The Eurasia Proceedings of
Educational & Social Sciences (EPESS)
ISSN: 2587-1730

The Eurasia Proceedings of Educational & Social Sciences (EPESS), 2018

Volume 11, Pages 177-183

ICONSE 2018: International Conference on Science and Education

Preparing Flood Victims for Emergency House Evacuation

Farhad BALASH
Kharazmi University

Dayang AVANG HJ HAMID
Universiti Teknologi Malaysia

Abstract: Remarkable confrontations arose from natural disaster, are considered as the mankind natural reactions. In this study, flood evacuation is treated as the systematic process to react against this nature's anger. Unfortunately, little is considered through the qualitative lens to understand human behavior for Emergency House Evacuation (EHE) during the flood. In this study, preparing the residents is examined as to manage their behavior to evacuate their house during a flood. Methodologically, qualitative study is conducted to discover different components of EHE. Thirty-five victims participated as the key informants to reflect the different components of EHE and employing thematic method of analysis to develop and explore the components representing different views of the victims. EHE is seen to comprise three sequential components of predicting (A), controlling (B), and action (C) with nine secondary-level dimensions. These dimensions relating to the predicting are: estimating, discriminating, and timing. Two dimensions relating to the controlling are closing entries and disconnecting utilities. Four dimensions relating to the action are equipping, collecting, recognizing, and leading, respectively. Consequently, timing as one of the dimensions of predicting, is presented as the turning point of the process, which determines the sequence of the EHE process from the sequence of ABC to AC. Evidently, an emerged model of the study is accentuated to use in order to reduce the tension during EHE, which helps the victims to accelerate the process of evacuation at the maximum level of safety and confidence in the imposed situation.

Keywords: Flood, Evacuation, Training

Introduction

Commonly, there are many nations that challenging with flooding as the major concern. Especially, the most vulnerable nations are those facing with permanent rainfalls. In the past years, perhaps due to climate change, heavy floods have been happening all over the world with worrying timekeeping (Magiswary et al, 2010 a). In the US, floods do about $ six billion losses and kill about 140 civilians every year. A 2007 report by the OECD found that coastal flooding alone does some $3 trillion in damage worldwide. Yellow River Valley in China engaged millions of civilians in floods during the last century. Malaysia as one of the tropical countries is not away from this natural catastrophe. Generally, monsoons and atmospheric changes bring the flood in tropical areas. Eight years ago, in Kota Tinggi, Johor, heavy rainfalls brought huge damages for the region, and around 51000 families were affected (Chan, 2006) (Shafie, 2009). The worst tragedy in Malaysia, Johor returns for the mentioned period that propelled several studies to overcome the consequential issue (Chan, 2006) (Shafie, 2009) (Gue &Tan 200) (Gue et al, 2008). According to, Adroit Data Recovery Center (ADRC) in Malaysia from 2004 to 2008, over 330.000 families were affected by flooding. Mostly, studies for flood disaster are limited to the aftermath of flooding for the citizens (Magiswary et al, 2010 a) (Chan, 2006) (Shafie, 2009) (Gue & Tan, 2006) (Gue et al, 2008) (Magiswary et al., 2010 b). Moreover, the focus is on landslide, safety on hill-site, environmental degradation, first aids, and geo-hazard phenomena. Although these areas are important as the needful aspects to support citizens, the basic and initial tangible aspects as the pre-disaster phenomena should be in parallel consideration for researchers. Basically, the anxiety and incapability during flooding can be treated as the consequences of poor preparedness (Magiswaryet al., 2010 b). There are some researchers like Malilay, and Gill (Malilay et al.,1996) (Gill 2014), and world organizations that focused on post-disaster needs assessment.

These organizations such as United Nation Development Group (UNDG), The World Bank, United Nations Development Programs (UNDP), Global Facility for Disaster Reduction and Recovery (GFDRR) International Recovery Platform (IRP), United Nations Environment Program (UNEP), and in Malaysia, which is the target region of this study, Natural Disaster Relief Committee (NDRC) mostly focuses on construction and medical assessment. Among them, little is heard about preparatory measures for emergency house evacuation.

