

How to cite this paper:

Siti Sarah Maidin, Marini Othman, & Mohamad Nazir Ahmad. (2017). Governance of flood disaster framework: A way forward using the framework in Zulikha, J. & N. H. Zakaria (Eds.), Proceedings of the 6th International Conference on Computing & Informatics (pp 650-655). Sintok: School of Computing.

GOVERNANCE OF FLOOD DISASTER FRAMEWORK: A WAY FORWARD USING THE FRAMEWORK

Siti Sarah Maidin¹, Marini Othman², Mohamad Nazir Ahmad³

¹International Islamic University Malaysia, Malaysia, sitisara@iium.edu.my

²Universiti Tenaga Nasional, Malaysia, marini@uniten.edu.my

³Universiti Teknologi Malaysia, Malaysia, mnazir@utm.my

ABSTRACT. Weakness in the governance component within a flood management system will jeopardize the works of the system as a whole. Specific to flood management, poor governance reflects weakness in tracking and monitoring of flood activities and systems, poor mitigation of flood risk, and non-optimal use of given (as well as investment) resources. This study proposes a governance framework to govern the flood disaster in Malaysia. The Control Objective for Information and Related Technologies, Hyogo Framework for Action, and Sendai Framework for Disaster Risk Reduction principles were used as guiding principles for the development of the proposed framework. A qualitative field study was deployed for the identification of baseline practices in governing the flood in Malaysia. As a result, Governance for Flood Disaster framework which consist of ten (10) building blocks components were constructed. It is hoped that further studies can be undertaken to develop and establish each of the components within the framework and that the framework itself can be further tested and improved over time.

Keywords: COBIT, Hyogo framework, Sendai framework, performance management, learning and growth, information sharing

INTRODUCTION

Extensive research has been done on tools and technologies in Flood Disaster (FD), however, lack of emphasize has been given to address governance issues (I-SAPS, 2013; Dorasamy, et.al, 2013; Maidin, et.al, 2014). Despite of the existence of governing policies and SOP, the outcome of the Flood Disaster (FD) dictates further improvement in the aspects of governance (Maidin, et.al, 2015; Othman, et.al, 2013). Consequently, this paper presents a proposed framework which can be used as a reference to govern Flood Management (FM) in the country. The framework is an attempt to provide a single integrated reference which enables governance over collaborative responses to FD by participating agencies. This paper is presented in the following manner: the next section presents the theoretical foundation of the research, followed by the methodologies implemented. Next, the proposed framework for Governance of Flood will be discussed. Then, the simulation of the framework is explained. Finally, conclusion is presented.

THEORETICAL FRAMEWORKS

The research has laid its ground in the existing practices and frameworks. First, the research established the baseline practice in Malaysia by critically reviewing the implementation of the combined NSC Directive 20 and the flood Standard Operating Procedure by the Kemaman district (KSOP). The NSC Directive No. 20 is the governing policy for disaster in Malaysia (NSC, 2012) whilst the KSOP has been acknowledged as the best available practice in Malaysia (TK, 2015).

Then, this practice is compared to the strengths found in the established and well-received COBIT, Hyogo, and Sendai frameworks. Control Objective for Information Technology (COBIT) is successful in business domain specifically in governing Information Technology (IT) and IT related technologies (Othman, et.al, 2013; Othman, et.al, 2014). The adoption of the Hyogo Framework in 2005 by over 160 countries highlights the united international focus on disaster risk reduction (UNISDR, 2005) while the adoption of Sendai framework which emphasizes the “build back better” concept (UNISDR, 2015).

Conceptual Elements in Governing Flood

Taking into account the stated above principles and theory, a comparison was made based on the key concepts found in COBIT, Hyogo and Sendai Framework. The following table summarizes the strength of COBIT, Hyogo and Sendai as compared to current practice of NSC Directive and KSOP in Malaysia.

Table 1. The strength of COBIT, Hyogo and Sendai as compared to current practice of NSC Directive in Malaysia.

