2014 Year (Heisei 26 Year)

Doctoral Dissertation

A Study toward Community Involvement in Local Flood Risk Reduction Activities: Case Study Flood Situation in 2011, Thailand

Ritsumeikan University Graduate Schools

Graduate School of Policy Science

RAUNGRATANAAMPORN I-soon

Contents

Lists of figure

Lists of Table

Abbreviations

ADPC	- Asian Disaster Preparedness Center
ANCHOR	- Academic Network for Community Happiness Observation and Research
BMA	- Bangkok Metropolitan Administration
CBDRR	- Community-Based Disaster Risk Reduction
DDPM	- Department of Disaster Protection and Mitigation
FEMA	- Federal Emergency Management Agency
FROC	- Flood Relief Operation Center
GFDRR	- Global Facility for Disaster Reduction and Recovery
GISTDA	- Geo-Informatics and Space Technology Development Agency
HFA	- Hyogo Framework for Action
ICS	- Incident Command System
IFRC	- International Federation of Red Cross and Red Crescent Societies
IGR	- Inter-Governmental Relation
IHDP	- International Human Dimensions Programme on Global Environmental Change
IPCC	- Intergovernmental Panel on Climate Change
MAC	- Multi-Agency Coordination Centre
MoE	- Ministry of Education
NESDB	- Office of the National Economic and Social Development
NSO	- National Statistic Office
OTOS	- One Tambon One Service
PAO	- Public Administration Organization
RAST	- Radio Amateur Society of Thailand
SC	- Single Command
SCWRM	- The Strategic Committee for Water Resource Management
SNAP	- Strategic National Action Plan for Disaster Risk Reduction
SOP	- Standard Operating Procedure
TMD	- Thailand Metrological Department
UNDP	- United Nations Development Programme
UNFCCC	- United Nations Framework Convention on Climate Change
UNISDR	- The United Nations Office for Disaster Risk Reduction

Acknowledgement

This research did not finish unless valuable effort and support from many people. First of all, I would like to gives my appreciation to my two supervisors, Prof. KAMIKO Akio and Prof. Hidehiko KANEGAE from Graduate School of Policy Science, Ritsumeikan University. Their experience and knowledge are motivating and open my perspectives toward public administration and disaster management and I will adapt and continue for further study in the future

I would like to gives my appreciate to Prof. MURAYAMA Hiroshi, Prof. MATSUOKA Kyungmi, Prof. ODA Hisaya, Prof. NISHIMURA Yozo, Prof. Salem Kim HICKS, Prof. Masato KAMIKUBO, Prof. Yoko OTSUKA, Prof. Katsuki TAKAO, Prof. Monte CASSIM, Prof. SHIBATA Akira, Prof. Kenichi NAKAGAMI, Prof. Kmiko SHIKI, and Prof. Yusuke TOYODA for encouragement, inspiration, give valuables comment and suggestion in this research.

I appreciate to Assoc. Prof. Dr. Chaweewan DENPAIBOON and Dr. Thongchai ROACHANAKANAN for supporting me since I study in Bachelor Degree. I also would like to show appreciation to key informants, Ms. Petchda Vejsri, Head Office of Plan division and Ms. Kanchana Vilairat, Head Office of Social Welfare, Pak Kret Municipality and respondents who contribute data and information for fulfill in this research. Also I appreciate to Japanese Government to provide Monbukagakusho: MEXT scholarship to me during study in Japan. I also appreciate to staffs of Disaster Mitigation of Urban Cultural Heritge (Rits-DMUCH), Project room 2 staffs, and staffs of graduate School of Policy Science, Ritusmeikan University for pleasant support.

I am thankful to my family, Thai, Japan and foreign friends, and juniors for giving good encouragement and support for me to complete my research. All of yours efforts are helping me to pass and overcome to those difficulties, barrier, and challenges during study abroad. I got memorable moments in my life while I stay in Japan. Thank you very much

A Study Toward Community Involvement in Local Flood Risk Reduction Activities: Case Study Flood Situation in 2011, Thailand

ラウンラッタナアンポン　アイスーン
RAUNGRATANAAMPORN I-soon
Student ID: 5831110011-2

Abstract

Public participation in disaster management was stated as a crucial aspect toward current issue in comprehensive disaster risk reduction activities. It became more crucial component since response and recovery provided by government and authorities were reaching the limit. There were some difficulties and conflicts happened during flood incident in 2011 Thailand. Community members who lived in flood affected area, tried to cope and collaborate with municipality to respond during flood incident. The study aims to confirm factors which many previous studies pointed out motivating community members to be involved in flood risk reduction activities at community level.

This study focused on the post period of flood incident between 2013 - 2014 as not recovering but normal period. The study is based on two theories: 1) TPB based on Ajzen and Fishbein (1985), and 2) **Flood Risk Acceptability** (Slovic, 1974; Hunter and Fewtrell; 2001, Geiger; 2005). In the concept of TPB; there are three components: 1) Attitude toward risk: It covers characteristic of flood risk, expectation on damage, and fear and anxiety; 2) Self-estimation: It contains experience, interest toward risk reduction, understanding toward flood risk; and 3) Social pressure: It means effect from other people, reliability of information, and leadership of service provider. In the concept of **Flood Risk Acceptability**, the case study applied relevance factors to **Flood Risk Acceptability** which Zhai and

Ikeda (2008) mentioned: It treats flood risk perception, personal characteristic, and flood disaster experience. Also, the case study considered factors that Motoyoshi (2005) pointed out as follows: fear, consideration of society, risk perception, trust in administrative organization, cost and benefit, and subjective norm.

The study applied 22 variables related with **Flood Risk Acceptability** to identify factors that influenced community members to respond during flood incident. The study distributed questionnaires randomly to 200 respondents during August-September in 2013. Based on the concept of **Flood Risk Acceptability**, the study had adopted variables to analyze the correlation between influence factors that are personal characteristic (7 variables), flood risk perception (4 variables), flood disaster experience (1 variables), effects from other people or information sources (4 variables), fear, and uncertainties and expectation (3 variables), and the number of starting dates to respond. The analysis was classified by level of flood inundation (3 variables). The results confirmed that personal characteristic and flood disaster experience have significantly negative correlation to the starting dates to respond since flood started to inundate.

The study applied 10 kinds of flood risk reduction activities. The factors that could predict taking the activities were fear and anxiety toward flood situation and effect from other people (4/10 of flood risk reduction activities were significantly predicted). Second was understanding and experience toward flood situation (3/10 of flood risk reduction activities were significantly predicted) and third was Reliability and transparency of information (2/10 of flood risk

reduction activities were significantly predicted). Among flood risk reduction activities that community members tend to act, the factors significantly predictable were "Using sandbags or water pumping for flood protection" (4/8 of factors predicted with significant level at 0.05). "Sharing information", "Apply insurance" and "Participating in evacuation drill" (2/8 of factors predicted with significant level at 0.05) Based on **TPB**, some components could be applied for predicting intention of community member towards decision to take flood risk reduction activities.

This dissertation contributed to confirm that **TPB** and **Flood Risk Acceptability** are applicable for a Thai case. The dissertation also achieved to establish the conceptual framework to identify intention of community members to be involved in flood risk reduction activities based on **TPB** and **Flood Risk Acceptability**. The dissertation also identified types of flood risk reduction activities that community members are able to collaborate with municipality officer based on SNAP for Disaster Risk Reduction. The dissertation confirmed that both of personal characteristic and flood disaster experience significantly correlated to **Flood Risk Acceptability**. Finally, the dissertation confirmed three components in **TPB** were able to predict intention of community members to take flood risk reduction activities in Thailand for responding to the next flood incident.

Preface

Rationale of Studies

Disaster management has become a hot issue in urban development and human security since threats from hazards and vulnerability are increasing, and have caused the damage from natural disasters to become more severe, and it has become crucial to lower the socio-economic loss. “Disaster,” is defined as a serious disruption to the functioning of a community or a society involving widespread human, material, economic or environmental losses and having an impact which exceeds the ability of the affected community or society to cope using its own resources (UNISDR, 2009). “Hazards,” are defined as a dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihood and services, social and economic disruption, or environmental damage (UNISDR, 2009). In 2005, the United Nations Office for Disaster Risk Reduction (UNISDR) established a model for disaster management called the Hyogo Framework for Action (HFA). This framework was determined to be the baseline of disaster management, and community involvement towards disaster management, thus it became a crucial aspect of tackling threats from disasters and hazards in the peaceful time of the non-disaster phase. The Hyogo Framework for Action stated that approaches such as increasing capacities of community members in disaster preparedness, adaptive behaviors to reducing risks, knowledge transfer from disaster stakeholders, and concern from the next generations are primary tasks to apply on the community level as Community-Based Disaster Risk Management (CBDRM). To achieve successful disaster management on the local

level, external organizations such as the government, non-profit organizations (NPOs), the academic sector and the private sector are encouraged to cooperate with the community and municipality in order to increase the capability of the community to reduce the risk and handle the damages and losses caused by disaster. Thailand adopted the Hyogo Framework of Action to be implemented in the case of disaster management as a Strategic National Action Plan (SNAP) for the period from 2010-2019.

Thailand has experienced flooding since ancient times, with the annual monsoons as the crucial factor. This circumstance happened in case of flooding in 2011; there were five tropical monsoons during 25th July 2011 – 16th January 2012 which originated from the northern region in August and became severe in September which caused floods throughout the central region of Thailand of approximately 14,241 Square Kilometers in November 2011. The affected area of flooding covered 65 provinces and killed 657 persons at that time. The case of Thailand flooding in 2011 drew attention among scholars and communities towards finding improvements in regional watershed management in the future. Basically, the perception towards water management in Thailand was more concerned with the water scarcity issue in drought period rather than the issue of excessive water in the monsoon period, and the perception in flood disaster relief was addressed as the social welfare relief activity. As a result, the flood disaster management was concerned with a defensive approach rather than an offensive approach. The aspect of multi-boundary management was stated as one necessary factor in large-scale disaster management; there was no organization that could deal with flood situation as a cross-jurisdiction organ in a professional

way, although each governmental organ and division had data and information related to the flood situation the linkage between those organs was not found. Moreover, the non-clarity of information, belated information and miscommunication among media and people occurred often which led to misunderstanding towards the real situation of disaster.

Due to the political unrest in Thailand caused by different political perspectives, the political conflicts in Thailand had emerged in 2004, seven years before the flood incident started in 2011. These political conflicts had widespread consequences through other policies in Thailand after 2004 in relevance to the seeking for political advantage in political interest groups and continuity of policies implementation. The political unrest also affected the management of the flood in 2011. Although Thailand had adopted disaster management policies at an international level and tries to applying them at a local level, failure in terms of policy implementation, precisely in case of political conflicts, are undermining the effectiveness in policy implementation. Moreover, considering the disaster situation itself, there has been political failure in terms of the implementation and this has affected the ability of the response by remaining resources.

The effort of local community and municipality toward disaster risk reduction was found during the flood incident in 2011. Municipalities tried to cope during the flood incident by their own resources and encourage local community to participate in disaster response plan. Collaboration among stakeholders in municipalities happened since it was stated as an important component in comprehensive disaster risk reduction and management. Thus, study toward public involvement in disaster risk reduction is necessary to realize

how people react towards threats of forthcoming hazard, what kind of decision that they made to minimize damage caused by floods and consequential hazards, and how do they decide to take action. These are also important to realize the current situation of disaster risk reduction effort in the community as well.

Concept of Study

This research discusses the circumstances of the Thai flood in 2011 and Flood policy in Thailand before flooding in 2011, discussion of policy and practice, precisely in case of policy failure in terms of implementation in disaster response is discussed. Moreover, the intention of local people to take action in flood situations after the 2011 flood is reviewed. The originality of this research is the discussion between policy and practice in the case of the flooding in Thailand in 2011, and the intention to take action in relevance to flood response and flood risk reduction activities in flood prone communities. This research tries to debate the circumstance of community involvement toward flood risk reduction and response. There are four research questions as follows (1) How important is community collaboration in disaster risk reduction activity? (2) How far can a community members could be involved in disaster management plans at the community level? (3) What kinds of factors influence people to respond during flood incidents? and (4) What kinds of intention motivate people to take action in flood preparation activities in comprehensive flood disaster risk reduction? There are five chapters in this research as follows:

Chapter I will describe research questions, research objectives, research framework, and definition of key concepts. Also the basic ideas of flood disaster policy in Thailand and the situation of flooding in Thailand in 2011 is reviewed in this chapter.

Chapter II will describes various concepts in relevance concepts of flood risk acceptability and Theory of Planned Behavior (TPB) and establish tries to link between these major concepts to establish theoretical framework in this research.

Chapter III will examine between Strategic National Action Plan and flood disaster response in local level. This chapter also compares the different intentions of local people to taking preparation in flood situations and the relationship between personal characteristics and influencing factors that affect the decision to respond during flood incident.

Chapter IV will discuss intention of local people to take flood risk preparation in urban flood prone areas. This chapter applies the concept of decision analysis and flood risk acceptability to analyze the intention of local people to decide to prepare or be involved in Community-Based Disaster Risk Reduction activities.

Chapter V will summarize the research output in chapter II to Chapter IV in relevance to community involvement toward disaster risk reduction

plan at the municipal level, intention to respond and intention to take action toward flood risk reduction activities and intention of Community-Based Disaster Risk Reduction (CBDRR). This section also gives suggestions for future studies in regards to the disaster resilience concept and flood risk acceptability.

1. Introduction

1.1 Research questions and research objectives

1.1.1 Research questions

The aim of this research is to figure out the motivation of community members in flood prone area deciding to involve in flood risk reduction activities. This study had select case of flood incident in 2011 in Thailand to explain what happened during the flood situation in Thailand in 2011 and the consequences due to the constraints of flood management provided by the government in 2011 flooding case, there are four research questions which can be stated as follows

(1) How to integrate **Theory of Planned Behavior (TPB)** and **Flood Risk Acceptability** to identify willingness of community members to involve in flood risk reduction activities?

(2) How can community members involve in flood risk reduction activities during flood incident?

(3) What factors influence community members to respond during flood incident based on **Flood Risk Acceptability?**

(4) What factors do motivate communities' members to involve in flood risk reduction activities in normal period based on **TPB?**

1.1.2 Research objectives

This research was divided into five chapters; Chapter 1 to Chapter 5, but the evidences to answer research questions are contained in Chapter 2 to Chapter 4. There are six objectives in this research which could be described in table 1.1

Table 1.1 Summary of research questions and research objectives

Research question	Research objectives	Chapter
*How to integrate **Theory of Planned Behavior (TPB)** and **Flood Risk Acceptability** to identify willingness of community members to involve in flood risk reduction activities?*	To establish the conceptual framework based on TPB and Flood Risk Acceptability for investigating intention of community members to involve in flood risk reduction activity	Chapter 2
How can community members involve in flood risk reduction activities during flood incident?	To identify types of flood risk reduction activities that communities be able to involve in current disaster management plan.	Chapter 3
*What factors influence community members to respond during flood incident based on **Flood Risk Acceptability?***	To find out how early the community members starting to respond during flood incidents.	
	To analyze the relationship between personal characteristics, influence factors, and the starting dates to respond since flood incident start based on **Flood Risk Acceptability**	
*What factors do motivate communities' members to involve in flood risk reduction activities in normal period based on **TPB?***	To identify factors that motivates community members to involve in flood risk reduction activities based on **TPB**	Chapter 4
	To predicting the intention of community members to involve in flood risk reduction activities based on **TPB**	

Source: Author, 2014

1.1.3 Research hypotheses

The research hypothesis in this study had being mentioned in research question 4; What factors do motivate communities' members to involve in flood risk reduction activities in normal period based on **TPB?** In research question no 4: To identify factors that motivate community members to involve in flood risk reduction activities based on **TPB**. These eight types of influencing factors are 1) Leadership and performance of government and supporters, (2) reliability and transparency of information, (3) fear and anxiety toward flood disaster, (4)

expectation on relief and expected damage, (5) effects from other people, (6) characteristic of flood risk, (7) source of information, and (8) experience and understanding of respondent toward flood disaster. All factors have being test in this research. The hypothesis has set and could described as follows;

H_0: Leadership and performance of government and supporters, Reliability and transparency of information, Fear and anxiety toward flood disaster, Expectation on relief and expected damage, Effect from other people, Characteristic of flood risk, Source of information, *and* Experience and understanding, *do not significantly influence the intention to take action toward flood risk reduction activities.*

H_a: Leadership and performance of government and supporters, Reliability and transparency of information, Fear and anxiety toward flood disaster, Expectation on relief and expected damage, Effect from other people, Characteristic of flood risk, Source of information, *and* Experience and understanding, *do significantly influence to intention to taking action toward flood risk reduction activities.*

This research had adopt and applied Theory of Planned Behavior (TPB) and Flood Risk Acceptability to identifying factors that influence community members to involve in flood risk reduction activities.

1.1.3 Research framework

Fig. 1.1 Research Framework

Source: Author, 2014

1.1.4 Published papers

To achieve this research, the following research papers were published as supplementary to this research

(1) I-soon RAUNGRATANAAMPORN, (2014), An Investigation of the Circumstances of Flood Response in Thailand-Case Study of the Flooding Situation in 2011, Journal of Policy Science, Vol.21 No.2, February 2014, pp. 43-66 – **In Chapter 1 and 3**

(2) I-soon RAUNGRATANAAMPORN, Penpathu Pakdeeburee, Akio Kamiko, Chaweewan Denpaiboon (2014), Government-Communities Collaboration in Disaster Management Activity: Investigation in the Current Flood Disaster Management Policy in Thailand. Procedia of Environmental Science (2014), pp. 622-631 **In Chapter 2 and 3**

(3) I-soon RAUNGRATANAAMPORN, (2014), Determination towards Decision of Public Response in Flood Situation: Case Study in Urban Flood Prone Area in Central Region in Thailand. Applied Environmental Research, (*Vol.36 No.3, May-August 2014*) – **In Chapter 3**

1.2 Flood management policy in Thailand

Thailand is located in low land area and had often affected by tropical storms and flash flood annually. Flood had been considering as a severe threat of natural disaster compared to other kinds of hazards (UNDP, 1994). According to table 1.1 shows that the weight score of risk in hydrological hazards such as flooding ($W_{Flooding}$=2.39), typhoons ($W_{Typhoon}$=2.31) and tropical storms are having higher weight score compared to other kinds of risk (i.e., $W_{Accident}$=2.37; $W_{Drought}$=2.24; $W_{Earthquake}$=1.97) Moreover, the level of severity and risk are high while the level of hydrological management are at a moderate level. Consequential hazards such as mudslide, landslide and river floods can happen when torrential rainfall occurs.

Table 1.2 Level of severity, vulnerability, management, risk and weight score classify by types of hazard

Types of risk	Level				Overall	Weight score
	Severity	Vulnerability	Management	Risk		
Flooding	High	Moderate	Moderate	High	High	2.39
Typhoon and tropical storm	High	High	Moderate	Moderate	Moderate	2.31
Earthquake	Low	Low	Bad	Moderate	Moderate	1.97
Mudslide	Moderate	Low	Bad	Moderate	Moderate	2.15
Drought	High	Moderate	Moderate	Moderate	Moderate	2.24
Conflagration	High	Moderate	Moderate	Moderate	Moderate	2.2
Explosions	High	Moderate	Bad	High	High	2.34
Accidents	High	Moderate	Bad	High	High	2.37
Human disease	Low	Low	Moderate	Low	Low	1.63
Plant disease	Moderate	Low	Low	Moderate	Moderate	1.77
Civil unrest	Low	Low	Low	Moderate	Moderate	1.87
Refugee	Moderate	Low	Moderate	Moderate	-	-

Source: Strategic National Action Plan (Thailand), 2010

Threats from flood risk also affecting to human security and economic development. According to data of economic loss stated by the Office of the

National Economic and Social Development (NESDB) shown that the trends of economic loss due to flood incident during year 1989 to year 2011 (national level) has increased (Fig. 1.2) Economic loss due to flood incident dramatically increased during the year 2009 to year 2011

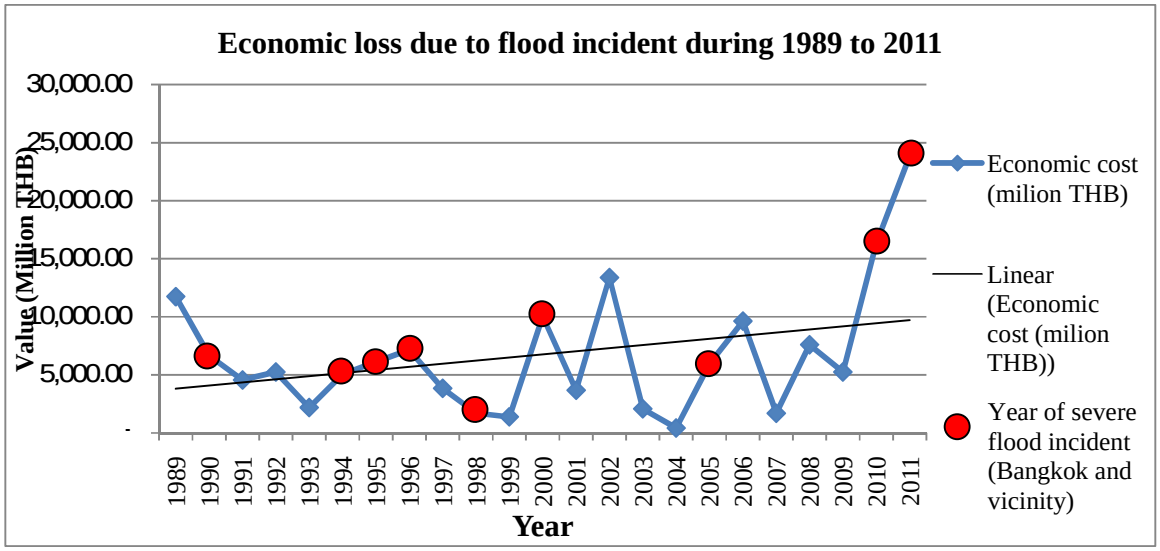

Fig. 1.2 Economic loss due to flood incident during 1989 to 2011
Source: Office of the National Economic and Social Development, 2013

1.2.1 Flood policy in Thailand had change since 1990

(1) Legal basis

The legal basis relevant to floods in Thailand has changed from an irrigation-oriented approach to flood protection system and then has changed to comprehensive disaster management approach since 1990. The contents and intention of the legal basis of Thai regulation since the year of 1960 to 2012 could be split into three periods as follows:

First period (During 1960-1970) the intention of the legal basis in relevance to flood management policy is related to irrigation-based management. Precisely, water discharge for irrigation and flood safety are stated in those acts.

For example, the Canal Treatment Act (1902), Irrigation Act (1939), Royal Irrigation Act (1942), Municipality Act 1953 (Revised 2010), Bank for Agriculture and Agricultural Cooperatives Act (1966), Electricity Generating Authority of Thailand Act (1968).

Second period (1970-1990) the flood management issues had changed and become more specific in flood control. Contents and intention in regulations are not only concerning water discharge and water management but the contents that relevance to mitigation in urban planning and flood relief, has been considering in flood management issue. For example, the Town Planning Act (1975), Groundwater Act (1977), The Civil Defense Act (1979), Canal Treatment Act (1983), and Bangkok Metropolitan Administration Act (1985). Moreover, some regulations are assigning tasks to municipalities and Bangkok Metropolitan Administration to prepare and respond during flood incidents within its jurisdiction.

Third period (1990-2000) the intention of flood regulation in Thailand had been changed to a more relief-driven approach. Especially focusing on providing relief and subsidize efforts to people who are affected by disaster. For example, the Victims Relief in Accordance to Assist Authorities towards Disaster Emergency Act (2000), Ministerial of Finance Rule: The Advancement of The Budget Allocation to Relief Victims in Accordance to Disaster Emergency (2003), Disaster Relief Act (2007), and the Regulations of the Office of the Prime Minister on National Water Resource Management (2007). The government had enacted other four regulations in 2010, which relates to budget allocation and subsidizes the affected people. For example, Ministerial of Finance Rule: The

Advancement of the Budget Allocation to the Water Management System and Future Disaster Management Framework (2012), Ordinance of Promotion of Disaster Insurance (2012), and the Ordinance of Subsidize to Victims from Flood (2012). Moreover, the Thai government is implementing Strategic National Action Plan (SNAP) for Disaster Risk Reduction as the operation framework for comprehensive disaster management. (i.e., Strategic National Action Plan (SNAP) for Disaster Risk Reduction (2010), Regulation of the Office of the Prime Minister on National Water Resource Management (2011), Water Resource Management Act (Propose, 2012-2017). Legal basis had changed from the irrigation-related issue to comprehensive disaster management plan. Table 1.1 shows the chronology of the legal basis that relates to flood issue during 1990 – 2012

Table 1.3 Chronology of legal basis relevant to flood-related issue during 1900 – 2012

Year	Direction	Explanation	Name of regulation
1900-1970	Irrigation-related issue and general management	Flood related issues had been enacted in terms of water discharge. At municipal level the intention of water control is related to maintaining quality of life, which is relevant to the task of administrators.	• Canal Treatment Act (1902), • Irrigation Act (1939), • Royal Irrigation Act (BE2485), Municipality Act 1953 (Revised 2010) Bank for Agriculture and Agricultural Cooperatives Act (BE 2509) Electricity Generating Authority of Thailand Act (BE2511)

Source: Office of the council of State, 2014

Table 1.3 Chronology of legal basis relevant to flood-related issue during 1900 – 2012 (Cont')

Year	Direction	Explanation	Name of regulation
1970-1990	Introduction of flood concern in relevance to mitigation, relief and management	States the importance of mitigation in urban planning, which is relevant to environmental protection and public safety. Mitigation on the flood vulnerability in urban areas relates to ground water consumption, And designation to local administration to respond and provide relief under its jurisdiction area	• Town Planning Act (BE2518) • Groundwater Act (BE2520) • The Civil Defense Act (BE 2522) • Civil Disaster Relief Act (BE2522) • Canal Treatment Act (BE2526) • Bangkok Metropolitan Administration Act (BE2528)
1990-2010	Relief-oriented, compensation and comprehensive management framework	To specify the characteristic of disaster victims. Allowance of local government at provincial level to allocate relief budget in its jurisdiction depending on the level of severity and duration. Assign emergency manager (mayor) to take response to disaster situation and apply the mitigation and preparedness effort at the beginning of disaster incidents. The intention of water management in national and regional level had been started	• Victims Relief in Accordance to Assist Authorities towards Disaster Emergency Act (BE 2543) • Ministerial of Finance Rule: The Advancement of the budget allocation to relief victims in accordance to disaster emergency (BE2546) • Disaster Relief Act (BE2550) • Regulations of the Office of the Prime Minister on National Water Resource Management (2007)
2010-2012	Strategic and comprehensive management framework and relief and compensation flood relief policy	To establish an action framework in disaster management under the framework of Hyogo Framework for Action (HFA). Establish relief, compensation and ensure that the disaster victims could get the proper relief. Designate Department of Disaster Prevention and Mitigation (DDPM) and authorities in municipality organ to take respond toward water management. To foster the relief budget procedure during the process of compensation.	• Strategic National Action Plan (SNAP) For disaster Risk Reduction (2010) • Regulation of the Office of the Prime Minister on National Water Resource Management (BE2554) • Water Resource Management Act (Propose, 2012-2017) • Ministerial of Finance Rule: The Advancement of the budget allocation to the water management system and future disaster management framework (BE2555) • Ordinance of Promotion of Disaster Insurance (BE2554) • Ordinance of Subsidize to Victims from Flood (BE2555)

Source: Office of the council of State, 2014

Since economic loss due to flood incident had slightly risen since 1989 until 2011, the amounts of budget allocation in disaster response are increasing as well. Fig. 1.3 shows that the amount of advance budget toward flood response rose slightly during the years of 2001 – 2005. Due to flood incident in 2011, it shown that Department of Disaster Prevention and Mitigation (DDPM) Thailand had applied a large amount of budget advancement compared to the previous year.