There are several studies in line with the importance of evacuation. The researchers in their models and recommendations try to highlight the standing of evacuation due to different natural disaster (Bird, 2009) (Jonstone, 2012) (Haddow, 2017); although, none of them is succeed to present applicable model for this issue. Basically, providing a model for training people during flood emergency evacuation needs to be developed using a dynamics approach. It simulates the acceptance of evacuation orders by the residents under threat; families in the process of evacuation from their houses; and time required for all evacuees to get shelter and safety. The training models can be conceptualized by considering the flooding conditions and the main set of cultural and psychological factors that govern human behaviour during the flood evacuation. The number of family members under the flood danger, the process of evacuation, collecting valuables, flood conditions (precipitation, river elevation, etc.), and different flood warnings and evacuation orders can be included in the EHE models for evacuation. They are connected to the worries that clue to the threat recognition, which prompts evacuation decisions. The main purpose of the EHE model is to enhance the effectiveness of flood emergency evacuation. The model consists of the choices of flood warning method, timing of an evacuation order, coherence of the family, and upstream flooding conditions.

Method

The orientation of this study is an interpretive approach. The researchers tasked to make sense or interpret the phenomena in terms of interpreting all the sources of data and meaning behind them (Denzin, 1998).

The EHE project aims to reveal flood victims' perspectives and understandings, particularly with regards to their post-hoc lived experiences in the natural extreme settings. With the role of observers and interviewers, a team of researchers from University Technology Malaysia (UTM) sought data from the environment and lived setting in order to interpret (Schwandt, 2000) the participants' experience and perceptions in confrontation with the latest flooding from 15 December 2014 – 3 January 2015. To reach at the better understanding point of the phenomena, the researchers selected the case study design (Miles, 1994) (Stake, 2000) (Punch, 2009). Purposively, a single case was adopted as to get in-depth insights into the concept of EHE in the extreme-condition of different flooding areas in Kelantan state. The participants were in a confined boundary of space and time during flooding. The research was conducted within two weeks, in different affected regions, Gumusang, and Kulai Krai. These regions were selected because they are typical reported parts of Kelantan state. The regions have been acknowledged by many sources as the top affected regions among other regions.

Thirty-five participants, 11 males and 24 females were interviewed that 60% from Guamusang and 40% of them from Kulai Krai. Respectively, the number and percentage of participants by education were 2 illiterate residents, which were 5.7% from total, 9 at primary level (25.7%), and 24 at secondary level (68.6%). Regarding their age, 57.1% of them under 20, 48.6% between 21-39, 8.6% between 40-59, and 40 % over 60-year-old. The data collection of the fieldwork was accomplished over the two weeks, consisting of researchers' memos writing, photos and videos taking, and interviews' recording. Semi-structured interviews were conducted with all participants where they agreed before their interviews. Partial informal discussions during and researchers' discussions about each case were noted as to have complementary sources for validation of the data and clarifying the certain emerged concepts and further opinions from the target group.

Regarding key features and the pattern of EHE process in confrontation with extreme flooding, the researchers used thematic analysis. Three key steps of reduction, selection and simplification were employed as to develop the emerging themes and to link them together (Miles, 1994) (Yin, 1994). Ultimately, the main themes and sub-themes were constantly compared as to saturate the data.

Results and Discussion

Four groups of questions asked from the victims about EHE. These questions broke down into several items as to understand the process of EHE. The items for the first group are:

- What were the characteristics of the flood?
- What were the characteristics of your house/building?
- If you want to describe yourself in general, what kind of person you are brave, timid, or challenging…?

Second and third groups together are listed as:

- How long did it take between your realization of the disaster and time of evacuation?
- What was your immediate reaction when you found out that there was a flood near your house?
- What was your thinking about, during your evacuation?
- Did you rescue someone during the flood?
- Were you able to recover your valuables (money, gold, Wallet…) before the flood reached your area?

