Constructing a Theoretical Framework for Assessing Community Disaster Mitigation and Preparedness

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Abstract: This exploratory study was carried out to gather the essential components for developing a theoretical framework for measuring community awareness of disaster management. This is to provide an effective instrument for educating individuals, communities and organizations about awareness regarding disaster preparedness and prevention in order to conduct a more thorough investigation. This theoretical framework was developed using a combination of literature research, interviews, focus group discussions, and observation. The study found that demographic characteristics, knowledge of disaster, disaster experience, attitude and awareness of disaster mitigation, exposure to mitigation and preparation as well as preparedness to respond to disaster are the main elements of the independent variables of this conceptual framework. These elements will affect community’s perceptions on managing disaster response, and thus affects individual, community and organization’s mitigation and preparedness for disaster. A proposed conceptual model for measuring the level of awareness for mitigation and preparedness in disaster management is presented. This framework implies that in preparing for disaster, people of different social context may perceive disaster differently and may even affect disaster mitigation and preparedness contrarily.

Keywords: awareness, disasters, mitigation, preparedness, perception

1. Introduction

Disaster is the global issues that transcends national boundaries and seriously discussed encompasses earthquakes, tsunamis, floods, and landslides which is transcends over the national boundaries. The word 'natural disaster' refers to a hazard or accident posed by floods, earthquakes, hurricanes and the like that occur on earth and cause losses include loss of life, the economy, infrastructure and the psychological impact of those affected [1, 2, 3, 4]. This catastrophe has caused destruction to property, loss of life and displacement of population. Over 200 million people are affected worldwide each year by natural catastrophes, which are typically weather-related [5]. Floods are the most common natural catastrophes to afflict Malaysia, followed by landslides, forest fires, droughts, and haze. Earthquakes and
tsunamis that occurred in nearby nations can also affect Malaysia. In a period of 20 years (2008-2018) alone, more than 3 million people were impacted by the natural disaster in Malaysia, which also cost RM 8 billion and resulted in the deaths of 218 people [6].

The Malaysia National Security Council (NSC) Directive No. 20 [7] define disaster as: "Any incident whether natural or due to human factors that occurs suddenly causes injury/death and damage to property or the environment and causes disruption to the activities of daily living." It is very complex and difficult for us to set the time, location and magnitude of the impact. However, with technology as well as empirical evidence natural disaster are to some extent can be predicted in terms of its expected period, location and the extent of its impact. The force of an incident can be seen clearly only after an incident. Many of the disaster, its impact can be seen clearly only after going through the statistics, the number of casualties and physical destruction of such property and the environment. This makes the importance of disaster preparedness to be fostered by everyone. With a solid preparation, at least the community are able to generate awareness and educate the public prior to an event in order to minimize the impact of a catastrophe and prepare the community in dealing with disaster. This is to facilitate the subsequent phases in the disaster response and recovery phases. All these phases are separate entities but interrelated and have a certain degree of importance according to the situation.

There is no doubt about the importance of effective response and recovery phases and these phases cannot be avoided during disasters as these are life-saving activities, can helps to control the damage, as well as restore order and community unrest. However, the phases of mitigation and preparation should not be ignored too because it will affect the facilitation of the response and recovery phases. Therefore, this discussion will explore the means to manage disasters more effectively by educating the public to mitigate and prepare for disasters. At least, this strategy may seek to reduce the risk of loss of life, destruction of property and the environment, the psychological effects suffered by the victims of the disaster in terms of stress, health, anxiety and confusion due to the damage and destruction of property suffered by the residents as well as facilitate the authorities in managing the disaster victims. Consequently, the main objective of this study is to: (1) identify the components in the phase of mitigation and preparedness in disaster management; and (2) propose the conceptual framework for the measurement of mitigation and preparedness in disaster management.

2. Literature Review

Research by the World Meteorological Organization (WMO) reported that the flood was the third largest natural disaster that claimed many lives and destruction of property. In Malaysia, flooding is a natural phenomenon that occurs every year, especially between November until January and sometimes lasted until February and March. Several studies were conducted by scholars in Malaysia related to community understanding of the disaster risk mitigation and preparation phases. According to 1,100 samples collected from various locations in Segamat District, Johor, by Tuan Pah Rokiah et al. [8], found that the preparation of individuals and communities is influenced by their experiences being affected by. Their study's results indicate that there are disparities between those who have encountered disasters and those who have not. Comparatively to individuals who lack expertise, the experienced will make preparations from a psychological perspective embracing cognitive, emotional, and psychomotor components. Additionally, Ang Kean Hua [9] has conducted research on the community's readiness for the monsoon floods in Kota Bharu, Kelantan. The results of a study involving 400 respondents who reside near the Kelantan River reveal that the benefits of experiencing disasters cause the community's awareness to always be raised. These preparations may be observed in the community's actions, which included building high-rise structures, stockpiling a lot of food, and getting boats and buoys ready for use as safety equipment. Next, Ahmad Azan et al. [10] discovered that education, involvement, and leadership have a distinct significant association with community readiness in the face of disasters in their study of 318 respondents who were residents of Bukit Antarabangsa, Ampang Jaya, Selangor.

