

Exploring Flood Disaster Preparedness Awareness Factors through Historical Flood Victims in Bangkok Metropolitan and Vicinity by Using Factor Analysis

Dr. Chaiyaset Promsri

Rajamangala University of Technology Phra Nakhon, Bangkok, Thailand

E-mail: Chaiyaset.p@rmutp.ac.th

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Abstract

Based on the synthesis of related literatures, this research found thirteen related dimensions that involved the development of natural disaster preparedness awareness including hazard knowledge, hazard attitude, training for disaster preparedness, rehearsal and practice for disaster preparedness, cultural development for preparedness, public relations and communication, storytelling, disaster awareness game, simulation, past experience to natural disaster, information sharing with family members, and commitment to the community (time of living). The 40-item of flood disaster preparedness awareness questionnaire was developed based on these thirteen dimensions. Data were collected from 595 participants in Bangkok metropolitan and vicinity by using snowball sampling technique. Cronbach's alpha was used to examine the internal consistency for this instrument. Reliability coefficient was .97, which was highly acceptable.

Exploratory Factor Analysis where principal axis factor analysis used was employed. The Kaiser-Meyer-Olkin index of sampling adequacy was .973, indicating that the data represented a homogeneous collection of variables suitable for factor analysis. Bartlett's test of Sphericity was significant for the sample as Chi-Square = 23168.657, $df = 780$, and $p\text{-value} < .0001$, which indicated that the set of correlations in the correlation matrix was significantly different and acceptable for utilizing EFA. Factor extraction was done to determine the number of factors by using principal component analysis and varimax. The results revealed that four factors had Eigen value greater than 1 with more than 60% cumulative of variance. Factor #1 had Eigen value of 22.270, and factor loadings ranged from 0.626-0.760. This factor was named as "Knowledge and Attitude of Natural Disaster Preparedness". Factor #2 had Eigen value of 2.491, and factor loadings ranged from 0.596-0.696. This factor was named as "Training and Development". Factor #3 had Eigen value of 1.821, and factor loadings ranged from 0.643-0.777. This factor was named as "Building Experiences about Disaster Preparedness". Factor #4 had Eigen value of 1.365, and factor loadings ranged from 0.657-0.760. This was named as "Family and Community". The results of this study provided support for the reliability and construct validity of natural disaster preparedness awareness for utilizing with populations similar to sample employed.

Keywords: *Flood Disaster, Flood Disaster Preparedness, Flood Disaster Awareness, Factor Analysis*

Introduction

The massive flood disaster in the history of Thailand in 2011 caused lives and damages of Thai people in 65 provinces including major districts and business areas of Bangkok metropolitan and vicinity. As a capital city and a center of business and transportation, the attack of natural disaster had enormously destroyed not only lives and properties of people, but also trust and confidence on the Thai government. Even though the major cause of this historical flood event in Bangkok area and vicinity were relevant to physical problems of the city, the consequences of this catastrophe reflected the weak preparation of people.

Disaster preparedness of people to cope with critical incidents before they occur is a vital key to mitigate and minimize the damage on properties, and fatality rates. People must be aware of threats and disasters that can harm their lives and assets, and be ready to confront with these disasters effectively prior to receiving aids from the government. To cope with natural disasters effectively, people must develop their disaster preparedness awareness. However, based on the literature reviews, there was no evidence indicating factors or components that help strengthen individual disaster preparedness awareness as an entire series of preparation. On the other hand, numerous studies attempted to place an emphasis on a single component or some dimensions that could enhance disaster preparedness awareness of individuals (Promsri, 2014). This study tried to compile those research pieces together to develop the key components of flood disaster preparedness awareness.