Moreover, the items of the fourth group are itemized as:

- Which direction did you choose to run to?
- Was there any other consideration apart from running away from the house?
- Did you try to sweep away the water entering your house during the flood?
- Were you trapped in the house?

Based on the data, the victims' frequent complaints about their psychological shocks during EHE were a justifiable reason to think about the process of EHE. According to Perry and Lindel (2003), human needs dynamic interactions with the environment. Therefore, in the case that human beings are not ready to confront with the environment the psychological shocks are reasonable. The compatibility with the environment in general, and nature in particular, entails the accurate and valid decisions based on the actual needs (Quarantelli, 1995). Based on the data, the first reaction against the flooding is EHE. The researchers found that the ineffective EHE is the main phenomenon of this study as the researchers expected before going to the fieldwork. Fundamentally, to the extent that these people are being on time and optimized, the compatibility with the natural disaster is going to be more feasible. Therefore, training not only have the significant contribution to enhance mankind's knowledge and skills, but also have the imperative role to improve efficiency and effectiveness to adapt individuals with the coming problems of the ever-changing nature (Lawler, 2000) (Murray, 2002) (Belzer, 2003) (Guskey, 2003) (Killion, 2007).

In order to train the residents and help them to overcome the situation, researchers try to find the main evacuation process in order to find the model to train the individuals. Therefore, three main categories were emerged to complete the process during EHE; namely, predicting, controlling, and action. In other studies, several scholars found other components. For instance, in 1990 Laska (Laska, 1990) mentioned in human decision-making process for evacuation, which is divided into four psychological phases of concern, danger recognition, acceptance, and evacuation decision. Along with Laska (1990), Tobin and Ollenburger (1996) alluded to the Red River Basin evacuation model utilized a structure that divides the process into three phases of concern, danger recognition, and evacuation decision. In another example Simonvic and Ahmad mentioned that in order to be ready to confront disastrous conditions, there are some noticeable needs for the better preparation (Flood Evacuation Emergency Planning Natural Hazards):

- Understanding of emergency order processes
- Understanding of human behavior during the emergency
- The communication between the community (family member) affected by the authorities of disaster and emergency management
- Preparedness through simulation, or investigation of ''what-if'' scenarios.

Basically, he mentioned to evacuation management, and they counted three main components of prediction, control, and response, which are determined in cultural base. In this study, although there is a similarity of the names of components, but the definitions of each component are different. Based on the data in this study, predicting constitutes from three sequential themes of estimating, discriminating, and timing. These elements help residents measure the approximate level of flood with considering the time and type of flood. A typical excerpt from a 28-year-old victim shows the importance of predicting that he says:

> "Everything happened by sudden in two hours I was shocked, and I didn't know which way I should run and how to lead my family. It would be good to predict the flooding through weather cast or mobile alert."

It is deduced from his statement that residents need to beware of the flooding before entrapping. Generally, in some nations governments put many efforts to mitigate and redirect inevitable floods such as some engineering works and installing advanced computer as to predict with astonishing accuracy where floods will befall and how severe likely to be. 7

Three themes support the concept of predicting, which should be seen in a stepwise order. Estimating, distinguishing, and timing are the themes that are elicited from the data. Regarding the estimating, it is perceived from the participants that there are different ways to estimate the level and time of flooding. Participants mentioned three major ways of estimating such as alarming sensors, media estimation, and traditional estimation. It is emphasized that installed alarming sensors or central alarming to inform the residents to evacuate seems necessary for the residents. Moreover, they emphasized on media role in informing and estimating the flooding. Most of the survived victims indicated in the way that estimates the flood. For instance, one of the 58-year victims expressed:

> "Before flood I understood the rain will become worse because by our tradition knowledge in our village, we know if the water reaches to the upper part of our legs means we have to evacuate, and it is going to be dangerous."