In the meantime, a study on the effects of flood catastrophes on enterprises in Kuala Krai Kelantan was carried out by Nasir et al. [11]. The numbers of 175 experienced traders who had their commercial properties damaged or destroyed by floods participated in the study. The results of this study demonstrate that raising public awareness of the potential of disaster depends on cooperation between all parties. Among the crucial steps in disaster preparedness are awareness campaigns, workshops, trainings, and classes, both formal and informal. A study by Sarina et al. [12] examined the preparations and adaption measures taken by Hulu Dungun people to deal with the phenomena of flood disasters. The results of in-depth interviews and observations with the 15 respondents revealed that the victims of the flood disaster had a variety of disturbances and stress on a physical, social, and emotional level as a result of their exposure to the tragedy. These experiences prompted the community to take initiative and create mitigation plans as well as short- and long-term planning to deal with the threat of flooding in their area with the help of various government organizations. These steps (mitigation and preparedness) are intended to facilitate and coordinate diverse disaster management strategies. However, a study conducted by Norsyuhada et al. [13] using 384 respondents demonstrates the resilience of communities. Their research, which was carried out in Manik Urai Lama, Kuala Krai, Kelantan, demonstrates how closely disaster knowledge, experience, and education/training are related to a community's capacity for disaster mitigation and preparation.
The neighbourhood had demonstrated its ability to create plans for attempting to survive during disasters, particularly in the stockpiling of food stocks, beverages, and medications.

In addition, a review of many documents that contain disaster management policies was carried out. One of these is the flood risk management strategy created by the International Commission for the Protection of the Danube River (ICPDR) [14] in 2015 for nations in the Danube River basin, specifically Germany, Austria, Czech Republic, Slovakia, Hungary, Serbia, Bosnia and Herzegovina, and Moldova. Additionally, the Queensland State Disaster Management Plan [3], the Sendai Framework for Disaster Risk Reduction 2015–2030 [4] recommended disaster coping framework; Disaster Risk Management for Sustainable Development (DRM-SD) [15] by the Center for Global Sustainability Studies, Universiti Sains Malaysia and Malaysia Disaster Management Reference Handbook [6], were also studied to get appropriate ideas as a foundation for developing a conceptual framework for the mitigation and preparation phase in disaster management.

According to the empirical results of these research and the recommendations made in the policies found that knowledge, experience, attitudes, exposure to disasters, and disaster awareness are all elements that influence how prepared the public perception about disasters. These elements also have an impact on how the community prepares for and mitigates disasters. These empirical results and suggested remedies are similar to Theory of Planned Behavior in explaining how people and communities react to different stages of a disaster. Wan Baharudin et al. [16] in their study on organizational achievement, making changes could ensure the success of an organization. According to the Theory of Planned Behavior, there are three key elements that influence behaviour: attitude, subjective norms, and behavioural control expectations. This theory states that influencing change-supporting behaviour is the expectation of benefits from change (attitudes), leader support (subjective norms), and self-efficacy regarding change. (behavioural control expectations). Overall, attitudes, subjective standards, and behavioural control expectations as expressed will affect a person's desire to engage in each of their distinct behaviors, which will then result in behaviours that may be expressed by real acts.

3. Research Methodology

This study will employ qualitative methods as the main method for gathering study data that enable the researcher to combine varied data from pertinent literature reviews, in-depth interviews, focus group discussions, and observations. Qualitative methods are frequently employed to generate valid and reliable instruments for obtaining detailed information, encoding, parsing, translating and defining a phenomenon in its original condition [17, 18,19]. Additionally, this method offers researchers a number of benefits, including time savings, the ability to conduct more thorough and accurate research on a problem within the study organization, simultaneous data collection for analysis and reporting of research findings, the avoidance of bias and reliability in evaluating, interpreting, perception, and agreement, among other benefits [18, 19].