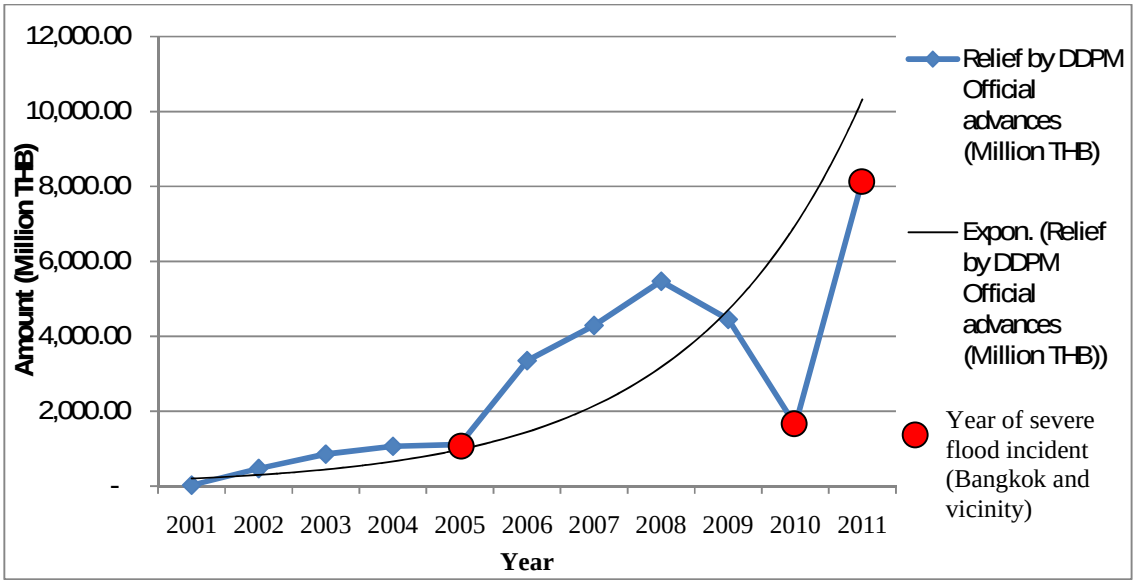

Fig. 1.3 Amount of relief allocation provided by department of Disaster Prevention and Mitigation in official budget advancement during 2001-2011

Source: Office of the National Economic and Social Development, 2013

(2) Emergency operation in disaster management under management framework

The Disaster Relief Act (2007) established the Department of Disaster Prevention and Mitigation (DDPM) as an agency to respond to all circumstances

of a disaster situation. The DDPM's tasks and duties comprise a system of responding to disaster management in a comprehensive way (mitigation, preparedness, response and recovery) by coordinating with governmental sectors, divisions and departments, local authorities, private organizations, and civic society within an integrative approach. The disaster policy in Thailand gained greater importance following the tsunami incident which devastated the southern region of Thailand in 2004. It drew the attention of the Thai government had implement various kinds of projects that relevance to recovery and mitigation efforts, for enhancing a sense of safety culture on the local level. According to the disaster management policy established by the Department of Disaster Management and Prevention in the year 2013, there are seven aspects and four strategies, which are described in table 1.4

Table 1.4 Content of Disaster Department and Mitigation Plan

Core Strategy	Approaches
(1) To apply the Incident Command System (ICS) as an operational framework (2) To minimize the number of traffic accidents under the governmental policy as national policy (3) To prepare the suitable operation plan of disaster management in accordance to the ASEAN Economic Community (AEC) policy in 2015 (4) Increasing the idea of safety culture to young generation (5) To increase the preparation in local level by applying Community-Based Disaster Risk Management (CBDRM) (6) To increase capabilities and accuracy in disaster-related information and data (7) To increase the capabilities of volunteer activities ready to be dispatched for disaster response	(1) Increase capacities of organizations with relevance to disaster management activities toward disaster prevention and relief (2) To increase the effective integration among disaster response units on national level (3) To encourage the collaboration through networking of disaster response units for increasing the effectiveness of disaster management on local level (4) To improve the system of victim relief to become more standardized

Source: Department of Disaster Protection and Management, 2013

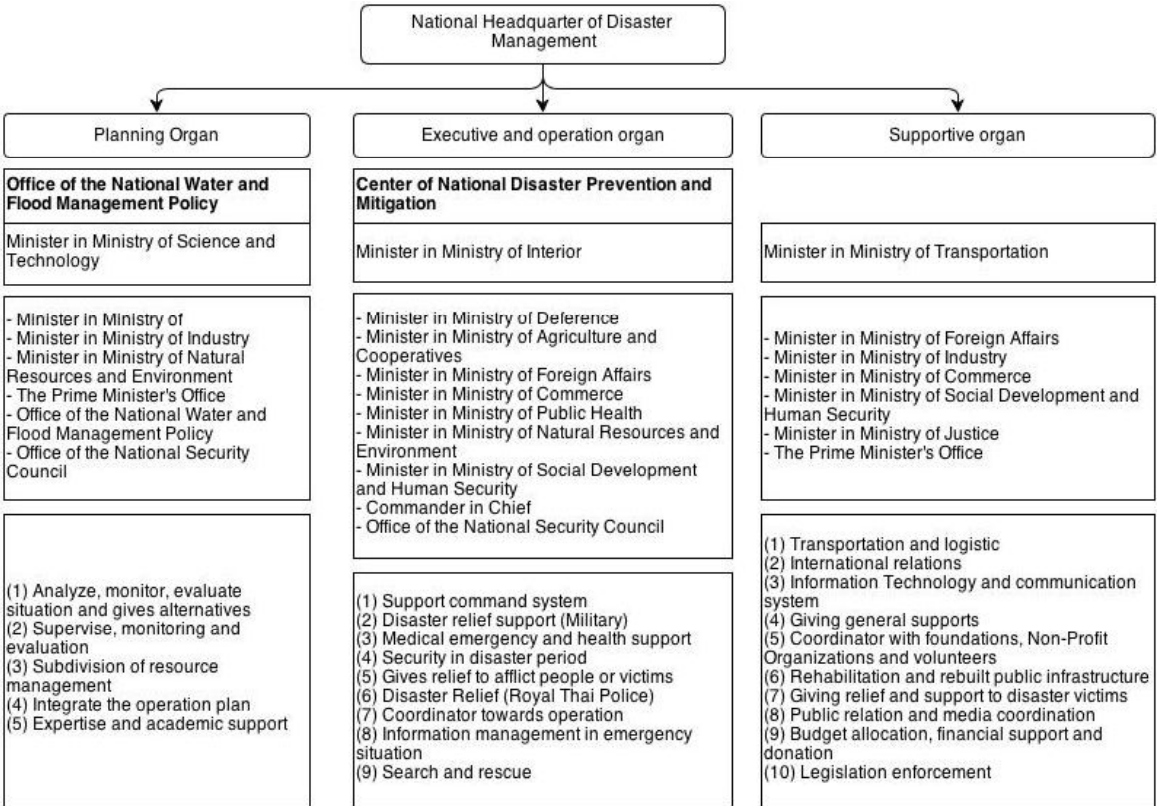

Fig.1.4 Classification of Duty in National Headquarter of Disaster Management in Thailand

Source: Division of Disaster Protection and Mitigation, 2012

(3) Strategic National Action Plan (SNAP) for Disaster Risk Reduction had implementing in various countries

The Ministry of Interior had established a plan called Strategic National Action Plan (SNAP) on Disaster Risk Reduction (SNAP) in 2010 to apply an operational plan to respond to disaster situations during 2010 – 2019. This plan was established in accordance with the Hyogo Framework for Action (HFA) for reducing vulnerability by applying various kinds of projects and approaches in relevance to comprehensive disaster management under five objectives are (1) to increase the safety standard in terms of life and assets of people and tourists to become a practical safety standard at the international level, (2) To establish the strategic plan of disaster management to reduce threats caused by disaster in

the long-term period, (3) To declare the willingness of the Thai government towards efforts to reduce damage and loss under the concept of Disaster Risk Reduction (DRR), (4) To develop and establish a disaster reduction plan in long-term period under the Hyogo Framework of Action, and (5) To increase capabilities of divisions, departments and government at all level towards disaster management issues, and encourage them to establish disaster risk reduction plan and operate an integrative approach according to SNAP plans.

There are four aspects that are specified into the plan as core strategies, these are (1) Prevention and Mitigation [i.e. Information management, Risk assessment, and Community-Based Disaster Risk Management Programs (CBDRM), and Risk awareness projects]; (2) Preparation [i.e. improvement of early warning system, disaster training drill, disaster preparedness plan, machine preparation, basic needs preparation, budget allocation, and infrastructure preparation]; (3) Emergency response [i.e. monitoring, Incident Command System (ICS), evacuation planning, provision of relief aid, search and rescue]; and (4) Rehabilitation and Reconstruction plan [i.e. disaster damage assessment, measurements in relief efforts, urban infrastructure restoration, disaster relief goods allocation and management, mental relief, and recovery plan establishment]. The SNAP plan also designs the main actors and supporters to coordinate for each strategy.

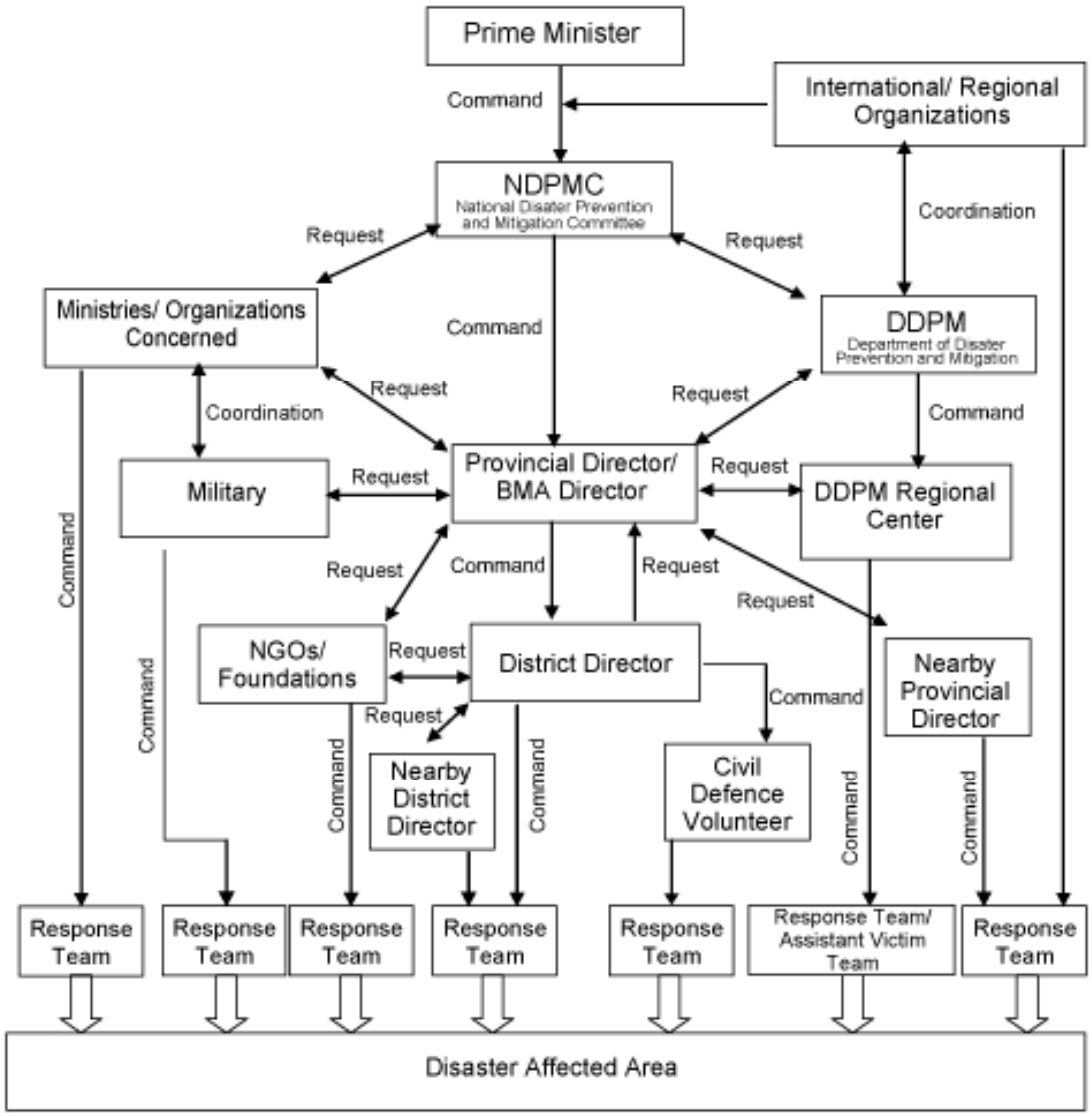

Fig.1.5 Command system in disaster response of Thailand
Source: ADPC, 2014

1.2.2 Disaster management framework in regional level

According to the Strategic National Action Plan (SNAP), the contents of each strategy regarding disaster management activities are stated as an operation plan in terms of a year plan. Evaluation on the successful toward non-structural mitigation measurement such as Community-Based Disaster Risk Reduction, establishing a risk map, implementing disaster drills, and sharing information relevant to the disaster situation, are evaluated annually. All are

applied as a baseline of this plan and operation. Moreover, the specifications of the disaster emergency response operation plan are varying according to the characteristic of the hazards.

The provincial and district level (Amphoe) have responsibility regards to tasks stated in Strategic National Action Plan (SNAP) by supervising, monitoring, and evaluating municipal activities of disaster management at the local level and ensuring that those subordinate organs (municipalities) are establishing proper methods of disaster management. The provincial and district level (Amphoe) will supervise municipalities to see their capacity for handling disaster situations and when their limits have been reached and also for those disaster situations which afflict multi-jurisdictions of municipalities.

1.3.3 Disaster management in local level

(1) Municipality

Public Administration Organizations (PAO) were authorized as the main organizations to support, provide, monitor and implement necessary services under its jurisdiction (Article 1) and have to respond to disaster or emergency situations as a first-hand respondent, and support provincial governor as a deputation (Article 20 of Disaster Relief Law, 2007). As they are closely related to communities, municipalities are considered a local government in Thailand (Section 1 Article 4 and Section 3 Article 69-71 in accordance with the Public Administration Act, 1991). Bangkok Metropolitan Administration and Pattaya City are being considered as special type of local governments. The reasons are that both of these two local governments have their own legal identity, their mayor serve as city managers, and these two local governments are established

in order to serve the rapid growth of urban development. (Bangkok as a capital city, and Pattaya due to its rapid development as a tourist destination) Those two areas are considered as special local governments and obtained the legal right to enact and implement services and regulations in accordance with the provision of basic services, specific demands and other tasks in its jurisdiction for serving the local demand. Moreover, as stated in the single-command approach in the framework of disaster response, Local Administrative Organizations (municipalities, Pattaya City and Bangkok Metropolitan Administration) are enabled to become first-hand respondents towards disaster management issues. However, the changing of decision-makers or emergency managers is dependent on the severity of the disaster and the size of the affected area.

Municipalities and other agencies such as police, military, foundations and private sector are coordinating together in the event of a disaster. The Division of Disaster Prevention in municipalities implemented the regulation that the two major responders diagnose the damage caused by the disaster and provide basic relief. On a legal basis, municipalities are concerned with the relief and mitigation of disaster threats, but in the case of flood incident in 2011, the disaster proved larger than the municipalities' capacity to handle and respond to it. Thus, municipality response and relief methods were focused on flood budget relief in accordance with the Thai Cabinet in two ways: one was the ordinary flood relief budget, which provided for households that were affected by flooding for more than seven days; the second was a subsidy budget based on flood damage which is not to exceed 30,000 THB per household. Providing budget relief became the main strategy to gives relief to victims for recovering their

conditions after the flood. However, the reason that budget relief seems to be such a big problem in municipality response is a misunderstanding from local communities, namely that the expectations for relief per household are larger than the limitation offered per household. This conflict of interest stems from the difference in cost estimation between that arrived at in self-evaluation by affected household and that determined by the evaluation of municipal officers.

(2) Bangkok Metropolitan Administration (BMA)

The Bangkok Metropolitan Administration is considered a special local government system, which can divided into three parts as follows: (1) Executive organs, which generally coming from elections; (2) Department and divisions, which are classified as sixteen departments governed by the Permanent Secretariat of the Bangkok Metropolitan Administration; and (3) Sub-district office, which derived command and policy initiated by superior organs and was implemented as an actor. Primary objectives of the Bangkok Metropolitan Administration are maintaining public safety, disaster mitigation and provide basic relief aid, city planning, traffic management, provision of infrastructures, social welfare, and environmental policies. All the tasks are stated as tasks of the Bangkok Metropolitan Administration (Bangkok Metropolitan Administration act, 1985)

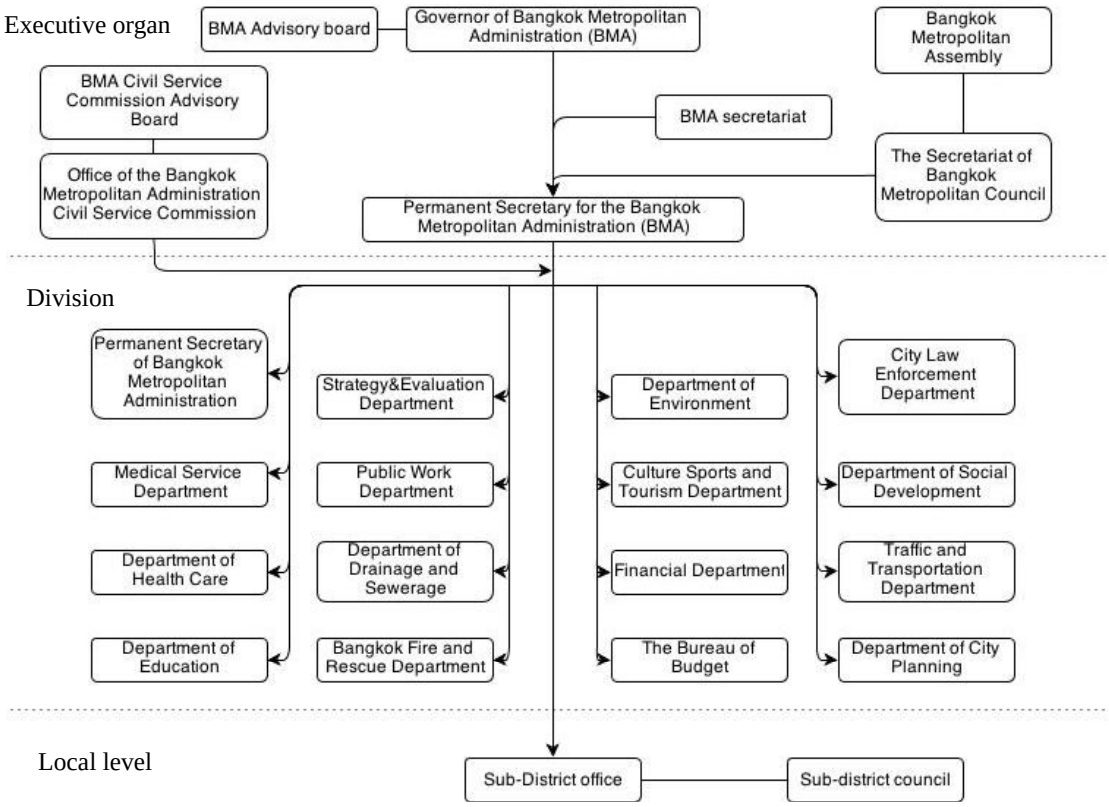

Fig. 1.6 Executive organization in Bangkok Metropolitan Administration
Source: Bangkok Metropolitan Administration, 2013

The primary flood response in the Bangkok Metropolitan Administration is under the purview of the Department of Drainage and Sewerage. The two threats that relates to flood risk in the BMA are, (1) intensive rainfall, and (2) tidal flood risk. There are two types of flood measurement in the Bangkok Metropolitan Area: structural measurement and non-structural measurement. The implementations under these two approaches depend on the area of density. Structural measurement, such as the polder system and embankment projects are applied in urban areas (high density of population area) While non-structural measurement such as urban planning or canal cleaning, are applied in urban areas (medium or low density of population area). As an autonomous organization, the Bangkok Metropolitan Area had to respond to flood protection

by itself under its legal basis, and the BMA governor became an emergency manager in the case of flood situation as an executive organ. There are two kinds of subordinate organs which are considered operational organs: in-charge organs and supportive organs. The authority which is in charge of flood management in the Bangkok Metropolitan Area are the Department of Drainage and Sewerage and District office in relevance to Department of Drainage and Sewerage organs (50 Districts in BMA), and the supportive organization are other division in district level and Bangkok Metropolitan Authority (Department of Drainage and Sewerage; 2014)

Current situation of disaster management framework in Thailand in relevance to the inter-governmental relationship towards disaster management is top-down, and structure-oriented approach. Tasks of local government towards disaster management are to implement disaster mitigation and preparation projects in their jurisdiction. In case of disaster situation, municipalities could respond towards disaster situation based on its resources and capacities. Since the situation become more severe and cover larger than one jurisdiction, superior organs such as provincial office and central government, have to command and become the emergency manager towards that situation

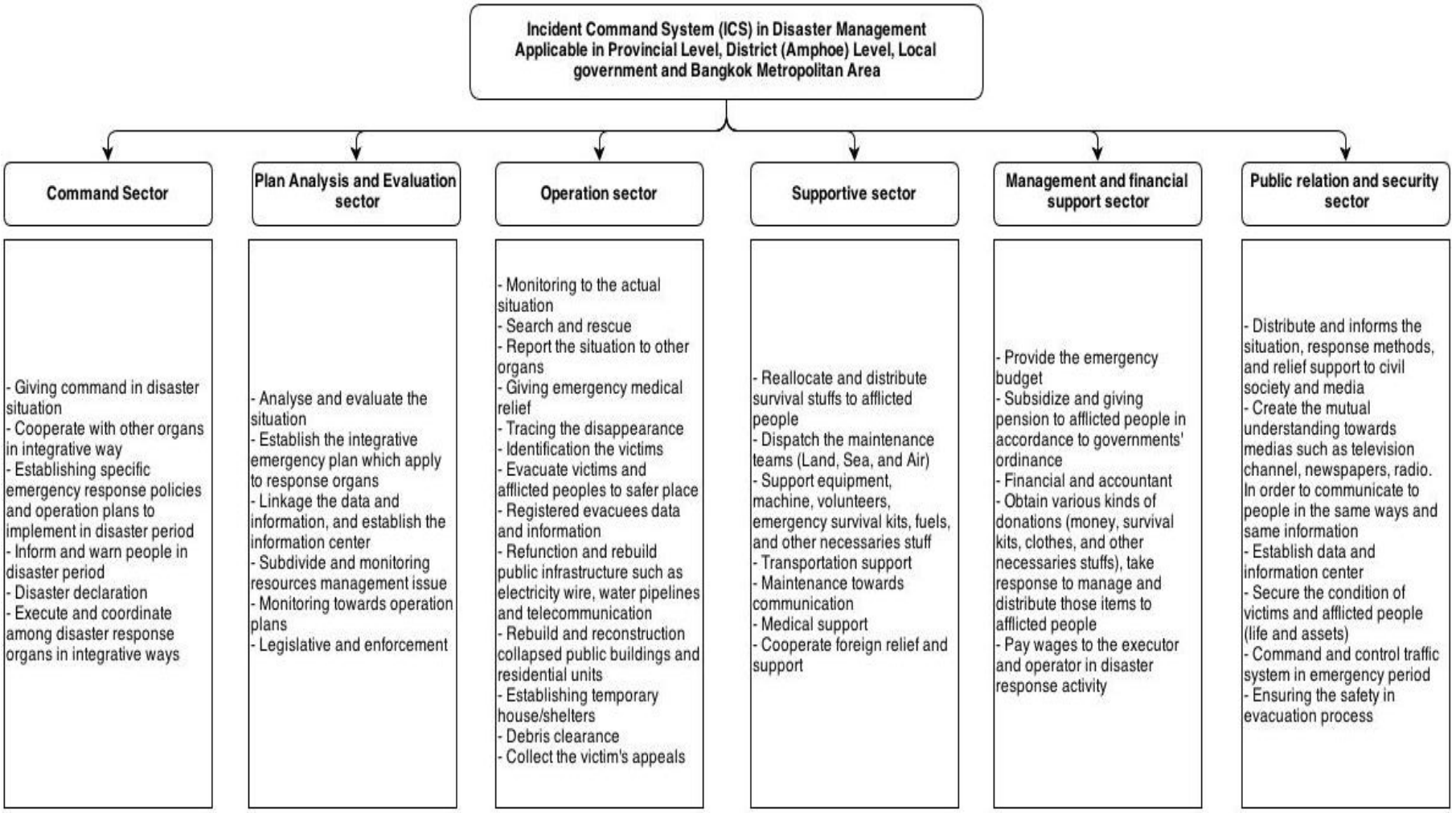

Fig.1.7 Incident Command System (ICS) and on-site single command

Source: Department of Disaster Prevention and Mitigation, 2012

The government had applied Incident Command System (ICS) to respond to disasters situation. The person in the role of emergency manager would change depending on the severity of situation. Generally, municipalities, the Bangkok Metropolitan Administration, and Pattaya City will take responsibility as primary organs towards disaster situation and use their own resources and capability. (Article 50 of Municipality Act 2000; Section 5 Article 89 of Bangkok Administration Act, 1985; and Section 4 Article 62 of Pattaya City Administration Act, 1999). In cases where the situation becomes more severe and municipalities are unable to handle them, the supervisory organization (e.g., on the provincial and central government levels) will supervise and command the response to that situation. In the case of wide-scale disaster situations, the Prime Minister will become the emergency manager. The structure of single command is shown in table 1.5 and figure 1.8.

