



الجامعة
UNIVERSITI
TEKNOLOGI
MARA



QS COLLOQUIUM 2020

SERIES XII PROCEEDING OCT 2020 - FEB 2021

BACHELOR OF QUANTITY SURVEYING (HONS.)
Department of Built Environment Studies & Technology,
Universiti Teknologi MARA Perak

QS COLLOQUIUM 2020 SERIES XII

UNIVERSITI TEKNOLOGI MARA (UiTM) PERAK BRANCH
OCTOBER 2020 - FEBRUARY 2021

Perpustakaan Negara Malaysia

Editors

Sr Dr. Kartina Alauddin
Sr Puteri Sidrotul Nabihah Saarani
Noor Anisah Abdullah @ Dolah
Nur Fatihah Mohamed Yusof



Centre of Studies for Quantity Surveying
Department of Built Environment Studies & Technology
Universiti Teknologi MARA (UiTM) Perak Branch
Seri Iskandar Campus, Perak, MALAYSIA

ISBN: 978-967-19692-0-5

Copyright @ QS Colloquium Series XII

All right reserved. No part of this publication may be produced, stored in a retrieval system, or transmitted in any form or by means electronics, mechanical, photocopying, recording or otherwise, without prior permission in writing form the publisher.

IMPROVING ACTIVE FIRE PROTECTION SYSTEMS AT PUBLIC OFFICE IN KELANTAN

Nur Eliza Farhan Mohamad Rudin¹ and Adnin Syaza Jaafar²

^{1,2} Centre of Studies for Quantity Surveying, Department of Built Environment Studies & Technology, Universiti Teknologi MARA, Perak Branch, Seri Iskandar Campus, 32610, Seri Iskandar, Perak, Malaysia.

nur.ellyza@ymail.com¹, syaza278@uitm.edu.my²

Abstract:

In the construction industry, one of the major things that need to consider is fire protection. This is very important and must be taken into account in the fire protection framework to ensure that public office buildings in Malaysia are in a safe state. The aim of this research is to establish the factors in improving active fire protection systems in Public Office. Objective of the research were to (1) identify the requirement of active fire protection in Public Office Building, (2) to assess the compliance of active fire protection systems in Public Office Building and (3) to recommend the factors for improving active fire protection systems in Public Office Building. In order to achieve this objective, there are two method which is quantitative and qualitative are used for this research. The observation and questionnaire circulated from this analysis to the inhabitants of the Public Office around Kelantan. The questionnaires was distributed to 217 number of occupants in the public office building in Kelantan. Based on research, it can be concluded that most of the respondent aware regarding the fire risk when there is no fire protection in the building. Based on the observation conducted, there are fire protection available in the public office building. They are fire extinguisher, heat detector, smoke detector, and fire hose reel, emergency lighting and emergency signage. Last but not least, it is very importance to ensure the maintenance of the fire protection system to keep the fire protection system running well.

Keywords: Active fire protection, public office, Kelantan

1.0 INTRODUCTION

Fire protection is one of the major items that need to be considered in the construction industry. In other opinion made by Zhao et al (2012) said that, initial fire warning in these Group-living Yards, the automatic fire alarm system should not be used to increase the detection rate by a single fire detection method. This is very important and must be taken into account in the fire protection framework to ensure that public office buildings in Malaysia are in a safe state. It is critical that the building has a proper fire protection system in place in order to prevent the fire from spreading. Fire appears to spread rapidly when they begin and can inflict significant damage in short periods of time. A delay of 5 or 10 minutes in the arrival of fire and rescue services can greatly increase the amount of damage caused by fire or make the difference between life and death. (Wu and Chen, 2012).

1.1 Problem Statement

Nowadays, in solving problems related to fire protection, construction management are fails. The fire protection system is one of the dynamic components that must be handled by the owner of that buildings. So, it's going to be expenditures and a lot of cash from that, and the owner has to take immediate action to repair the building's fire safety systems. Swanson (2012) claim that poorly maintained machinery can result in more frequent equipment failures, poor utilization of equipment, and delayed production schedules. Equipment that is misaligned or malfunctioning can lead to questionable quality scrap or goods. From Occupational Safety and Health Administration (2015), Fire service activities take place in vulnerable, time-sensitive circumstances. A slight delay in operations can adversely affect subsequent operations and the outcome of the incident, particularly when the first fire appliance arrives and is placed.

