been encouraged by the designation of the site as the different demands of Penang's residents and visitors are catered for by high-rise structures there, which also include flats, apartments and condominiums. The urban environment of Penang, an innovative and quickly growing Malaysian state, has undergone a remarkable transition throughout time.

High-rise building has become a noticeable part of Penang's skyline as a result of the growing desire for urban living and the limited amount of available space. This has led to a larger population density and an equal demand for affordable housing choices. Due to this change in the population, affordable high-rise residential structures are now essential for meeting the housing needs of various socioeconomic categories. While these big buildings provide comfort and modern facilities, they also present particular fire safety challenges. In 2021, statistics show that fires recorded throughout Malaysia show that residential houses recorded the highest number of cases, which was 4177 cases [6].

The fire safety is an important system of buildings and occupant's protection [7]. Lack of understanding of fire safety among building managers, employees and members of the public is another factor that may increase the danger of a fire. Residential high-rises are always at risk of fire, which can be quite harmful to building residents. Human error and negligence are often the cause of fire occurrences [2]. The increasing number of fire incidents worldwide is currently an issue of public concern. As a result, the significance of fire safety management must be recognized to reduce the chance of an unforeseen incident occurring. Ensuring that fire safety measures are installed in buildings correctly is the duty of both public and private sectors [9]. Effective operation is required for fire safety systems like sprinklers, fire alarms, portable extinguishers and detectors, indicates, people from all areas of life should be aware of fire safety.

According to [10] the most dangerous exposures in high-rise buildings include fire, explosion and contamination of life-supporting systems including the air and consumable water supply. Because of the quick spread of pollution, fire and smoke that was these dangers can be accidentally or purposely set off and quickly take a disastrous turn. Every person living in a high-rise building must be equipped to respond quickly in an emergency. This is because the initial three to four minutes of a fire emergency are crucial. If a fire emergency is addressed quickly and according to established standards, well in advance of the incident, tragedy can be prevented.

The purpose of active fire system standards and bylaws is to guarantee the highest level of building safety and fire safety. The technical requirements, setup and upkeep of fire systems, including automatic sprinkler systems, smoke detection systems and fire extinguishers, are outlined in this standard. The bylaw also specifies how building occupants must be trained on fire safety and undergo routine testing and inspections. It is crucial to abide by these laws to lower the possibility of fatalities and property damage, as well as to guarantee prompt and efficient emergency response [8].

In conclusion, fire is a risk that can change a person's life in any high-rise building. If proper planning is not done in advance, the situation may get worse. By adhering to the laws and regulations established by the authorities, implementing sensible preventive measures and providing thorough training to building occupants, firefighters and facility managers on how to handle a fire emergency, the overall risk of fire and related losses can be significantly decreased.

### **1.1 Research Aim and Objectives**

This research aimed to assess the management practices and compliance of safety standards in high-rise low-cost residential buildings in Penang with the following objectives: -

- i. To evaluate the condition of fire-active systems in low-cost high-rise buildings in Penang.
- ii. To investigate the level of compliance of the active fire system against by law in low-cost high-rise buildings in Penang.
- iii. To recommend improvements in fire safety aspects of low-cost residential buildings in Penang

### **1.2 Research Question**

The following was how the research questions was applied in Penang to increase the effectiveness of active fire suppression in low-cost for high rise residential buildings:-

- i. What is the condition of fire-active systems in low-cost high-rise buildings in Penang?
- ii. What is the level of compliance of the active fire system against by law in low-cost high-rise buildings in Penang?
- iii. How do improvements in fire active system aspects of low-cost residential buildings in Penang?

## **2. Methodology**

The purpose of this chapter was to go over the methodology that was employed in the research to accomplish the primary goal. The research technique includes every step of the study-planning process from start to finish. This chapter aimed to provide a comprehensive review of the study design, research methodology and research process as a whole. Ensuring a well-defined framework for the research methodology is vital to ensure that runs smoothly encountering obstacles.