Table 1.5 Actors in Incident Command System

Level	Description	Emergency manager	Operator
1 (Low level of severity)	Local public administrations (e.g., municipality, and Pattaya City) could handle and take response by their own capability	Disaster Protection (Amphoe, District level) Execute by Sheriff	Disaster Protection (Municipality, Tambon Administration Organization, and Pattaya city)
2 (Moderate severe)	Local public administrations and sub-districts in Bangkok Metropolitan Area could not handle to the situation by their own capability	Flood Disaster Command Headquarter (Provincial level)	Disaster Protection (Amphoe, District level) Execute by Sheriff Disaster Protection (Municipality, Tambon Administration Organization, and Pattaya city)
3 (High severe)	Flood disaster becomes more widespread and cause damages and loss, which is larger than provincial level could handle it	National Disaster Protection Headquarter, Execute by Minister of Interior	Disaster Protection (Amphoe, District level) Execute by Sheriff Disaster Protection (Municipality, Tambon Administration Organization, and Pattaya city) Flood Disaster Command Headquarter (Provincial level)
4 (Extremely severe)	Flood disaster becomes extremely severe. According to Disaster Relief Act in 2007, Prime Minister will command and make decision toward emergency response issues	Prime Minister	All subordinate organs

Source: Office of the National Water and Flood Management Policy, 2013

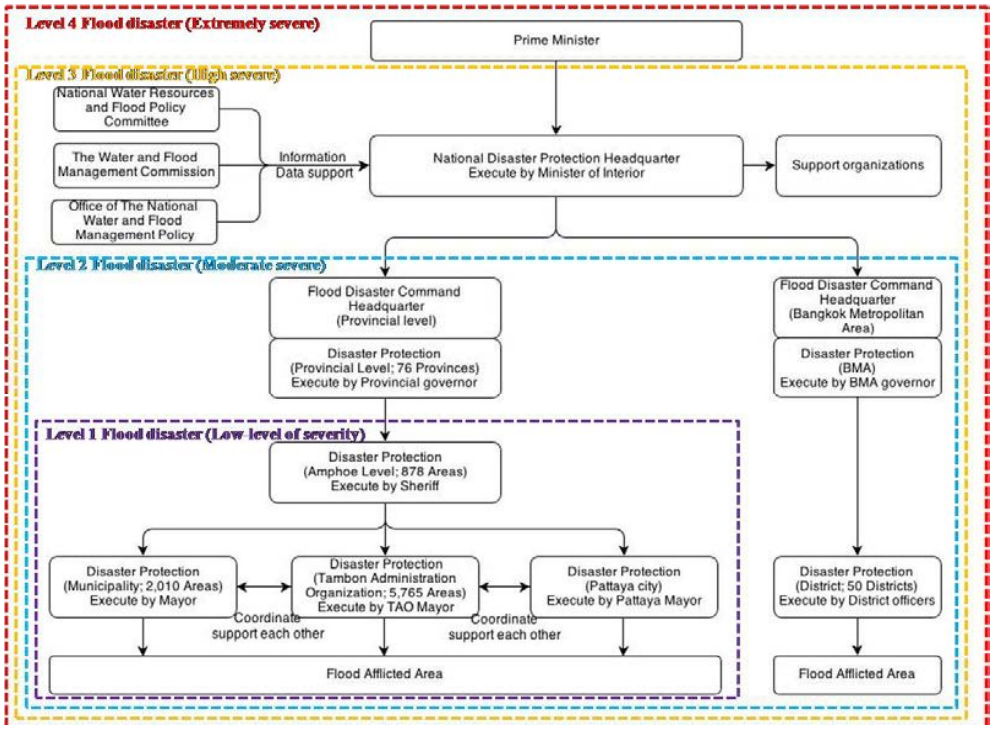

Fig. 1.8 Executive units under the single command system
Source: Office of the National Water and Flood Management Policy, 2013

1.3 Flood incidence in 2011 Thailand

1.3.1 Flood incidence

Thailand has always experienced flooding due to annual monsoons. However, the flood incident in 2011 had occurred by tropical monsoon and the effect from storms that tracked in 2010 (AON), there are five tropical monsoons that struck during the period from 25th July 2011 to 16th January 2012. The flooding originally began in the northern region of Thailand in August of 2011 and become severe in September in the northern part of the Chao Phraya Basin. Then it expanded to impact a wide swath of the central region in October. The affected area of flooding covered 65 provinces with an estimated area of 90,652.43 square kilometers and claimed the lives of 815 people to that point in time. The flood inundation from the northern region caused flooding in the central region from the end of July to the end of August, 2011, but the situation became more severe from September 1st to November 27th. There are two reasons for the severity of the flooding in 2011: natural causes and man-made factors. A natural characteristic of the affected regions and the effects from global warming caused an unexpected intensity of rainfall, which in turn caused flood inundation in the regions. Due to the small volume of rainfall intensity in flood season in 2010 the authority decided to increase the amount of water for irrigation collected. However, due to the effect from five depressions that cause excessive rainfall in the Northern region, which also caused the inflow of water to dams and reservoirs reached their limit. To avoid dam failure, the decision to discharge water had been made. The other cause was man-made, namely self defense in flood-prone areas, which caused isolation in flood protection, and the

existing flood-management measures could handle only the average annual flooding (Kongchan, 2012). These four factors that caused the flood in Thailand to become severe are (1) Highest amount of rainfall with five tropical storms[1], (2) water runoff from the major river, (3) unsuitable land use in flood plains, and (4) flood mismanagement (Poapongsakorn and Meethom, 2012: 251-255)

Fig.1.9 Track map of five tropical storms in 2011
Source: Aon Benfield Analytics, impact on demand, 2011

1.3.2 Damages and loss

According to data collected by the National Statistic Office (NSO) during 10th February to 21st March 2012 toward the flood situation in 2011. Results of the survey showed that there are 16.9 million households that were affected by flooding (80.4% of total households in 2010) and most of the affected households were impacted by the flood both inside and outside buildings. There are 17.6 million people who were affected by flooding (82.2% of the total population in

[1] Five tropical storms which traced and cause flood incident in 2011 are:
Haima Depression (from 23th – 27th June, 2011): rainfall 5 days > 150 mm.
Nok Ten Depression (from 30th July – 1st August, 2011): rainfall 3 days > 150 mm.
Hai Tang Storm (from 26th – 28th September, 2011): rainfall 3 days > 180 mm.
Nesard Storm (from 2nd – 3rd October, 2011): rainfall 2 days > 120 mm.
Nalkae Storm (from 6th – 7th October, 2011): rainfall 2 days > 100 mm.

2010). In conclusion, there are 684 districts level (Amphoe) and 4,920 sub-district levels (Tambon) in 61 Provinces affected by flooding. Although there were not many people killed in the flooding, this situation caused a large amount of economic damage and loss especially in the industrial sector, supply chain, and at the household level. In the case of casualties, there are approximately 8.1 percent of total affected households had experienced injuries or casualties due to flood incidents. Most of the health-related issues in the flood disaster at that time are related to stress on household members, flux, conjunctivitis and rash (Table 1.6)

Table 1.6 Percentage of flood affected household categorized by illness and Casualties

Illness and Casualties	Region					
	Total	Bangkok	Central	Northern	Northeast	Southern
Affected and cause illness or Casualties	8.1	6.6	11.4	7.0	6.8	5.9
Stressfulness, conjunctivitis, flux, Hong Kong foot and rash	7.5	4.9	10.8	6.5	6.6	5.7
Injuries	0.6	1.5	0.8	0.4	0.1	0.2
Casualties	0.3	0.3	0.2	0.3	0.2	0.2
Electric shock	0.1	0.1	0.1	0.2	0.1	0.1
Drown	0.0	0.0	0.0	0.0	0.0	0.0
Chronic diseases	0.1	0.0	0.1	0.1	0.0	0.0
Other cause	0.1	0.2	0.0	0.0	0.1	0.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

Source: National Statistic Office, 2012

The average income in flood-affected households decreased in the post-flood period when compared to the pre-flood period. Households in Bangkok and the central region were seriously damaged compared to households in other regions, and the people in affected areas had to adapt from full-time jobs to part-time jobs. However, this data also shows that overall unemployment increased approximately one percent overall. In the case of damage costs, people who lived in households in Bangkok and the central region saw higher damage costs to assets than in other regions.

The average household incomes decreased after the flood incident in 2011. According to data in fig. 1.10, the average monthly household income in Central region, Northern region, Northeast region, southern region and Bangkok Metropolitan decreased after the flood incident in 2011. Household income in central region decreased by 13.23 percent compared to the average income before flood incident. Second is household income in Bangkok Metropolitan area, equal to 10.76 percent. And third is Northern region, which equals to 10.19 percent respectively.

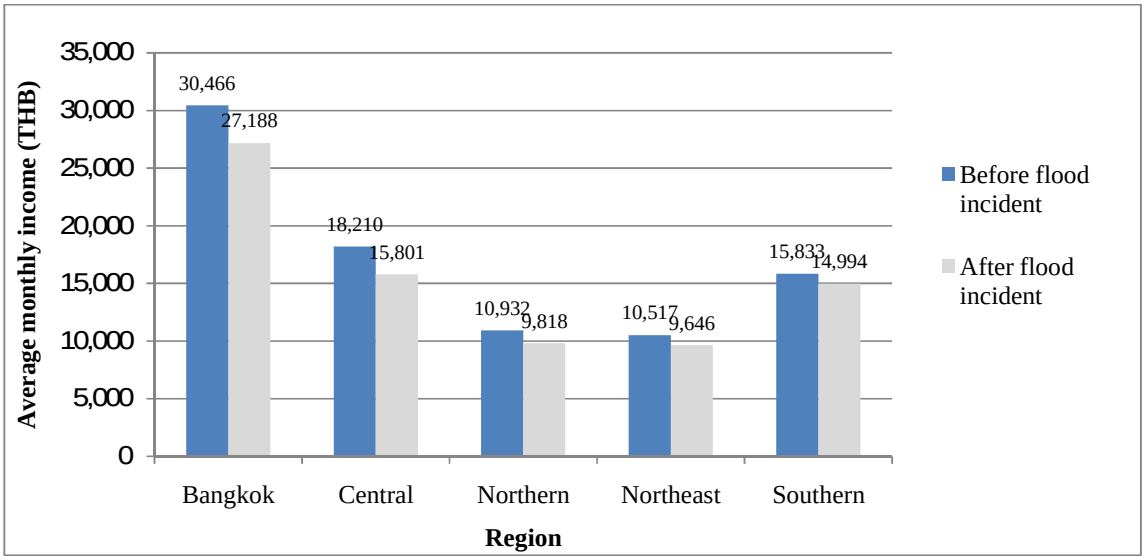

Fig. 1.10 Comparison in average household income before and after case of flood incident in 2011

Source: National Statistic Office, 2012

Assets in Bangkok are most affected by flood during the flood incident in 2011. Data show that households in Bangkok had heavy damage cost in assets compared to households who are living in other region (Fig. 1.11) Average cost of damage to housing in Bangkok was equal to 24,626 THB/household. Average costs of damage to vehicle are equal to 23,769 THB/household, and average costs of damage to furniture were equal to 12,172 THB/household

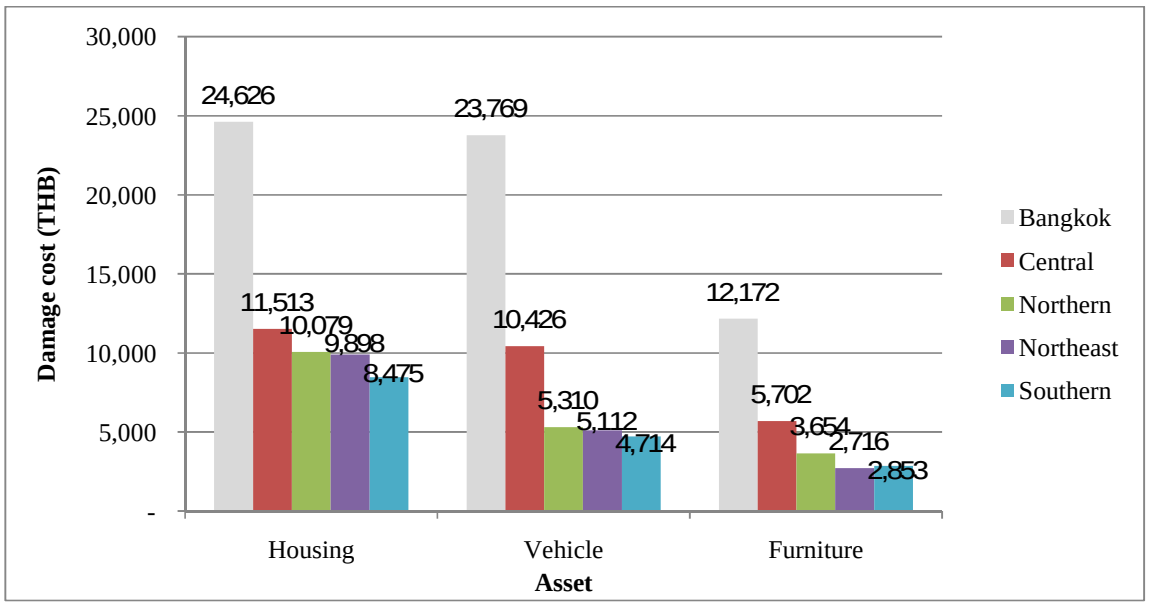

Fig. 1.11 Comparison between damage cost in housing, vehicle and furniture classified by region

Source: National Statistic Office, 2012

Rate of unemployment in all regions increased after the flood incident in 2011. According to surveys, the percentage of unemployment after flood incident in Bangkok had increased approximately two percent compared to prior flood incident, which is similar to other regions (fig 1.12)

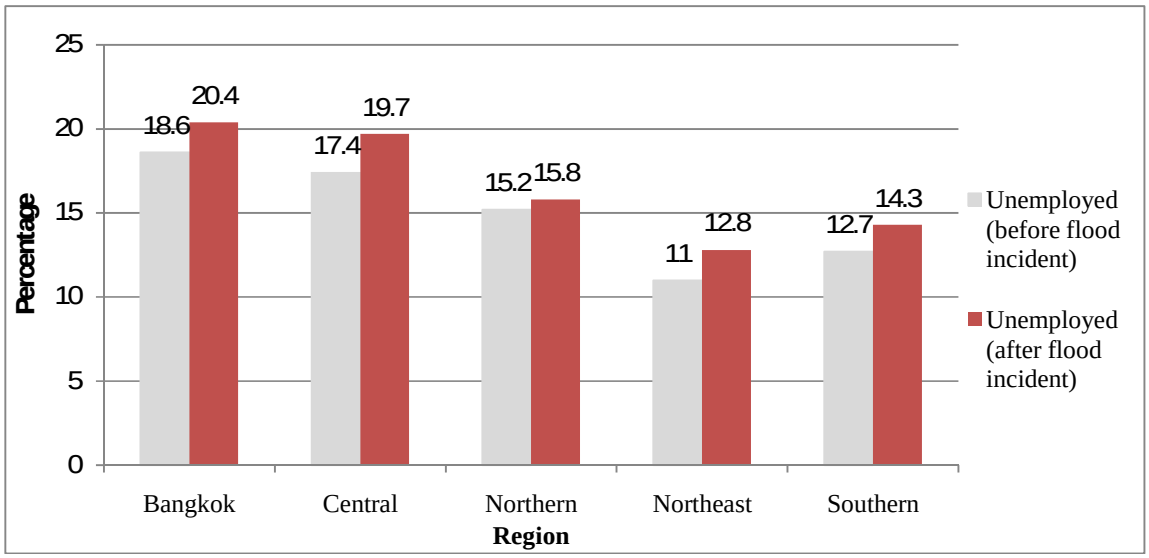

Fig.1.12 Comparison between unemployment rate before and after flood incident in 2011

Source: National Statistic Office, 2012

1.3.3 Government response during disaster

According to the response and recovery provided by government, municipalities and department of Disaster Prevention and Mitigation (DDPM) toward flood response. The operation had started at the middle of June 2011 to prepare and mitigate possible damages that might caused by the tropical depression. The Incident Command System (ICS) in expected flood affected areas had been operated. Most of efforts carried out during the flood incident were on-site monitoring headquarters, preparation for relief, and survival kits provided by the authorities. In the case of governmental responsibilities, not only budget allocation to provincial level and municipalities level for advancement in disaster response, but enactment of subsidy to flood victims and provide basic relief also had been made. Moreover, the establishment of command systems such as Flood Relief Operation Center (FROC), Multi-Agency Coordination Center (MAC) were established to countermeasure and be applied in the process of decision-making during flood incident.

In October 2011, the Thai government established the Flood Relief Operation Center (FROC) for giving basic relief to flood victims and flood-affected communities. There are 14 tasks which are relevant to flood response efforts. They are: (1) Giving relief to victims and offering additional response to flood relief as a one-stop service; (2) Rapidly responding and providing relief and ensuring the security and assets of victims; (3) Monitoring relief aid and ensuring it operates properly; (4) Providing vehicle support; (5) Coordinating with other divisions and departments in disaster prevention for announcing to people in a timely manner; (6) Establishing evacuation plan and providing

temporary shelters for flood victims; (7) Monitoring and overseeing water discharge; (8) Have authorized to establish donation centers; (9) Tracing the demands and attitudes of victims through various kinds of information avenues, such as hotlines, news and notifications; (10) Monitoring and overseeing the relief effort for victims; (11) Assigning relevant organizations to provide to FROC information and data which is necessary for support assessment; (12) FROC becoming the information center for flood prediction and making announcements; (13) Giving a daily report to the Prime Minister; and (14) Have authorized to establish or approve working groups for supporting its operation as necessary.

1.3.4 Problems during flood response

There are some conflicts that occurred during the flood incident in 2011 that were considered as the effect from political unrest in 2006 until 2011: before flooding. Political conflict caused by the dual perspectives of Thai Society between two political parties between Democrat Party and Thai Rak Thai Party (TRT) which had started since the 2005-2006 political crises in Thailand[2]. The crisis had move forward to conflicts among groups of people and groups of interest as well. The establishment of political interest groups such as People's Alliance for Democracy (PAD) and, National United Front of Democracy against Dictatorship (UDD) had founded. Due to those conflicts, effects from the unrest have an effect on the economic and political perspectives. These political issues have influenced citizens decision to involved in political conflicts and these

[2] Political Crisis in Thailand in 2005-2006 started from the result of the unrest of Thaksin Shinawatra due to his political issue such as Privatization, human right abuse during extrajudicial killing of the War of Drugs, (Wikipedia, 2014)

political conflicts continued to become larger and become public interest until nowadays (2014).

Political conflicts caused widespread conflicts not only the lack of clarity at policy level, local levels and community level, but also because of the inequality of relief distribution. The conflicts between two of the different administrative bodies were also found during negotiation, especially between Bangkok Metropolitan Area and the nearby vicinity. Conflicts had raised due to the failure of negotiation between flood affected area and non-flood affected areas in relevance to water gate control and decision toward discharging the amount of water. (Isasangkul Na Ayutthaya, 2014)[3] Conflicts during the flood situation in 2011 did not only have an effect at local level, community's level, and friends or colleagues, but also affected to the policy level as well. Although political conflicts had been rising in 2006, it became more pronounced during the flood situation. (Chaiyanukitt, 2011)[4]

Problems that occur during flood situation are also caused by the unclear information of flood management policies and response measures in practice. Effect of unclear information and response from service providers such as government and local authorities caused anxieties in local communities who had been affected by floods. Moreover, the current flood management policies had achieved in terms of "direction setting" but still lacked in implementation. Also, additional tasks of government at all levels are to explain proper reason to communities' members toward designation of flood detention area before the

[3] See the detail in appendix A pp. 193

[4] See the detail in appendix A pp. 193

doubt become large and difficult to answer. Those incidents may cause conflicts to become unresolved. (Tammo, 2011)[5]

The problem of intergovernmental relations between the central government and local government occurring in the flood response of 2011 were also found during operation. The flood emergency response, which was established by the central government, deputized local government to tackle the situation as a first-hand respondent; however, the supportive organizations such as authority, budgets, proper communication, information management, coordination, and necessary equipment were not adequately provided, which leading to the ineffectiveness of the emergency response as consequence. As a result of brainstorming among Public Administration Officers, executive organs summarized the ineffectiveness of flood response in 2011. The two issues are: (1) The decision maker in the case of flood response is decided at the provincial level, that is to say the local level; and (2) Although canals became crucial players in the discharge of flood waters, their management is excluded from the tasks of Public Administration Organization because the Royal Irrigation Department has authority on water discharge (Kokphol, 2012)[6]. According to the results of a seminar entitled "Public Administration Organization towards disaster management strategy handled by King Prajadhipok's Institute during 13th – 14th March 2012, regarding to the experiences of emergency management in flood situation in the year of 2011", there were seven lessons learned which could be stated as follows: (1) The flood in the Bangkok Metropolitan Region was

[5] See the detail in appendix A pp. 198

[6] See the detail in appendix A pp. 195

unexpected, which reveals the ineffectiveness of communication and a lack of information for making decision; (2) There was a lack of supportive systems such as database, equipment, and alternatives to apply in Incident Command System (ICS) and Single Command (SC) during the period of respond; (3) There was not any strategy for protecting the transportation network, which became crucial for providing relief; (4) Flood barriers such as sandbags or big bags are might not be appropriate for flood protection since the flood barriers leaked, the water volume flowed in rapidly and caused severe damage out of proportion to the effectiveness of reducing the inflow of water volume; (5) Community involvement and individual participation became a potential part toward flood management; (6) Designated evacuation shelters were affected by the flood, which reveals the failure of risk assessment; and (7) Risk communication is important, as there are five factors (the excessive rainfall on the upstream level, effect from tidal flooding in coastal or riverside areas, land subsidence, the ineffectiveness of land-use regulation, and the ineffectiveness of flood-management systems) were stimulated the severity of flooding in the case of flood incident in 2011.

The consequences of the flood incident in 2011 reveal the ineffectiveness of flood management, information sharing, inaccuracy of information, and the difference of flood perceptions among different people and different communities, which led to conflict in flood-affected areas. However, there are some efforts being made to resolve those conflicts in emergency response. According to the result of

a study by the Thailand Research Fund[7], involving conflict resolution in flood response, although some conflicts occurred, they did not go further and become violent. And communities and municipalities tried to collaborate with each other to minimize their deficiencies in responding to the flood. According to Prof. Dr. Chaiwat Sataanan, Faculty of Political Science, Thammasat University, and Assoc. Prof. Dr. Anuchat Puangsamlee, Faculty of Environment and Resource Studies, Mahidol University, most of the cases of conflict in flood response come from affected communities that tried to claim their rights in flood-relief activities, and those kinds of situations influenced them to involve in flood response activity (Puangsamlee, 2012)

Problems toward the transparency of relief allocation provided by government become questioned in society. Moreover there were rumors from local communities about unequal provision of flood relief, which is that the communities that tend to support government are likely to get further relief and assistance comparing to communities that do not support government. Incident of conflicts become more severe if all of services providers such as government, authorities, media and communities started blaming each other. Also the unbalanced information provided by media which broadcast the flood situation in Bangkok Metropolitan Area and its vicinities rather than broadcast to other areas of flood affected communities caused resentment of communities' members in the upper stream level (Tammo, 2011)

The controversy between the policy decision-making and the implementation units had seen during flood situation, and the lack of clarity

---

[7] Thailand Research Fund (TRF), 2012, *The Voice and Vulnerability: Political Debate in Flood Situation in 2011*

between decision makers and local negotiation were found in the flood response at municipality level. Moreover, political interest groups decided to take part in the flood response.

In conclusion, the four types of conflict in flood-management issues are: (1) Vulnerability aspects which relate to ineffectiveness of flood preparation and flood discharge or drainage; (2) Conflict during emergency response, such as illegally opening water gates or breaking flood barricades; (3) Conflict during the recovery process, such as demand of temporary shelters, electricity, and food; And (4) Inequality of response and relief provision offered by the government, causing dissatisfaction due to double standards. Precisely, there are 46.9 percent of the total cases occurred in the emergency response period, were signing their names to involve as groups and announcing via media to communicate and demand to claim their request. Moreover, the main groups which were blamed are FROC, then the provincial offices, but people did not blame the municipalities. One possible reason is that people are realizing the limits of competency of municipalities, but it is possible that communities are familiar with municipalities themselves. Regardless to the method of declaration, more than 58.7 percent of cases were resolved in negotiation through a self-help approach and did not proceed further to conflict. Confrontation can easily come about to cause further conflict. The residential districts, including some parts in Bangkok Metropolitan Area and Pathumtani Provinces, became the vulnerable area for causing conflicts from flood management and the protective measures (flood barriers, sandbags, or water gate control) especially were potential causes for further conflict and riots.

These conflicts and claims also reveal the gaps among governmental sectors, especially the intergovernmental relationship [between the central government and the local government, and between executive organs and operational organs.] Thus, the effort from government should operate with equity. Moreover, clarifying the mechanism of flood management and the flood management mechanisms are necessities. [Strengthening the inter-governmental relations in order to reduce gaps between the central government and the local government] Negotiation among stakeholders should be considering in flood management in the future. (Thai Research Fund, 2012)

Since the situation became severe in October of 2011, the government had established the Flood Relief Operation Center (FROC). A failure of communication and inaccuracy of information had occurred during the incident, which influenced people to protect themselves by using their own resources rather to rely on the information provided by FROC. Moreover, difference aspects of political issues among affected communities were spotted in the transparency of flood relief procedure. The poor response and management from the government affected its credibility, especially in the Prime Minister and the government's ability to provide good governance of flood response both in that situation and moving forward.

According to a survey by the Academic Network for Community Happiness Observation and Research (ANCHOR) conducted by Assumption University, which surveyed toward the attitude of people towards disaster response organizations. The result shows that the majority of samples were satisfied in the service provided by army forces were ranked first, advocacy groups were

second, and media groups were third. With regard to satisfaction in the service sector, satisfaction in the medical hotline ranked first, followed by the railway hotline in second and emergency calls in third. (ANCHOR, 2011)

As a result of the failure in management in the case of the flood of 2011, the perceptions of people towards the government sector were at a low level. The result from Suan Dusit poll shows that there are 46.90 percent of respondents mentioned that the government could not handle severe flood problems because of the poorly prepared management, and there are 24.39 percent had mentioned that the government was still giving out unclear information. On the aspect of relief, the 60.0 percent of evacuees needed compensation from the government. 21.24 percent of respondents are requiring unemployment compensation, and 18.71 of respondents need debt reliefs. In the case of non-evacuees, 24.75 percent needed the government to control the price of goods and 17.57 percent needed transportation fare exception. (Dusit Poll, 2011)

1.3.5 Summary of flood incidence in 2011, Thailand

Thailand is affected by annual floods due to tropical storms and depressions. In respond to this, Thailand had developed its regulation in accordance to flood management since the 1990s, which were firstly concerned toward an irrigation-based approach, water control being the primary concern at that time. The intention of legal basis toward flood management had been found during 1970-1990; which was concerned toward flood protection, control and management. Various efforts of measurement such as urban planning, relief effort, and subsidy were implement. Recently in 2010, flood management in

Thailand become more strategic, comprehensive disaster risk reduction and subsidies to flood victims, had being considered as a current issue of management. The strategic National Action Plan (SNAP) for Disaster Risk Reduction had applying during 2010-2019. The concept of Single Command (SC) is being applied as an operation plan at national level and Incident Command System (ICS) being applied as an operation plan at local level.

However, in the case of the flood incident in 2011 Thailand, which was considerable as severe flood incident in the history; it was widespread throughout northern region, central region, northeast region, Bangkok Metropolitan and its vicinities. The reason that cause this incident happened are (1) effect from collecting water in dams and reservoirs in year 2010 for irrigation due to the small amount of rainfall intensity in year 2010, and (2) effect from five depressions during June to October.

Although Government and local government, such as provincial administration and municipality are took respond to distribute relief for flood victims. However, dissatisfaction of victims towards relief provision by government or authorities, conflicts between flood-affected communities and non-flood affected communities occurred during flood incident. Many people believe that conflicts in communities during the flood incident stemmed from the political unrest since 2005.

However, since the ineffectiveness of government and authority in relevance to taking response during flood incident are found. There are some efforts of collaboration among municipality and communities, and between communities in flood-affected areas. People who are living in non-flood affected

area donated relief or money; participated in flood protection in local community as manpower, and shared information. This circumstance shows the potential of mutual flood risk reduction during flood incidents, which shows the potential of collaboration among community members, residents who are living in flood affected and non-flood affected areas. These situations are considered as an important perspective in Community-Based Disaster Risk Reduction in Thailand.

2. Integrating the theory of planned behavior and flood risk acceptability to determine willingness to involve in CBDRR

2.1 The importance of communities-municipality collaborating in Community Based Disaster Risk Reduction

The aim of the first research question is to answer, "*How to integrate* ***Theory of Planned Behavior (TPB)*** *and* ***Flood Risk Acceptability*** *to identify willingness of community members to involve in flood risk reduction activities?*" The objective of this chapter is to establish the conceptual framework based on TPB and Flood Risk Acceptability for investigating intention of community members to involve in flood risk reduction activity

The concepts which have relevance to disaster management issues, in terms of concepts of resilience, disaster resilience, public participation, Theory of Planned Behavior and flood risk acceptability. All issues had being reviewed in this section. The study diagram of this research had shown in fig. 2.1

Fig. 2.1 Study diagram in chapter 2

Source: Author, 2014

2.2 Roles of community in supporting the building of disaster resilience

2.2.1 Components of disaster resilience

There are various definitions and concepts regarding to resilience given by scholars. For example, as a potential of a particular configuration of a system to maintain its structure or function during disturbance, how system could reorganize following disturbance-driven change, and measured by size of stability domain (Lebel, 2001) Normally, resilience could be described as three components as follows; (1) threats from disturbance that a system can absorb and maintain as the same state before it was disturbed; (2) the ability that the system is capable for maintaining; and (3) the ability to build and increase the capacity or adaptation after it was disturbed (Carpenter et al. 2001, Pisano, 2012). Resilience can be described as the ability of a system, community or society to cope and deal to hazards by resist, absorb, accommodate and recover in a practical manner. Prevention and restoration are necessary in the resilience perspective (UNISDR, 2007). Resilience also refers to positive adaptation after it disturbed, or the ability to overcome challenges or personal threats in relevance to psychology perspective despite experiencing adversity (Wald et al., 2006; Herrman et al., 2011:259). As the ability to deal with disturbance and adapt while undergoing change for retaining to the same function, structure, identity and feedbacks (Walker et al., 2004:5). Resilience becomes important in disaster management in terms of effectiveness of respond during disaster situations or "absorb" and effectiveness of recover after the uncertain situations or "bouncing back" occurred. Resilience refers to the ability to continue after a disaster occurs,

which relates to the ability to be restored to full capability from functional failure in the event of disaster (Masuda, 2011). Based on table 2.1 components of resilience are focusing on how to maintain resources and how well that system could react to those threats or challenge.