In Zulkifli et al (2017) stated that many cities in Indonesia such as Jakarta, Depok and others, over the years, increasing cases of fires in public buildings have been registered. There are small active and passive fire protection systems in office buildings, and few components are not practiced properly in compliance with international and local standards and regulations. Therefore it can cause a fire to occur.

Malaysia was shocked with news that The Employees' Provident Fund (EPF) building on Jalan Gasing here, which was partially destroyed in a fire in the year 2018, is now permanently closed. In February 2018, a blaze destroyed about 40% of the building in Jalan Gasing. (Rashvinjeet, 2019). According to the Fire and Rescue Services Agency, the fire was caused by a spark caused during maintenance work that ignited flammable cladding panels used on the exterior of the building.

1.2 Aim

To establish the factors in improving active fire protection systems in Public Office Building.

1.3 Research objectives

- i. To identify the requirement of active fire protection in Public Office Building.
- ii. To assess the compliance of active fire protection systems in Public Office Building.
- iii. To recommend the factors for improving active fire protection systems in Public Office Building.

1.4 Scope of research

This research will focus on factors to improving fire protection system in Public Office Building in Kelantan and only focus on the active fire protection system in that building excluding passive fire protection because active fire protection system that early detect a fire starting. It is also because of the certain types of active fire protection is not function and not working well during fire and most of the building does not complied the requirements of active fire protection outlined compared to passive fire protection.

2.0 LITERATURE REVIEW

2.1 Active Fire Protection

In order to operate effectively in the event of a fire, Active Fire Protection (AFP) is a group of systems that involve some amount of action or motion. Actions may be controlled manually, such as a fire extinguisher or automatic, such as a sprinkler, but some amount of action is needed either way. AFP includes fire/smoke warning systems, sprinkler systems, and fire extinguishers. To detect whether there a fire and/or smoke in a building, fire/smoke alarm systems are used. The design intent is they are "on" at all times with an ionization smoke detector. Ionized air acts as a conductor between two charged electrodes in the sensing chamber. The electrical charge is "off" until reduced enough, and that quickly signals a warning (Bromann, 2011).

2.2 The Requirements of Active Fire Protection in Public Office

The Uniform Building By-Laws, 1984 under Street, Drainage and Building Act, 1974, are the latest bylaws regulating fire protection in buildings. The different specifications for building design and construction are prescribed in the Fire Requirement. The owner of the building need to update the antiquated practices as well as review the suitability of unmodified applications for those codes to suit our local climate.

2.3 Factors in Improving Active Fire Protection Systems at Public Office

Kelvin & Da-yong (2014) the fire safety of building occupants is based on large number of inter-related fire safety characteristics that are part of the fire safety policy. For the protection of occupants, maintenance of furniture, furnishings, electrical equipment and good housekeeping is a critical as the maintenance of passive and active fire safety systems. The probability of fire ignition, its creation and subsequent events are affected by building materials and appliances. If a fire can be stopped from starting or prevented from developing once it starts, then this is just as effective as the active and passive systems themselves as an effective means of fire control.

Synergy Fire Engineering (2017) specified that fire extinguisher should be serviced regularly and colleagues should be provided with fire extinguisher instruction to ensure they are willing and confident to use them. The key thing to note is that all fire extinguishers should be kept in areas that are readily accessible to take care of if there is an emergency. According to Educational Premises (2006) a person needs to assess its efficacy after the emergency plan has been developed and training has been provided. Doing the fire drill is the perfect way to do this

The main activities and procedures that need to be performed during the fire investigation and evacuation of buildings are detailed in this section. The word used to describe these systems in the Action Plan. The fire action plan is the final portion of a fire response plan to protect occupants in the event of an emergency (Kelvin & Da-yong, 2014).

3.0 METHODOLOGY

The collection of data to be obtained from the primary and secondary data and data analysis from the observation as well as questionnaire to be generated and distributed to occupants of the Public Office in Kelantan. The population of the study is all end users (N=600) from four (4) public office, namely Jabatan Kerja Raya Kota Bharu (JKR), Majlis Daerah Tanah Merah (MDTM), Jabatan Kerja Raya Tanah Merah, Pejabat Tanah Jajahan Tanah Merah. Based on Krejcie and Morgan (1970), the sample size was determined using a stratified sampling technique (n=234). The method of sampling used for this analysis was a basic random sampling technique. A simple random sampling was carried out by choosing a population sample in such a way that each item has the same probability of being selected as a sample. Then the sample was randomly drawn from a sampling frame. From there, without any bias, a random sampling frame was picked.