This chapter provides detailed information about how data was collected, giving a clear explanation of the methods and procedures used in gathering the information. This research uses a qualitative method to conduct fire safety research, a comprehensive approach was taken through interviews with various professionals as well as building observations and fire safety system audit. Interviews were conducted with the fire department stakeholders (two firefighters which were from the Fire department officers of the safety and fire operations unit and officers of the development fire safety, Penang that were capable of the questions and answers on the interview questionnaire especially on technical and management parts). However, three building managers conduct to manage three case study which was under the Penang State Housing Board. Observations and fire system audits were used to control active fire protection systems in high-rise residential buildings, ensuring the system's function and condition. The use of a checklist based on the UBBL 1984 and the Fire Services Act 1988 ensures legal compliance during inspections. A case study that took place in the state of Penang, known for its high incidence of fire, offers in-depth insights through the

integration of various methods including interviews, observations, fire safety audit and document review. This study focuses on low-cost residential buildings, specifically buildings A, B and C, to understand fire safety practices in the context of urban development in Penang. A comprehensive approach to gather diverse information from various stakeholders contributes to a more comprehensive understanding of fire safety.

## *2.1 Research Process*

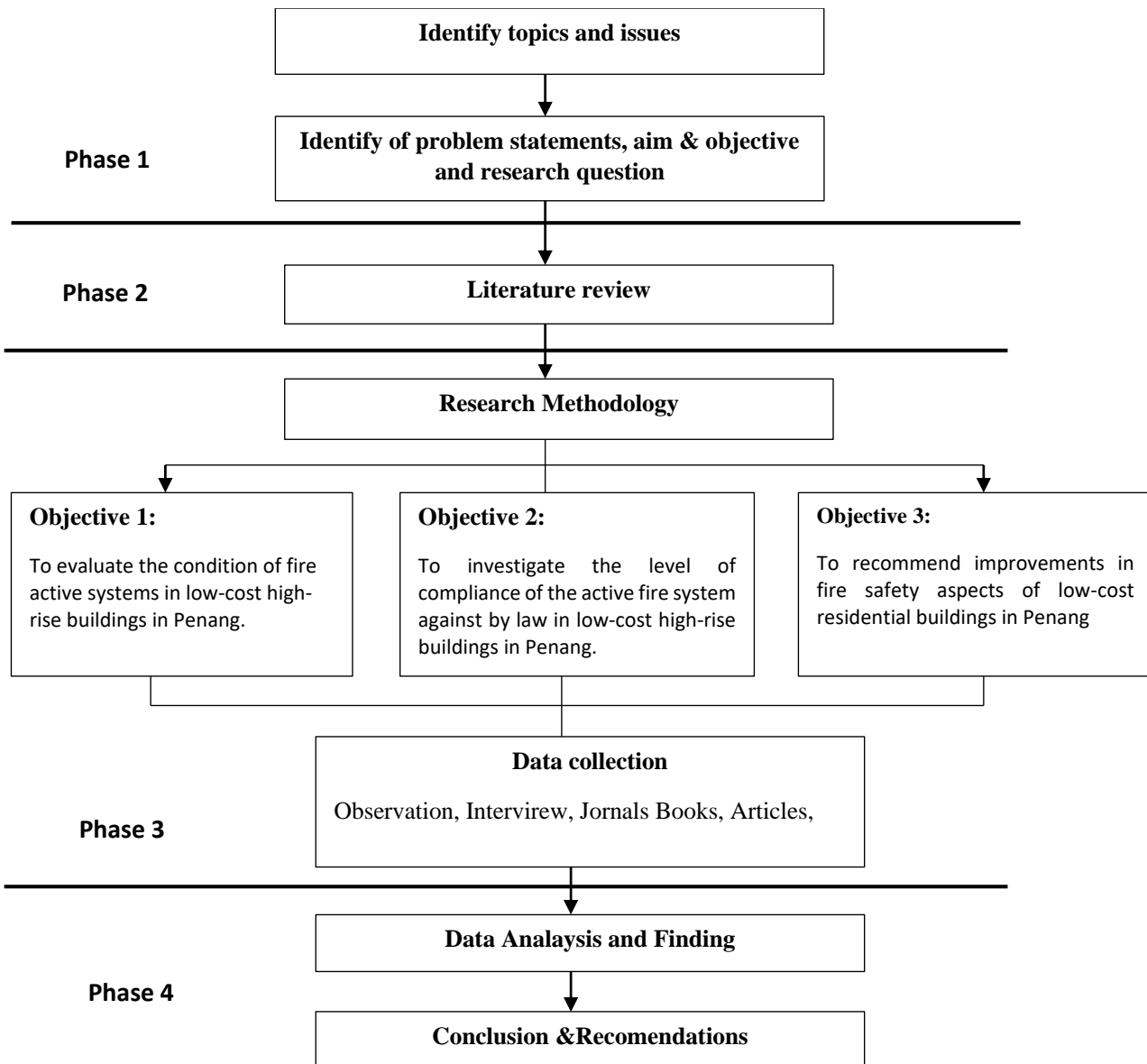
Figure 1 shows the research framework that presents a methodical strategy for assessing and enhancing fire safety in Penang's low-cost high-rise structures. Finding pertinent subjects, problems, goals, objectives and research questions was the first step in the process. Phase 2 relates to creating the study approach and carrying out a literature review. The three primary goals of the study were to assess the state of the active fire systems, look into whether the requirements of the law are being followed and make recommendations for enhancing the fire safety of these structures. Journal, book and article reviews, interviews and observations were some of the techniques used to gather data. Phase 3 is the data collection phase; Phase 4 is the data analysis and findings phase, which concludes with recommendations for improving fire safety measures in Penang's affordable high-rise residential complexes.