The above excerpt shows that in local areas that they have experience in flooding, and they have some traditional ways to understand the time and level of flooding. It seems that the transferring these kinds of knowledge can help the residents to estimate the time and level of flooding.

Other concepts of predicting are distinguishing and timing. Respectively, distinguishing refers to river elevation and precipitation, which can be predicted as the type of flooding. Albeit, most flood damages are related to humans' interest in living near in river valleys (Malilay,1996). Moreover, the timing is referred to the time that residents should know how long they have time for EHE. Timing includes two themes of the slow and heavy uprising. Usually, slow uprising takes long time to overflow the river to come into the house that sometimes it takes one day. The heavy flooding takes in short time usually reported from one to two hours. Based on the observation and the explanation of participants, researchers came to this conclusion that flooding from river areas different from other areas. Furthermore, the participants mentioned that time management for them was very important to collect their stuff and leading family. Therefore, those areas with the fast uprising could not manage to have effective EHE than those in the areas with slow uprising.

Sometimes the problems of timing of evacuation and order of actions, and evacuation process are reported as the main issue (Quarantelli,1977) (IJC, 2000). According to the data analysis, the middle category between predicting and action are controlling. Some of the participants expressed that during the flood, they tried to challenge with the flood to prevent flood coming inside the house and also some emphasized on the electricity problem during flooding. For instance, one of the victims says:

> "I was disappointing during my challenge with water because I did not know what to do close the entries or collecting the needful stuff, so I made a decision to leave struggling and to find the valuable but there was no electricity to find the documents. I was under stressful situation to manage the priority."

By considering all the points from participants like the above excerpt the researchers come up with the controlling as the concept to support their perceptions. Categorically, controlling founds from two sequential themes of closing entries and disconnecting utilities. These elements assist the people to control the aftereffects. In order to control the aftermath disaster the residents during a flood should try to close the entries such as windows and backdoor. Moreover, as to prevent damages from electrical devices and gas, it is offered to disconnect the main electricity fuses and closes the gas flow.

The last but not least category is action, which is located at the end of the EHE process. Normally, the control and predict of behaviors during an emergency is not easy. The experiences of flood evacuation show various problems from happening chaos (IJC, 2000) (Morris,1997). Based on the data, there are some sequential actions that can help residents to evacuate their house after considering the predicating and controlling stage. These sequential actions are equipping, collecting, recognizing, and leading, respectively. Regarding equipping, the leader of the family should control the family members to wear their safety jackets as an imperative stuff to help them. The next theme after equipping is collecting. Frequently, the victims complained about the situations that after flooding they entrapped, and they could not reach for the food and water that helicopters sent for them and sometimes they needed rope to help others. Additionally, they mentioned to the darkness at night in everywhere and need light to find their ways. Moreover, in some cases they mentioned to the difficulty for their valuables and documents. For instance, one 45-year lady expressed:

> "It was difficult situation I didn't know what to collect on that moments: my kids, water, money, or our ID cards. I just took my ID cards and available documents, but unfortunately all the docs became wet and dirty."

It is realized from her excerpt that residents at the time of EHE, they don't have enough concentration to collect their basic stuffs. Therefore, the researchers come up with the term, collecting as the item refers to pick up the prepared backpack, which is contained plastic-covered documents, spare keys, valuables, dried snacks, torch, rope, and water.

Last two themes are related to recognizing and leading. Regarding leading residents should recognize which exit door is the best way to exit and try to choose the safe door and after exit choose the best way. According to data from participants at the time of evacuation family members, all are under mental pressure. In some cases, the kids fell down and hurt during final stage of evacuation. Based on the informal discussions with some participants, the researcher came at the point that it is instructive to lead the family with pre-trained practices. At this stage of EHE the leader of the house stays in front of the family members and one of the elder family member stays at the end of members' chain. The links and interrelations among all mentioned categories and themes are shown in (Figure 1).