Key concepts for examined practices	Present Practice		COBIT	Hyogo	Sendai
	NSC	KSOP			
Accountability	√	√	√	√	√
Communication	√	√	√	√	√
Community involvement	X	√	X	√	√
Information sharing	X	√	√	√	√
Performance measurement	X	X	√	√	√
Learning and growth	X	X	√	√	√
Strategic alignment	√	√	√	√	√
Risk management	√	√	√	√	√
Resource management	√	√	√	√	√
Value delivery	√	√	√	√	√
Institutional support	√	√	√	√	√
Stakeholder engagement	√	√	√	√	√
Cross-agency collaboration	√	√	√	√	√
Education, partnership and research	X	√	X	√	√
Organizational structures	√	√	√	√	√

Accountability is associated with roles and responsibilities which improves transparency. Cross-agency collaboration is initiated through communication process for information sharing purposes. Community needs to be knowledgeable in Disaster Management (DM) specifically in early warning phase for timely response. Stakeholder engagement and organizational structures is vital for the right decision making process. The key areas in governance com-

prises of risk management, optimal use of resources, strategic alignment, value delivery and performance management. The learning and growth are the elements needed to access the performance measurement. Institutional support can be established through partnership and research. The research concludes with recommendations on the use of the framework to improve the FD governance in Malaysia.

METHODOLOGIES

The study is initiated by reviewing the NSC Directive No.20, KSOP, Hyogo, COBIT and Sendai framework. The justification for the selected document in the study has been justified in the earlier part in Introduction. The conceptual model is derived from the Directive No.20, KSOP, Hyogo, Sendai and COBIT (Table 1).

The conceptual model is further validated through field study which comprises a series of interview, observation and document study. Interview session was conducted with respondents from several responding agencies in Malaysia including Fire and Rescue Department (FRDM), Welfare Department (WD), Road and Transport Department (PWD) and Department of Drainage and Irrigation (DID). The goal of the interview session is to probe into the gaps identified in the Governance for Flood Disaster (GFD) practices in Malaysia specifically in the community involvement, information sharing, performance measurement, learning and growth, education, partnership and research and early warning. An observation was conducted at Fire and Rescue Department (FRDM) operation room with the goal to observe the use of IT in information sharing process across-agencies and to access the performance measurement tools and mechanism for learning and growth purpose. Document studied in the study is the MyFire Journal by FRDM with the objective to strengthen the findings related to performance measurement and learning and growth element in achieving the FD vision and mission, cross-agency collaboration and resource management. The information derived from field study was further gathered to construct the proposed GFD framework.

PROPOSED FRAMEWORK

The identified elements in the theoretical framework and findings from the field study lead to the GFD framework construction as presented in Figure 1. The framework consist of ten (10) building blocks components which are namely: Flood Impact Reduction; Risk Management; Resource Management; Nationwide Flood Workforce (off-site; field/on-site; Mobile); Public (off-site); Education, research and Partnership; Integrated nation-wide flood system; Open Data Platform Interface; Value Delivery and Performance Measurement.