### *i. Observation*

The observation approach, which comprises the fundamental strategy of basically monitoring what happened until a few insights or insights develop, is defined as a way to observe and explain the subject's behaviour [17]. One of the most ancient ways of gathering data is observation, which is employed by social scientists as well as scientists. The name "observation" conveys an impression of straightforwardness and ease of use for gathering data using this approach [17]. However, it is not a valid scientific study. The research underscores the effectiveness of employing observation as a valuable method for data acquisition. This technique involves gathering primary data, aligning with the study's objectives. Specifically, the research employs building observations to scrutinize active fire protection systems within high-rise residential buildings. Through these observations, the aim was to ascertain the functionality of the fire systems and ensure their overall good condition. Observation as a key research tool, the study seeks to gain comprehensive insights into the practical operation and maintenance of fire-active systems in the context of high-rise residential structures, contributing valuable data to meet its research objectives.

### *ii. Fire safety audit*




In the research methodology, based on observation the checklists play a crucial role, particularly during the inspection process. These checklists were meticulously crafted by legal standards to pinpoint specific criteria outlined in building laws. Their purpose is to ensure that the subject of inspection complies with the stipulations laid out in the prescribed act. In the context of this study, the checklist aligns with the Uniform Building By-Laws of 1984 (UBBL 1984) and Fire Service Act 1988. Utilizing UBBL 1984 as a reference in the checklist ensures a systematic and legal approach, facilitating the identification and verification of building law requirements. This meticulous checklist application enhances the research's reliability and adherence to legal standards throughout the inspection and analysis phases.



**Fig. 1.** Research process phase

### **iii. Case study**

Case studies offer a wealth of detailed information, surpassing the depth provided by alternative methods such as surveys. The state of Penang was chosen for this case study because of its high fire incidence which ranks second in the north and fourth in the peninsula. Penang is a city that develops in terms of development and technology but does not focus on building safety. This is a major advantage, enabling research understanding. At the same time, case studies integrate data collected from various methods, including surveys, interviews and document reviews. Despite its advantages, case studies come with limitations and potential pitfalls, each of which are detailed below. The specific case studies carried out focused on low-cost residential buildings in Penang, which is buildings A, B and C (Figure 2). This targeted approach aimed to provide a comprehensive examination of fire protection systems and practices in the context of residential structures in the Penang area. Based on the table below are three case studies that were chosen.

