Managing Flood in the Context of Education, Research and Partnership in Malaysia

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ARTICLE INFO
Submission date: 25/10/2018
Acceptance date: 21/11/2018
Publication date: 20/1/2019

Abstract

Several structural and non-structural measures and approaches have been implemented by the Malaysian government in order to overcome and alleviate the flood disaster. To date, Education, Partnership and Research have been identified as crucial components in forming an effective Flood Management system in Malaysia. This argument has been supported by many public and private institutions worldwide. As such, the standards and plans can be developed and implemented at district, state and federal levels. The spirits of Hyogo and Sendai were used as the guiding principles. Semi-structured interviews with several responding agencies were conducted for data collection. The findings indicated that less emphasis was given to the roles of components such as Education, Partnership and Research in Flood Management. The aim of this paper is to propose an integrated system for storing, disseminating and analyzing information pertaining to Education, Partnership and Research.

Keywords: Collaboration, disaster, environment governance, information sharing.

Introduction

The Flood Disaster (FD) system in Malaysia is compounded of climate, geography, culture, ethics and behavior. Undoubtedly, FD affects the environment, property and community. In Malaysia, various measures have been undertaken to improve all aspects pertaining to Flood Management (FM). Many calls have been made by the Malaysian Government [1] to seek solutions in FM. The two (2) common types of flood which hit Malaysia are Flash flood and Monsoonal Flood. Klang Valley Flash Flood Bertam Valley flash flood and East Coast Malaysia Monsoonal Flood are some examples of flood in Malaysia [2].

The Flood Disaster Governance Framework in Malaysia (GFM) has been constructed to tackle the governance issues [1]. The framework contains eleven (11) building blocks consisting of components: flood impact reduction; risk management; resource management; nationwide flood workforce (off-site, field/on-site/mobile); public (off-site); pre-agreed contractors, businesses and rebuilders; education,

research and partnership; integrated nationwide flood system; information sharing process; value delivery and performance management. Expert opinion technique was used to validate the GFM framework. The outcome from the expert opinion was analyzed using the Cohen's Kappa method in order to measure the agreement level of the experts with the associated validation questions. The rule-of-thumb indicates that Kappa value of 0.7 or above is adequate [2]. Based on the outcome of the validation process, the overall agreement is between 0.82 to 1.00. Therefore, it can be concluded that the GFM framework has been accepted by the experts in Malaysia. Figure 1 illustrates some of the components in the GFM framework and it is evident that Education, Partnership and Research (EPR) is a part of the Framework.

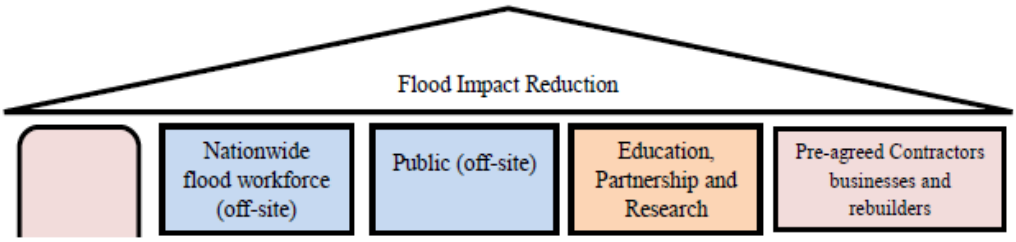

Figure 1. Education, Partnership and Research Component in the Framework [1].

Incorporating EPR into FM promotes the awareness of disaster prevention, public education and collaboration between public and private institutions in Disaster Risk Reduction (DRR). EPR is associated with collaboration among researchers across the globe in discovering solutions for improving FM and determining the mechanism to inculcate awareness within the community in responding towards flood [3,4].Literature Review

In the current work, frameworks such as Hyogo framework, Sendai framework and NSC Directive 20 were reviewed. Hyogo framework is a globally accepted framework which focuses on the governance of DRR. The adoption of Hyogo framework in 2005 by over 160 countries highlights the global international focus on DRR [5]. Nevertheless, Hyogo framework is instrumental in raising community preparedness in DRR and catalyzing actions between multiple stakeholders [4]. Hyogo focuses on the roles and responsibilities of communities in responding to disaster.

Sendai framework is the successor instrument of Hyogo framework. Sendai emphasizes the strengthening of good governance practices in DRR with a broader and people-centric approach [4]. Sendai promotes "build back better" concept which highlights the element of research and partnership between public and private institutions in order to rebuild the affected area.

NSC Directive 20 is the flood governing policy in Malaysia. The content in the directive includes ensuring 'post-mortems' are performed after each disaster incident. Furthermore, this policy emphasizes that mechanisms should be formulated for evaluating and rectifying problems in order to prevent any recurrence. The Directive sets out the mechanism in responding to flood and outlines the organizational structure; however, the mechanisms involved in community

involvement, importance of research component and engagement of public-private partnership in FM are not addressed.

