

Participatory Design for Accessible Evacuation Centre for Flood Victims in Kelantan

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Abstract – Malaysia has been experienced with many natural disasters such as flood, landslide, earthquake and drought, which resulted in damaging the properties and causing casualties especially during the biggest flooding affected over 36,128 families was in 2014 at East Coast of Malaysia mainly in Kelantan. Public buildings such as schools, religious buildings, including mosques or community halls, have been used as evacuation centres in Malaysia every year. Many studies identified many evacuees were facing many problems, particularly in terms of physical facilities, such as providing improper assistance in terms of facilities, privacy, and many others. This paper objectives are firstly, to review the requirements of the physical facilities for evacuation centre, secondly to assess the components of the physical facilities for evacuation centre and finally to propose the criteria of physical facilities for evacuation centre. A qualitative approach was adopted, and data were collected through observation, interview and secondary data through literature analysis. Three case studies in Kelantan were chosen based on three categories which are small capacity (Veteriner office, Kuala Krai), medium-capacity (Sekolah Menengah Kebangsaan Keroh, Kuala Krai) and big capacity (Sekolah Menengah Kebangsaan Agama Lati, Pasir Mas). The data were analysed to assess the physical facilities provided in the evacuation centre to facilitate the flood victims. The benefit of this research is to give awareness to flood victim for future disaster through technology, management, physical and mental. Thus, evacuation centre is important to create comfortable, privacy and rehabilitated environment to serve the flood victims physically and mentally.

Keywords: *accessible, disaster, evacuation centre, flood victims.*

I. INTRODUCTION

In December 2014, Malaysia was stunned by the news of the floods taking place on the East Coast of Malaysia, especially in Kelantan. East Coast of Malaysia, particularly in Kelantan were facing the massive floods every year due to our monsoon season, and flood that occurred in 2014 was the worst, where the water levels in most of the floods in the region were superseded by the floods of the last big flood of 1967 (Azlee, 2015).

A. Flood in Malaysia

Floods typically occur unpredictably but based on the previous experience, we can sense the early sign of flooding that happens particularly when heavy rainfall persists. The preparedness for early flooding must be taken to face potential flooding in relation to past flooding that occurs (Abdul Rahim et al., 2015). According to Billa et al. (2006), the previous disaster incident should be studied to expose the region's vulnerabilities and insufficiencies in disaster management and preparedness. In addition, emergency management or disaster management involving preparedness, response and recovery is one of the disciplines in dealing with and avoiding both natural and manmade disasters, while at the same time reducing disaster impacts (Victoria Department of Human Services, 2013). Disaster management can also be one of the places involving disaster training, studying, and predicting the threat, as well as rescue activities. On the other hand, the community and administration preparedness must be increased to reduce the risk of natural disaster, such as flood, which we are unable protect (Center for Science and Environment, 1996). According to Billa et al. (2006), they highlighted that;

"in the phase of disaster preparedness, it is a tool for planning evacuation routes, designing emergency centers and integrating satellite data with other relevant data in the design of disaster warning systems".

During the monsoon season, the evacuation centre would serve as a flood control centre where the at the same time it has been equipped to operate as the victim's evacuation centre (Fig. 1). The evacuation centre is one of the important elements to have in place whenever a disaster happens. It is a safe place for the community to assemble (Somasundaram & Davies, 2014). Evacuation and the use of evacuation centres, involves the planned and coordinated movement of persons from an unsafe or potentially location to a safer location (Siti Falindah & Nik Nadrul Hisham, 2015). According to Katuk et al. (2009), that an evacuation centre would only operate with the instruction by the district officer (chairman of district disaster released committee) during emergency. All agencies are responsible and incharged of safe and rescue either in the flood area and at the operation centre. Proper physical planning must be planned to anticipate future impact due to disaster occurrences (Sharma & Priya, 2001). A good disaster planning strategy can be achieved through an effective and efficient response to the disaster. According to Katuk et al. (2009) and Ngai Weng Chan (1995) there are 4 types of human reaction to disasters, which are: a) to protect (prevent and modify disasters) b) to accommodate (change human use system to suit disasters) c) to retreat (resettlement, forbid development in disaster zones, migration), and d) not taking any action (Table 1).



Fig. 1. Disaster Management Mechanism in Malaysia

Source: Malaysia Civil Defence Force (2019)

B. Participatory Design for Evacuation Centre

Participatory design is a philosophy that uses participative approaches to involve users in the design process. This is an approach that actively involves all stakeholders in the design process to ensure the design meet the needs of target users. Engaging their ideas and incorporating them in later versions of the design. In Malaysia cases, various agencies were involves in the operational of an evacuation centre, such as police, fire and rescue team, arm force and as a member of the National Disaster Management and Relief Committee, Department of Social Welfare is responsible for the work of aid delivery and recovery of disaster victims. As contained in Directive National Security Council

(NSC) No. 20 Social Welfare Department has four (4) main roles and responsibilities are: a) Prepare and maintain evacuation centres. b) Prepare and distribute donations of food, clothing, and other necessities. 23 c) Carry out the registration on the victim for the purpose of recovery of the victims. d) Provide guidance, advice, and counselling to victims.