Building	Building A	Building B	Building C
Picture			
Level	21 floors	18 floors	15 Floor

**Fig. 2.** Three types of building for the case study

### 3. Results and Discussion

#### 3.1 Evaluate the Condition of the Fire Active System

The evaluation of fire safety audit executed by three buildings. The zoning was divided into level floors.

**Table 1**

The analysis condition of fire active system in case study 1 (Building A)

Zone	Fire extinguisher	Fire alarm and monitoring	Sprinkler	Wet Riser and Hose reel	Emergency Light System
<i>CASE STUDY 1</i>		<i>Provide not enough as required by</i>	<i>N/A</i>		
<i>Building A</i>		<i>UBBL</i>			
1	/	<i>ONLY at ground level</i>		X	/
2	/			X	X
3	X			/	X
4	/			X	X
5	/			X	X
6	X			/	/
7	X			/	/
8	X			/	X
9	/			X	/
10	/			X	/
11	/			/	X
12	/			/	/
13	X			/	/
14	/			/	/
15	X			X	X
16	/			/	X
17	/			X	X
18	X			/	/
19	X			X	/
20	X			/	X
<b>RESULT</b>	<i>Not carry the SIRIM logo, placed in the floor, Missing, Not in good condition</i>	<i>Cannot work well, damage</i>	<i>N/A</i>	<i>Missing, put in store, Prevented by things</i>	<i>Not working well, broken</i>

**Table 3**

The analysis condition of the fire active system in case study 2 (Building B)

Zone	Fire extinguisher	Fire alarm and monitoring	Sprinkler	Wet Riser and Hose reel	Emergency Light System
<i>CASE STUDY 2</i>		<i>N/A</i>	<i>N/A</i>		
<i>Building B</i>					
1	X			/	/
2	X			/	/
3	X			X	/
4	/			X	/
5	/			X	X
6	X			/	X
7	/			X	X
8	X			X	/
9	/			X	/
10	X			X	/
11	X			/	X
12	/			X	/
13	X			X	/
14	/			/	X
15	X			X	/
<b>RESULT</b>	<i>expired date, not service and maintenance, vandalism, missing, not function</i>	<i>N/A</i>	<i>N/A</i>	<i>missing, not functioning, blocked by the resident's clothes</i>	<i>Malfunction, broken</i>

**Table 4**

The analysis condition of the fire active system in case study 3 (Building C)

Zone	Fire extinguisher	Fire alarm and monitoring	Sprinkler	Wet Riser and Hose reel	Emergency Light System
<i>CASE STUDY 3</i>		<i>N/A</i>	<i>N/A</i>		
<i>Building C</i>					
1	/			/	/
2	X			X	X
3	X			X	/
4	/			X	X
5	/			X	/
6	/			/	/
7	X			/	X
8	/			X	/
9	/			X	X
10	X			/	X
11	/			/	/
12	/			X	/
13	X			X	/
14	/			X	X
15	X			/	/
16	/			/	/
<b>RESULT</b>	<i>expired date, not service and maintenance, vandalism, missing, not function</i>	<i>N/A</i>	<i>N/A</i>	<i>missing, not functioning, blocked by the resident's clothes</i>	<i>Malfunction, broken</i>



The fire extinguishers in Buildings A, B and C (Figure 3) are in poor condition and do not comply with the legislation, as shown in the diagram below. It was discovered that several fire extinguishers were missing, some were not functioning correctly and the expiration date had gone past the maximum. Tenants have also vandalized fire extinguishers and some of them have been buried under other items or left on the floor, making it harder to get to them in an emergency. According to UBBL 1984, Part VIII, Clause 225, every building must have a fire extinguisher that complies with the tenth schedule. This schedule states that residential buildings less than 120 meters high or between six and forty stories must have fire extinguishers that work properly and are in good condition. Lack of regular maintenance and inspection shows an attitude of indifference that can endanger the lives of building occupants.