Hyogo framework [3] and Sendai framework [4] encourage the integration of EPR component into the current FM practices. Japan has been adopting Hyogo [3] and Sendai [4] frameworks and they have been recognized in ensuring speedy recovery and nation rebuild after a disaster [6]. As compared to the NSC Directive 20 in Malaysia, an integrated system that can be used to automate the processes and activities involved in FM is absent. This has inspired many researchers in exploring on ways to systematize the EPR component in FM.

Methodology

EPR in FM is supported by strong collaboration between public and private institutions worldwide. It offers opportunity for the development and implementation of FM standards and plans at district, state and federal levels. The education component is essential in raising the awareness of FM threat among the community [7], while research and partnership provides opportunity to improve the structural and non-structural measures in FM [8].

Hennink, Hutter & Bailey [9] stated that the interview method allows the interviewers to investigate rich information such as research findings and respondents personal experience. Although the respondents are big in population, nailing on the right respondents with regards to EPR is challenging. Semi-structured interview questions were used during the face-to-face interview session. There were eleven (11) interviewees coming from five (5) different agencies that involve directly in FM mission such as National Security Council (NSC), Fire and Rescue Department (FRDM), Public Work Department (PWD), Department of Irrigation and Drainage (DID) and Welfare Department (WD). The selected respondents are from the management and professional group of Grade 41 and above with more than 5 years of experience in FM. Table 1 summarizes the details of respondents. There were eleven (11) questions prepared for the interview sessions. The aim of the interview session was to investigate the awareness of current EPR practices in FM.

Table 1: Details of Respondents.

Agency	Number of Respondents
National Security Council (NSC)	1
Fire and Rescue Department (FRDM)	3
Public Work Department (PWD)	4
Department of Irrigation and Drainage (DID)	1
Welfare Department (WD)	2

Findings and Discussion

Apparently, most of the respondents agreed that the element of EPR was not incorporated into the current FM practices. The governing body such as NSC has revealed that EPR was not emphasized in the daily operation. Interestingly, the governing policy, i.e. Directive 20 did not indicate the element of EPR as well. Some of the respondents from agencies such as FRDM, PWD and DID mentioned that they

recognized the contribution of EPR; however, the implementation mechanism was absent. All responding agencies agreed on the importance of EPR deliverables in FM.

The education component should take into account the role of local leaders in educating the community in their particular districts. Education is crucial in imparting information, knowledge and wisdom in the community. In general, the success of FM is very dependent on the collaboration between local leaders. Information pertaining to the relief centre locations, flood kits and actions in responding to disaster are imparted to the community either verbally (from the local leaders) or using pamphlet. The local leaders are peoples that help to inculcate awareness among their communities and educate the community for timely response during flood. The information dissemination between the local leaders and the community is essential for speedy action in FM. Taking a cue from Japan disaster [6] the local community in Japan is well educated in responding to disasters. This is established through mutual cooperation between local neighbourhoods. Neighbourhood association and community leader should work together in educating the community in responding to disasters.

The city of Kemaman in Terengganu, Malaysia has been recognized for its success in handling flood in 2014 [10]. One of the factors that contributes to its success in FM is the engagement with local leaders. The good relationship between the local leaders and the government is significant in FM. The local leaders are peoples who are well-experienced, knowledgeable and well-respected in the community. They play a vital role in disseminating information to the communities. The local leaders are able to understand the local dialects well and therefore any information (e.g. evacuation strategies, flood updates, etc) can be disseminated within the community effectively. Malaysian government is currently looking into smart community programme for expediting the dissemination of information and reducing the digital divide between rural and urban folks [11].

Multiple parties such as researchers, policy makers, government organization, academia and private institutions were engaged in the current research. The formulation of research element is crucial for exploring the challenges in EPR, discovering alternatives and proposing solutions. Research can be defined in a broader context which includes pre-positioned research documents, standardized instruments and investigation report. The research outcome is then communicated to the relevant authorities for the translations into prototypes and policies. There are several disaster related research centres that have been established worldwide. These centers consist of higher education institutions, government organizations and private institutions such as Disaster Research Centre (DRC), Massey University of New Zealand, National Institute of Environmental Health Sciences (NIH) and Advanced Centre for Enabling Disaster Risk Reduction (ACEDRR). These research centers are formed to encourage pioneering innovations in research and policy making. As one of the components in EPR, research allows one to identify the challenges in FM and opens the doors for possible collaboration between researchers across the globe, which would lead to the enhancement of disaster resilience in the EPR domain.

Public-Private Partnership Component

Public-private partnership has been recognized as the important pillar in "nationwide movement for disaster reduction" in Japan [12]. The engagement

between public-private institutions is crucial for continuous development or enhancement of tools and technologies and financial support so that the DRR strategies can be implemented effectively. In the case of London [13], Environment Agency (EA) has implemented a new model in allocating funding for flood defence schemes. The EA denoted that "*instead of meeting the full costs of a limited number of schemes, the partnership funding approach means that government money can help meet the costs of any worthwhile scheme [...]*. As a result, more schemes are likely to go ahead than under the previous 'all or nothing' funding system". The Local Government Association (LGA) supports the leveraging in private fund principles for the mutual benefits between the beneficiaries and the flood defence investment.