The questionnaire survey was developed in form of closed ended question survey. The questionnaires consisted four (3) sections. The rating scale used to measure the variables that include nominal choice, and Likert Scale. The data is analyzed using the descriptive statistics available in version 23 of SPSS. Using this study, it is possible to obtain frequencies, mean and percentage of respondent data to generate the information outcome.

4.0 ANALYSIS AND FINDINGS

4.1 Observation Checklist

The observations were made at the selected Public Office in Kelantan. The checklist is used to identify the fire protection available in the public office building. Table 1 presented the observation analysis of fire protection availability in the public office building. The observation is made to check either the fire protection system at that public office is available or not available or function or not function.

Table 1. Observation Analysis

Ref of Public Office Building	Types of Fire Protection							Remarks
	1 Fire Extinguisher	2 Heat Detector	3 Smoke Detector	4 Fire Hose Reel	5 Automatic Sprinkler System	6 Emergency Lighting	7 Emergency Signage	
1	/	-	/	/	-	/	/	1. Inside the room (1) 2. At ceiling near fan (3) 3. At corridor (4)
2	/	/	-	-	-	-	/	1. At the entrance (1) 2. At corridor 3. Not function at the ceiling (5)
3	/	-	-	-	-	-	x	1. At the corner of the room 2. Not function/damage (2) 3. At ceiling near fan (3)
4	/	-	x	-	-	/	/	1. New and inside the room at wall (1) 2. At the center of the ceiling (3)

/ Function

x Not function

- Not available

A total of 217 (93%) sets of questionnaire were successfully returned and reliable for further analysis. The study found that the more than half (90%) of the respondents were familiar with fire protection systems. This can be inferred that the majority of the respondents were highly understand to provide valid opinions on the problem of the study and reliable to provide understanding on the active fire protection systems.

4.2 The Requirement of Active Fire Protection Systems at public office building.

Based on Table 2 the information related and types of fire protection system used in the public office building. For every question, the frequency and percentage are separated. Therefore, 3 tables which are the information related and requirement of fire protection which is entitled as YES or NO answer, it is because to know how much the knowledge of the respondents about the fire protection. The highest ranking goes to the risk that will face when without fire protection systems in the public office building. Most of the respondents know, they will face with the risk when the fire is occurred but in that building does not have any fire protection to protect their self and that building.

Table 2. Agree Scale

ACTIVE FIRE PROTECTION SYSTEMS	FREQUENCY	PERCENTAGE
Familiar with the fire protection systems	207	95.4
Alert about fire protection principles	204	94
Fire protection play important roles In public office building	215	99.1
Knowledge about the fire protection	177	81.6
Risk without fire protection	216	99.5
Importance of fire protection	214	98.6
Active types of fire protection	208	100
Sprinkler system	217	87.6
Wet and dry riser	190	100
Hose reel	217	100
Fire extinguisher	217	100
Fire alarm	216	99.5
Smoke detector	214	98.6
Heat detector	215	99.1
Fire hydrant	178	79.7
Fire blanket	213	98.2
Emergency lighting	214	98.6
Emergency signage	208	100

Based on the Table 2 above show that, the one of the types of active fire protection which is wet and dry riser at the highest ranking. Most of the respondents do not know what wet and dry riser is. And where is the location of wet and dry riser in the public office building. Based on the literature review stated that, Dry Riser System are mounted complete with a ground floor or fire service level inlet breeching connector and with landing valves at designated points on each floor.

Table 3. Disagree Scale

Familiar with the fire protection systems	FREQUENCY	PERCENTAGE
Familiar with the fire protection systems	10	4.6
Alert about fire protection principles	13	6
Fire protection play important roles in public office building	2	0.9
Knowledge about the fire protection	40	18.4
Risk without fire protection	1	0.5
Importance of fire protection	3	1.4
Active types of fire protection	9	4.1
Sprinkler system	0	0
Wet and dry riser	27	12.4
Hose reel	0	0
Fire extinguisher	0	0
Fire alarm	0	0
Smoke detector	1	0.5
Heat detector	3	1.4
Fire hydrant	2	0.9
Fire blanket	44	20.3
Emergency lighting	4	1.8
Emergency signage	3	1.4

4.3 To recommend the factors for improving active fire protection systems in Public Office Building.

Table 3 shows the mean, standard deviation in the public office building statement on the factors to improving the fire protection system. Based on the Table 3, analysis shows that the respondent’s level of agreement on the factors to improve the active fire protection system in the public office building statement were ranked from strongly agree (M=4.38) to (M=4.69). Most of the respondents are very confident of what step should be taken to avoid the fire at their public office building. It is very importance to ensure the maintenance of the fire protection system to keep the fire protection system running well.