**Fig. 3.** Fire extinguisher problems

Based on the analysis of the alarm system and fire monitoring in Buildings A, B and C (Figure 4), the three buildings do not meet the requirements as stated in the Tenth Schedule of the UBBL 1984 which stipulates that every residential building of six to forty floors or less than 120 meters in height must install and ensure the fire alarm system and monitors are in good condition. In Building A, the fire alarm and monitor system did not work due to the lack of monitoring and inspection by the building management. Buildings B and C do not have alarm systems and fire monitors due to lack of funds and high installation costs. Therefore, the building management needs to conduct periodic monitoring and inspection and provide a fire alarm system and monitors that work well to ensure the safety of building occupants.

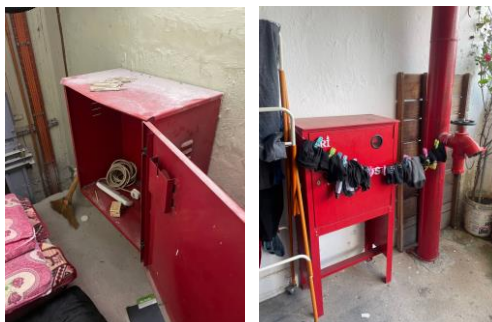


**Fig. 4.** Fire alarm and monitoring system

The wet riser and hose reel systems in Buildings A, B and C (Figure 5) were inspected, and it was discovered that none of them complied with the Tenth Schedule's criteria for UBBL 1984, Part VIII, Clause 225. The system in Building A was misplaced and malfunctioned, making it challenging to access in an emergency. The same issue affects Buildings B and C as well: the system is either non-existent or malfunctioning, and the designated area is clogged with personal items belonging to the



tenants that obstruct entry. This shows a serious lack of fire safety management, which can endanger the occupants. Therefore, immediate action needs to be taken to ensure that all wet riser and hose reel systems are installed correctly, work properly and are regularly maintained by established regulations.



**Fig. 5.** Wet riser and hose reel

Buildings A, B and C's emergency lighting systems (Figure 6) were discovered to be malfunctioning during an inspection, and numerous emergency lights were either missing, broken or not lighted. The emergency lighting system has been seriously damaged as a result of this condition, which suggests a lack of routine inspection and maintenance. A functional emergency lighting system was required for residential structures with six to forty stories or less than thirty metres in height, as per UBBL 1984, Part VIII, Clause 253, Tenth Schedule. In addition to breaking the law, Buildings A, B and C's disregard for these rules puts the residents' safety risk. Therefore, building management needs to immediately repair and replace damaged emergency lights, ensure that all emergency lights are working, and carry out regular inspections and maintenance to ensure the safety of all building occupants.



**Fig. 6.** Emergency lighting system problem

### 3.2 Investigation Level of Compliance Fire Active System

Through interviewing 5 respondents, it cooperated by answering all questions. Two of the five were fire safety supervisors and fire departments. The rest were building managers in each of the three buildings. From interviews, fires often occur in residential areas, especially in low-cost flats. This involves the lives and property of residents in low-cost flats. Based on interviews, the frequency of periodic inspections in low-cost residential buildings was,

- i. **Respondent A:** Basically, fire inspections in low-cost housing buildings are carried out every three or six months by fire safety regulations. Usually, the monthly or yearly inspection by the

*building manager, who will manage and hire the contractor for the inspection. If there is a request from the manager of the building, the fire and safety department will monitor it.*

- ii. **Respondent B:** *According to fire and safety laws, regular inspections must be done every 6 months or once every 3 months to ensure that the equipment is in good condition and working properly.*
- iii. **Respondent C:** *According to the schedule, it is set every three months for inspection and maintenance.*
- iv. **Respondent D:** *In this building, periodic inspections were done every three months but sometimes they do not follow the schedule and sometimes check once a year.*
- v. **Respondent E:** *For low-cost residential buildings, periodic inspections were required, which is once every three months. This is to make sure it works properly, there is no missing.*