Based on the synthesis of related literatures, this research found thirteen related dimensions that involved the development of natural disaster preparedness awareness including hazard knowledge, hazard attitude, training for disaster preparedness, rehearsal and practice for disaster preparedness, cultural development for preparedness, public relations and communication, storytelling, disaster awareness game, simulation, past experience to natural disaster, information sharing with family members, and commitment to the community (time of living). These dimensions had been systematically combined for the development of natural disaster preparedness awareness instrument for exploring flood disaster preparedness awareness of Thai citizens. Therefore, this study aimed to explore key factors related to development of flood disaster preparedness awareness of Thais by analyzing them with the statistical approach.

Objective of this Study

The objective of this study was to analyze factors that were related to flood disaster preparedness awareness of Thai citizens.

Research Question

What were key factors of flood disaster preparedness awareness of Thais who lived in Bangkok metropolitan and vicinity and experienced historical flood event in 2011?

Scope of this Study

This study focused on exploring the relevant factors of flood disaster awareness of Thai citizens by using exploratory factor analysis (EFA). Population was gathered from citizens who lived only in Bangkok metropolitan and vicinity and experienced flood event in 2011. The period of time for data collection was between June-August, 2014. Questionnaire used in this study was developed based on a synthesis of literature reviews, and provided to participants who lived in Bangkok and vicinity and experienced the major flood event in 2011 by using snowball sampling technique. The reason of using snowball sampling technique was due to the difficulty to collect data in the specific areas as flood victims in these specific areas lived in different types of accommodation such as home, townhome, rental house, flat, condominium, etc. The accessibility to those people in specific areas was limited and confined. Cluster sampling might have been appropriate if the researcher were able to contact the community leaders for data collection assistance; however, this technique was unable to be implemented due to the difficulty of coordinating with community leaders in specific areas. As a consequence, the researcher finally contacted the person who was personally known as the flood victim in the major flood in 2011 to complete the questionnaire. After the completion, the participant was asked for recommendations for anyone whom he/she knew as a flood victim to collect data.

Literature Review

Recent research on flood preparation indicated that flood problem awareness and information reception were the key factors of flood preparedness. Thus, regardless of organizational types, all parts relating to flood preparation process needed to support and work together on knowledge development, awareness establishment, essential resources preparation, and effective framework development to cope with flood disaster effectively (Tayaratsrisakul, Sarakshetrin, & Chuleeporn, 2012). However, these factors needed to be developed continuously and constantly to ensure awareness of residents in the community and society on the importance of flood disaster preparedness (Khan, 2008)

Enders (2001) proposed components of community awareness measurement and awareness including hazard knowledge, attitudes to risk, previous experience of emergencies, exposure to awareness raising, and ability to mitigate, prepare, and respond. In addition to these factors, some studies demonstrated that continuous learning, living environment influence, and family members and neighbor influences were also important for enhancing and building disaster preparedness awareness (Beach, 2011). Paton (2003) suggested that household preparation such as clean water and food cans, first-aid kits, and lifesaving equipment was necessary for disaster preparedness. Tierney, Lindell, Perry (2001) stated that previous experience helped alleviate level of preparation because people knew how to adjust themselves to cope with disaster more effectively. Besides, the effective approaches of stimulating knowledge about disaster preparation through traditional classroom, billboard for public relations, school visit, and online learning through VDO or social media were essential for building awareness (Cohen, 2006). Not only previous experience and traditional learning, but also simulation and board game could help increase flood disaster preparedness awareness as people would learn from each other while playing board game (Cleveaux, Spence, & Katada,

2010; Pearson, 2011). All of these past studies exemplified ways to improve disaster awareness which could be implemented alternatively. However, in fact, there was no one best way practice that would help strengthen flood disaster preparedness awareness of people. Therefore, the combination of critical dimensions relating to flood preparedness awareness found in previous research was conducted in order to explore the key factors of flood disaster preparedness awareness.