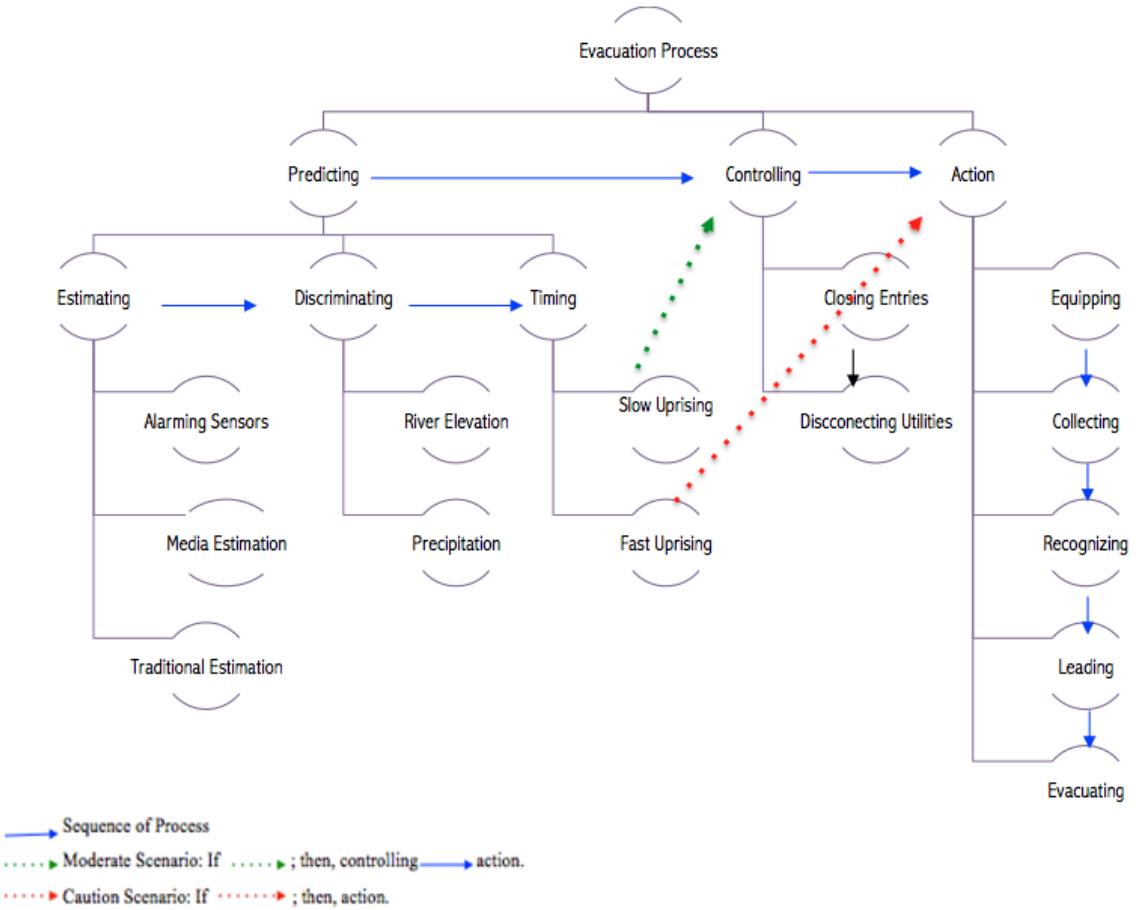

Figure 1. EHE process model

It is construed from the above figure that the evacuation process is treated as the systemic process of predicting, controlling, and action. This dynamics system is based on the theory of feedback processes (Sterman, 2000). A feedback system is induced by the contingent situation and behavior. This system has a closed-loop structure that brings results from later actions of the system that refers to control future actions. One class of feedback loops seeks a goal and responds as a consequence of changes to achieve the goal. Hereby, in the elicited grounded model at the predicting stage, estimating, discriminating and timing can help the residents to prepare themselves for EHE. The critical item in predicting stage is, timing, which can be presented as the turning point of the process. Timing determines the sequence of the EHE process from the chain of predicting-controlling-action to the short sequence of predicting-action. The reason refers to the speed of water uprising. In the case of slow uprising, there is an ample time to go through the controlling stage such as closing entries and disconnecting utilities; therefore, the whole process is going to be run step by step. However, In the case of slow