In general, based on interviews, most respondents stated that the frequency of periodic inspections in low-cost buildings is once every three months. According to the set schedule, preferably every three months, but if there are time constraints, it should be done every six months. Based on the observation of the building and the interview, it is not consistent with what the respondent said that it does an inspection every three months, but when it observes the building, many fire active system equipment has been damaged, lost and does not work. This shows that the building manager does not conduct periodic monitoring and inspection even though the schedule has been set by the Pinang Island State Housing Council and the fire department. As a respondent D said sometimes not follow the schedule because of time constraints and less budget allocation to hire a contractor to do the inspection. This is due to the lack of budget allocation, such as knowing that low-cost housing is where most of the occupants find it difficult to pay for maintenance, so this is one of the causes. Through the level of compliance for periodic inspections is relatively weak

Based on the fire department's statement, for residential buildings, it is the full responsibility of the building management. The building management needs to schedule and make full monitoring. Firefighting duties are only performed if there is a complaint from the occupants or a request by the building manager. But the fire department can also conduct a surprise inspection if there is an order from the superiors. Based on the interview, all respondents expressed the same opinion, which was to ensure that all fire active system equipment was tested, maintained and inspected periodically. In addition, Respondent B and Respondent E stated that the building manager needs to be firm against residents who commit vandalism or obstruct and place personal items in areas such as fire extinguishers, hose reels and others. This affects if there is a fire it will be difficult for the occupants to use and the emergency route was narrow. Besides that, need to conduct fire drills to the occupant so that the occupant knows and understands more about the procedures of fire safety. Building management is responsible for monitoring these safety procedures and making sure that all active fire systems are not only inspected and maintained regularly but also kept clear of obstructions by residents. Management must keep an eye on residents and prevent them from putting items in the way of fire safety equipment. This way, the fire safety system is kept accessible and intact, which is crucial in case of an emergency.

From the interview the responses from the respondents for how to ensure the level of fire safety and active fire systems comply with the law in low cost housing residential building.

- i. **Respondent A:** *All inspections are carried out following the standards set by fire safety laws and regulations. Any deficiencies found during the inspection must be corrected immediately. In addition, active fire systems must be tested and maintained according to a set schedule. Furthermore, the fire department also emphasized the importance of regular fire drills for residents.*
- ii. **Respondent B:** *The building management must ensure that all active fire systems are maintained and inspected according to the schedule set by law. Maintenance and inspection records are carefully kept for authority reference. In addition, it is necessary to supervise the occupants so as not to obstruct or place items in the active fire system equipment area.*
- iii. **Respondent C:** *All fire equipment is tested and maintained according to a set schedule. Fire drills are also held regularly to ensure all occupants understand emergency procedures.*
- iv. **Respondent D:** *We also ensure that all fire equipment is tested and maintained according to schedule. All installation and maintenance is done by a certified contractor. In addition, keep maintenance and inspection records for reference during audits by the authorities.*
- v. **Respondent E:** *All equipment such as fire extinguishers, hose reels, emergency lights are tested periodically. Ensure the equipment is in the right place, not to obstruct, and must advise or put notice to occupants not to do vandalism.*

Based on the interview, all respondents expressed the same opinion, which is to ensure that all fire active system equipment is tested, maintained and inspected periodically. In addition, Respondent B and Respondent E stated that the building manager needs to be firm against residents who commit vandalism or obstruct and place personal items in areas such as fire extinguishers, hose reels and others. This affects if there is a fire it will be difficult for the occupants to use and the emergency route is narrow. Besides that, need to conduct fire drills to the occupant so that the occupant knows and understand more about the procedures of fire safety. Building management is responsible for monitoring these safety procedures and making sure that all active fire systems are not only inspected and maintained on a regular basis, but also kept clear of obstructions by residents. Management must keep an eye on residents and prevent them from putting items in the way of fire safety equipment. This way, the fire safety system is kept accessible and intact, which is crucial in case of an emergency.

Generally, from observation and interview, it can be seen that the observation from each of the building, inspection and maintenance was not carried out well. The observation that can be discussed include fire extinguishers that are expired a year ago, some of fire extinguishers was missing and was vandalized. In one of the buildings, the hose reel was stored in a security store due to frequent cases of theft. This causes one of the faults in the event of a fire. Most of the equipment of the fire active system was not in good condition. This was because the building management took no action for fire safety. Moreover, to maintain the fire active system, it must have a budget to replace the equipment.