Table 3. Analysis that the respondent's level of agreement

ITEM NO	DESCRIPTION	MEAN	STANDARD DEVIATION	RANKING	CATEGORY
a)	All the fire protection system is under regular maintenance plan.	4.65	0.551	3	Strongly Agree
b)	All fire safety installations shall be tested individually.	4.38	0.621	10	Strongly Agree
c)	Prepare a weekly or monthly checking procedure on the operation of the fire protection system.	4.44	0.658	9	Strongly Agree
d)	Report the entire fault on the fire protection system.	4.55	0.615	6	Strongly Agree
e)	Records all the maintenance data.	4.5	0.586	8	Strongly Agree
f)	Provide the fire emergency procedures for the institution.	4.56	0.533	5	Strongly Agree
g)	A service of the fire extinguisher is done for every year.	4.68	0.533	2	Strongly Agree
h)	All fire extinguishers should be located in easily accessible areas	4.69	0.494	1	Strongly Agree
i)	Implementation of fire drills training in the institution once a year	4.54	0.526	7	Strongly Agree
j)	All types of rising mains together associated valve and foam inlet should be maintained and tested by a competent person	4.66	0.539	4	Strongly Agree

5.0 CONCLUSION

The fire protection system is central in all occupants' life throughout the world. If the fire protection are not taken seriously, perhaps it could become a factor that could cause a catastrophe fire case. The findings of the study are of the all fire protection systems should be located in easily accessible area. So, it shows that they need to make sure that the fire protection system is located at the right place, easy to find when the fire occurs, and that the fire protection system is not obstructed. The most important thing is to ensure that all the requirements of public office fire protection systems are sufficient and that all the equipment can function properly, because the public office building is kept well and maintained within 100 years and above. The occupants of the public office should record all the maintenance data because it shows that the building did the maintenance work on the basis of the schedule provided.

6.0 REFERENCES

- Bromann, M (ed) (2011) *Fire Protection For Commercial Facilities, United States*, CRC Press.
- Biao, Z., Xiao-meng, Z. and Ming-yong, C. (2012) 'Fire protection of historic buildings: A case study of Group-living Yard in Tianjin', *Journal of Cultural Heritage*, 13(4), pp. 389–396. doi: 10.1016/j.culher.2011.12.007.

- Djunaidi, Z., Tuah, N. A. A., and Rafifa, G. (2018) *Analysis of the Active and Passive Fire Protection Systems in the Government Building, Depok City, Indonesia*. [Online] <http://knepublishing.com/index.php/KnE-Life/article/view/2569> Accessed: 3 June 2018.
- Kelvin, H. W & Da-yong, X. (2014) Fire Safety Management of Complex Developments, *Procedia Engineering*. 71, pp.410-420.
- Krejcie, R. V., & Morgan, D. W. (1970). *Determining Sample Size for Research Activities*. *Educational and Psychological Measurement*, 30(3), 607–610. Meyrick Associates, (2002). *Electricity Service Quality Incentives Scoping Paper*. Prepared for: Queensland Competition Authority, Australia.
- Occupational Safety and Health Administration (2015) ‘Fire Service Features of Buildings and Fire Protection Systems’, p. 71
- Rashvinjeet, S. B. (2019) *'Jalan Gasing EPF building now permanently closed'* The Star Online, 20 September.
- Simon, N. B. et al. (2013) ‘*Development of a fixed firefighting system selection tool for improved outcomes*’, *Journal of Information Technology in Construction*, 18(September), pp. 353–371.
- Staines, B. B. (2010) ‘Fire protection in the building industry Identifying risks and understanding safety measures’.
- Swanson, L. (2010) ‘*Linking maintenance strategies to performance*’, *Int. J. Production Economics*, 70, pp. 237–244. doi: 10.1016/S0925-5273(00)00067-0.
- Wu, C. H. and Chen, L. C. (2012) ‘*3D spatial information for fire-fighting search and rescue route analysis within buildings*’, *Fire Safety Journal*. 48, pp. 21–29