The first stage in the data gathering procedure is an in-depth interview. This method is one of several used to gather data orally, with the researcher recording the responses in writing, audio, video, and other electronic formats [17, 18]. The method of interviewing will be used in a semi-structured way to enable the researcher to ask formal questions prepared in advance of the interview as well as to meticulously investigate by re-questioning respondents in relation to the responses provided to a formal question that has been asked. [17, 20, 21]. It allows the researcher to obtain reliable data regarding a question, following that the researcher will transcribe the answers for analysis [18].

A total of 20 respondents were involved in this interview came from various background including federal/local government agencies, and the community. The interview process was conducted in several locality in Kedah (Yan District, Kubang Pasu District and Baling District) on 13th – 15th January 2023 (7 respondents); Kelantan (Tumpat District, Pasir Mas District and Gua Musang District) on 30th January – 1st February 2023 (8 respondents); and Perak (Hulu Perak District) on 2nd February 2023 (5 respondents). The localities were chosen because they were especially prone to and severe natural disasters.

The respondents who are the agency's representatives are at various levels of positions, particularly at the strategic and operational levels. They have directly experience of being involved in a number of catastrophic occurrences that have happened in their respective localities. The discussions focused on the participants' specific areas of responsibility, particularly in terms of contributions, strengths, and weaknesses in occurrences that were connected, particularly those that pertained to mitigation efforts and the preparation of individuals and communities. This is to obtain thorough and understandable information related to mitigating and preparation measures toward disaster at the individual, community and organizational levels.

Additionally, observation techniques were employed to determine whether the community at the research location was aware of mitigation efforts and disaster preparedness. With the use of this technique, data about the attitudes and behaviours of research participants can also be gathered in addition to observations of the consequences of events [17, 18]. This method was adapted as well according to the experiences of several researchers who were personally involved in disaster-related operations during employed by the security services. The information gathered from these observations was utilized to explain the effects of actual disaster events as well as to learn more about the attitudes and actions of the community with regard to disaster relief and preparation. In this study, the researchers made the most of their previous experience in managing floods in the states of Sarawak in 2007 and 2008, which included the Sri Aman Division, Lubok Antu, Betong, and Saratok Districts, and Kelantan in November and December 2013 and 2014/2015.
which covered three areas of responsibility, namely the districts of Jeli, Tanah Merah, and Gua Musang.

4. Findings

These components could be taken into consideration as independent variables based on the literature review and fieldwork. Those components are:

4.1. Demographic characteristics

The demographic characteristics of the respondents, which include gender, age, marital status, level of education, occupation, income, type of residence, and location of residence, can significantly influence how they perceive disasters and, consequently, how well or poorly they are prepared for them. Demographic characteristics can also influence how respondents perceive disasters, which can help them gain knowledge and skills to mitigate future disasters. In terms of gender, female may be well prepared for disaster in comparison with male as they are seen to be more at home and caring for the safety of their children than male who are less at home and working. Nevertheless, it may be otherwise. The respondents’ educational background may also have an impact on how they perceive disasters and, consequently, how prepared they are. Some respondents may have read and researched about disaster management, which can have a significant impact on how they perceive disaster preparedness. Indeed, a person’s profession can affect how they prepare for a crisis and/or how they prepare for it. For instance, military personnel may have experience providing disaster relief, and this experience may have a significant impact on how they prepare for disaster. They might even have the knowledge and abilities to avert future catastrophe. The type and location of a community’s homes may also influence how prepared or unprepared they are for potential disasters. In this case, Malaysia has a number of highly well-known flood-prone locations. Therefore, by enhancing the design or heights of their homes, the community in these locations may be able to avert another calamity.

4.2. Knowledge of disaster

Knowledge of disaster refer to the information on the disaster, understanding of the different types of disasters, and early warning of disasters and actions. In fact, gaining knowledge is a key part of disaster preparation. Disaster can be avoided with knowledge as well. The community must first comprehend the elements that make up a disaster, its context, and how disasters can be reduced and averted if disaster management is to be improved. Disasters occur when people are unprepared and oblivious of natural threats. When a community lacks the information to comprehend the threat and effects of hazards, natural disasters will occur. The community must therefore improve their understanding of the social context of natural catastrophes, including norms, values, and perceptions, in order to increase their knowledge. Knowledge may take the shape of specialized or local knowledge. Local knowledge refers to a community’s capacity to comprehend the accepted customs and norms of the culture, as well as their comprehension of previous disasters and the principles they upheld in those situations. Expert knowledge can also come from a community’s experiences with handling technical information and resources, as well as through the application of this information for scientific integration with policy communities. The relationship between knowledge and disaster management is crucial to comprehend and accept in order to improve disaster management for the community.