uprising, there is an ample time to go through the controlling stage such as closing entries and disconnecting utilities. Therefore, all the process is going to be run step by step. However, in the case of fast uprising, there is not enough time for residents to do the controlling stage, and it is suggested to skip the controlling stage and start the sequences of action stage such as equipping, collecting, recognizing, and leading.

Conclusion

Malaysia is in an urgent situation to settle the problem of flood as soon as possible; therefore, providing the pre-caution services and training program for people with high-risk areas seems necessary as to make them ready to confront with the flooding. Based on the reports, EHE is the initial action of people in flooding condition. Different activities are presented as the needful measures to prepare the residents. These activities include predicting, controlling, and action. In the first, predicting covers estimating, determining, and timing. These three sequential elements help the residents to predict the type and the time of flooding. Next, controlling which consists of two stages of closing entries, and disconnecting utilities. Finally, the process continues with action, which comprises four elements of equipping, collecting, recognizing, and leading, respectively. The interactions and interfaces of all finding factors come into the specific action in confrontation with diverse extreme conditions. On balance, this study also reveals the results in terms of conceptualizing the model of EHE. Ultimately, preventive measures such as prerequisite equipment and certain diet are highlighted to reduce the aftermaths of flooding.

Briefly, it is suggested the government invests to provide the comprehensive learning programs for the people in high risk areas. The range of these programs could be covered from the schools to official media such as TV channels and radios. It is recommended that animators and computer programmers plan to provide attractive and hi-tech programmes as to internalize the process of EHE.

Acknowledgements

The authors gratefully acknowledge the financial assistance from Ministry of Higher Education Malaysia (under Prototype Research Grant Scheme-Vot Registration Numbers: PY/2015/04476, R.J130000.7809.4L645), UTM Research management Centre (RMC), Universiti Teknologi Malaysia as well as Sports Innovation & Technology Centre (SITC), Institute of Human Centered Engineering (IHCE), Bioscience & Medical Engineering Faculty, UTM in providing the facilities for this research.

References

ADRC, (2015). Adroit Data Recovery Center, Retrieved from http://www.adrc.com.my/ on 1st Feb 2015.

Belzer, A., (2003). Toward Broadening the Definition of Impact in Professional Development for ABE Practitioners, Adult Basic Education, 13, 1, 44-59.

Bird, D.K., Gisladottir, G., Dominey-Howes, D., (2009). Resident perception of volcanic hazards and evacuation procedures. Natural Hazards and Earth System Sciences, 9, 1, 251-266.

Chan, N. W., (2006). Increasing Flood risk in Malaysia: causes and solutions, Disaster Prevention and Management, 6, 2, 72-86.

Denzin, N. K., Lincoln, Y.S., (1998). The Landscape of Qualitative Research, Sage Publications, Thousand Oaks.

Flood Evacuation Emergency Planning Natural Hazards, 34, 25–51.

Gill, S. P. D., (2014). Joining Global Effort in Post- Disaster Recovery and Reconstruction the Post-Disasater Needs Assessment Process, The World Bank, GFDRR Labs.

Gue, S. S., Tan, Y. C., (2006). Landslides: Case Histories, Lesson Learned and Mitigation Measures, Conference on Land Slide, Sinkhole, Structure Failure: MYTH or SCIENCE?, Ipoh Perak.

Gue, S. S., Karnawati, D., Wong, S. Y., (2008). Policy and Institutional and Framework for landslide Mitigation and Risk Reduction, First World Landslide Forum, Tokyo Japan.

Guskey, T. R., (2003). The Characteristics of Effective Professional Development: A Synthesis of Lists,ERIC.