Table 2.1 components of resilience

Components	Definition	Application
Robustness	Ability to absorb, response, and cope to the disturbances and crises (Bruneau et al., 2003)	Monitoring system, modularity, adaptive decision-making model.
Redundancy	An excess capacity ad back-up system which is enabling the maintenance of core functionality in the event of disturbances, resources and capacities management (Bruneau et al., 2003) Decision choice	Redundancy and supplementary of necessaries infrastructure, solutions and strategies
Resourcefulness	The ability of adaptation to crisis, respond flexibility and transform a negative impact into a positive (Bruneau et al., 2003) Resourcefulness are necessary to determine the influence of resilience (Walker et al., 2009)	Capacity for self-organization, Creativity and innovation, trusts among groups in networks, governance system and institutions coordination, cooperation and collaboration
Response	The ability to mobilize quickly in the crisis situation (Bruneau et al., 2003)	Communication, inclusive participation in all actors in society.
Recovery	The ability to regain a degree of normality after a crisis or event, which is the flexibility of system and ability of adaptation to upraise for prompt to the next disturbance	Active "horizontal scanning" and responsive regulatory feedback mechanisms.

Source: World economic forum, 2014

There are three levels of resilience, which could be stated as follows

(1) Individual or personal resilience is refers to "the capacity to mobilize personal features that enable individuals, groups and communities (including controllers communities such as workforce) to prevent, tolerate, overcome and be enhanced by adverse events and experiences" (Mowbray, 2010) Factors that can effect individual resilience are feelings (e.g., anger, anxiety, fear, guilt or depression), thoughts (e.g. esteem, confused, security, belief), and behaviors (e.g., isolation, forgetfulness, error, lethargy). All of these can affect personal attitudes (Mowbray, 2010). According to Kelly in 2005, and Lewis in 2011; individual

resilience is related to internal locus of control, perseverance, emotional management, awareness, optimism, perspective, self-efficacy and ability to problem-solving (Kelley, 2005; Lewis et al., 2011). These perspectives are relevance to psychological resilience. Traditional perspectives of individual resilience studies focus on health science and psychological science.

(2) Community resilience

Consideration towards how people are able to overcome stress, trauma and other life challenges by drawing from social networks and cultural resources embedded in communities, or communities themselves exhibit resilience for responding to stress and challenges in ways that tend to restore their function (Christensen and Robinson, 1980; Kimayar et al., 2011: 66) "As the process of communities adapting positively to adversity or risk" (Kobau et al., 2011, Cooke et al., 2011) (Thornley et al., 2013:7)

(3) Society resilience

According to Folke et al., 2010 there are three relevance concepts and approaches that could state as follows; (1) Resilience – the capacity of complex social – ecological system (SES) to continually change and adapt yet remain within critical thresholds; (2) Adaptability – which is subset of resilience which is relevance to adjust or respond for changing external drivers and internal processes, and thereby allow for development along the current trajectory or maintaining stability domain; and (3) Transformability – the capacity to cross threshold into new development trajectories (Pisano, 2012)

Resilience could be mentioned as two dual-aspects such as efficiency and persistence, constancy and change, or predictability and unpredictability

(Holling; 1973, 1996). However, resilience is set of the consideration between engineering and ecological aspects (Howling, 1996, Gunderson et al. 2002) Thus, comparing with disaster management, resilience could be separated into two parts as follows; (1) pre-disaster and disaster phase; which is how a system could "absorb" or minimize damages due to threats of disaster by its own resources which are the efforts of preparation, mitigation and response that had been addressed in this part. And (2) post-disaster phase; which focusing to the efforts that system could recovered after it was disturbed. The phase of "bouncing-back" after the residual damages that the system could not absorb, the various kinds of recovery and reconstruction are mentioned in this part. The core concept of resilience is focus on the ability of self-reaction to deal with uncertainties caused by system disturbance to absorb, minimize or resist. Successfulness of resilience determines by how to cope, or bouncing back to absorb possible damages and how to minimize damages at the same time. Thus local resource management is necessary to maintain and become important components in a resilience study.

The concept of resilience also applies in urban planning issues as well. According to Godschalk in 2003, there are eight components of disaster-resilience cities are (1) **Redundancy** – systems designed with multiple nodes to ensure that failure of one component does not cause the entire system to fall; (2) **Diversity** – multiple components or nodes versus a central node, to reflect against a site specific threat; (3) **Efficiency** – the positive ratio of energy supplied to energy delivered by a dynamic system; (4) **Autonomy** – capacity to operate independent of outside control; (5) **Strength** – power to resist a hazard force or attack; (6) **Interdependence** – integrated system components to support each other; (7)

Adaptation – capacity to learn from experience and the flexibility to change; and (8) **Collaboration** – multiple opportunities and incentives for broad stakeholder participation (Godschalk, 2003: 136-143)

Resilience in modern concepts has been applied to managerial function especially for increasing compatibility of government function. Perceptions of resilience had changing to become more practical approach, which are the management of ecosystems has to be proceed as well as the extension of social flexibility, innovation and adaptation which has extended the ability of resilience in society (Holling, 2001). Applications or efforts with relevance to how to increase flexibly or ability of the government function to cope with challenges or disturbance, and how to improve those systems to become more practical in the operation process. All are necessaries to increase the capability of managerial function regards to resilience concept. Moreover, introduction of social perspectives in accordance with increasing the capability of performance are being considered. For example, Aldrich in 2012; had explained how social resources can increase the effectiveness of resilience. Based on his concept, participation and providing information or knowledge in between groups in society are important. That stimulates a sense of social capital which consequently increase the efficiency of resource management. Moreover, trustworthiness is also important to increase the mobility and opportunities for changing resources among stakeholders (Aldrich, 2012)

Table 2.2 variables, assumptions and operationalization in social resilience

Variable	Hypotheses and assumption	Operationalization
Quality of governance	Better-informed, more competent decision makers, speed up recovery	Competence of leaders; presence of rent seeking and corruption
External aid	The larger the amount of aid, the faster the recovery	Amount of aid, supplies, and experts provided to the area by the government and NGOs
Amount of damage	The greater the damage, the longer the recovery	Number of dead, wounded, homeless; infrastructure condition and fiscal losses
Population density	Denser areas are slower to recover because of difficulties in replacing housing stock	People per square kilometer
Demographic/socioeconomic conditions	Wealthier, younger, majority ethnicity, educated, communities recover more quickly	Income, education, race, average age, homeownership, economic inequality
Social Capital	Areas with greater volunteerism, membership in voluntary groups, and trustworthiness overcome collective action problems and recover more quickly; can simultaneously slow recovery for out-groups on the periphery	Number of local voluntary organizations; voting rates; levels of trust and volunteerism; membership in our panchayats; participation in local events and festival

Source: Aldrich, 2012

Important of public and community members as a resource in disaster management are being stated as one components in the disaster management issue. For example McEntire (2005) stated that there are two approaches in disaster response, are (1) Traditional approach; which relates to the bureaucratic approach; relevance to command and control under the hierarchical approach. And (2) Professional approach; which relates to networking, problem-solving and norm, collaboration among stakeholders and flexible of response (Dynes, 1994; Selves 2002)

The basic features of the traditional model of public management based on Petrescu (2010) description, stated that administration is an instrument of the executive power. Rules are objective known by the public and edited in such a manner that they formulate a clear legal framework. Jobs' depersonalization; as the advantages of occupying a certain position are related to the job itself and

not the person that has the respective job. The functionaries' behavior is standardized by respecting the rules, this being an important manner of assuring discipline. (Petrescu et al., 2010)

According to the concept of traditional approach id disaster management, showing that some features that refers to the characteristics of hierarchy-oriented, command and control approach are (1) Refers to civil defense, command and control, bureaucratic, or emergency service perspectives (Quarantelli 1987; Dynes 1994; Neal and Phillips 195; Schneider 1995; Selves 2002; Edwards-Winslow 2002), (2) Disaster with primary background coming from military approach, (3) Government is the most reliable actor because societal chaos will result in time of disaster, (4) Hierarchy and adhering strictly to standard operating procedures, (5) Emergency management is concerned with first-responder issue only (i.e., officers who are working in central government and local government, and people who are living in disaster-affected communities). However, the traditional model is not preferred by scholars nowadays, but still provides useful insights into post-disaster operations (McEntire, 2007: 87). Table 2.3 shows the components of disaster response based on the traditional approach

Table 2.3 Assumption and implication/conclusion in disaster response based on traditional approach

Assumption	Implication/Conclusion
War and civil defense disasters are of paramount importance	Other types of disasters are neglected
Emergency management should be located in emergency service department	Emergency management functions are only related to first responders
Emergency managers coordinated emergency service only	Disaster functions such as media relations are overlooked
Emergency managers need to have control, uniforms, emergency vehicles, and siren	Turf battles and resentment build among first responders
Politicians are nuisances	Isolation from key leadership and other departments
Disasters result in a great deal of social chaos	The desire to bring order to disaster is natural and to be expected
Government is the main or only responder in times of disaster	Centralization of power and decision making is beneficial during disaster
Information obtained or relayed outside government cannot be trust	Bureaucratic expertise and top-down communications structures are best
Emergency workers will leave their post	A strong paramilitary leadership is required
SOPs will be effective in any and every disaster situation	Adherence to SOPs is preferred over creativity and improvisation
Failing to follow SOPs will be detrimental to the response	
Citizens do not or cannot respond effectively to disaster	Exclusion of others is viewed as the most effective type of response
Victim behavior includes panic, looting, and antisocial behavior	
Emergent groups hinder response operation	

Source: McEntire, 2007

Unlike the traditional approach, the professional approach seeks toward the problem solving, networking or encouraging norms perspective (Dynes, 1994; Selves 2002). This approach stressing that collaboration has emerged since the 1940s, and has transformed from a bureaucratic top-down approach to become more flexible; increasing the sense of collaboration, multi-organization management, and intergovernmental and intersectional cooperation (Wagh Jr. and Streib, 2006; 131-140). Based on this approach, the capacity and effectiveness of emergency manager in the coordination roles among organizations in disaster management are become one of the key successes of disaster responses in terms of the professional approach (Drabek, 1987)

Some characteristics that refer to the professional approach are (1) Considering to all kinds of hazards, networking, collaborative, problem solving, or public administration model (Dynes 1994; Neal and Phillips 1995; Schneider 1995; Selves 2002; Edwards-Winslow 2002); (2) Horizontal relationships (i.e., collaboration among authorities or groups that has same of power level) are as important as vertical relationships (i.e., coordination between authorities or groups that has different of power level); (3) No single individual, group, or organization can respond alone; (4) People are working together to overcome the challenge of the disaster; (5) Emergencies and crisis situation cannot be prevented (Neal and Phillips 1995, p.334) then citizens ought to respond to the disaster whether they are invited or not; and (6) The public is a resource in disaster management issues. However, problems in professional models which is stated in scholars' works are the capacity in emergency managers, organization cultures and the conflicts between participant organizations (Wagh Jr. and Streib, 2006). Table 2.4 shows components of disaster response based on the professional approach.

Table 2.4 Assumption and implication/conclusion in disaster response based on professional model

Assumption	Implication/Conclusion
There are more types of disasters than civil hazards	Take an all-hazards approach to emergency management
Emergency managers cannot deal with disaster alone	Include politicians and the leaders of all departments in response activities
Disaster pose challenges; people will meet the demand	Emergency managers must be ready for multi-organizational response
Emergence is not an aberration	
The desire to bring order to disaster is natural and to be expected	
Emergence cannot be prevented	
Emergence fills a void	
The public is a resource, not a liability	

Source: McEntire, 2007

Table 2.4 Assumption and implication/conclusion in disaster response based on professional model (Cont')

Assumption	Implication/Conclusion
Standard operating procedures do not always work	Flexibility is needed; departures from standard procedures are okay
No single responder can deal with disaster alone	Hierarchical relationship are not possible; stress horizontal relations
Emergency management is not the same as emergency services	Accept a broader view of the disaster

Source: McEntire, 2007

Table 2.5 Comparison between strength and weakness of traditional approach and professional approach in disaster management

	Traditional approach	Professional approach
Strengths	• Government had recognized as a vital participant in disaster response operations • Standard operating procedures do help responders know what to do in case of crisis situation • Hierarchy and orders are often advantageous in that might protect lives and help accomplish tasks based on prior experience	• Concerning toward all-hazard approach to emergency management • The professional approach sees the big picture of emergency management • Recognize that many actors are involved in disaster response operations which may facilitate an effective response • Flexible in response
Weakness	• Emergency managers and government agencies are not the only actors involved in disaster response operations • Standard operating procedures do not work in every disaster • Problematic assumption as follow • (1) Some order from higher level might cause chaos in local level • (2) the disaster response operations can be directed as if in an authoritarian manner	• Reduces the importance of the government in disaster • By approaching emergency management from a broader perspective, it may downplay the importance of emergency services • Fails to recognize the need for hierarchical leadership in disaster situations • The professional approach overlooks importance of following strategies that have been developed in the past and tested over time

Source: McEntire, 2007

2.3 Community becoming key stakeholders in minimizing losses in disaster situation

Disaster Management can be defined as the entire process of planning and intervention to reduce damage from disaster by mitigate, prepare, response and

recovery measures, which is a neglected element of development planning (D&E Reference Center 1998). Disaster management also refers to the process of forming common objectives values in order to encourage participants to plan for and deal with potential threats and disaster situation (Pearce, 2000, Chapter 2, 11) The tradition of emergency management is a rationale which considers towards the function of law enforcement and agencies as a temporary job such as fire department (Petak, 1985) but gradually changes to more coordinate a varieties of resources, techniques and skills for fast respond and recovery (Wilson and Yemaiel, 2001:119). As a fundamental, coordination is the crucial aspect in order to fulfill towards post-disaster recovery and achieve the sustainability in disaster management which has also become a challenge nowadays (Raju and Niekerk, 2013). Local government can play as the key role in disaster management activities in order to save loss of life in local communities (Col, 2007:114). Local governments and communities are becoming the first-hand respondent to threats of disaster (O'Leary, 2004:1). Basically, the activities within the responsibility of local government relevant to disaster management can be separated into two types that are comprehensive (i.e., preparedness, mitigation, response and recovery) and integrated response with other authorities or supervision organization. (Col, 2007:114)

The importance of the public as resources in disaster risk reduction and response under the concept of resilience had been found in modern disaster management. There are many stakeholders taking part in disaster management and development activities; stakeholders such as emergency services, governmental organizations and civil society become the first-hand respondents.

Other Non-Governmental Organizations (NGOs) as external organizations facilitate and create links of cooperation among first-hand respondents at the domestic level and international level. (Collins, 2009)

Table 2.6 Broad typology of institutions identified with disaster and development strategy

Type of organizations	Description	Institutional rationale	Role in disaster and development work
Emergency services	State sector primary responders	Deal with immediate aftermath of an incident	A part of civil contingencies and disaster preparedness plan
Civil society	People who are informally grouped with each other through location or their means of primary subsistence	People independently cooperating with each other towards a common goal	Mobilizes prevention and response activities as part of ordinary life
Civil Societal Organization (CSO)	Community based function, locally more representative	Represent coordinated bottom-up strategies that include local knowledge	Community-Based disaster management (CBDM) using community response groups, risk and resilience committees or similar
Non-Governmental Organization (NGO)	Has legal institutional status usually agreements with official donors and/or recipient governments	Development or disaster reduction through project and plan advocacy. Independence from the government of the country within which it was formed	Implementing donor and government disaster and development programs/ emergency facilitator which links between civil societal groups, funders and government
NGO (development)	NGO that is oriented towards human development issues	Addresses basic and extended human needs	Recreate livelihood society, support infrastructural development
NGO (environment)	NGO that is oriented towards environment and conservation issues	Address sustainability of the natural resource base (ecological conservationist or economic approaches)	Promote intrinsic value of nature and secure natural environment, as a part of disaster risk reduction and sustainability development
Non-Governmental humanitarian agency (NGHA)	Implements humanitarian assistance. Include international committee	Saves life in emergency situations. Rationale may vary depending on the mission statement of each organization	Assess emergency aid requirements and delivers to target populations during crisis.

Source: Collins, 2009

Table 2.6 Broad typology of institutions identified with disaster and development strategy (Cont')

Type of organizations	Description	Institutional rationale	Role in disaster and development work
Inter-governmental organization (IGO)	Organization where two or more governments represented	Represents international state-level dialogue and policy on issues of global concern	Syntheses global disaster and development policy, provide support base to international disaster and development related strategy
Private Sector	Primary owned enterprises	Business and enterprise for profit	Implements strategies that improve business continuity issues

Source: Collins, 2009

The importance of other stakeholders such as non-governmental organization, local council members, informal or formal community leaders, volunteer or faith leaders, residents and Community-Based Organization; all are important in Community-Based Disaster Risk Reduction approach. The flexibility, independence and democracy of these groups could apply to Community-Based Disaster Risk Reduction as charitable organizations, service organizations, participatory organizations and empowering organizations. (Lovekamp, 2010: 367)

Perspectives in social aspects are able to change after disaster situations (Lovekamp, 2010: 367). Disaster could stimulate society to change its attitudes after a disaster situation under these three components (1) social change (i.e., pattern of interaction in social institution); (2) roadmap of life (i.e., perspectives that relates to value, norms, symbols and culture); and (3) ability to make choice. Moreover, economy, demographic characteristic, complexity of political system, source of information, conflicts and relationship of culture issue can motivate social change after disaster situations (Lovekamp, 2010:367). Since the

importance of collaboration among stakeholders has become underpinned. Determination toward the successfulness of collaborations are depending on organization goals, organization culture, information-related issue, situational stress, time pressure, uncertainties, experience toward previous collaboration, number of parties, level of interdependency, trust and preference, and perceptions of each organizations and participants (Kapucu and Graryev, 2011: 366-375)

The important of community and public participation as a critical resource for comprehensive strategies in disaster management issue. It has been stated in disaster management framework from international through to community level. Community members have to tackle toward threats of disaster and consequential hazards in normal period and since the incidents start, rather than waiting for relief provided by the government. Community should try to minimize their vulnerability as much as possible. Moreover, in the case of a large disaster situation, external relief provided by government, municipality or Non-Profit Organizations are become limited, and this causes the local community to respond and help each other. To minimize damage cause by disasters, the combination of self-help in residents, a mutual-help effort from community, and a public-help effort from government are important (Cabinet Office, Government of Japan, 2011:38). There are three main actors in collaboration in disaster risk reduction are (1) citizen as self-help; use various opportunities to learn about disaster prevention/reduction, and diffuse what they have learnt from disaster and being more concerned with disaster prevention/reduction measures. (2) Community as Mutual-help; to prepare for disaster through regular community

interaction and strengthen the relationship among residents and community organizations to overcome the disaster situation, and (3) municipality as public help; make use of assistance from national, prefectural, municipal governments and be prepared to overcome to disaster threats whenever they happen (Disaster Reduction and Human Renovation Institution, 2012). Table 2.7 and 2.8 shown multi-faceted consolidations of the three main points of the lesson gained from the Great Hanshin-Awaji Earthquake. It showed the importance of residents as self-help, community as mutual-help and municipality as public help. However, intentions of collaboration based on these concepts are depending on disaster situation. (Disaster Reduction and Human Renovation Institution, 2012)

Table 2.7 three faceted of self-help, mutual help and public help in emergency and recovery

	Emergency and recovery		
	Life	**Living**	**City**
Self help	Getting in touch with other people and culture gives people the strength to live	To solve local problems, collective housing and community businesses, etc. should be set up	Need to pay attention to the separation and recycling of garbage and refuse resulting from the disaster in order to reduce disaster refuse
Mutual help	Community members' initiative to act is essential for care of disaster victims and people giving reason to live	Cooperation between citizens, volunteers, and local authorities is essential for livelihood support for people in disaster shelters and temporary housing	Community corporation essential for reconstruction of housing and lifestyle
Public help	Detailed support for the elderly, etc. and mental care for disaster victims is important	Need for action to promote early return to business of local industries and business	Most important reconstruction policy is the reconstruction housing

Source: Disaster Reduction and Human Renovation Institution, 2012

Table 2.8 Three facets of self-help, mutual help and public help in reconstruction and prevention

	Reconstruction and prevention		
	Life	**Living**	**City**
Self help	Important to educate oneself daily about disaster reduction	Create a strong disaster resistant society through cooperation between communities and companies	Ensuring the safety of one's house protects one's family and neighbors
Mutual help	Important for various people; citizens, volunteers, specialists, public authorities, etc. to work together	Need for measures to lighten economic burden resulting from damage to housing from disaster	Need for local residents to be involved in community development in normal times
Public help	Important to provide disaster reduction education and information in order to foster human resource	People-friendly and eco-friendly urban development create towns strong against disaster	Promotion of strong disaster resistant urban foundation measures

Source: Disaster Reduction and Human Renovation Institution, 2012

Activities that relevant toward increasing capability of residents to cope due to disaster situation such as disaster training drill, promotion life safety, or developing community disaster preparation are applied at the local level as same as improving command system and management system in municipality had been done in Community Based Disaster Risk Reduction activities. (Tokyo Fire Department, 2014)

Table 2.9 Level and application of three-level of disaster risk reduction

Concept	Implication	Basic strategies
Self-help	Promote life safety	Promoting life safety Promoting fire safety Educating public on initial firefighting
Mutual help	Promoting teamwork	Developing community disaster preparedness Developing the cooperation system for the people who need assistance in case of disaster
Municipality help	Developing the capability of municipality to minimize disaster damage	Developing the ability to cope with multiple disaster Developing the total emergency response capabilities Creating a disaster fact-finding and information sharing system Developing inter-agency teamwork Keeping emergency operation centers functional and effective

Remark: based on earthquake incident
Source: Adapted from, Tokyo Fire Department, 2014

The importance of Community Based Disaster Risk Reduction has been stated since the importance of safety culture had been emphasized as one approach to reduce vulnerability at the community level (Center for International Studies and cooperation, 2007:14) Community-Based Disaster Risk Reduction addresses the importance of community involvement in risk identification, analysis, building capacities, initiate plan, monitoring, and evaluation to minimize its vulnerability (ADPC, 2003). Activities such as risk mapping, training drill, education in school, evacuation planning, and participatory planning in community are considered in community-based disaster risk reduction activities. The importance of community members in disaster could be found in all phases of disaster risk reduction activities such as information sharing, providing support for the initial period of the disaster situation, becoming manpower to foster community reconstruction, and helping organize immediate relief (Patterson, et al., 2010: 137-138)

Table 2.10 examples of community involvement in disaster risk reduction

Disaster risk reduction	Activities and implication	Roles of community members
Preparation	Apply preparation plan for community. Collect data which relevance to vulnerability people.	Making a suitable plan for apply in community, learning case practices, collecting necessary information and self preparation.
Response	Supporting other organizations during evacuation, provision disaster response at initial period. Sharing information. And support search and rescue	Provide food, basic relief and shelter as partial support to evacuees Inform the situation to victims' family (Pope 2006; Rev. Nguyen 2006; Cohen 2005)
Recovery	Stimulate and foster recover process after disaster situation. Mutual support in reconstruction.	Showing residents demand to authorities to foster recovery process Become manpower during reconstruction phase. Helping organize immediate relief

Source: Adapted from Patterson, et al., 2010: 137-138

Local knowledge, local perception toward risk and intention to be involved in local activities for minimizing vulnerability in either personal vulnerability or

community vulnerability are becoming key issues in CBDRR (Kafle and Murshed, 2006:17-18)

To describe how local people could be involved in disaster risk reduction, the concept of the Ladder of Participation is applied in this explanation. The ladder of participation was first explained by Arnstein in 1969 showing that public participation could separate into three levels, which are (1) non-participation, (2) degree of tokenism, and (3) degree of citizenship. For each step, the power and involvement of the citizen is gradually increased in public policy, the concerning of power of citizens towards public policy such as federal social programs, urban renewal, anti-poverty and model city (Arnstein, 1969: 216) Regarding the baseline of participation, these eight steps of participation are shown in table 2.11

Table 2.11 Characteristic of participation towards the ladder of participation

Major step	Characteristic	Steps	Description
Non-participation	Not enable people to participate in planning or conducting program, but enable powerholders to educate or cure the participants	Manipulation	People are placed on rubberstamp advisory committees or advisory boards for the express purpose of educating them or engineering their support
		Therapy	Come from the "dishonest and arrogant" Citizen have to change by themselves in any plan and conducting programs, rather than giving them a say in procedures
Degree of tokenism	People are allowed to hear and to have voice in planning and conducting program	Informing	Government tries to inform to citizen regarding to their rights, their responsibilities and option, but just the one-way communication, of no feedback and no power to negotiation
		Consultation	Inviting citizens' opinions, like informing them, can be a legitimate step toward their full participation, but the output from consultation might not be account to powerholder decision
		Placation	Citizen have some degree of influence through tokenism is still apparent

Source: Arnstein, 1969

Table 2.11Characteristic of participation towards the concept of Arnstein (Cont')

Major step	Characteristic	Steps	Description
Degree of citizenship	People can increasing degree of decision-making towards planning and conducting program	Partnership	Power if in fact redistributed through negotiation between citizens and powerholders, the planning and decision-making has been shared, which is effectively on the organization leaders is accountable
		Delegated power	Negotiations between citizens and public officials can also result in citizens achieving dominant decision-making authority over a particular plan or program
		Citizen control	Citizen have control their local policy and managing regarding to their demand

Source: Arnstein, 1969

In order to explain the idea of participation towards disaster management in terms of coordination, table 2.12 compares the concept of disaster management in the traditional approach and the professional approach. Based on the concept of disaster management stated by McEntire in 2005 and the concept of Ladder of Participation which introduced by Arnstein in 1969, shows that although people and communities are able to involve in disaster management activities, the limitation is that reaching the top of the ladder might not be possible, especially during disaster situation (Boin and T'Hart, 2003) thus, the highest of participation through disaster management activities in this study is limited at the partnership level which is stated in table 2.12

Table 2.12 Comparison between applications of disaster management based on ladder of participation

Characteristic	Description	Application to disaster management
Traditional approach, or non-participation		
Manipulation	People are placed on rubberstamp advisory committees or advisory boards for the express purpose of educating them or engineering their support	Totally follow orders (e.g., law, ordinance or enforcement, or some government initiate disaster management projects)
Therapy	Come from the "dishonest and arrogant" Citizen have to change by themselves in any plan and conducting programs, rather than giving them a say in procedures	Providing basic relief to communities and promising to communities that municipality can protect threats of disaster in the next time
Transitional approach, or degree of tokenism		
Informing	Government tries to inform to citizen regarding to their rights, their responsibilities and option, but just the one-way communication, of no feedback and no power to negotiation	Informing and provide basic information to local community as the standard
Consultation	Inviting citizens' opinions, like informing them, can be a legitimate step toward their full participation, but the output from consultation might not be account to power holder decision	Invite community to participate the disaster management plan in the initial stage (e.g., public hearing)
Placation	Citizen have some degree of influence through tokenism is still apparent	Community member initiate some effort which relevance to disaster management activities to municipality, and shown willingness to involve to those kind of activities in the normal period
Professional approach, or degree of citizen power		
Partnership	Power if in fact redistributed through negotiation between citizens and power holders, the planning and decision-making has been shared, which is effectively on the organization leaders is accountable	Community tries to drive some activities relevance to disaster management together with municipality
Delegated power	Negotiations between citizens and public officials can also result in citizens achieving dominant decision-making authority over a particular plan or program	Might not be reach in this level especially in case of disaster response
Citizen control	Citizen have control their local policy and managing regarding to their demand	

Source: Adapted from Arnstein, 1969, McEntire, 2005, author, 2013

The importance of coordination among government and communities had been addressed as the crucial factors in disaster response, which could be addressed as a professional approach of emergency management. However, problems such as delays in response, communication, and differences of mutual

understanding among divisions towards management in disaster situations; are undermining the effectiveness of disaster response and always occurring in practice. In order to increase the level of professionalism in disaster response, communities should play the important roles and should understand more towards the professional ideas of disaster response rather than focusing on how to increase the capability of the government.