Table 1. Some Descriptions on the Management at Evacuation Centre

Reference	Description
Somasundaram & Davies (2014), Queensland Government (2013), and Siti Falindah and Nik Nadrul Hisham (2015).	The evacuation centre is one of the important elements to have in place whenever a disaster happens. It is a safe place for the community to assemble (Somasundaram & Davies, 2014). Evacuation and the use of evacuation centres. involves the planned and coordinated movement of persons from an unsafe or potentially location to a safer location..." (Queensland Government, 2013).
Katuk et al. (2009).	A flood operation center (FOC) will be activated by the district officer when a flood begins. In this case, all representatives of each agency will be in the flood area and at the same time other representatives will be in the flood operation center A good disaster planning strategy can be achieved through an effective and efficient response to the disaster.
Billa et al. (2006).	it is critical that disaster management measures are prepared and implemented when they arise to avoid or minimise their or other flood impacts.

Source: Authors (2021)

According to Department of Social Welfare Malaysia (2019), every evacuation centre in Malaysia was managed by a group of local people appointed by District officer. Each evacuation centre was led by one manager who is an officer from Department of Social Welfare District office (see Fig. 2). Officer can manage more than one evacuation centre.



Fig. 2. The Organisation Chart of Evacuation Centre in Malaysia

Source: Department of Social Welfare (2019)

The needs to provide the facilities for PwDs are compulsory in every public building, especially at the evacuation centre. According to the Person with Disabilities Act 2008 (Act 685), clause 26 (1), PwDs have the right to use and access to public facilities, services, amenities, and buildings that provided for public on equal basis (Law of Malaysia, 2008). Under this clause also mentioned on the public facilities provided must be universal design to facilitate PwDs to use and access on the facilities.

II. METHODOLOGY

An observation has been conducted, as the purpose of this analysis was not to conduct a test but to provide the sample with a general context. Case studies are to be performed by interviews with the management of centre and observations. Tools include a detailed assessment of the building used as an evacuation centre.

The methods include descriptive observation of the building and inventory analysis of the centre. An inventory review was conducted to examine the specific aspects of the evacuation centre that mainly focuses as victim shelter.

III. CASE STUDIES

The case studies were in Kelantan, at the most affected area of the flood. The areas are the most affected area with the largest evacuees due to an unexpected rise of flood in 2014 (see Fig. 3).



Fig. 3. Map of Kelantan in Malaysia
Source: Authors (2021)

A. Case Study 1: Veteriner Office, Guchil, Kuala Krai, Kelantan

Veteriner Office in Guchil, Kuala Krai, Kelantan was gazetted as one of the Evacuation centre to be used by the flood victims surrounding the area of Guchil since 2007. This evacuation centre will cover the victims at the area of Guchil 5 and 7, Kuala Krai, Kelantan (Fig. 3). This evacuation centre has 2 blocks of building, a hall that can accommodate between 5-6 small families, 2 toilet and 2 bathrooms (Fig. 4). Most of activities such as cooking, and others are done in the hall or lounge area in front of the buildings. The victims were house in an open plan hall areas, and Jabatan Kebajikan Masyarakat (JKM) provided them with temporary compartment for their privacy (Fig. 5).



Fig. 4. Two Blocks of Buildings Were Prepared That Can Facilitated Around Maximum of 50 People Only
Source: Authors (2021)



Fig. 5. Hall to Accommodate Flood Victims
Source: Authors (2021)

B. Case Study 2: Sekolah Menengah Kebangsaan Keroh, Mengkebang, Kuala Krai, Kelantan

Sekolah Menengah Kebangsaan Keroh was in mukim Mengkebang, Kuala Krai, Kelantan was gazetted as one of the Evacuation centre to be used by the flood victims. This evacuation centre was categorized as medium capacity that can facilitate around 500 people only. During flooded season, this evacuation centre can cover victims of resident from Kg. Keroh (Fig. 6). Flood victims were group in the multipurpose classroom and hall that can function as sleeping area (Fig.7). There is a dining hall and one complex toilet area which was built for the use of flood victims (Fig. 8).