Haddow, G. D., Bulock, J. A., Coppola, D. P., (2017). Introduction to Emergency Management, Six Edition. BH.

IJC (International Joint Commission)., (2000). The next flood: Getting prepared, Final Report of the Red River Basin Task Force, 164, Ottawa Washington.

Jonstone, W. M., Lence, B. J., (2012). Use of Flood, Loss, and Evacuation Models to Assess Exposure and Improve a Community Tsunami Response Plan: Vancouver Island. Natural Hazards Review, 13, 2, 85-98.

Killion, J., (2007). Assessing impact: Evaluating staff development, Corwin Press.

Laska, S. B., (1990). Homeowner adaptation to flooding, An application of the general hazards coping theory, Environ. Behav. 22,3, 320–357.

Lawler, P. A., King, K. P., (2000). Planning for Effective Faculty Development: Using Adult Learning Strategies, Krieger Publishing, Malabar FL.

Magiswary, D., Murali, R., Saravanan. M., Maniam, K., (2010 b). Recent Advances in Management, Marketing, Finance, 19-30.

Magiswary, D., Murali, R., Saravanan, M., Maniam, K., (2010 a). ICT and Disaster Preparedness in Malaysia: An Exploratory Study, WSEAS Transactions on Information Science and Application, 5, 7, 735-748.

Malilay, J., Flanders, W. D., Brogan, D., (1996). A modified cluster-sampling method for post-disaster rapid assessment of needs, Bulletin of the World Health Organization, 74, 4, 399-405.

Miles, M.B., Huberman, A.M., (1994). Qualitative Data Analysis, 2nd ed., Sage Publications, Thousand Oaks.

Morris-Oswald, M., Simonovic, S. P., (1997). Assessment of the social impact of flooding for use in flood management in the Red River Basin, Report Prepared for the International Joint Commission, University of Manitoba, Winnipeg, 73.

Murray, J. P., (2002). The Current State of Faculty Development in Two Year Colleges, New Directions for Community Colleges, 118, 89-98.

Perry, R. W., Lindell, M. K., (2003). Preparedness for Emergency Response: Guidelines for the Emergency Planning Process, Disaster Prevention and Management: An International Journal 4, 336–350.

Punch, K. F., (2009). Introduction to Research Methods in Education. Sage Publications Limited.

Quarantelli, E.L., (1995). What Is a Disaster? International Journal of Mass. Emergencies and Disasters, 13, 3, 221-229.

Quarantelli, E. L., Russell, D., (1977). Response to social crisis and disaster, Annu. Rev. Sociol, 3, 23–49.

Schwandt, T.A., (2000). Three Epistemological Stances for Qualitative Inquiry: Interpretivism, Hermeneutics and Social Construction. In Handbook of Qualitative Research, edited by Denzin and Lincolns. Sage Publications, Thousand Oaks.

Shafie, A., (2009). Extreme Flood Event: A Case Study on Floods Of 2006 and 2007 in Johor, Malaysia, Colorado State University, Fort Collins, Colorado USA.

Stake, R. E., (2000). Case Studies, In Handbook of Qualitative Research, edited by Denzin and Lincoln, Sage Publications, Thousand Oaks.

Sterman, J. D., (2000). Business Dynamics: Systems Thinking and Modeling for a Complex World, McGraw Hill, NY.

Tobin, G. A., Ollenburger, J. C., (1996). Predicting levels of postdisaster stress in adults following the 1993 floods in the upper midwest, Environ. Behav. 28, 3, 340–357.

Yin, R. K., (1994). Case Study Research, design and methods, 2nd ed. Sage Publications, Thousand Oaks.

Authors Information

Farhad Balash
Institute of Educational, Psychological, and Social Research, Kharazmi University
Tehran / Iran
Contact E-mail: efarhaddevelopment@gmail.com

Dayang Avang Hj Hamid
Universiti Teknologi Malaysia, UTM
Johor Bahru, Malaysia