In order to become more professional, organizations are trying to coordinate with each other. The concept of governances had been introduced to fulfill that tasks, which is related to various fields such as public administration, conflict resolution, and environmental management (Emerson, Nabatchi and Balogh, 2011:2) application, situation in terms of governance, norms and rules designed to regulate individual and group behavior (Ostrom, 1990; Emerson et al., 2011). It could refers as the means to steer the process that influence decisions of private, public, and civic sector (O'Learly, Bingham, and Gerard, 2006:7) or a set of coordinating and monitoring activities that enables the collaborative partnership or institution (Bryson, Crosby, and Stone, 2006). These factors such as general system context, drivers, the collaborative government regime (principle engagement, shared motivation, capacity for joint action) are affecting to the efficiency of collaboration in cross-border, multi-jurisdiction level of government control (Emerson, Nabatchi and Balogh, 2011:7), funding, political will (Raju and Niekerk, 2013), organization structure, clear awareness of responsibilities, effective towards information system and transferring, leadership of government and unity, modern logistic technology, and continuous of operational system towards emergency management (Zhou et al., 2010), and

the support from higher governmental units and citizens (Col, 2007:121). The succession towards crisis management are (1) leadership and authority; (2) strategic thinking and decision making; (3) clear team structure; (4) information management; (5) crisis communications and media management; and (6) future planning and "What if?" thinking (Cockram and Heuvel, 2010:10)

2.4 Integrating the theory of planed behavior and flood risk acceptability for speculating on motivation of community action through CBDRR

The intention of local residents and community members are important toward achievement of successfulness and effectiveness of disaster risk reduction at the community level. It depends on how individual concerning toward threats of hazards or disaster. Thus, perceptions in relevance to risk acceptability could determine intention of residents and local people deciding to take action or participation in disaster risk reduction at local level. Theories such as Theory of Reasoned action (TAM) (Ajzen, 1975; Pelletier and Mongeau, 1992), Self-Efficacy Theory (SET) (Bandura; 1977), and Theory of Planned Behavior (TPB) (Ajzen and Fishbein, 1985); had applying to predict the intention of individual to behave and action based on attitude, motivation or cognition. Theory of Reasoned Action (TRA) which tries to predicting the intention of behavior based on personal or attitudinal factor (i.e., behavioral belief and outcome evaluation) and a social or normative factor (i.e., normative beliefs and motivation to comply) (Ajzen, 1975; Pelletier and Mongeau, 1992) Self-Efficacy Theory (SET) described by Bandura which these four aspects are cognitive locus of operation, sources of efficacy

expectation, affective and selection process. (Bandura; 1977, Bandura; 1993) According to Ajzen and Fishbein in 1985, described that the intention of behavior at a personal level in accordance to Theory of Planned Behavior (TPB) are based on three major perspectives are (1) Behavior belief; attitudes, interest (2) Normative belief; social norms or social pressure, and (3) Control belief; experience, interest, self-esteem (Ajzen, 1968, Ajzen and Fishbein, 1977) These three components not only affecting the intention of behavior but also affecting to each other. Decisions at a personal level to risk acceptability depend on personal perception towards risk itself, possibility of occurrence, fear and anxiety, interest in flood damage, social norms and self-responsibility (Motoyashi, 2006), comparison between the cost of reducing risks and the cost of suffering (Hunter and Fetwell, 2001). Those variables are similar to the decision model introduced by Ajzen in 1968; personal attitude, social pressure and self-determination towards disturbances influence individuals to accept that challenge and then changing the intention to respond, adapt or change their behavior toward the challenges or threats that they had perceived. If the decision model causes decision to overcome a challenge and it become resilient to that challenge, the perspective of risk acceptability consists as one part of disaster resilience in the perspective of decision-making in the individual, collective and society. (Ajazen, 1968)

There are some elements that affecting to decision making in natural hazards such as understanding of probabilistic events, perception of hazards, and the processes involved in balancing risks and benefits when choosing among alternative modes of adjustment to hazard adaptation (Slovic, 1974). Risk

perception is also affected by risk acceptability, which is distinguished between natural hazards and technological hazards (Covello, 2008). Individual's decision could be measured by their own vulnerability and coping capacity. Perception of people in disaster management issues, the perception of risk acceptability in aspects of individual perspective, as well as collective and societal perspective, could shape the sense of reducing vulnerability and increase coping capacity. Originally, acceptable risk was firstly applied in engineering terms to define and assess the structural and non-structural measures to reduce damage to humans, property, services and systems to a chosen tolerated level, which was based on the understanding toward probability (UNISDR, 2007) and later are applying more in social studies. To raise the awareness and public acceptability toward threats of flooding, it is necessary to stimulate and encourage disaster prevention at the local level. However, among the consideration of risk acceptability, it not only consideration of a single threat, but also other possibility of threats could also be considered. Factors that influence acceptance of risk can be considered by society, risk perception, fear and anxiety, interest in flood damage, self-responsibility, damage expectation and trust in administrative bodies (Motoyoshi, 2006:125). There are several points that lead risk to become acceptable, such as: (1) it falls below an arbitrary defined probability; (2) it falls below some level that is already tolerated; (3) it falls below an arbitrary defined attributable fraction of total disease burden in the community; (4) the cost of reducing the risk would exceed the cost saved; (5) the cost of reducing the risk would exceed the costs saved when the "cost of suffering" is also factored in; (6) the opportunity costs would be better spent on other, more pressing, public

health problems; (7) public health professionals say it is acceptable; (8) the general public says it is acceptable (or more likely, do not say it is not); and (9) politicians say it is acceptable (Hunter and Fewtrell, 2001:208). Thus, there are three main factors to determine the acceptable risks, which are: (1) acceptable by regulation; (2) acceptable by economic reasons; and (3) acceptable by the decision of professional or decision-maker groups. In the public sphere, where there is access to information which can influence the acceptable risk of public society, and which has accurate information, responsibility should be taken for the widespread dissemination of that information so that communities and people have the proper skills to interpret that information in order to determine which level of risk would be acceptable. Thus, the aspects of acceptable risk are mentioned in executive organizations, emergency managers who act as decision makers in disaster or risk management.

Intention of decision in local community could be determined by risk acceptability, are relates to decision theory, which relates to risk acceptance attitudes, voluntary and involuntary risk-taking, aversion to catastrophic risk with low probabilities but large potentials for damages, and social attitudes towards technological risk (Geiger, 2005). According to a 2008 study by Zhai and Ikeda on the acceptable risk in floods, there are various factors with relevance to acceptable flood risk. There are eight categories which are applied to define flood risk acceptability are: (1) acceptable flood risk: acceptability of above- and below-flood inundation; (2) characteristic of residents: age, income, number of people in household, occupation, residence, period and education; (3) flood-risk perceptions: flood disaster experience, perception towards frequency and

consequence of flood risk; (4) perception of other risks: other kinds of disaster, disease risks, urban risk, and high-technology risks; (5) preparedness for disaster: insurance, evacuation kits, embankments; (6) social measures: evacuation, familiarity with disaster maps; (7) information provision: external effects of flood control, local budget for public facilities; and (8) regional features (Zhai, and Ikeda, 2008:1052)

Table 2.13 Classification of variables in relevance to flood risk acceptability

Cluster	Variables	Source
Perspective of risk and hazard	Flood inundation level	Zhai and Ikeda, 2008
	Other types of risks (e.g., technological hazard, urban risk)	Geiger, 2005 Zhai and Ikeda, 2008
	Possibility of occurrence	Motoyoshi, 2006
Personal characteristics	Age, income, number in household, occupation, period of education	Zhai and Ikeda, 2008
Risk perception	Experience, frequency and occurrence	Zhai and Ikeda, 2008
	Fear and anxiety, interest in flood damage	Motoyoshi, 2006
Information provision	Information, local budget for public facilities, decision from expertise	Zhai and Ikeda, 2008 Hunter and Fewtrell, 2001
Physical characteristic	Regional feature	Zhai and Ikeda, 2008
Preparation	Insurance, evacuation plan, evacuation kits	Zhai and Ikeda, 2008
	Self-responsibility	Motoyoshi, 2006
Social measure	Familiarity with disaster map, consideration of society	Zhai and Ikeda, 2008 Motoyoshi, 2006 Hunter and Fewtrell, 2001
Economic measure	Determination between cost of reducing and cost of suffering	Hunter and Fewtrell, 2001

Source: Author, 2014

2.5 Social pressure, personal attitude, and self-evaluation affecting community willingness to involve in CBDRR activities

Since the importance of public involvement toward disaster risk reduction has been stated, decision of community members to be involved could determine the successfulness and effectiveness of disaster risk reduction activities. To analyze the intention of local people to participate in disaster risk reduction, this research applies the concept of Ajzen and Fishbein in relevance to Theory of Planned Behavior (TPB). These three components are (1) effect from society (i.e., effect from current disaster management policy, effect from other people in community, effect from disaster victims, and perceived information), (2) self estimation or control belief (i.e., experience, interest toward risk reduction, and ability to cope to that risk), and (3) Personal attitude toward challenge or threats of disaster (i.e., risk perception, expectation on damage, consideration between disaster protection and cost of investment, consideration between likelihood and occurrence). These factors influencing the intention of local people to take action toward disaster risk reduction in both self-help (resilience in individual level) and mutual help (resilience in community level). For example, decisions between personal risk acceptability had been made in order to take action; if the expected damage caused by flood could not be accepted, they would tend to make a reaction or response. In the other hands, if the determination between expected damages and current resources are adequate to take action, which means the additional preparation might be not necessary, and then they may decide to not take action. Although the resilience at a personal level was made and they are accepting the threats of risk, it could be able to add resilience at an individual

level. However, it might undermine the effectiveness of resilience at the social level, especially when the disturbances are larger than expected. This might cause the deficiency to bounce back in the managerial perspective, and the ability to absorb the next disturbance becomes poor, and that will undermine the effectiveness of resilience as a consequence. In conclusion, since the system is disturbed by both threats of hazard or disaster risk reduction policies from decision makers, the receiver's (local community or individual) determining variables are perceived information, current level of preparedness and attitudes toward risk, then they will decide whether to take action or not. This circumstance will affect the personal absorbing ability during the disaster period, ability of coping with the disturbance and ability to bounce back to reach the prior system. Decision to take action at an individual level could be changed due to the perceived information, situation of disaster, perceived experience after disaster occurs, or their attitude toward disaster or hazard has been changed.

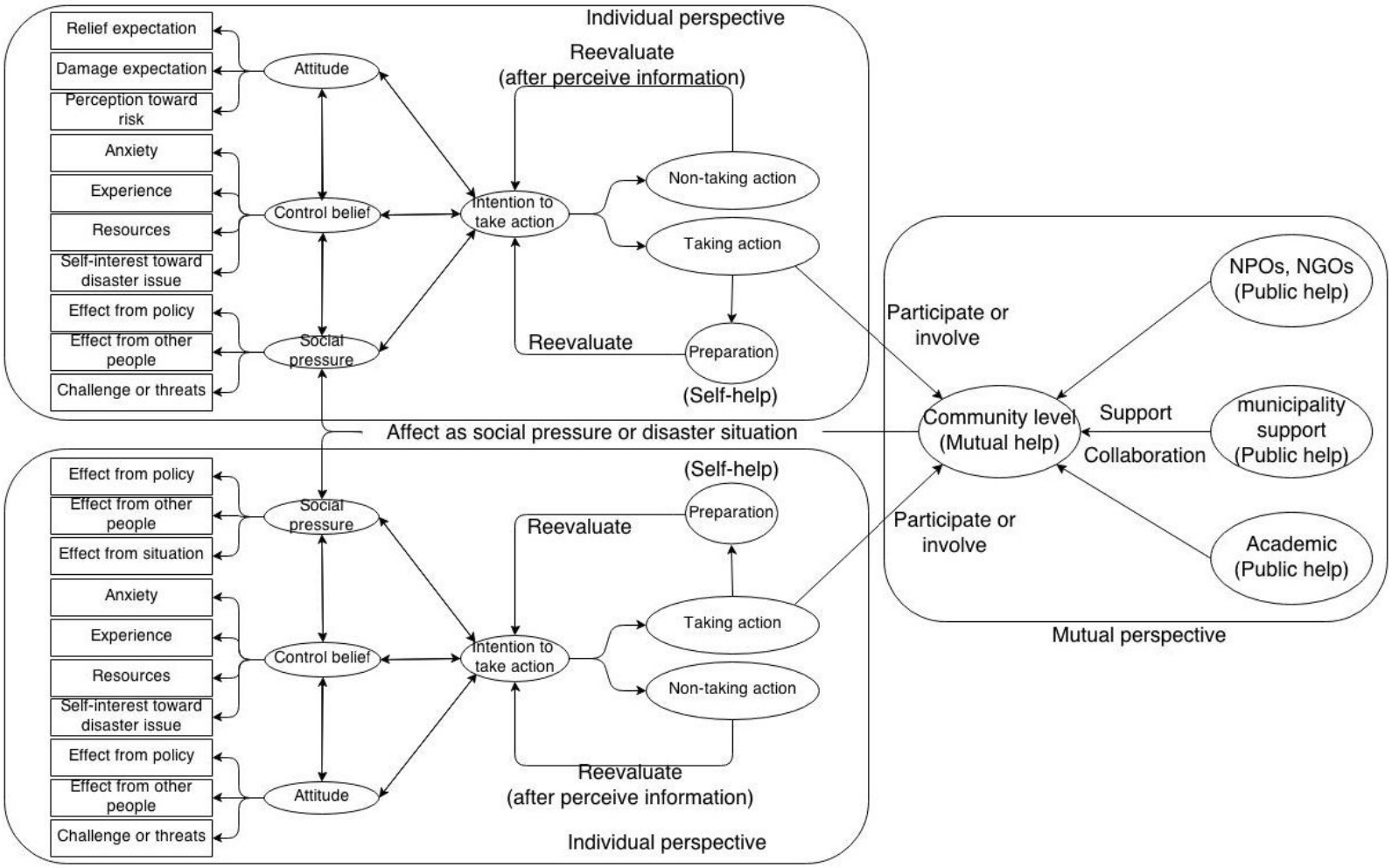

Fig. 2.2 Theoretical framework in analysis of intention to take action in disaster risk reduction at the level of self-help and mutual-help

Source: Author, 2014

The concept of resilience has been developing since 1973 from the environmental perspectives to social perspectives. Basically, it considers between how system could react to the disturbance or challenge by its own resources; absorb, and how that system could restore itself to the prior stage before it disturbed; bounce back. Adaptation was made in some extent for improving the system itself. The resilience concept was introduced in the managerial perspective and has become more practical and strategic, which are the governances, resource allocation, and incident command system are applied in order to raise the effectiveness of resilience in the management approach.

The importance of community involvement in disaster risk reduction is shown in many cases especially in relevance to Community-based Disaster Risk Reduction (CBDRR). The intention of CBDRR in the community is to stimulate and initiate people's participation at the local level under aspects of risk reduction. Community members and residents become important groups in disaster management at the local level when there is difficulty for other stakeholders, such as government or municipality, in providing relief in the response period. Moreover, community members are potentially helping each other or municipality officers as manpower, information providers or small-scale organizers in the disaster response from initial period.

To describe public involvement and intention to participate toward disaster preparation and community based disaster risk reduction, the concept in relevance to risk acceptability and disaster resilience has been applied in this research in order to establish theoretical framework. The intention of local people to take action or participate in disaster risk reduction come from (1) social

pressure or effect from society, (2) self-evaluation toward disaster or threats and ability to cope by their own resources, and (3) attitude toward risk or challenge. This research had adopted the concept of Theory of Planned and Behavior which introduced by Ajzen and Fishbein in 1985 and applying variables in relevance to concept of flood risk acceptability from previous study (Slovic, 1974; Hunter and Fewtrell; 2001, Geiger; 2005, Motoyoshi; 2006, and Zhai and Ikeda, 2008) in order to describe how local community members are intending to take action in disaster risk reduction. The intention of a community member or individual perspective could predict which level that local people intending to respond (non-taking action, self-help or mutual help) and what kind of disaster risk reduction activities that they intend to make, either personal preparation or collective response. It could potentially evaluate how well that community could absorb and bounce back due to the disturbance in regards to the concept of resilience.

3. Community involvement in CBDRR activities during flood incident

3.1 Community performance in responding to flood incident

The aim of this chapter is to answer the research question number 2 "*How can community members involve in flood risk reduction activities during flood incident?* Research objective in accordance to research question 2 is, to identify types of flood risk reduction activities that communities be able to involve in current disaster management plan. To answer research question number 2, The Strategic National Action Plan (SNAP) for Disaster Risk Reduction and the implementation plan called "Pak Kret Model" which is considered as one effort of the operation plan during the flood incident in 2011 Thai flood, are reviewed in this section. And research question number 3 is "*What factors influence community members to respond during flood incident based on Flood Risk Acceptability?*" There are two research objectives in accordance to research question 3 are (1) To find out how early the community members starting to respond during flood incidents, and (2) To analyze the relationship between personal characteristics, influence factors, and the starting dates to respond since flood incident start based on Flood Risk Acceptability. To answer research question number 3, a questionnaire survey about the attitudes to the flood incident in the selected case study in Pak Kret Municipality, Nonthaburi province, is analyzed. Pak Kret is considered as an urban flood-prone area.

Fig 3.1 Study diagram in chapter 3

Source: Author, 2014

3.2 The title role of community in providing information and manpower during disaster at the municipality level

3.2.1 Strategic National Action Plan (SNAP) for Disaster Risk Reduction

In 2010, the Ministry of Interior established a plan called Strategic National Action Plan (SNAP) on Disaster Risk Reduction to apply as operational plan for responding to disaster situation (2010 – 2019) This SNAP plan was established under the Hyogo Framework for Action (HFA) for initiatives on how to tackle threats from disaster and consequential hazards. According to SNAP plan, there are four aspects that are specified into the plan as core strategies are (1) Prevention and Mitigation, i.e. Information management, Risk assessment, Community-Based Disaster Risk Management Programs (CBDRM), Risk awareness projects; (2) Preparation: (i.e. improvement of early warning system, disaster training drill, disaster preparedness plan, machine preparation, basic needs preparation, budget allocation, infrastructure preparation); (3) Emergency response: (i.e. monitoring, Incident Command System (ICS), evacuation planning, provision of relief aid, search and rescue); and (4) Rehabilitation and Reconstruction plan: (i.e. disaster damage assessment, measurements in relief efforts, urban infrastructure restoration, disaster relief goods allocation and management, mental relief, and recovery plan establishment). SNAP plan also designs the main actors and supporters to coordinate for each strategy.

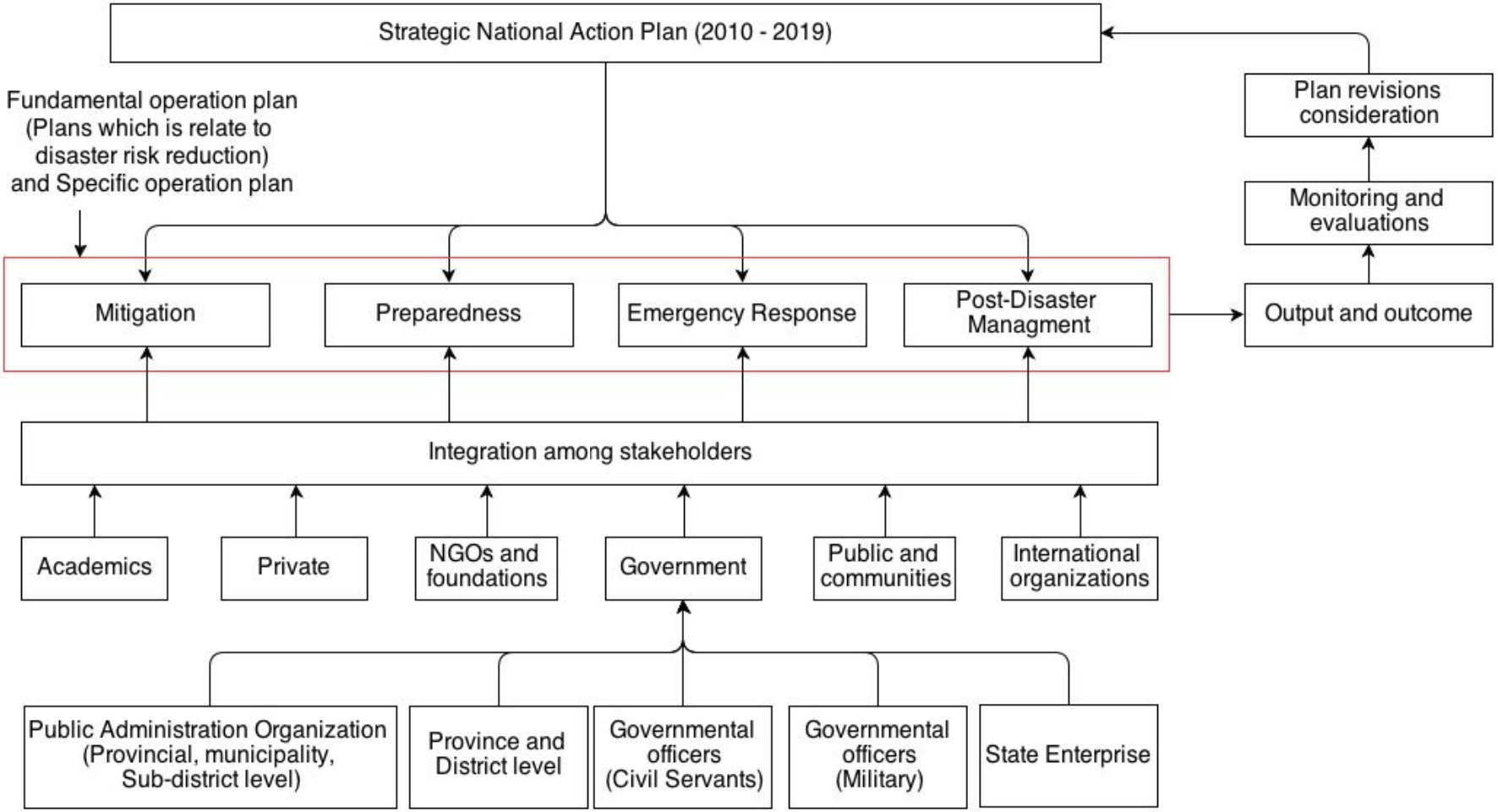

Fig. 3.2 Relationship between SNAP and National Preparation Plan
Source: Strategic National Action Plan, 2010

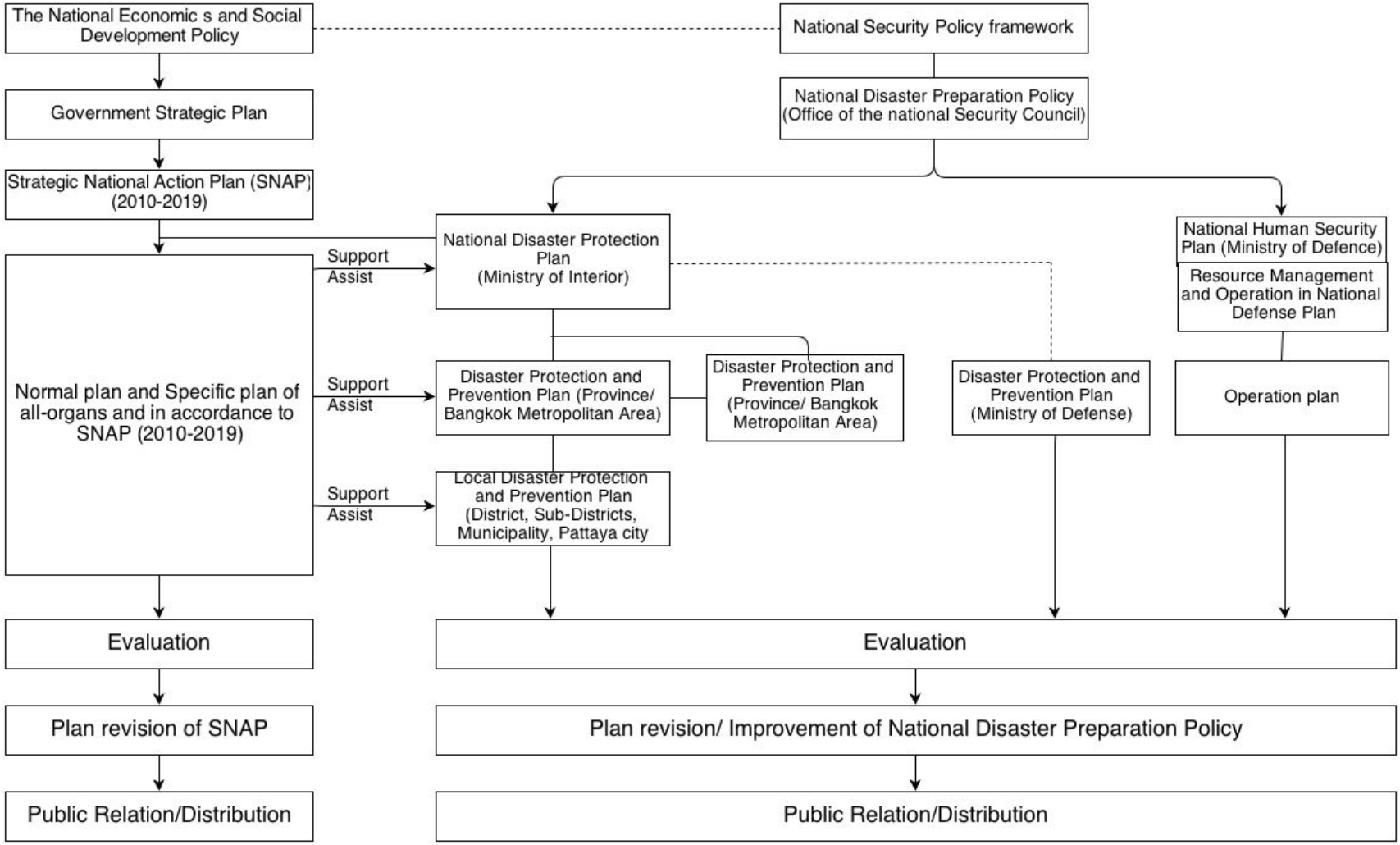

Fig. 3.3 Operation procedures and plan revision under SNAP

Source: Strategic National Action Plan, 2010

Table 3.1 Activities stated in Strategic National Action Plan (SNAP) in 2010 - 2019

Core Strategy 1: Prevention an d Mitigation			
Strategic Issue	**Description**	**Actors/ Participants**	
		Main Actor	**Supporters**
Expanded Implementation of Community Based Disaster Risk Management (CBDRM)	Establish the CBDRM as a baseline and to integration to all departments, division, and subordination organs	Department of Disaster Protection and Prevention	Related organizations, departments, divisions, Int'l Organizations
	Establish CBDRM curriculum for training officers in all departments, division, and subordination organs	Department of Disaster Protection and Prevention	Province, Amphoe, Municipality, PAOs, Int'l organizations
	Training CBDRM to disaster prone area	Public Administration Organization	Department of Disaster Protection and Prevention, Province, Amphoe, Municipality, PAOs, Int'l organizations
National Disaster Management Information System	Linkage the database to all level and all types of administrations (civil servants, military, department, division, etc.)	Department of Disaster Protection and Prevention, Military, Civil servants, PAO, NGOs, Int'l Organizations	Private sectors, Province, Bangkok
Multi Hazard Risk Assessment and Mapping	Integrative Flood, Landslide, and windstorm Protection Master Plan	Department of Disaster Protection and Prevention	Related organizations, departments, divisions
	Plan establishment in accordance to support to all types of hazards and disasters		
Public Awareness and Education for DRR	Raise public awareness in disaster risk reduction issues	Department of Disaster Protection and Prevention	Related organizations, departments, divisions, Private Organizations, foundations

Source: Strategic National Action Plan, Ministry of Interior, 2010

Table 3.1 Activities stated in Strategic National Action Plan (SNAP) in 2010 – 2019 (Cont')

Strategic Issue	Description	Actors/ Participants	
		Main Actor	Supporters
Core Strategy 1: Prevention an d Mitigation			
Public Awareness and Education for DRR	Raise common understanding in disaster risk reduction issues in young generation	Ministry of Education	Department of Disaster Protection and Prevention, Related organizations, departments, divisions
DRR applied Research and Development	Initiate and support research projects in topics relevance to DRR	Ministry of Education, Department of Disaster Protection and Prevention	Related organizations, departments, divisions
Core Strategy 2: Preparedness			
Enhanced National Disaster Early Warning and Dissemination	Coordination to departments which relate to early-warning system	National Disaster Warning Center	Department of Disaster Protection and Prevention, Institutions
	Encourage the local wisdom for apply in risk communication	Department of Disaster Protection and Prevention, Department of Local Administration	PAOs, Provinces, NGOs, Institutions, Religions, RAST
Training Programs	Regular training program	Department of Disaster Protection and Prevention	Related organizations, departments, divisions, Private Organizations,
Preparedness and Response Capacity Enhancement	One Tambon One Search and Rescue (OTOS)	Department of Disaster Protection and Prevention, MoE	Province, Amphoe, PAOs, Civil Society, Private Organization
	Establish local risk maps and evacuation map	Department of Disaster Protection and Prevention	Related organizations, departments, divisions, Private Organizations,
	Launching ICS training programs	DDP, MoE , Thai Research Funds	DDP, Amphoe, NGOs

Source: Strategic National Action Plan, Ministry of Interior, 2010

Table 3.1 Activities stated in Strategic National Action Plan (SNAP) in 2010 – 2019 (Cont')

Strategic Issue	Description	Actors/ Participants	
		Main Actor	Supporters
Core Strategy 2: Preparedness			
Public Awareness	Disaster warning equipments installation in communities	Department of Disaster Protection and Prevention, Department of Local Administration, Water Resource Management	PAOs, Provinces, NGOs, Institutions, Religions, RAST
	Establish local disaster early-warning network	Department of Disaster Protection and Prevention, Department of Local Administration, Department of Mineral Resources	Department of Provincial Administration, PAOs, Provinces, NGOs, Institutions, Religions, RAST
	Publish operating manual for community leaders	Department of Disaster Protection and Prevention, Department of Local Administration	PAOs, Provinces, NGOs, Schools
Core Strategy 3: Emergency Response Management			
Enhancing Emergency Communication System	Communication management for support ICS	The National Telecommunications Commission, Ministry of Information and Communication Technology	Department of Disaster Protection and Prevention, Department of Provincial Administration, PAOs, Provinces, NGOs, Institutions, RAST, Private organization
Core Strategy 4: Rehabilitation and Reconstruction Plan			
Preliminary survey (Damage assessment)	Establishing criteria for assessment (Damage assessment)	Department of Disaster Protection and Prevention	Department of Provincial Administration, PAOs, Civil society, Private organization
Demand assessment	Establishing criteria for assessment (Demand assessment)		Department of Provincial Administration, PAOs, Amphoe

Source: Strategic National Action Plan, Ministry of Interior, 2010

There are two types of relations within governmental sectors are vertical relationships and horizontal relationships. Vertical relationship always found in terms of policy implementation, especially in terms of designation through various kinds of commands and control approaches, such as Incident Command System (ICS) or Single Command (SC) where the subordinate units take action towards plans which the supervising organ initiates. The coordination effort and collaboration effort can be found in the subordinate organs, which are considered as action units such as municipality and communities. Collaboration among subordinate organs might happen in different subordinate organs where they belong to different supervising organs; horizontal relationship. The fundamental activities, such as training, information sharing or some disaster management activities stated in SNAP plans reveal the significant collaboration between community and government (Table 3.2). However, the vertical relationship becomes important in emergency response situation, where the horizontal relationship. (Among subordinate organs) become important and underpinned to increase their capability especially in non-disaster situations.