Research Methodology

This study was used quantitative approach to analyze key factors of flood disaster preparedness awareness through exploratory factor analysis. A 40-item of self-administrated questionnaire was developed based on thirteen dimensions of flood preparedness awareness synthesized from the literature reviews. Questionnaires were distributed to Thai citizens who lived in Bangkok metropolitan and vicinity and used to experience the historical flood event of Thailand in 2011 by using snowball sampling technique. However, since the number of victims or people who lived in Bangkok and vicinity was unclear, and was not confirmed by the relevant organizations, the population size was calculated based on unknown numbers. According to Taro Yamane (1973), when the population size was unknown, the appropriate samples for data collection should be about 400.

Snowball sampling technique was used due to the difficulty to collect data in the specific areas as flood victims in these specific areas lived in different types of accommodation such as home, townhome, rental house, flat, condominium, etc. The researcher contacted the person who were known as the flood victim in the major flood in 2011 to complete the questionnaire, and asked for recommendations for other flood victims he/she knew for further data collection through email or social networking platform. The period of time for data collection was limited to three months during June-August 2014. As the end of the data collection process, the total samples gathered in this study were 595.

To complete the questionnaire, participants were asked to rate each item of natural disaster preparedness awareness to the extent in which each statement described properly in their opinion. This instrument was a five-point rating scale ranked from “strongly disagree to “strongly agree”. To ensure the validity of this instrument, the index of item-objective congruence (IOC) was used to evaluate the content validity of each item of the scale by the experts in disaster and crisis management fields. A total of nine experts in disaster and crisis management fields were asked to evaluate the score for each item. The IOC score of more than 0.5 was considered being acceptable. After the evaluation, there was no item received a score less than 0.5.

In addition, Cronbach’s alpha was used to examine the internal consistency for this instrument. Reliability coefficient for the total scale was .97, which was highly acceptable. Exploratory Factor Analysis (EFA) was used to determine the number of factors to remain. Compatibility of data for EFA was assessed with Barlett’s test of Sphericity and Kaiser-Meyer-Olkin (KMO). If KMO was greater than 0.5, and the Barlett’s test was significant, the data would be suitable as compatible for EFA. In this study, KMO was 0.973 and Bartlett’s test of Sphericity was significant for the sample as Chi-Square = 23168.657, df = 780, and p-value < .0001, which

indicated that the set of correlations in the correlation matrix was significantly different and acceptable for utilizing EFA. Factor extraction was done to determine the number of factors by using principal component analysis and varimax, which were acceptable for utilizing EFA technique.

Results

As of 595 participants who completed the questionnaires, the majority of participants were female (61.7%). Many of them were aged between 18-30 years (39.5%). For the marital status, more than a half of them were single (62.2%). For educational level, the most of them were educated in undergraduate degree (63.4%). Almost 40 percent of participants had about 10,001-25,000 baht (38.7%) for their monthly income. For types of household, almost 50 percent of them lived in their own house (44.9%), and more than a half of them lived in Bangkok district (53.4%). For the number of family members, more than 30 percent of respondents had more than 4 members in their family (33.3%).

Exploratory Factor Analysis where principal axis factor analysis used was employed. The Kaiser-Meyer-Olkin index of sampling adequacy was .973, indicating that the data represented a homogeneous collection of variables suitable for factor analysis. Bartlett's test of Sphericity was significant for the sample as Chi-Square = 23168.657, $df = 780$, and $p\text{-value} < .0001$, which indicated that the set of correlations in the correlation matrix was significantly different and acceptable for utilizing EFA. Factor extraction was done to determine the number of factors by using principal component analysis and varimax. The results revealed that four factors had Eigen value greater than 1 with more than 60% cumulative of variance. Factor #1 had Eigen value of 22.270, and factor loadings ranged from 0.626-0.760. This factor was named as "Knowledge and Attitude of Flood Disaster Preparedness". Factor #2 had Eigen value of 2.491, and factor loadings ranged from 0.596-0.696. This factor was named as "Training and Development". Factor #3 had Eigen value of 1.821, and factor loadings ranged from 0.643-0.777. This factor was named as "Building Experiences about Flood Disaster Preparedness". Factor #4 had Eigen value of 1.365, and factor loadings ranged from 0.657-0.760. This was named as "Family and Community".