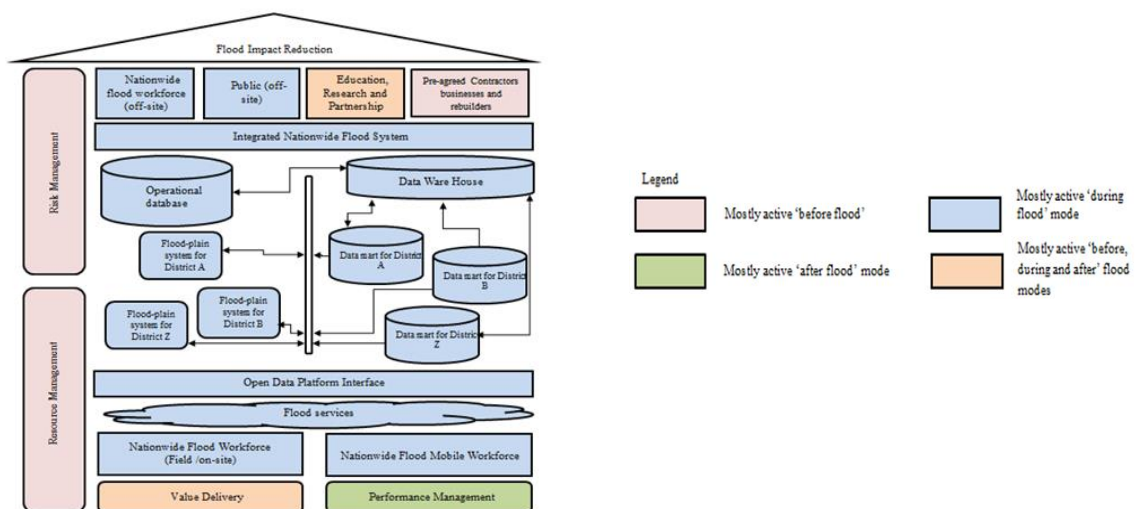


Figure 1. GFD Framework

Flood Impact Reduction is the goal in FM. COBIT, Hyogo and Sendai framework highlight the importance of specific goals in achieving the specified outcomes. Risk management is in line with COBIT, Hyogo and Sendai theory. Risk management aims to reduce the identified risk, prevent new risk and strengthen the resilience towards disaster. Risk management has been implemented in Malaysia. It is evident that in actual practices in NSC Directive No. 20 and KSOP, potential risks are identified before the flood occurrences and preventive measures are taken to minimize the disaster impact. Resource management is mentioned in COBIT, Hyogo and Sendai theory. Apparently, resource management is practices in both NSC Directive No. 20 and KSOP. Identification of resources and coordination of the resources are among the task executed in Malaysia FD practices. Value delivery is one of the key areas for governance domain as mentioned in COBIT, Hyogo and Sendai framework. Each of the FD process is required to deliver specified values. As highlighted in COBIT, Hyogo and Sendai framework, performance measurement articulates good practices, assessment and measurable Key Performance Index (KPI). It is evident that Malaysia Practices are lack of performance measurement and learning and growth.

The Nationwide flood system components are integrated nationwide flood system, operational database, data warehouse, open data platform interface and flood services. The component presents end-to-end the use of IT infrastructures to facilitate the communication process and information sharing. Operational database is used to manage real-time flood data. It capture, stores and disseminate FD information across agencies. Data warehouse is a FD reporting and data analysis system. Flood plain system is the implementation of FD plan according to the district based on the data retrieved from the data warehouse. Open data interface are the mechanism which gives access to the users with the designated privilege specified in the system. Flood services are tools and technologies used to access the flood system.

Community involvements are essential to raise the public awareness in DM specifically for life saving protective mechanism. Public (off-site) are community whom can be engaged to play a role in DM. Hyogo and Sendai emphasize the elements of education, partnership and research in DM as national practices. Collaboration with public and private institutions across the globe offers opportunity for the development and implementation of DM standards and plans at local, national and regional levels.

HOW THE FRAMEWORK IS USED

This section creates three (3) hypothetical scenarios where the GFD framework is implemented in the scenarios (before flood, during flood and after flood) for district Z in Malaysia. When flood is imminent, NSC issues alert to flood workforce (Department of Irrigation and Drainage, Fire and Rescue Department, Ministry of Health, Public Work Department, Welfare Department, Royal Malaysia Police, Malaysian Armed Forces and Civil Defense Department to be on standby (Refer nationwide flood workforce of the framework). They are grouped into Off-Site, On-Site and Mobile. The specific Floodplain system for District Z is system in use for managing the flood activities of the district (Refer to the Flood Plain System in the framework). As such, relevant data pertaining to the district is invoked (Refer to Data Mart in the framework). During standby mode, the off-site workforce will be dispatched to the identified operation center at district Z.

During Flood, the mobile workforce will be mobilized to monitor and help in the FD operation. The on-site workforce will execute the task as stated in the District Z SOP. The communication between the mobile workforce and off-site goes through the operation center and

established using communication devices such as GIRN and walkie-talkie. NSC will be updated by the nationwide task force (on-site/off-site and mobile) regarding to the situation at the District Z. The authorized on-site workforce and mobile workforce will update the operational database.

After Flood, each FD process performed in District Z need to be measured via specific tools and mechanism such as KPI. The output from the KPI is used to ascertain the FD processes achieve the specified goals (value delivery). Best practices and lesson learnt needs to be taken into account for continuous improvement cycle via learning and growth process (Refer to performance measurement in the framework).