Toward collaboration between government and community in disaster management, it depends on situation. Community member becomes participants in training in community level as effort for increasing capacities to minimize loss and damages caused by disaster. Become information providers to mayor or emergency managers in municipality level during disaster situation. And become surveyors to examine damages and loss after disaster situation (Fig. 3.3)

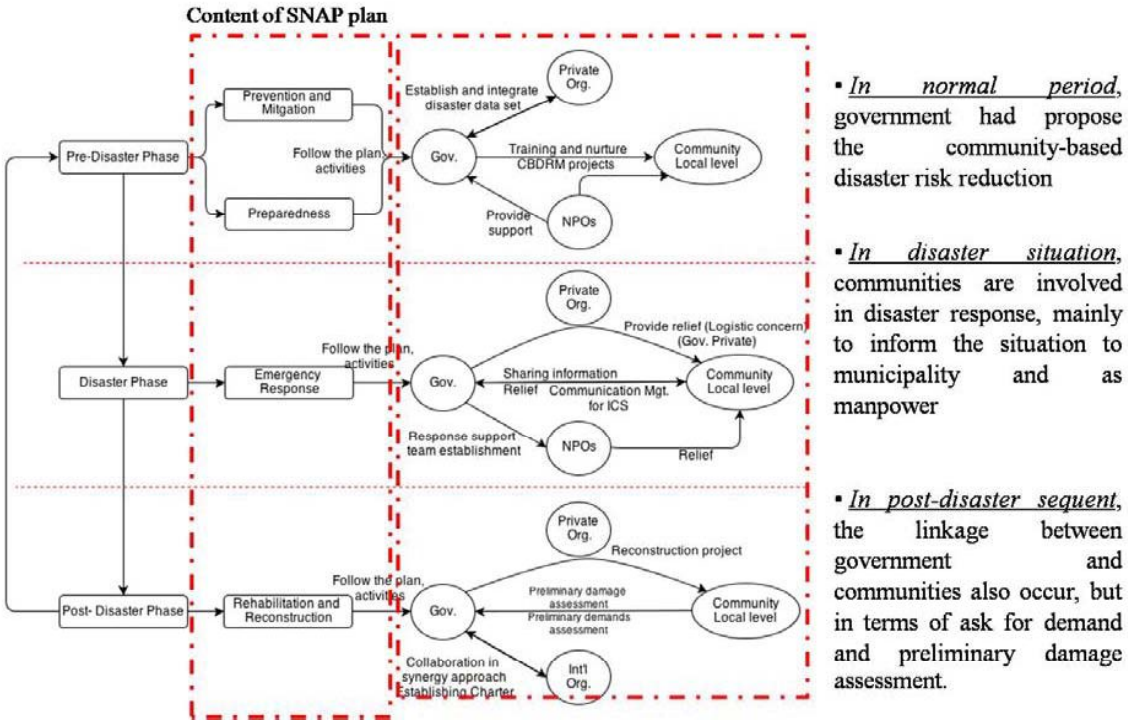

Fig. 3.4 Linkage between government and external organs in disaster collaboration under SNAP plan

Source: Author, 2014

Table 3.2 Investigation into the collaboration between government and community in disaster management policy in Thailand

Strategy	Activity	Role of communities, civil society	Compare to ladder of participation
Expanded Implementation of Community Based Disaster Risk Management (CBDRM)	Training CBDRM to disaster prone area	*Department of Disaster Prevention and Mitigation* – Nurture CBDRM training *Community* – Participation training	Informing (Gov – Com)
Public Awareness and Education for DRR	Raise public awareness in disaster risk reduction issues	*Publish pamphlets, websites, News to stimulate public awareness*	Informing (Gov – Com)
	Raise common understanding in disaster risk reduction issues in young generation	*Provide study curriculum for increase awareness in young generation in school*	Informing (Gov – Com)

Source: Author, 2013

Table 3.2 Investigation to the collaboration between government and community in disaster management policy in Thailand (Cont')

Strategy	Activity	Role of communities, civil society	Compare to ladder of participation
Preparedness and Response Capacity Enhancement	One Tambon One Search and Rescue (OTOS)	*Provide training curriculum for training local people to be ready for response in initial phase of disaster*	Informing (Gov – Com)
Enhanced National Disaster Early Warning and Dissemination	Encourage the local wisdom for apply in risk communication	*Encouraging the local radio team to participate in the sequent of disaster period. For support the implication of incident command system*	Informing (Gov – Com) (Com – Gov)
Public Awareness	Disaster warning equipment installation in communities	*Training community volunteers to monitoring hazards and inform to other community member*	Informing (Com – Com)
Preliminary survey (Damage assessment and demand assessment)	Establishing criteria for assessment (Damage assessment)	*Affected people assess damages in their community after disaster situation*	Informing (Com – Gov)

Source: Author, 2013

3.2.2 Pak Kret Model

Pak Kret Municipality is located in Nonthaburi province, which is considered as one province of the Bangkok vicinity. This area is residential zone for serving commuters who are working in the Bangkok Metropolitan Area. According to the geographical data, Pak Kret municipality is located in a low-flat land area and located near the Chao Phraya River and assumes risks of river flood and excessive rainfall. Pak Kret Municipality could have been affected by the flood in 2011 but was not critically affected by the flood of 2011. (GISTDA, 2012) Pak Kret Municipality officers started to make preparation in March 2011, when the upstream areas had already been affected by the flood. Pak Kret Municipality applied the Pak Kret Model as flood response operation framework, which relied on situation. According to Geo-Informatics and Space Technology

Development Agency (GISTDA) in 2013, Pak Kret municipality has not suffered a severe flood since 2006. (Fig. 3.4)

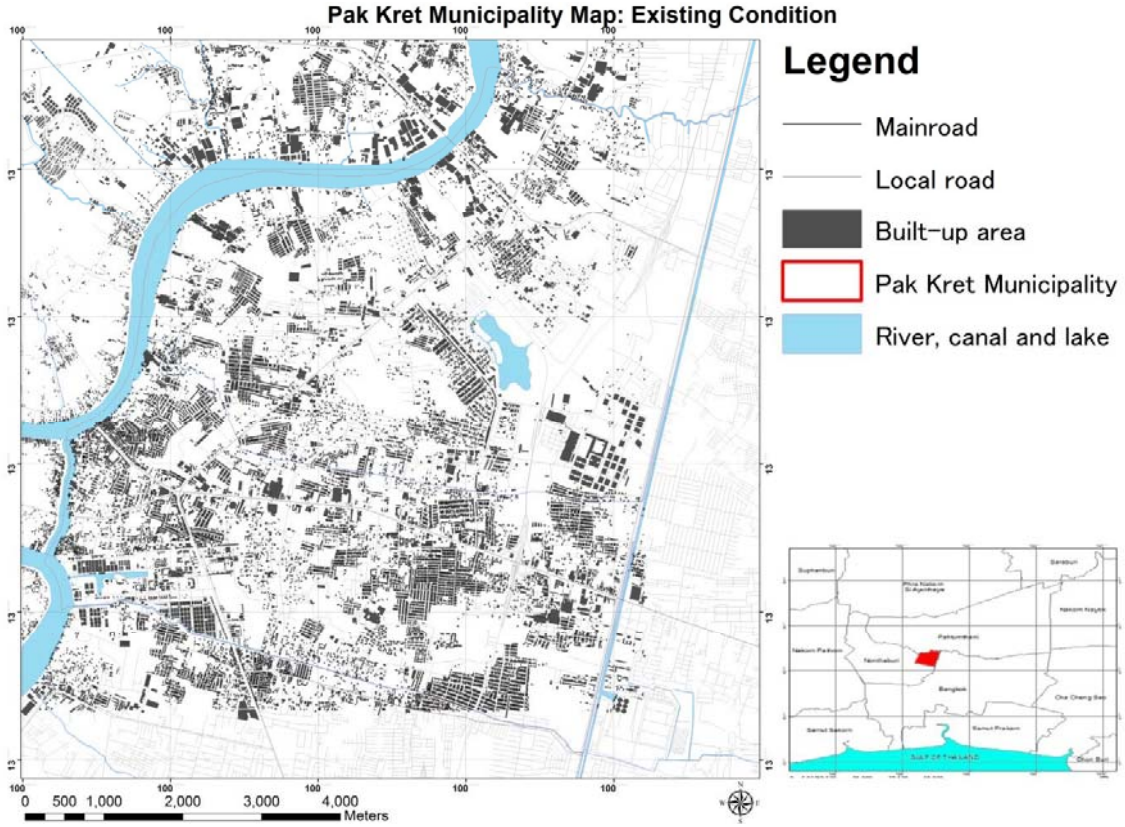

Fig. 3.5 Location of Pak Kret Municipality, Nonthaburi Province

Source: Pak Kret Municipality, 2012

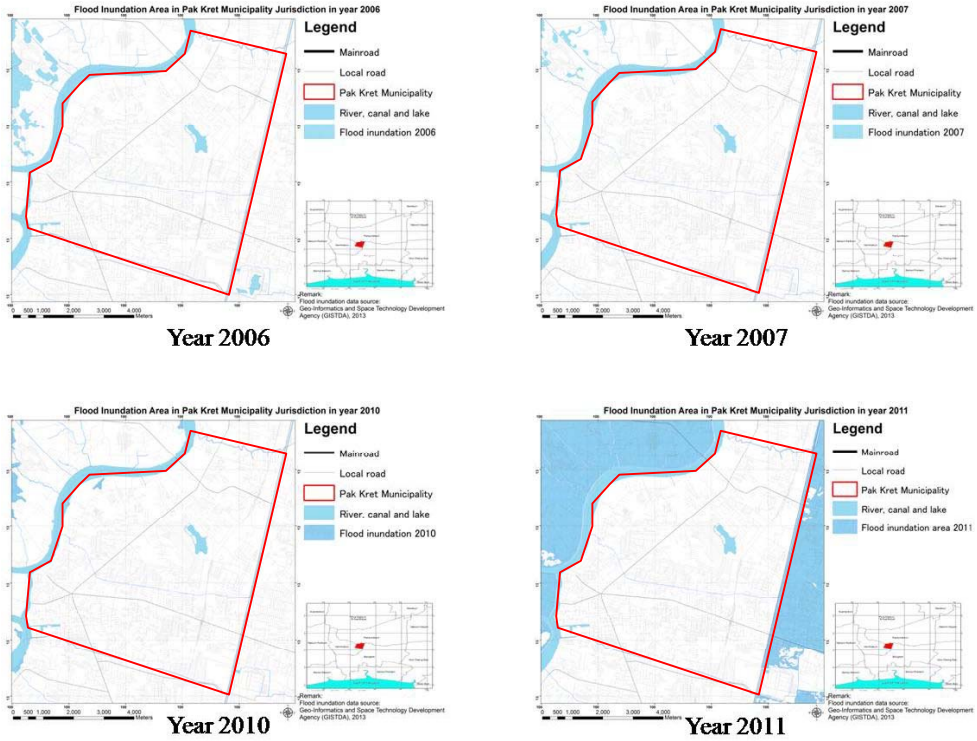

Fig. 3.6 Flood history in Pak Kret Municipality between 2006 – 2011
Source: GISTDA, 2012

3.3.1 Content of Pak Kret Model

The experience of the flood situation in the year of 1992 increased municipality concern and awareness of local communities towards flood protection. Activities and projects had started in the three-year municipality development plan, which related to disaster mitigation activity. (e.g. building river dykes, installing pumping stations and increasing the height of the road) These implemented projects caused Pak Kret municipality not to be affected by severe flooding afterwards. As the Municipality Ordinance which enacted in the year of 2003, Pak Kret Municipality was divided into three organs are executive-organ, legal-organ, and municipality officers; who are taking responsibility to provide services, establish and implement development policies of the

municipality under the execution by the Mayor[8]. Each division had responsibility in regards to duty, which are stated in ordinances as follows. (Table 3.3)

Table 3.3 Usual tasks in each organ under municipality

Division and office	Duties and tasks
Office of the Municipal Clerk	Municipality secretariat, collaborate organ between other organs within municipality, execute legislation and basic public service and being the organ that related to disaster prevention and relief
Division of Plan and Policy Analysis	In charge on the establish development guideline, analyze the plan, evaluation, establish planning budget, public relations, and establish special ordinances with not been state in municipality ordinance
Division of Finance	Manage and response in the budget and expense regarding to the municipality activities, and collect taxes
Division of Public Works	In charge on the building permission within municipality boundary, maintenance municipality infrastructure
Division of Social Welfare	In charge on the activities related to social works, and compost any activities for increasing capacity of labors community improvement tasks
Division of Public Health and Environment	Manage on municipality utilities, public health-related activity, and control local disease and plague
Division of Education	In charge on planning related to school activities, improving school curriculum
Subdivision of Disaster Prevention and Mitigation, Office of the Municipality Clerk	In charge of the activities regarding to the disaster relief, and prevention activities for protect people in daily life

Source: Pak Kret Municipality Office, 2013.[9]

According to the flood response activity in Pak Kret municipality, the crucial aspects in this activity had strengthened the importance of coordination, information sharing, relief efforts and other projects of flood response by integrating the positive aspects among municipality, communities, volunteers and other organizations as the foundation of flood response activity. There are eight principles of flood management in Pak Kret municipality[10], which could be stated as follows

8 Pak Kret Municipality (2013), [Online] http://www.pakkretcity.go.th/index.php [27/1/13]

9 Pak Kret Municipality (2013), [Online] http://www.pakkretcity.go.th/index.php [28/1/13]

10 Division of Plan and Policy Analysis, Office of the Pak Kret Municipality, 2012: Flooding Mitigation Report, Annual Report in 2012, Pak Kret Municipality, pp.32-35

(1) Progressive – In regards to the uncertain situation of disaster confrontation; emergency managers towards the prediction, emergency management, recovery efforts and understanding the physical characteristics of the area. All are becoming key issues for initiate and implement the relief activities to become more efficient.

(2) Risk Driven – The difference of physical characteristics had affected the severity of disaster and the abilities to manage and mitigate in that area. Consequently, the plan initiation and implementation towards disaster management should follow the actual situation, local resources and strength and weakness of communities, are affecting to the achievement of disaster management activity in effective way.

(3) Comprehensive – All divisions within horizontal level and vertical level had responsibility towards disaster response. Executive organs had to understand the context of disaster management activity in accordance to the disaster relief, response and other policies implementation towards disaster management.

(4) Integration – This principle considering as a core idea of disaster management in both the small-scale area and the wide-scale area of disaster. The emergency manager should play as a key person to manage resources and initiate the collaboration among divisions and groups of people. The potential towards integration also leads to the succeeds of disaster response and recovery activities.

(5) Coordination – This principle is related to the coordination among disaster response organs. The clarification on duties for each divisions are

necessaries in disaster management activity which increases the capability of responsible organs and reduce the redundancy towards disaster response activity.

(6) Collaboration – Emergency manager have to concern and maintain the relationship among actors in order to achieving the successfulness of collaboration among the multiple organs in disaster response activity. Encouragement of building mutual trust, teamwork, consensus and increasing the effectiveness of communication are important to achieve in this perspective.

(7) Professional – Emergency managers have to operate and manage by implementing the combination of both science and art as a professional way. Activities that relate to adaptation, investigation and improvement of education to understanding towards disaster management activities of emergency managers are necessary for the emergency managers.

(8) Flexible – Emergency managers have to keep in mind that disaster could occur at anytime as uncertain situations. Thus the response plan and implementation should depending on the actual situation, which could not totally rely on the response manual.

During the disaster situation, Pak Kret Municipality had implemented the Pak Kret Model as its operation for flood response which concerned the coordination among municipality, communities and non-profit organizations towards providing basic relief, confirming information to be accurate, technical

support and monitoring by mayor.[11] Regarding the Pak Kret Model, there are eight approaches described in table 3.4

Table 3.4 Activities in divisions towards tasks in Pak Kret Model

Task	Measurement	Divisions
On-site Threat monitoring	Launch on-site monitoring headquarters in strategic point under supervision by mayor in activities that related to monitoring and evaluation had been done in the strategic point for obtain actual situation	• Office of the Municipal Clerk • Division of Public Works
Public Relation unit	Establish Public Relation team for communicate by coordination between officers and local people for distribute accuracy data and information	• Division of Plan and Policy Analysis • Subdivision of Disaster Prevention and Mitigation, Division of Local Administration
Equipment support unit	Search and prepared flood protection equipment, coordinate for relief with external groups such as volunteers, foundations and other unaffected municipalities by flood disaster	• Division of Finance • Office of the Municipal Clerk
Relief aid support unit	Dispatch survey team to affected communities and the primary health care service for controlling contact disease	• Division of Social Welfare • Division of Public Health and Environment
Refugee rehabilitation support unit	Established special team for relief in case of the evacuation process had announce, and contact to public schools in municipality to become a temporary shelter place	• Division of Education Support
Disaster Emergency Response unit	Evaluate and monitoring the actual situation of flooding for collaborate to the equipment support team for dispatch flood protection equipment	• Division of Public Works • Subdivision of Disaster Prevention and Mitigation, Division of Local Administration
Community Participation unit	Encourage the communities for participating to the flood protection activities both inside the flood barriers communities and non-flood barriers communities	• Division of Social Welfare • Division of Education Support • Division of Plan and Policy Analysis
Flood monitoring unit (Update daily, recovery effort, immediate response, checking information before announcement)	Monitoring daily regarding to the unsecure situation of flooding, warning and giver information to people within municipality, and ensuring to the flooding situation in affected communities for reduce the redundancy which also reduce the unnecessary of relief in community level	• Division of Plan and Policy Analysis • Office of the Municipal Clerk • Division of Public Works

Source: Pak Kret Municipality, 2012

11 Division of Plan and Policy Analysis, Office of the Pak Kret Municipality, 2012: Flooding Mitigation Report, Annual Report in 2012, Pak Kret Municipality, pp.32-35

The potential of the Pak Kret Model toward flood respond are the sense of coordination among all tasks under disaster response between organs within the municipality, and trying to stimulate community members to involve with municipality officers to taking flood response as a mutual-help. Activities such as focusing on actual implementation, team working, and the leading role of mayor had obviously found. However, the Pak Kret model had operated during the disaster response in October 2011. Regards to the succeed of management of Pak Kret model, these three elements were addressed as follows

(1) The leadership of the community leaders – the experience from leader plays as the effective factors during flood incident, which included good management, problem resolving, and preparation before situation become more severe.

(2) The cooperation among communities – which is relates to the community network policy that launched in the normal period. The cooperation among communities and municipality can emerge effectively during the disaster phase.

(3) The accuracy of information – Various sources of information are widespread and causes people to misunderstand. To minimize this threat, the municipality had encouraged local people to inform the actual situation at on-site level. Consequently, the Flood Information Center had initiated screening, and established ordinances and information more accurately.[12]

In order to figure out activities in regards to the response and recovery activities in disaster management municipality, four main questions were asked

12 Pak Kret Municipality (2013), [Online] http://www.pakkretcity.go.th/index.php [26/1/13]

in December 2012 to the Head officer of Division of Planning, Pak Kret Municipality in Nonthaburi Province[13]. The activities of Pak Kret municipality are relates to improving living conditions in communities under the municipality jurisdiction.

Regarding to actual response and recovery in the municipality during the flood incident in 2011, since Pak Kret municipality had experienced by flood in the year of 1992, concerning to flood protection projects were addressed in the municipality development plan based on structural mitigation and measurement. To responding toward flood incident in 2011, on-site monitoring by the mayor had started in initial period. Information sharing to communities, media and volunteers and encourages people to participate in accordance to ther framework of Pak Kret model. Other divisions such as the Provincial Waterworks Authority (PWA) also took part in water drainage. Non-profit Organization also involved in disaster response activities. The activities are relates to health relief, rehabilitation and collecting data after the disaster, had partially support by NGOs. These circumstances are reflected as the positive perspective of municipalities coordination in terms of manpower, information sharing and gives flood protection equipment. However, the redundancy regarding relief allocation (e.g. survival bags and medicine distribution) provided by some groups or NPOs are not coordinated with the municipality but dispatched directly to communities, especially the familiar communities. As the

13 Petchda Vejsri, Division of Plan and Strategy, Pak Kret Municipality, Nonthaburi Province, interviewed in 19 December 2012

opinion of a key informant, the structure-based approach in term of registration, direction towards relief from higher organs might consume plenty of time.[14]

According to the success of flood management in Pak Kret Municipality in the opinion of the officer, the cooperation among other administrations organs in levels are necessary to achieve that goal. However, during the operation, there are both positive and negative outcomes. A positive aspects are the increasing sense of coordination among organs, communities and volunteers who play a significant role in disaster management activity. But threats from different backgrounds, ways of thinking and different perceptions towards political interest had deflected the efficiency in the disaster response at local level.

Threats from the unclear situation, information are leads decision making from the cabinet and central government become unclear during the pre-warning phase. This circumstance caused mayor decided to operate the plan befor flood incident. The preparations initiated by Pak Kret municipality began since March in 2011 instead of waiting to follow an order from the upper tier; government and cabinet. An actor who could be suitable for declaring a disaster situation should be initiated by the mayor or emergency manager in municipality, because they better know the actual situation than officers in the upper tiers. This consequently leads to preparedness and a well managed pre-caution phase.[15]

The potential of coordination between municipality and communities is important towards the flood response in Pak Kret municipality, which had clearly stated the importance of the public sector as resources. Especially as

---

14 Petchda Vejsri, Division of Plan and Strategy, Pak Kret Municipality, Nonthaburi Province, interviewed in 19 December 2012

15 Petchda Vejsri, Division of Plan and Strategy, Pak Kret Municipality, Nonthaburi Province, interviewed in 19 December 2012

manpower towards the municipality response activity under the scarcity of resources which is relevant to the concept of the professional approach.[16] The Pak Kret model had operated during the flood incident in regional level towards preparation and response. The mayor and deputy-mayor had responsibilities to monitor, supervise and implement relief at flood affected area. The relief and counter measurement are depending on the actual situation or incident. The mayor had to supervise due to an uncertain situation under a hierarchy of municipality management structure. The disaster response activity of Pak Kret municipality tended to be flexible and coordinately-based towards the aspect of the professional approach rather than the traditional approach.[17]

3.3 Community members were not ready for flood response

The expected respondents in this study are 200 samples; however, some of those sampled did not answer some questions, so those samples were removed from the analysis. The results of the questionnaire survey included aspects such as sex, age, education level, occupation, number of household members, number of vehicles owned, and perception of flood-prone areas are shown in table 3.5.