4.3. Disasters experience

This part refers to the individual experiences in disasters that have ever occurred in this area, including the date, the event’s circumstances, its impact, and the actions that were taken before, during, and after it. Any calamity, whether natural or man-made, may have left a person feeling a variety of emotions and feelings. An individual may experience shock, disorientation, difficulty integrating ideas and information, and trauma after an occurrence. As these reactions fade over time, various thoughts may come to mind and one’s behaviour may vary. Some people could become more perceptive to their surroundings, causing them to be on high alert and ready for calamity. They may be extremely sensitive to timing, which helps them plan ahead and coordinate better. Additionally, having experience with a previous disaster may lessen stress since they can predict how the incident will turn out. Participation in the community enhances their competence, confidence, and cooperativeness. As a result, they are better equipped to deal with more difficult issues that affect people individually and their communities.

4.4. Attitude and awareness of disaster mitigation

This component denotes to the assessment of the disaster’s causes and effects, awareness of the instructions and warnings, and preparation and mitigation responsibilities on the part of individuals, communities, and organizations. An individual’s attitude and awareness may vary depending on their knowledge, gender, disaster training they’ve taken, experience with a prior disaster, the short- and long-term effects that disaster had on their families and way of life, and their willingness to adapt or change. An individual might also be willing to acquire knowledge in order to better prepare for future disasters if they have a favorable attitude towards them. Alternatively, a person could decide not to use the information they’ve acquired to their advantage for efficient disaster management. Disaster victims take an active role in restoring their lives and means of support. Existing human capacities are acknowledged and strengthened further.

4.5. Awareness and preparation to respond

Prepare medical supplies, finance, and communication infrastructure, as well as emergency provisions such as food, clothing, and equipment for rescue. The term "preparedness"
refers to measures taken in advance of a disaster to guarantee that the proper responses are made in the case of an emergency. Examples include establishing early warning systems, institutional cooperation, managing evacuations and emergency operations, increasing public awareness, doing drills for these scenarios, and stockpiling. The goal is to decrease people's vulnerability by strengthening people's abilities to prepare for, handle, and lessen the effects of disasters. Communities that are informed and well-organized can exert pressure on the government to put policies and program in place that take into account the needs and interests of the public and encourage a safer environment. The community must take into consideration the roles and contributions of all community members; combine indigenous and local knowledge and resources with science and technology and outside support; and address the concerns of different stakeholders while upholding the fundamental needs of the most vulnerable sectors and groups. The capacity-building effect of public participation is important in all stages of disaster management. Community members are involved in the continual process of assessing catastrophe danger scenarios before, during, and after disaster events, taking into account factors such as class, gender, age, culture, geography, etc.

4.5. Proposed Conceptual Framework

Figure 1 illustrates the proposed theoretical framework. This framework was developed using the researchers' field research and literature review. For gauging community perception and awareness in the case of a disaster, a number of components were recognized as significant independent variables. The independent variables were knowledge of disaster, disaster experience, attitude and awareness of disaster mitigation, exposure to mitigation and preparation as well as preparedness to respond to disaster. The suggested construct for moderating variable is demographic characteristics, whilst the mediating variables is the individual perception of the disaster. Regarding the dependent variable, the construct for awareness were suggested containing the mitigation and preparation. These constructs are going to evaluate how each person behaves in terms of their capacity to carry out disaster mitigation efforts.

5. Conclusion

A suggested conceptual framework for gauging the degree of preparedness and awareness mitigation in disaster management is presented. This framework suggests that when preparing for a disaster, individuals from various social contexts may interpret the disaster differently and may even have an opposite impact on disaster mitigation and preparedness. A combination of the researchers' actual field study and reviews of previously published research articles went into the development of this conceptual framework. As a result, studies about disaster management have further improved the conceptual framework. Given this conceptual framework, it is expected that it will serve as a guide for practitioners in the field of disaster management as they create modules and curricula for training activities and education related to prevention and preparedness in disaster management, whether at the individual, community, or national levels. Additionally, it is envisaged that this model may be quantitatively tested. Quantitative testing will strengthen the framework's potency because the reliability and validity of instruments can be demonstrated statistically. The results of quantitative testing will also help to strengthen the policies, modules, and ongoing initiatives aimed at making people and communities more aware of mitigation and disaster preparedness.

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