CONCLUSION

The proposed GFD framework could improve the aspects of governance in flood management by taking into account the existing practices (gathered from the study the NSC Directives no. 20 and the KSOP) and carefully integrates elements, principles and concepts (from COBIT, Hyogo and Sendai) for what is lacking. The framework has filled in the gaps identified in the current Malaysian practices specifically into performance management, education, research and partnership, community involvement, information sharing and the development of acceptable learning curve for learning and growth. The components in the framework promote clearer roles and responsibilities, transparency, and assist in the decision making process.

It is hoped that the framework could be used to guide the overall improvement of the flood impact reduction activities. The spirit from Hyogo and Sendai injected the importance of education and public/community engagement in facing the disaster. Data and information is the key to flood process. This is where the principles and key processes of COBIT contribute to the framework. It offers a well-established practice that understands the nature of information and the technology that manipulates the information. All-in-all, the framework is promising to facilitate the controlling, directing and monitoring of the FD process.

ACKNOWLEDGMENTS

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).

REFERENCES

- Dorasamy, M., Raman, M.: Information Systems to Support Disaster Planning and Response. (2011). Problem Diagnosis and Research Gap Analysis. *Proceedings of the 8th International ISCRAM Conference*, vol. 1, pp. 1-10.
- Fire and Rescue Department Malaysia (FRDM). (2014). *MyFire Jurnal*, pp. 59-66.
- Heintz, M.D. Hagemeyer-Klose, M., Wagner, K. (2012). Towards a risk governance culture in food policy-Findings from the implementation of the “floods directive” in Germany. *Water*, vol. 4, no. 1, pp. 135-156.
- ISACA. (2012). *COBIT 5: A Business Framework for the Governance and Management of Enterprise IT*, An ISACA framework, ISBN 978-1-60420-237-3.
- I-SAPS. (2013). *Pakistan Report on Policy Dialogue: Governance Issues in Disaster Risk Management*. Retrieved from <http://www.i-saps.org/publication.html>.
- Maidin, S. S., Othman, M., Ahmad, M. N. (2014). Information Sharing in Governance of Flood Management in Malaysia: COBIT based Framework. *In 2014 IT Convergence and Security (ICITCS)*, pp. 31-34.
- Maidin, S. S., Othman, M., Arshad, N. H., Ahmad, M. N., Hamzah, M. N., Mohd. Salim, M. (2015). Issues and Challenges in Managing Enablers for Fire and Rescue Department Malaysia in

- Search and Rescue Mission. In *4th International Conference on Disaster Management and Human Health, Istanbul, Turkey*. WIT Transactions on the Built Environment, vol. 168, pp. 1099-1109.
- Ministry of Education Malaysia (MOE). (2015). Geran Penyelidikan Pengurusan Bencana Banjir (Tahun 2015)- Fundamental Research Grant Scheme, Transdisciplinary Research Grant Scheme, Prototype Development research Grant Scheme.
- NSC. (2012). Briefing to Universiti Utara Malaysia on Portal Banjir and Emergency Command Center.
- Othman, M., Ahmad, M.N., Suliman, A. and Arshad, N.H. (2013). Towards COBIT-Based Framework to Govern Flood Management. In *16th AIS Pacific-Asia Conference on Information Systems (PACIS'13)*.
- Othman, M., Ahmad, M. N., Suliman, A., Arshad, N. H., Maidin, S. S. (2014). COBIT Principles to govern flood management. *International Journal of Disaster Risk and Reduction (IJDRR)*, (9), pp. 212-223.
- Teganukita (TK). (2015). Retrieved from <http://teganukita.my/operasi-banjir-di-kemaman-gold-standard-pm>.
- The Sun Daily (TSD). (2015). Retrieved from <http://www.thesundaily.my/news/1689349>.
- United Nations International Strategy for Disaster Reduction (UNISDR). (2005). *Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters*. Retrieved from http://www.unisdr.org/files/1037_hyogoframeworkforactionenglish.pdf.
- United Nations International Strategy for Disaster Reduction (UNISDR). (2015). *Sendai Framework for Disaster Risk Reduction*. Retrieved from <http://www.unisdr.org/we/coordinate/sendai-framework>.