### 3.3 Recommend the Improvements

One of the first steps was to ensure that routine inspections and maintenance are done consistently. All fire equipment, including fire extinguishers, hoses and emergency lights should be checked regularly to ensure they are working properly. The building management should also follow

the information schedule set by the superior regarding the importance of these periodic inspections, as well as how to identify early signs of damage or failure of fire equipment. In addition, the building management needs to take strict action if the occupant commits vandalism or removes fire-active system equipment.

In addition, the fire department and the building manager need to hold regular training and safety education for the residents. Fire drill programs should be held periodically to ensure that all occupants know what to do in the event of a fire. Education on the use of fire equipment such as fire extinguishers and basic fire extinguishing techniques should be applied. Occupants should also be taught about emergency evacuation plans and how to act quickly and calmly in an emergency. Management needs to work with the fire department to ensure training and education was provided to residents. This not only increases safety but also increases occupants' sense of responsibility for fire safety.

Furthermore, cooperation with authorities such as the fire department and local authorities was important to ensure the effectiveness of these measures. Holding dialogue and training sessions together with the authorities can help identify weaknesses in the current system and improve them. The authorities can also provide technical assistance and advice on safety standards to be followed. With close cooperation, residents of low-cost housing can enjoy better protection and live more safely.

Installing a smart fire alarm system is another proactive step that can be taken. Smart fire alarm systems can detect smoke and heat more accurately and can connect directly to the control centre or occupants' mobile phones. This ensures a faster response to fires, reducing the time needed to evacuate the building and call for emergency assistance. Although installation may be high initially, this technology can save lives and reduce property damage in the long run.

The fire department or the management can have an application that helps the building management and residents about fire safety awareness. Through this application, the fire department can monitor the management for making periodic inspections. If they fail to make periodic inspections, then the fire department can be fined against the building management. This does not happen without concern from various parties. In addition, it can provide early exposure in the event of a fire. This application can also be activated in the event of a fire to make it easier to contact the fire department.

#### **4. Conclusions**

The condition of fire-active systems in buildings A, B and C reveals significant deficiencies. Fire extinguishers were often in poor condition, missing, blocked, misplaced or expired across all three buildings. Buildings B and C lack fire alarm systems entirely while Building A has a single, malfunctioning alarm. Building C also has issues with broken or missing keys and blocked or missing hose reels and wet risers. Additionally, all buildings have faulty or malfunctioning emergency light systems, highlighting the overall instability and poor maintenance of fire protection equipment.

Observations and interviews for objective 2 highlight severe weaknesses in the maintenance and inspection of fire protection systems in low-cost high-rise residential buildings. Numerous fire extinguishers were missing, vandalized or expired and theft concerns lead to improper housing of hose reels and other equipment. Despite a fixed inspection timetable by the Pinang Island State Housing Council and the fire department, compliance was lacking, with many systems found to be broken or non-functional. Building management often cites funding and time constraints as reasons for not conducting regular inspections, compounded by tenants' financial hardships, resulting in general non-compliance with fire safety regulations.

To enhance the fire-active system. Fire safety in low-cost buildings is mostly dependent on routine maintenance and inspections of fire safety devices, as well as occupant education and training. The most recent technological advancements along with the installation of intelligent fire alarm systems increase the dependability and efficiency of these safety precautions. Working together with authorities also guarantees adherence to rules and upholds a high level of safety *via* record-keeping and audits.

It is critical for maintaining resident safety and well-being that government rules, benchmarks and requirements for active fire systems in affordable high-rise buildings be followed. These rules require the installation of crucial fire safety features, such as sprinkler systems, smoke detectors and easily accessible fire extinguishers. The danger of fire-related incidents and fatalities can be considerably decreased by builders and property managers following these rules. Furthermore, fire safety systems should be kept operational and efficient through routine maintenance and inspections, as required by these regulations. In general, these policies play a crucial role in protecting people and their belongings, encouraging a safety-conscious culture and increasing public trust in residential building safety regulations.

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