Proposed Integrated Systems

The absence of specific mechanism used to store and disseminate information pertaining to EPR has complicated the FM scenario. The NSC Directive 20 has highlighted the need of having a data bank at the national level for better flood monitoring. However, the implementation mechanism is not detailed. The need of having an integrated platform to store and analyze information related to EPR was highlighted by the respondents as well. The platform or integrated system would serve as a central point between coordinating agencies (NSC) and responding agencies for sharing information pertaining to EPR. Therefore, the current research proposes to develop an Integrated System by emphasizing the concepts of "information demand" and "information supply" which are crucial for information planners, information acquirers, and information users [14

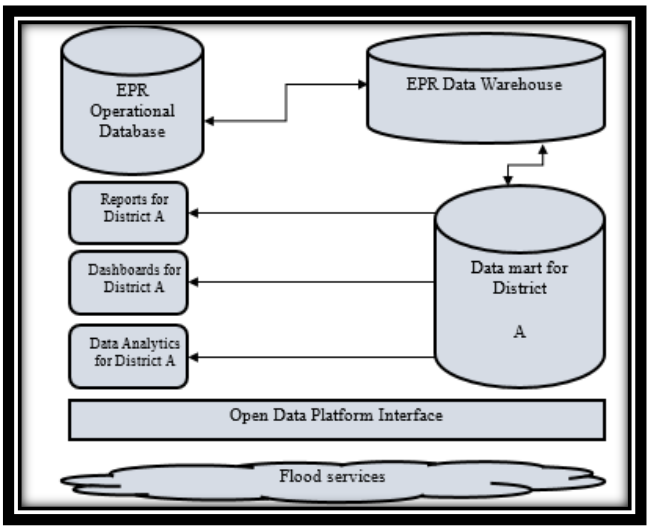

Figure 2. Proposed Integrated System.

The contribution of current work is the proposal of an integrated system for capturing and transferring EPR data and information. The system should comprise of three core elements: 1) Information sharing process, 2) Open Data Platform Interface (ODPI) and 3) Flood Services. The component presents end-to-end use of IT infrastructures for facilitating the communication process and information sharing within different communities, researchers and public-private institutions.

Referring to Figure 2, the EPR Operational database is used to manage real-time flood data. It captures, stores and disseminates FM information such as local

leader's accountabilities, current research progress and records on established partnership across multiple authorities. The data warehouse is a FM reporting and data analysis system that contains data such as potential flooding areas, flood risk mapping and climatological information. The implementation of FM plan varies according to the Standard Operating Procedure (SOP) of a particular district. Therefore, data mart is grouped according to district due to the diversity in culture and dialect of each district involved in FM. The output of data mart could be in the forms of report, dashboard and data analytics. ODPI determines the level of access to the users based on the designated privilege as specified in the integrated system. The different level of access is the fundamental security principle. Some examples of access types are read, write, share, append and modify. Flood services are tools and technologies used to access the flood system. The access to flood services is established using computers, laptops and handheld devices via web browsers and applications. The successful interaction of the components in the integrated system can facilitate EPR information sharing and coordination across responding agencies.

Simulation on How to Use the Proposed System

The user can access the system using handheld devices or desktop computers. ODPI can then be used to decide whether the access is granted or revoked. If access is granted, user could log into the system and perform the operation according to the assigned privilege. The details of EPR is invoked in the operational database. Data warehouse is designed to identify the specific districts of the selected EPR areas. The district names are sent to data mart. Data mart would fetch all the relevant information about the affected district such as responsible local leaders name, details of victims, status of flood awareness activities and campaign, volunteer in each district, research activities status, public-private partnership status, flood drill, details of flood awareness campaign, and nearest evacuation center. Based on the information obtained from the data mart, reports, dashboards and data analytics for District A are then generated.

Conclusion

Consistent engagement between communities, researchers, public and private organizations is crucial in ensuring the effectiveness of FM. The communities should be knowledgeable and play an active role in responding to FM. From the findings, it has been reported that the current FM system does not take into account the element of EPR. Therefore, an Integrated Information Technology (IT) based system is proposed in the current work to automate the EPR processes in FM. The system comprises of Operational Database, Data Warehouse, Data Mart, ODPI and Flood Services, which are the fundamental components for EPR information sharing across authorities. The components would interact with each other, followed by the generation of output data in the forms of report, dashboard and data analytics. These outputs are beneficial to communities, researchers and public-private organizations. Hopefully, the proposed system can be translated into working prototypes and implemented in apps-based application.

Acknowledgment

The authors wish to thank the Ministry of Higher Education Malaysia for funding this study under Long Term Research Grant Scheme (LRGS/b-u/2012/UUM/Teknologi Komunikasi dan Informasi).

Conflict of Interests.

There are non-conflicts of interest .

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