16 McEntire, 2007, Disaster Response and Recovery, pp.86-108

17 Ibid, 2007, pp. 86-108

Table 3.5 Basic information of respondent

Variables	Aspect	Quality	Percentage
Sex of respondent	Male	89	44.7
	Female	**110**	**55.3**
	Total	199	100
Age of respondent	Less than 20 years	19	9.6
	20-30 years	59	29.8
	30-40 years	34	17.2
	40-50 years	**60**	**30.3**
	50-60 years	25	12.6
	Over than 60 years	1	0.5
	Total	198	100
Education level	Lower than junior high school	14	7.1
	Junior high school	16	8.1
	High school	35	17.8
	Vocational degree	34	17.3
	Bachelor degree	**83**	**42.1**
	Higher than Bachelor degree	15	7.6
	Total	197	100
Monthly income	Less than 10,000 THB	65	33.9
	10,001-20,000 THB	**78**	**40.7**
	20,001-30,000 THB	36	18.7
	30,000-40,000 THB	11	5.8
	More than 40,000 THB	2	1
	Total	192	100
Occupation	Student/University student	32	16.2
	Civil servant	27	13.7
	Contractor/hired	**36**	**18.3**
	Shopkeeper/business owner	20	10.2
	Unemployed	2	1
	Housekeeper	19	9.6
	Employee in private entrepreneur	34	17.3
	State enterprise	25	12.7
	Other	2	1
	Total	197	100
Do you think are you living in flood risk area?	**Yes**	**102**	**53.1**
	No	71	37.0
	Not sure	19	9.9
	Total	192	100

Missing data are excluded
Source: From Questionnaire survey, August, 2013

There are 200 respondents in Park Kret Municipality case study, most of the respondents are female; there are 110 female, which is equal to 55.3% of total sample in this survey. Most of respondents are of the age of forty to fifty years

old, there are 60 respondents which is equal to 30.3% of total sample. Second is respondents who are in between twenty to thirty years old, there are 59 respondents, equal to 29.8% of total sample. Most of respondents graduated with a bachelor degree; there are 83 samples that graduated at bachelor level, which is equal to 42.1% of total respondents. Second rank is high school; there are 35 persons, which is equal to 17.8% of the total sample. Regarding the monthly income of the respondents, the result shows that most of respondent's incomes are in between 10,001 – 20,000 THB/month; there are 78 persons, which is equal to 40.7% of total respondents. Second is the monthly income that less than 10,000 THB/month, there are 65 respondents, which is equal to 33.9% of total respondents in this case. Most of respondents are contractors; there are 36 persons, equal to 18.3% of total respondents in this study. Second is employee, there are 34 persons, which is equal to 17.3% of total respondents. Third is student and university student; there are 32 persons, which is equal to 16.2% of total sample in this study area. Most of the respondents in Park Kret Municipality recognized that they are living in a flood prone area; there are 102 persons, which is equal to 53.1% of total respondents in this study. There are 71 persons who do not think they are living in a flood prone area, which is equal to 37.0% of total respondents. The basic information of respondents in Park Kret Municipality is shown in table 3.5

3.3.1 Community members are taking flood response after two or three days after flood incident start

According to respondents' decision to respond classified by flood inundation level, there are differences in perception of flood risk acceptability of respondents. In the case of Pak Kret Municipality, the output shows that the decision of respondents to respond seems to be similar regardless of flood inundation. Most respondents are not taking a flood response immediately since flood incident start. In the case of flood inundation level of less than 30 centimeters, the average time to respond for respondents was approximately five days after flood incident started, but in the range of two to seven days ($_{Mean0-30cm}$=5.81, SD=3.71) after the flood occurs. However, the average for people to respond regardless of level of flood inundation was approximately 6 days (Mean $_{31-60cm}$ =6.08, SD=3.27, Mean $_{61-90cm}$ =5.88, SD=2.29) Output of the average date of respondents towards decision to take response classified by level of flood inundation is shown in table 3.6.

Table 3.6 Starting date to take response during flood incident classify by level of flood inundation

Number of date to take response after flood incident	Flood inundation level					
	0-30 cm		31-60 cm		61-90 cm	
	Qty.	Perc.	Qty.	Perc.	Qty.	Perc.
One day	1	0.50	1	0.50	1	0.50
2-3 days	76	38.19	41	20.50	18	9.05
3-6 days	42	21.11	82	41.00	108	54.27
6 Days or later	80	40.20	76	38.00	72	36.18
Average	5.81		6.08		5.88	
SD	3.71		3.27		2.29	
Mode	4		3		3	

Source: From Questionnaire survey, August, 2013

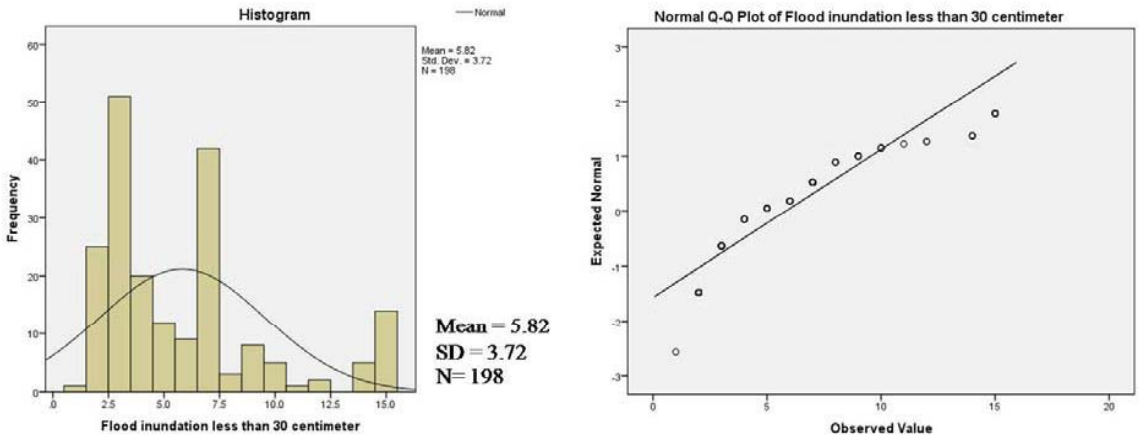

Fig. 3.7 Histogram and normal Q-Q plot of time to starting response after flood had inundated at 0-30 CM

Source: Author, 2014

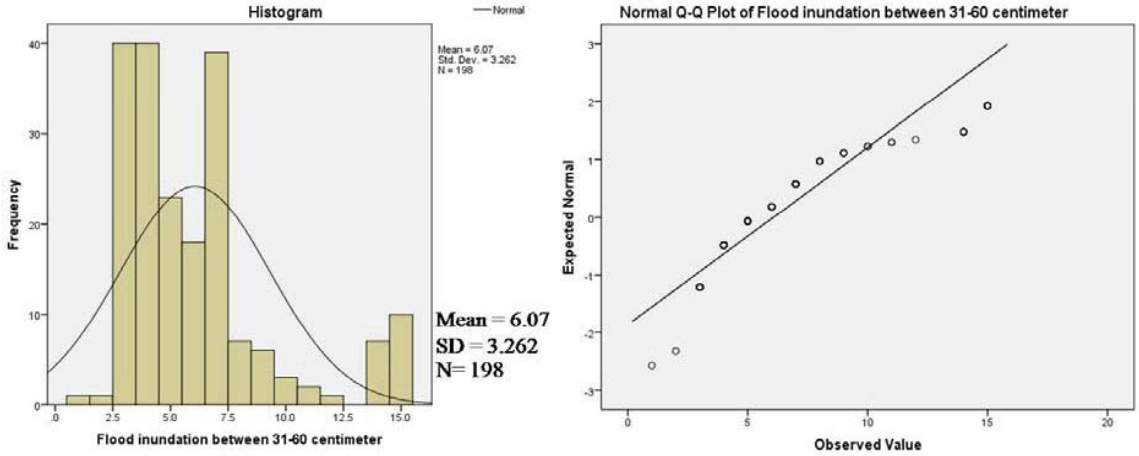

Fig. 3.8 Histogram and normal Q-Q plot of time to starting response after flood had inundated at 31-60 CM

Source: Author, 2014

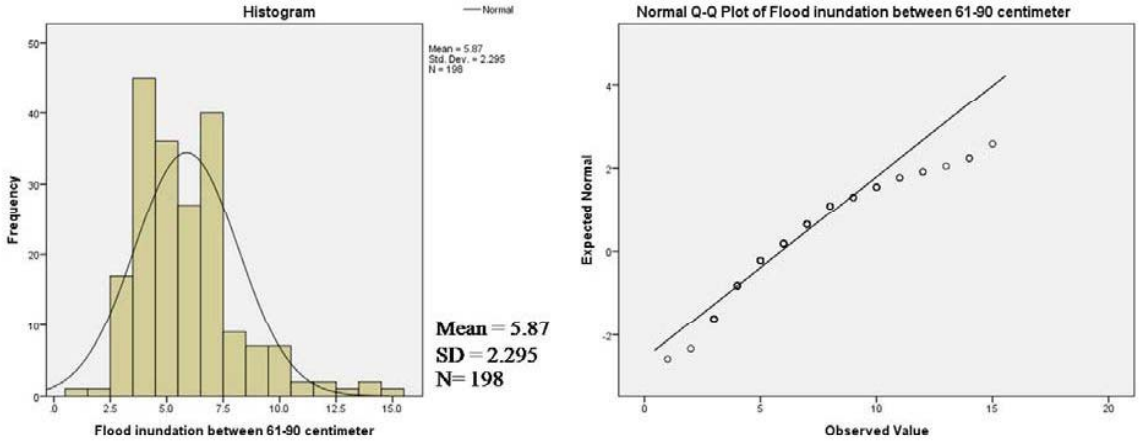

Fig. 3.9 Histogram and normal Q-Q plot of time to starting response after flood had inundated at 61-90 CM

Source: Author, 2014

3.3.2 Respondent though that they and municipality should be the first respondent in flood management activity

There are three groups of stakeholders in this study (1) first-hand respondents on the local level; (i.e., respondents, community leaders, local politicians, municipality, and risk community); (2) first-hand respondents on the domestic level; (i.e., government, police and military); and (3) supporters, non-profit organizations; (i.e., safe community, academic sector, business sector, and private organization). According to the output, respondents in Pak Kret Municipality are expecting that first-hand respondents who are living in local level should get involved in flood management activity as the first priority (Mean $_{\text{local level}}$=4.53). The activities that this group should involve such as public hearing, giving some advice or consultation, and other activities that relate to flood management issues. The second groups of stakeholders that should get involved in flood disaster management activities are supporters; (Non-profit organization, safe communities, academic sector, business sector and private organization) (Mean $_{\text{supporter}}$=3.89). Activities is that this group should be involved with or partially involve with are giving support, participating in public hearing, giving some advice and consultation, which is same as first-hand respondents in domestic level; (government, police and military groups), (Mean $_{\text{domestic}}$ = 3.68). The output of this aspect is shown in Table 3.7

Table 3.7 Comparison between stakeholders in flood management activity

Aspects		Pak Kret Municipality	
		Mean	SD
First hand respondents in local level			
Respondent		4.90	1.21
Community leaders		4.98	1.01
Local politicians		4.59	1.08
Municipality		3.89	1.79
Risk community		4.27	1.56
	Average	**4.53**	0.45
First hand respondents in Domestic level			
Government		3.75	2.35
Police and military		3.60	1.95
	Average	3.68	0.07
Supporter			
Non-Profit organization		3.49	1.34
Safe community		3.90	1.27
Academic sector		3.91	1.15
Business sector		4.08	2.31
Private organization		4.09	1.04
	Average	3.89	0.22

Note:
1 No involvement (Follow the order, manual and demonstration which provided by other stakeholders)
2 Lowest level of involvement (Giving supports as a basic relief or first-aid)
3 Low level of involvement (Partially involve or giving supports in some aspect)
4 Moderate level of involvement (Participate to public hearing, giving some advise and consultation)
5 High level of involvement (Mostly involve in disaster-related issues)
6 Highest level of involvement (Become the main actor or first-hand respondent in flood management)
Source: From Questionnaire survey, August, 2013

3.3.3 Effect from other people and flood characteristic cause them to take action

There are two major factors in this study, (1) internal factors; experience of respondent toward flood situation, lifestyle of respondent in normal period, understanding towards flood management, sense of insecurity, and expectation of respondent to be safe from flood; and (2) external factors; groups on the local level or community, colleague or relatives, and received information, duration

and severity. Table 3.8 shows that experience of respondents toward flood situation, lifestyle of respondent in normal period, and their own understanding towards flood management, did not influence them to participate towards flood management activity. Unlike these two factors such as sense of insecurity and expectation of respondent to be safe from the flood, are influencing the respondents decision to get involved in flood management (Involve $_{unsecurity}$= 93; 46.50%; Involve $_{expectation}$=162; 81.00%). In case of external factors, the factor that most influences them to take action are severity of flood situation (Involve $_{severity}$= 148; 74.00%), duration of flooding (Involve $_{duration}$=137; 68.84%), influence from received information (Involve $_{information}$=122; 61.00%), and influence from colleagues (Involve $_{colleague}$=109; 54.50%)

Table 3.8 Comparison between influencing factors toward decision of involvement

Factor	Intention to take response					
	Not involve		Not influence		To involve	
	Qty	%	Qty	%	Qty	%
Internal factors						
Experience of respondent toward flood situation	**86**	**43.2**	53	26.6	60	30.2
Lifestyle of respondent in normal period	**87**	**43.7**	84	42.2	28	14.1
Understanding towards flood management	56	28.1	**88**	**44.2**	55	27.6
Sense of unsecure	48	24.0	59	29.5	**93**	**46.5**
Expectation to safe from flood	16	8.0	22	11.0	**162**	**81.0**
External factors						
Effect from other people	40	20.0	65	32.5	**95**	**47.5**
Effect from groups in local level	34	17.0	57	28.5	**109**	**54.5**
Effect from colleague	34	17.0	57	28.5	**109**	**54.5**
Effect from received information	27	13.5	51	25.5	**122**	**61.0**
Actual flood situation	28	14.1	34	17.1	**137**	**68.8**
Flood severity	24	12.0	28	14.0	**148**	**74.0**

Source: From Questionnaire survey, August, 2013

3.3.4 Community members are not taking flood preparation in normal period but take response since they affect by flood

There are six types of preparation activity in this study are sharing information, participating in disaster drill practice, making any tentative plans for flood response, participating in community-based disaster risk reduction, studying about disaster preparation, and checking survival kits. The output shows that most of respondents are deciding not to prepare or take action relevant to the flood management. Although there are some respondents that decide to take action in preparation, but intensity of taking action will decrease. The output of preparation activity is shown in fig. 3.9.

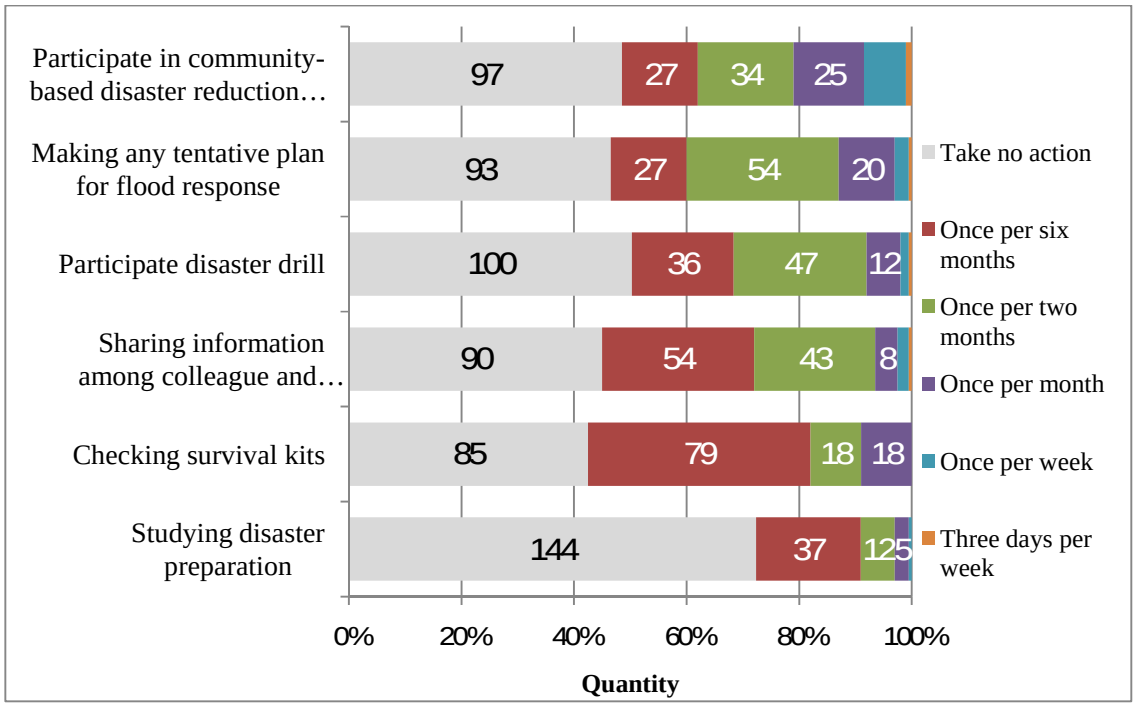

Fig. 3.10 Perception of flood preparation activities of respondents in Pak Kret Municipality

Source: From Questionnaire survey, August, 2013

There are seven kinds of response activity in this survey such as preparing basic relief, sharing information among your colleagues or friends, using public

media to spread perceived information; helping or supporting the organizations in charge as volunteer; donating money, material and survival kits; and tracking announcements from the government. According to the output, respondents decided to take action when they are affecting by flood or they perceive that they might be affected by flood. Moreover, most activities that they decide to take action are related to the information-based approach (e.g., sharing information and using public media) and preparing themselves to tackle the flood situation. The output of response activity is shown in fig. 3.10.

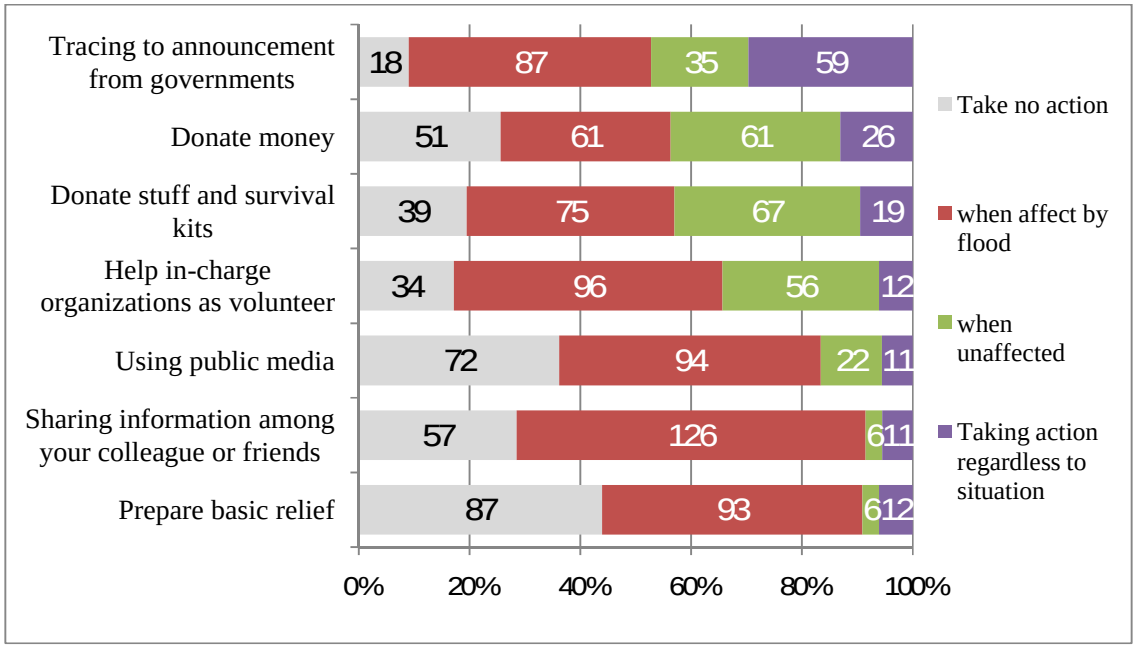

Fig. 3.11 Perception of flood response activities of respondents in Pak Kret Municipality

Source: From Questionnaire survey, August, 2013

3.4 Indicator influencing community to respond during flood incident

In order to analyze how personal characteristics affecting to the decision to take action towards the flood incident, this research applied two kinds of analysis. These are: (1) personal characteristics and the decision to respond classify by levels of flood inundation, and (2) influencing factors which lead respondents to decide to become involved in flood response activity. Correlation between the starting days to take response, personal characteristic and influence factors, are analyzed. This data in relevance to the starting dates to respond for those respondents to start to respond are a non-normal distribution, thus this analysis will determine as a non-parametric statistic. This analysis classified level of flood inundation into three groups are (1) number of starting days that respondent decided to respond after the flood had inundated at 0-30 cm, (2) number of starting days that respondent decided to respond after the flood had inundated at 31-60 cm, and (3) number of starting days that respondent decided to respond after the flood had inundated at 61-90 cm.

To define the correlation between personal characteristics, influencing factors and level of flood inundation, this study applies Point Biserial Correlation Analysis to checking the relationship between each variable. The testing hypothesis has been set and can be described as follows

H_0: There is no correlation between the two variables

H_a: There is a correlation or relationship between the two variables

3.4.1 Personal characteristics and the decision to take response

This section tries to analyze how personal factors could affect the decision to respond towards the flood situation. This study applied the correlation analysis between personal characteristics (i.e., sex, age, education level, income, occupation, number of household members, number of vehicles, perception of living place of respondent) and flood inundation level. Table 3.9 shows the output from point biserial correlation analysis between personal characteristics and the decision to respond in this study. The result of correlation analysis could be described as follows;

(1) Flood inundation level at 0 – 30 centimeter

According to result in table 3.9, some personal factors are significant correlates to the starting date to take response in flood inundation level at 0 – 30 cm. The result shows that age and perception of respondent toward living area are significantly negative correlates to the decision of the starting date to respond when the flood inundation level is at 0 – 30 cm (Age<->Flood level $_{0\text{-}30cm}$ = - 0.233, Sig. =0.001), (Area <->Flood level$_{0\text{-}30}$ = -2.43, sig. = 0.000). While the number of households and number of vehicles are significantly positive correlates to the starting date to respond when the flood inundation level is at 0 – 30 cm (No.HH<->Flood level $_{0\text{-}30cm}$= 0.204, sig.=0.004) , (No.Vehicle<-> Flood level $_{0\text{-}30cm}$= 0.238, sig.= 0.004) whereas sex of respondent, education level of respondent and monthly income of respondent are insignificant positive correlate to the starting date to respond when the flood inundation level is at 0 – 30 cm

(2) Flood inundation level at 31 – 60 centimeter

According to the result in table 3.9 some personal factors are significant correlates to the starting date to respond when the flood inundation level is at 31 – 60 cm. The result shows that age and perception of respondent toward living area are significantly negative correlates to the decision of respondents decided to respond when the flood inundation level is at 31 – 60 cm (Age<->Flood level $_{31\text{-}60cm}$ = - 0.241, Sig. =0.001), (Area <->Flood level$_{31\text{-}60}$ = -0.280, sig. = 0.000) Number of vehicles is a significantly positive correlate to the starting date to respond when the flood inundation level is at 31 – 60 cm (No.Vehicle<-> Flood level $_{31\text{-}60cm}$= 0.238, sig.= 0.004) whereas sex of respondent, education level of respondent and number of household members are insignificant positive correlates to the starting date to respond when the flood inundation level is at 31 – 60 cm

(3) Flood inundation level at 61 – 90 centimeter

According to result in table 3.9, some personal factors are significant correlates to the starting date to respond when the flood inundation level is at 61 – 90 cm. The result shows that age and perception of respondent toward living area are significantly negative correlates to the decision of respondents decided to respond when the flood inundation level is at 61 – 90 cm (Age<->Flood level $_{61\text{-}90cm}$ = - 0.213, Sig. =0.003), (Area <->Flood level$_{61\text{-}90}$ = -0.273, sig. = 0.000) ,whereas sex of respondent and number of vehicle level of respondent are insignificant positive correlates to the starting date to respond when the flood inundation level is at 61 – 90 cm.

Table 3.9 Correlation between date of starting to respond and personal characteristic in Pak Kret municipality classify by level of flood inundation

		Level of flood inundation		
		0- 30 CM	31-60 CM	61-90 CM
Sex of respondent	Pearson Correlation	0.008	0.038	0.014
	Sig. (2-tailed)	0.911	0.598	0.842
	N	198	199	198
Age of respondent	Pearson Correlation	**-.233(**)**	**-.241(**)**	**-.213(**)**
	Sig. (2-tailed)	**0.001**	**0.001**	**0.003**
	N	**197**	**198**	**198**
Education level of respondents	Pearson Correlation	0.049	0.017	0.078
	Sig. (2-tailed)	0.499	0.818	0.275
	N	196	197	196
Income of respondents	Pearson Correlation	-0.022	-0.055	-0.080
	Sig. (2-tailed)	0.762	0.452	0.271
	N	191	192	191
Number of household person	Pearson Correlation	**.204(**)**	0.138	0.007
	Sig. (2-tailed)	**0.004**	0.054	0.927
	N	**194**	195	194
Number of vehicles	Pearson Correlation	**.238(**)**	**.202(*)**	0.123
	Sig. (2-tailed)	**0.004**	**0.016**	0.145
	N	**142**	**142**	142
In your idea, do you living in flood prone area?	Pearson Correlation	**-.243(**)**	**-.280(**)**	**-.273(**)**
	Sig. (2-tailed)	**0.001**	**0.000**	**0.000**
	N	**191**	**192**	**191**

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Source: From Questionnaire survey, August, 2013

3.4.2 Influencing factors and the decision to take response

This section tries to analyze how personal factors could affect the decision of respondents deciding to respond towards the flood situation. This study applied point biserial correlation analysis between influencing factors (experience, lifestyle in a normal period, understanding of respondent towards water management, sense of insecurity, and expectation, actions from other

people, influence of colleagues, groups of people in the community, information, actual flood situation, and duration of flooding) and flood inundation level. Table 3.10 had shown the output from correlation analysis between personal characteristics and the decision to respond in this study. The result of correlation analysis could be described as follows;

(1) Flood inundation level at 0 – 30 centimeter

According to the result in table 3.10, some factors are significant correlates to the starting date to respond when the flood inundation level is at 0 – 30 cm. The result shown that experience of respondents toward flood situation and lifestyle of respondent in normal period, understanding in flood management, are significantly negative correlates to the decision to the starting date to respond when the flood inundation level is at 0 – 30 cm. (Experience<->Flood level $_{0\text{-}30cm}$ = -0.254, Sig. =0.000), (Lifestyle in normal period <->Flood level$_{0\text{-}30}$ = -0.225, sig. = 0.001). Understanding of flood management and sense of insecure are significantly positive correlates to the decision to the starting date to respond when the flood inundation level is at 0 – 30 cm (Understanding<->Flood level $_{0\text{-}30cm}$ = 0.143, Sig. =0.044), (Sense of insecurity<->Flood level $_{0\text{-}30cm}$ = 0.027, Sig. =0.000), whereas effect from nearby people, effect from colleagues, received information, and actual flood situation are insignificant positive correlates to the starting date to respond when the flood inundation level is at 0 – 30 cm

(2) Flood inundation level at 31 – 60 centimeter

According to the result in table 3.10, some factors are significant correlates to the starting date to respond when the flood inundation level is at 31 – 60 cm. The result shows that experience of the respondent toward flood situations and lifestyle of respondent in normal period are significantly negative correlates to the decision of date starting to respond when the flood inundation level is at 31 – 60 cm (Experience<->Flood level $_{31\text{-}60cm}$ = -0.203, Sig. =0.004), (Lifestyle in normal period <->Flood level$_{31\text{-}60}$ = 0.348, sig. = 0.000), while the understanding toward flood management and sense of unsecure are significantly positive correlates to the decision of date starting to respond when the flood inundation level is at 31 – 60 cm (Understanding<->Flood level $_{31\text{-}60cm}$ = -0.226, Sig. =0.001), (Sense of insecurity<->Flood level $_{31\text{-}60cm}$ = 0.282, Sig. =0.000) Effect from nearby people, effect from colleagues, received information, actual flood situation are insignificant positive correlates to the starting date to respond when the flood inundation level is at 31 – 60 cm

(3) Flood inundation level at 61 – 90 centimeter

According to the result in table 3.10, some factors are significant correlates to the starting date to respond when the flood inundation level is at 61 – 90 cm. The result shows that the experience of the respondent toward flood situation and lifestyle of respondent in normal period; are insignificantly negative correlates to the decision of date starting to respond when the flood inundation level is at 61 – 90 cm (Experience<->Flood level $_{61\text{-}90cm}$ = -0.023, Sig. =0.748), (Lifestyle in normal period <->Flood level$_{61\text{-}90}$ = -0.097, sig. = 0.176) Factors that relevance to understanding of flood management and influence from

other groups in community level are insignificantly positive correlates to the decision of date starting to respond when the flood inundation level is at 61 – 90 cm (Understanding<->Flood level $_{61\text{-}90cm}$ = 0.065, Sig. =0.362), (Influence of groups in local level<->Flood level $_{61\text{-}90cm}$ = 0.091, Sig. =0.200), and (Level of severity<->Flood level $_{31\text{-}60cm}$ = 0.125, Sig. =0.079) While sense of unsecure, and other action are significantly positive correlates to the to the decision of date starting to respond when the flood inundation level is at 61 – 90 cm (Sense of insecurity<->Flood level $_{61\text{-}90cm}$ = 0.334, Sig. =0.000), (Effect from other people action<->Flood level $_{61\text{-}90cm}$ = 0.220, Sig. =0.000). Effect from nearby people, effect from colleagues, and received information are insignificant positive correlate to the starting days to respond when the flood inundation level is at 61 – 90 cm

Table 3.10 Correlation between influencing factors and flood inundation level in Pak Kret municipality

		Level of flood inundation		
		0- 30 CM	31-60 CM	61-90 CM
Experience	Pearson Correlation	**-0.254****	**-0.203****	-0.023
	Sig. (2-tailed)	**0.000**	**0.004**	0.748
	N	**198**	**199**	198
Lifestyle in normal period	Pearson Correlation	**-0.225****	**-0.226****	-0.097
	Sig. (2-tailed)	**0.001**	**0.001**	0.176
	N	**198**	**199**	198
Understanding in flood management	Pearson Correlation	**0.143***	**0.149***	0.065
	Sig. (2-tailed)	**0.044**	**0.036**	0.362
	N	**198**	**199**	198
Sense of unsecure	Pearson Correlation	**0.0279****	**0.282****	**0.265****
	Sig. (2-tailed)	**0.000**	**0.000**	**0.000**
	N	**199**	**200**	**199**
Effect from other people action	Pearson Correlation	0.034	0.066	**0.152***
	Sig. (2-tailed)	0.629	0.352	**0.032**
	N	199	200	**199**
Effect from groups in local level	Pearson Correlation	0.025	0.034	0.091
	Sig. (2-tailed)	0.724	0.637	0.200
	N	199	200	199

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Source: From Questionnaire survey, August, 2013

Table 3.10 Correlation between influencing factors and flood inundation level in Pak Kret municipality (Cont')

		Level of flood inundation		
		0- 30 CM	31-60 CM	61-90 CM
Effect from colleague	Pearson Correlation	-0.029	0.002	0.070
	Sig. (2-tailed)	0.686	0.979	0.326
	N	199	200	199
Received information	Pearson Correlation	-0.011	-0.014	0.016
	Sig. (2-tailed)	0.879	0.846	0.827
	N	199	200	199
Actual flood situation	Pearson Correlation	-0.021	0.036	0.069
	Sig. (2-tailed)	0.768	0.617	0.331
	N	199	200	199
Level of severity	Pearson Correlation	0.027	0.072	0.125
	Sig. (2-tailed)	0.710	0.312	0.079
	N	199	200	199
expectation to safe from flood	Pearson Correlation	0.004	0.038	0.066
	Sig. (2-tailed)	0.044	0.036	0.362
	N	198	199	198

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Source: From Questionnaire survey, August, 2013

3.5 Community temporal collaborate with municipality during flood

The current disaster management is concerning with various kinds of activities in order to find out how to minimize damage and loss caused by disaster and consequential hazards. Collaboration and coordination are necessary in disaster management and had been setting as strategic approach in the modern of disaster management. Since the capacities of local government and community members to handle the disaster have reached their limits, a collective response becomes crucial in disaster management, especially toward respond in emergency phase.