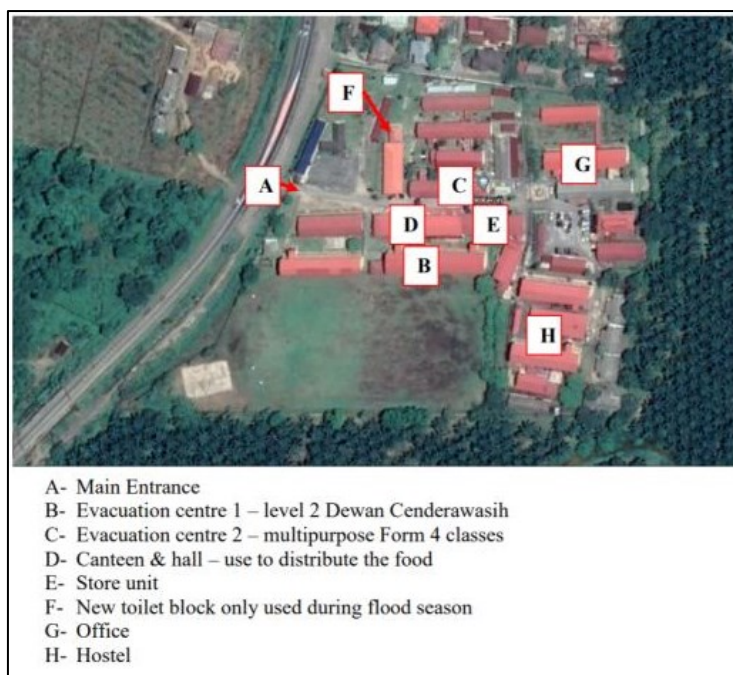


Fig. 6. Master Plan of Smk Keroh, Mengkebang, Kuala Krai
Source: Authors (2021)



Fig. 7. SMK Keroh Was Flooded Due to the Overflow of Sungai Nal in Kampung Keroh in 2014
Source: BH Online (2014)



Fig. 8. Hall That Used to Accommodate Flood Victims
Source: Authors (2021)

C. Case Study 3: Sekolah Menengah Kebangsaan Agama (SMKA) Lati, Pasir Mas, Kelantan

Sekolah Menengah Kebangsaan Agama (SMKA) Lati located at Pasir Mas, Kelantan was gazetted as an evacuation centre to be used by the flood victims by Department of Social Welfare. The village involved are the resident from Kg. 61 Banggol Jering, Kg. Banggol Manak, Kg. Kepas Apam, Kg. Lati, Pondok Lati, Kg. Serai Lima, Taman Alia and Taman Sri Mas. The facilities provided are hall, mosque, multipurpose classroom, canteen as dining area and toilet at each block (Fig. 9).



Fig. 9. Tents Were Provided for Each Family As Sleeping Area
Source: The Malaysian Insider (2014)

IV. ANALYSIS AND FINDINGS

Based on the data collected for all 3 case studies there are three components that has been covered in these studies, and a comparison was put in Table 2. It shows that all case studies do not accessible by Person with Disabilities (PwDs). However, schools are better evacuation centre as it has better facilities as compared to community centre.

Table 2. Comparison Between 3 Case Studies

Facilities	Case Study 1: Veteriner Office	Case Study 2: SMK Keroh	Case Study 3: SMKA Lati
Type	Community centre	School	School
Hall Size for sleeping area	Can accommodate 50 people only	Can accommodate 500 people only	Can accommodate 2000 people only
Toilet	Only 4 cubicle	There additional toilet provided only for flood victims	Use existing school toilet. No additional toilet for flood victims
Dining area	No dining area.	There are school canteen can be used as dining area	There are school canteen can be used as dining area
Cooking area	No cooking area. Need to cook outside the building	There are school canteen can be used as cooking area	There are school canteen can be used as cooking area
Store unit	No store unit	One store room was used as to store the supply. Limited space	One store room was used as to store the supply. Limited space
Accessible for PwDs, elderly or pregnant women	No accessible	No accessible	No accessible
Praying area	No praying area	There are musolla that can be used for praying area	There are musolla that can be used for praying area
Area for social activities	Sleeping area were used to organise any activities	Provided, use existing hall	Provided, use existing hall
Medical treatment area	No	No	No

Source: Authors (2021)

Referring to the design consideration for disaster relief centre, it shows that all centres do not consider climatic conditions into design consideration. As some are using existing buildings, it was observed that all centre is exposed to the direct sunlight and heavy rain. On the other hand, all victims do not have privacy, they are visible to culture and social issues such as loitering, snoop and other social issues (Abdul Rahim & W Seman, 2019). Therefore, it can lead to different level of criminals such as rape, steal and others. The social problems that might happened at the evacuation centre needs to be taken care and solution need to be identify for their safety, welfare, and comfort (Said et al., 2013). On the other hand, there is no proper storage to install personal items or documents to secure victims important belongings. There is a need for future planning to improve the school as it will continuously use as evacuation centre every year especially during monsoon seasons. On top of that, accessibility are the most crucial attributes that need to be improved. All level of ages being relocate to the evacuation centre including the aged, person with disabilities, children and others, thus, they need proper facilities that can ease their movements in the buildings. Without these facilities, they might feel stress due to limitation of movement.

V. CONCLUSION

The evacuation centre plays a significant role in safe and rescue process for the victims of flooding. The importance of providing flexible and comfortable places for flood victims was also highlighted, as most of them were disaster traumatising and needed comfort, safety, and privacy as a

way of rehabilitation during, before and after disaster. The component of the evacuation centre must also be considering the comfort of the victims and facilitating their welfare throughout this study. The level of preparedness for the evacuation centre must also be reviewed annually so that they are prepared for future floods.

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