These four factors were explored and defined as follows:

1. **Knowledge and attitude of flood disaster preparedness** was defined as "using poster, slogans, documents for public relations, games and simulations, and rehearsal relating to flood disaster as well as having direct experience and receiving related stories about flood disaster and crisis to help strengthen flood disaster awareness of individuals."

2. **Training and development** was defined as "providing knowledge and training, developing training and rehearsal activities, support equipment and innovation, sharing information about flood disaster as well as giving rewards or admiring individuals who are aware of flood disaster to help increase flood disaster awareness of individuals."

3. **Building experience about flood disaster preparedness** was defined as "providing and reviewing knowledge about critical environment and signals that occur before disaster, sharing the case studies relating to past disasters, giving the opportunities for people to get

involved in crisis and disaster management, and encouraging an understanding of risk assessment to help develop flood disaster awareness of individuals.”

4. **Family and community** was defined as “sharing information and knowledge about flood disaster with family members, participating on community activities relating disaster management, and developing flood disaster management plan in the household to help develop flood disaster awareness of individuals.”

Conclusion and Discussion

To effectively cope with flood disaster, people are required to have flood disaster preparedness awareness which helps decrease the damage and loss. Past studies showed no evidence of the set of relevant factors that help enhance individual flood disaster preparedness awareness. However, significant components of disaster preparedness awareness were found separately in various studies in disaster management field. Many of them demonstrated fundamental factors that people need to possess in order to respond to disaster effectively. Since no studies showed the group of key disaster preparedness awareness variables, this study attempted to gather those scattering pieces found in previous research and organize them to develop the key components of flood disaster preparedness awareness. Thus, the main objective of this study was to explore the flood disaster preparedness awareness factors.

According to Promsri’s review (2014), thirteen relevant dimensions that involved the development of natural disaster preparedness awareness were found. These dimensions included hazard knowledge, hazard attitude, training for disaster preparedness, rehearsal and practice for disaster preparedness, cultural development for preparedness, public relations and communication, storytelling, disaster awareness game, simulation, past experience to natural disaster, information sharing with family members, and commitment to the community (time of living). To explore the flood disaster preparedness awareness factors, these thirteen variables were used to develop the questionnaire. After carefully reviewing and assessing content validity of the newly developed instrument, the final version of 40-item of natural disaster preparedness awareness questionnaire was completed. Data were collected from 595 participants in Bangkok metropolitan and vicinity. Cronbach’s alpha was used to examine the internal consistency for this instrument. Reliability coefficient was .97, which was highly acceptable. Utilizing exploratory factor analysis (EFA), the results showed that four factors had Eigen value greater than 1 with more than 60% cumulative of variance. These four factors were named as follows: “Knowledge and Attitude of Flood Disaster Preparedness,” “Training and Development,” “Building Experiences about Disaster Preparedness,” and “Family and Community”

In order to increase flood disaster preparedness awareness of Thai citizens in the future, these four dimensions needed to be put into accounts and taken for considerations. Government and local public organizations needed to be responsible for providing education and information about flood disaster preparedness awareness to Thai people. Education and training programs should be developed in order to prepare people to cope with flood disaster effectively. Moreover, family and community also played a vital role in enhancing preparedness awareness of people. Sharing flood disaster experiences with family members deemed very

necessary for preparedness awareness enhancement. Also, developing flood disaster management plan in the household was critical to establish the readiness and preparation for flood disaster.

This study was the first study in the field of disaster management that placed an emphasis on exploring flood disaster awareness of individuals in Thailand. The appropriate recommendation for further study was to examine the indicators of flood disaster awareness by utilizing second-order confirmatory factor analysis (CFA). Research application was beneficial for government and local organizations to create procedures and activities that help increase flood disaster awareness of Thai citizens more effectively.

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