The importance of the Strategic National Action Plan (SNAP) in relevant to collaboration effort has been found in both coordination and community

collaboration. Strategies such as Incident Command System (ICS) and Single Control (SC) are implemented in current disaster management framework in Thailand. However, the relationship within the governmental sector depends on the level of severity of disaster; the decision maker will change when the limitation of the ability of the executive organization has been reached, implying that if local government (e.g., municipality) can control their own resources and if it can do, supervision will not intervene with the local government disaster management activity. This relationship reveals the sense of decentralization approach as well, meaning that the supervising organ will intervene only in case of necessary issues according to law of subsidiary. In the case of government–community collaboration, even their relationship and collaboration, those activities in this disaster management policy (SNAP) plan are communication-related issues, and tend to be passive. To be precise, the relationship between government and community is related to information sharing activities, linkage data and information, preliminary disaster damage evaluation, and participation in training. Despite various kinds of collaborations between community and government, they have been spotted by empirical study into emergency response; thus, those kinds of participation can be considered as temporary collaborations. Most of activities that both government and community relate together are based on disaster management policy which tend "to inform" another organ rather than be applied as two-way communication. Although these plans stated the intention to establish Community Based Disaster Risk Reduction (CBDRR) Programs, it is still questioned on how community shall increase their level of participation since the main actors belong to governmental side, and have measurements (e.g.,

standards or curriculum) which can possibly be manipulated. Nevertheless, although the intention of Community-Based Disaster Risk Reduction is stated in the disaster management policy, these policies did not obviously reveal the sense of public participation.

During the flood incident in 2011, Pak Kret Municipality had adopted the Pak Kret Model as an operation plan. This operation had been launched during March 2011 until January 2012. The Pak Kret model has shown the potential of collaboration between municipality officers and community members. Activities that community members and residents could get involved with in this operation were sharing information, informing the actual situation, becoming volunteers or manpower to make sandbags, build temporary bridges or barriers for flood protection. Moreover, external groups or authorities such as NGOs and non-flood affected municipality gave relief in terms of equipment and stuff for flood protection. It was the potential towards coordination in the Pak Kret model in 2011 which had caused the Pak Kret municipality to put this strategy as a disaster response activity.

Analysis in this study has shown that personal factors and influencing factors are correlated to the decision of the respondent respond to floods classified by level of flood inundation. Factors such as numbers of household persons (Life) and number of vehicle ownership (Assets) are positive correlates to the decision of respondents to get involved in flood response, whereas occupation of respondents, personal perception towards flood prone area and age of respondents are negatively correlated to the decision of flood response. While influencing factors; experience, lifestyle of respondents, understanding toward

flood management, sense of insecurity, influences from other people, groups and information, actual flood situation, and level of severity influence respondents to get involved in flood response. Although personal characteristics and influencing factors are affecting the decision of the respondent to respond to the flood, it depends on the situation of risk, and level of flooding in this case. Moreover, the slowing in flood response might be occurring in this area. According to the output of the survey the respondents decided not to take response in the beginning of flood incident but they decide to take response after two or three days after flood incident start. Besides, most of respondents did not prepare for the flood response and decided to take action since they recognized that they are likely to confront the flood incident instead to preparing flood risk reduction in the normal period. The reason is this are did not get severe flood inundation, which also shows that preparations of flood risk reduction in community level are poor and they intend to take a sudden response when they perceive risks.

4. Factors motivating community involvement in CBDRR during the normalcy

4.1 Introduction of possible factors motivating community to involve in CBDRR during the normalcy

The aim of this research is to answer the research question "*What factors do motivate communities members to involve in flood risk reduction activities in normal period based on **TPB?***" There are two objectives: (1) To identify factors that motivates community members to involve in flood risk reduction activities based on **TPB** . And (2) To predicting the intention of community members to involve in flood risk reduction activities based on **TPB**. This research had been carried out through a questionnaire with local people who are living in Pak Kret Municipality, Nonthaburi Province. There are 250 respondents in this survey and this survey had done in March 2914

Fig 4.1 Study diagram in chapter 4

Source: Author, 2014

4.2 Communities answered they unwanted to involve in CBDRR

This study was conducted in January – March 2014 by questionnaire survey which elicited 250 respondents in total. The basic information of respondents can be summarized as follows; just over half of respondents are female; there are 134 female respondents which is equal to 53.6% of total of respondents. The highest frequency of respondents' age was 30-40 years, with 67 respondents making 26.8 percent of total respondents in this case study. Second is the age group of 20-30 years, there are 62 respondents which is 24.8 percent of total respondents in this case study. According to the income of respondents, the results of the survey have shown that most respondents belong to the low-income class (monthly income lower than 15,000 THB/month) In this strata, there are 117 respondents which is equal to 46.8 percent of total respondents. Second is the income range between 15,001-30,000 THB/month, for which there are 86 respondents which equal to 21.6 percent of total respondents in this case study. The third group is the average income between 30,001-45,000 THB/month; there are 42 respondents which equals 14.0 percent of total respondents in this group.

Most respondents graduated with a Bachelor's degree; there are 117 respondents who had achieved a Bachelor's degree, which is equal to 46.8 percent of total respondents. According to the occupation of respondents, most are students/university students (72 respondents; 28.8%), 44 respondents are business owners or shopkeeper (17.6%), and 42 respondents are private officers (16.8%). According to the perception of location of flood prone areas, most respondents are not sure that their residence (Pak Kret Municipality) is located in a flood prone area; there are 107 respondents which is equal to 42.8 percent of

total respondents who are not sure whether this area is located in a flood prone area or not. Conversely, 94 respondents thought that this area was located in a flood prone area which is equal to 37.6 percent of total respondents in this case study. The summary of basic information of respondents living in the Pak Kret Municipality is shown in table 4.1

Table 4.1 Data of respondents in Pak Kret Municipality, Nonthaburi Province

Variables		Quantity	Percentage
Sex of respondent			
	Male	116	46.4
	Female	134	53.6
	Total	250	100.0
Age of respondents			
	Less than 20 years old	46	18.4
	20-30 years old	62	24.8
	30-40 years old	67	26.8
	40-50 years old	44	17.6
	50-60 years old	22	8.8
	Higher than 50 years old	9	3.6
	Total	250	100.0
Average income of respondent			
	Less than 15,000 THB	117	46.8
	15,001-30,000 THB	86	34.4
	30,001-45,000 THB	42	16.8
	45,001-60,000 THB	4	1.6
	More than 60,000 THB	1	0.4
	Total	250	100.0
Average expenditure of respondent			
	Less than 15,000 THB	157	62.8
	15,001-30,000 THB	54	21.6
	30,001-45,000 THB	35	14.0
	45,001-60,000 THB	3	1.2
	More than 60,000 THB	1	0.4
	Total	250	100.0

Source: Author, 2014

Table 4.1 Data of respondents in Pak Kret Municipality, Nonthaburi Province

Variables	Quantity	Percentage
Education level of respondent		
Primary school	15	6.0
Junior high school	24	9.6
High school	34	13.6
Vocational degree	33	13.2
Diplomatic degree	6	2.4
Bachelor degree	117	46.8
Master degree	18	7.2
Higher than Master degree	3	1.2
Total	250	100.0
Occupation of respondent		
Civil servant	23	9.2
Private entrepreneur	25	10.0
Student/college student	72	28.8
Housekeeper	8	3.2
Employment	26	10.4
Private officer	42	16.8
Business owner/shopkeeper	44	17.6
Unemployed	6	2.4
Other	4	1.6
Total	250	100.0
Perception of respondent toward flood prone area		
Living in flood prone area	94	37.6
Not living in flood prone area	49	19.6
Not sure	107	42.8
Total	250	100.0

Source: Author, 2014

There are ten types of flood risk reduction and preparation activities in this research (Table 4.2). The results have shown that most respondents decide not to carry out flood risk reduction activities during a normal period. Moreover, respondents do not typically participate in community activities such as Community-Based Disaster Risk Reduction Activity (CBDRR) (66.8%), participate as volunteer to help community in flood mitigation (50.4%) or recovery activity (64.0%), participate in evacuation drill (56.4%), apply sandbags for flood protection (54.4%), or check survival kits (55.6%). In contradiction, they are willing to share information to other people regarding flood management issues (65.5%), donate stuff to flood victims (51.2%), plan evacuation routes or destinations (52.0%), and apply insurance (65.2%)

Table 4.2 Intention of respondent to take action for flood risk reduction

Aspects	Would not act		Take action	
	Quantity	Percent	Quantity	Percent
Sharing information	86	34.4	**164**	**65.6**
Donate stuff to flood victims	122	48.8	**128**	**51.2**
Be volunteer to help community in flood mitigation activities	**126**	**50.4**	124	49.6
Checking survival kits	**139**	**55.6**	111	44.4
Planning evacuation route/destination	120	48.0	**130**	**52.0**
Apply insurance	87	34.8	**163**	**65.2**
Apply sandbags	**136**	**54.4**	114	45.6
Participate in evacuation drill	**141**	**56.4**	109	43.6
Participate in CBDRR	**167**	**66.8**	83	33.2
Be volunteer for cleaning or recovery community after flood incident	**160**	**64.0**	90	36.0

Source: Author, 2014

4.3 Summary efficient factors motivating community to involve in CBDRR during normalcy

There are 30 variables that applied to measure the intention of respondents to carry out flood risk reduction activities in this research. This research applies a scale for measuring the intention of respondents to take action in flood risk reduction and preparation activities (which is 0 is equal to not influenced and 10 is highly influenced to take action) The results in table 4.3 demonstrate that aspects which relate to flood damage, fear and anxiety towards the threats of flooding and possibility of income loss; are highly influence toward the intention of respondents to consider taking flood risk reduction activities compared to other variables. Damage to life (X_{25}; mean= 6.92, SD=2.86), Damage to assets of respondents (X_{26}; Mean= 6.92, SD=2.65), Level of flood inundation (X_{39}; mean= 6.31, SD=2.06), Duration of flood incident (X_{38}; mean=6.22,

SD=2.08), possibility of income loss (X_{28}; mean=6.18, SD=2.29), and fear and anxiety of flood disaster (X_{54}; mean=6.18, SD=2.68), and familiarity between respondent and neighborhood (X3; mean=5.04, SD=2.10). On the other hand, aspects that relate to leadership of community leaders; (X_{12}; mean=4.86, SD=2.091), municipality or government; (X_{13}; mean=4.92, SD=2.06), reliability of performance, and familiarity between respondent and neighborhoods; (X_{14}; mean=4.98, SD=2.08), ; Leadership of government officer leadership of municipality officers, leadership of community leader, reliability of performance of government officers toward flood risk reduction activities (X15; mean=4.99, SD=2.07), (Table 4.3) are of least influence upon the intention of respondents to take action toward flood risk reduction activities and preparation

Table 4.3 Average and standard deviation of attitude in relevance to flood preparation

	Average	SD
x1_Acquaintances influence respondents' decision to take action	5.42	2.205
x2_Relatives influence respondents' decision to take action	5.15	2.132
x3_Familiarity between respondents and neighborhood	5.04	2.108
x4_Inflicted damage to other people influences respondents' decision to take action	5.28	2.103
x5_Sense of citizenship influences respondents' decision to take action	5.29	1.973
x12_Leadership of government influences respondents' decision to take action	4.86	2.091
x13_Leadership of municipality executive/mayor influences respondents' decision to take action	4.92	2.069
x14_Leadership of community leader influences respondents' decision to take action	4.98	2.088
x15_Reliability of performance of government in flood disaster management influences respondents' decision to take action	4.99	2.074
x16_Reliability of performance of local government in flood disaster management influences respondents' decision to take action	5.07	1.949
x17_Reliability of performance of community leader in flood disaster management influences respondents' decision to take action	5.08	2.016
x18_Reliability of performance of academics in flood disaster management influences respondents' decision to take action	5.06	1.946

Remark: Number of respondents = 250
Source: Author, 2014

Table 4.3 Average and standard deviation of attitude in relevance to flood preparation (Cont')

	Average	SD
x25_Damage to life influences respondents' decision to take action	6.92	2.863
x26_Damage to asset influences respondents' decision to take action	6.92	2.651
x28_Possibility of income loss influences respondents' decision to take action	6.18	2.290
x34_Risk from excessive rainfall influences respondents' decision to take action	5.72	2.006
x37_Consequential hazard from flooding influences respondents' decision to take action	5.96	1.896
x38_Duration of flood influences respondents' decision to take action	6.22	2.080
x39_Level of flood inundation influences respondents' decision to take action	6.31	2.063
x40_Decision made by government/local government towards flood relief influences respondents' decision to take action	5.59	2.044
x42_Transperency and accuracy of prediction provided by task authorities influence respondents' decision to take action	5.71	1.918
x43_Reliability of information distributed by government influences respondents' decision to take action	5.47	2.168
x44_Reliability of information distributed by local government influences respondents' decision to take action	5.57	2.099
x45_Reliability of information distributed by academics influences respondents' decision to take action	5.60	2.108
x46_Reliability of information distributed by neighborhood influences respondents' decision to take action	5.68	1.974
x47_Reliability of information distributed by social networks influences respondents' decision to take action	5.73	1.944
x48_Source of information (TV) influences respondents' decision to take action	5.68	2.019
x49_Source of information (radio) influences respondents' decision to take action	5.55	2.044
x50_Source of information (internet) influences respondents' decision to take action	5.46	2.052
x51_Source of information (SMS) influences respondents' decision to take action	5.12	2.069
x52_Personal experiences of flood situations influence respondents' decision to take action	5.48	2.432
x53_Personal understanding of flood management influences respondents' decision to take action	5.36	2.304
x54_Fear and anxiety towards flood disaster influences respondents' decision to take action	6.18	2.689
x55_Fear and anxiety towards global warming influences respondents' decision to take action	5.99	2.528
x56_Familiarity of flood situations influences respondents' decision to take action	5.33	2.15
x57_Current flood management policy influences respondents' decision to take action	5.37	1.824
x68_Expected damage to the family will influence respondents' decision to take action	5.62	1.917
x69_Expected damage to the community will influence respondents' decision to take action	5.61	2.039

Remark: Number of respondents = 250
Source: Author, 2014

Table 4.3 Average and standard deviation of attitude in relevance to flood preparation (Cont')

	Average	SD
x71_Respondents expect that the government should compensate/provide relief as soon as possible after floods	5.51	2.056
x72_Respondents expect that the local government should compensate/provide relief as soon as possible after floods	5.65	1.991
x73_Respondents expect that NGOs should compensate/provide relief as soon as possible after floods	5.54	2.061
x75_Respondents expect that the private sector should compensate/provide relief as soon as possible after floods	5.30	1.982
x76_Respondents expect that community members should compensate/provide relief as soon as possible after floods	5.41	1.982

Remark: Number of respondents = 250
Source: Author, 2014

According to factors described in table 4.4, some variables are able to be classified in the same category. To verify this statement, hypothesis based on factor analysis had set to test as below

H_0: Each factor do not significantly correlates with each other

H_a: At least two variables are significantly correlates with other variables

The result of factor analysis shows that some variables can significantly correlate to other variable at a 95 percent confidence level (KMO value = 0.894, Bartlett's test chi-square = 10,023.038, Df = 903, Sig. = 0.00) Thus, those variables are able to be grouped. According to the result of factor analysis, these 30 variables can be categorized into eight factors and are shown in table 4.5

Table 4.4 Kaiser-Meyer-Olkin Measure of Sampling Adequacy

		Value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.894
Bartlett's Test of Sphericity	Approx. Chi-Square	10023.038
	df	903
	Sig.	0.000

Source: Author, 2014

Table 4.5 Classification of variables into factors

	Factor							
	1	2	3	4	5	6	7	8
x15_Reliability of the performance of government in flood disaster management influences respondents' decision to take action	.854	.120		.185				
x13_Leadership of the municipality's executive/mayor influences respondents' decision to take action	.851	.119		.162	.125			
x16_Reliability of the performance of local government in flood disaster management influences respondents' decision to take action	.821	.140	.132	.161				
x12_Leadership of government influences respondents' decision to take action	.804	.122		.171				
x14_Leadership of community leader influences respondents' decision to take action	.793	.170	.132	.106	.196			
x18_Reliability of performance of academics in flood disaster management influences respondents' decision to take action	.655	.280	.223	.189	.171		.176	
x17_Reliability of performance of community leaders in flood disaster management influences respondents' decision to take action	.625	.216	.192		.262		.197	
x44_Reliability of information distributed by the local government influences respondents' decision to take action	.234	.855		.114			.152	
x43_Reliability of information distributed by the government influences respondents' decision to take action	.240	.850	.109	.204			.129	
x45_Reliability of information distributed by academics influences respondents' decision to take action	.180	.801			.118		.290	
x46_Reliability of information distributed by the neighborhood influences respondents' decision to take action	.105	.701		.153	.147	.211	.376	
x42_Transperency and accuracy of prediction provided by task authorities influence respondents' decision to take action	.262	.699	.128	.203		.204		.106
x40_Decisions made by the government/local government towards flood relief influence respondents' decision to take action	.150	.671	.147	.177		.360		.152
x47_Reliability of information distributed by social networks influences respondents' decision to take action		.615	.113	.102	.222	.185	.486	

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 8 iterations.

Source: Author, 2014

Table 4.5 Classification of variables into factors (Cont')

	Component							
	1	2	3	4	5	6	7	8
x54_Fear and anxiety towards flood disaster influences respondents' decision to take action			.828	.126	.206		.156	
x55_Fear and anxiety towards global warming influences respondents' decision to take action			.817		.285		.127	
x25_Damage to life influences respondents' decision to take action	.191	.182	.757	.113		.317	.163	
x26_Damage to asset influences respondents' decision to take action	.119	.163	.720	.118		.385	.190	
x56_Familiarity of flood situations influences respondents' decision to take action	.174	.228	.705	.335	.176			.209
x57_Current flood management policy influences respondents' decision to take action	.257	.201	.624	.272	.258	.137		.228
x28_Possibility of income loss influences respondents' decision to take action	.240		.517	.189		.511		
x72_Respondents expect that the local government should compensate/provide relief as soon as possible after floods	.197	.164	.192	.818		.131	-.135	.161
x73_Respondents expect that NGOs should compensate/provide relief as soon as possible after floods	.197		.132	.779	.115	.115	.169	
x75_Respondents expect that the private sector should compensate/provide relief as soon as possible after floods	.321	.235	.101	.731	.112		.252	
x71_Respondents expect that the government should compensate/provide relief as soon as possible after floods	.144	.238	.209	.716	.163	.113		.257
x76_Respondents expect that community members should compensate/provide relief as soon as possible after floods	.269	.260		.704	.201		.227	
x69_Expected damage to the community will influence respondents' decision to take action	.134	.119	.265	.534	.335	.374	.250	
x68_Expected damage to family will influence respondents' decision to take action	.146		.226	.502	.292	.364	.187	
x2_Relatives influence respondents' decision to take action	.102		.185	.104	.800	.148	.174	
x3_Familiarity between respondent and the neighborhood			.129	.144	.794	.177	.112	.188
x4_Damage inflicted to other people will influence respondents' decision to take action	.305	.112	.129	.108	.730	.186		
x1_Acquaintances influence respondents' decision to take action	.120		.198	.197	.676	.149	.309	
x5_Sense of citizenship influences respondents' decision to take action	.400	.184	.102	.212	.660	.176		

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 8 iterations.

Table 4.5 Classification of variables into factors (Cont')

	Component							
	1	2	3	4	5	6	7	8
x38_Duration of flood influences respondents' decision to take action		.215	.190	.155	.221	.803		
x39_Level of flood inundation influences respondents' decision to take action		.312	.130	.128	.227	.730	.128	
x37_Consequential hazard from flooding influences respondents' decision to take action	.155	.176	.158		.235	.637	.180	.162
x34_Risk from excessive rainfall influences respondents' decision to take action	.191		.263	.114	.191	.489	.113	.352
x50_Source of information (internet) influences respondents' decision to take action		.249	.105	.132	.162	.234	.712	.299
x49_Source of information (radio) influences respondents' decision to take action	.150	.340	.274	.196	.130	.240	.652	
x51_Source of information (SMS) influences respondents' decision to take action	.172	.346					.627	.281
x48_Source of information (TV) influences respondents' decision to take action	.154	.461	.168	.221	.213	.232	.608	
x53_Personal understanding of flood management influences respondents' decision to take action		.204		.113	.133	.120	.164	.860
x52_Personal experiences of flood situations influence respondents' decision to take action		.100	.147	.126	.165	.182	.252	.820

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 8 iterations.

Source: Author, 2014

The result from factor analysis shown that among 30 variables could be categorized into eight factors in this research are (1) Leadership and performance of government and supporters, (2) reliability and transparency of information, (3) fear and anxiety towards flood disaster, (4) expectation of relief and expected damage, (5) effect from other people, (6) characteristic of flood risks, (7) source of information, and (8) experiences and understanding of respondents toward flood disaster. Table 4.6 showed that fear and anxiety of flood disasters causes respondents to take part in flood risk reduction and preparation activity (Average = 6.12, SD=1.97), second is the characteristics of flood risks (Average= 6.054, SD= 1.66), and third is the reliability and transparency of information (Average= 5.621, SD= 1.712)

Table 4.6Factors, component variables, average score and standard deviation of grouped factors

Factor	Factor	Component Variable	Statistic	
			Average	SD
X_1	Leadership and performance of government and supporters	X_{15}, X_{13}, X_{16}, X_{12}, X_{14}, X_{18}, X_{17}	4.994	1.679
X_2	Reliability and transparency of information	X_{44}, X_{43}, X_{45}, X_{46}, X_{42}, X_{40}, X_{47}	5.621	1.712
X_3	Fear and anxiety toward flood disaster	X_{54}, X_{55}, X_{25}, X_{26}, X_{56}, X_{57}, X_{28}	6.126	1.978
X_4	Expectation of relief and expected damage	X_{72}, X_{73}, X_{75}, X_{71}, X_{76}, X_{69}, X_{68}	5.521	1.611
X_5	Effect from other people	X_2, X_3, X_4, X_1, X_5	5.236	1.753
X_6	Characteristics of flood risks	X_{38}, X_{39}, X_{37}, X_{34}	6.054	1.666
X_7	Source of information	X_{50}, X_{49}, X_{51}, X_{48}	5.453	1.765
X_8	Understanding and flood experience	X_{53}, X_{52}	5.416	2.268

Source: Author, 2014

To check the normality of factors, this research applied Shapiro Wilks W test for normality. The hypothesis to test for normality test are stated as follows;

H_0 : The observed distribution fits the normal distribution

H_a : The observed distribution does not fit the normal distribution

According to the result of normality testing (shown in table 4.7) not all factors demonstrate normal distribution (X_1=0.956, Sig.= 0.00; X_2=0.971, Sig.= 0.00; X_3=0.979, Sig.= 0.00; X_4=0.964, Sig.= 0.00; X_5=0.987, Sig.= 0.00; X_6=0.981, Sig.= 0.00; X_7=0.975, Sig.= 0.00; and X_8=0.971, Sig.= 0.00;) This result implies that these analyses are accepting the alternative hypothesis, Ha: The observed distribution does not fit normal distribution. This result could suggest that the intentions of respondents to take action toward flood risk reduction and preparation are different. Figure 4.2 to figure 4.8 shows that these influence factors do not have normal distribution, meaning that respondents placed different emphasis on these factors. Thus, respondents thought that some factors highly affect their intention to carry out flood risk reduction activities and flood preparation, while some factors motivate some respondents least to take action.

Table 4.7 Result of normality test for each factor

	Factor	Shapiro-Wilk value		
		Statistic	df	Sig.
X1	Leadership and performance of government and supporters	.956	250	.000
X2	Reliability and transparency of information	.971	250	.000
X3	Fear and anxiety toward flood disaster	.979	250	.001
X4	Expectation of relief and damage	.964	250	.000
X5	Effect from other people	.987	250	.028
X6	Characteristic of flood risk	.981	250	.002
X7	Source of information	.975	250	.000
X8	Personal understanding and flood experience	.971	250	.000

Source: Author, 2014

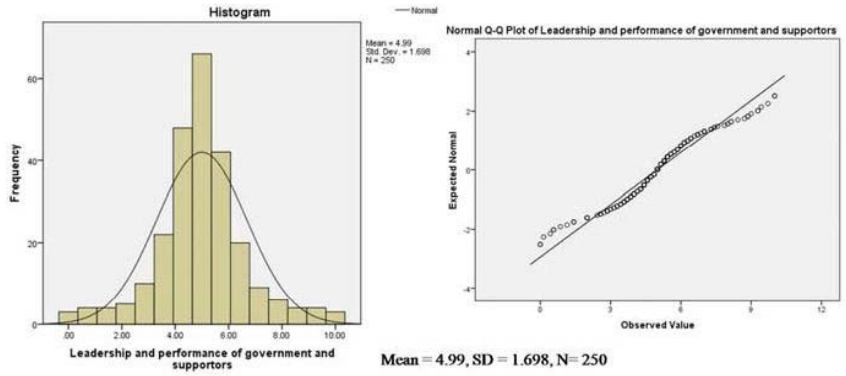

Fig. 4.2 Histogram and normal distribution plot of leadership and performance of government and supporters (X_1)

Source: Author, 2014

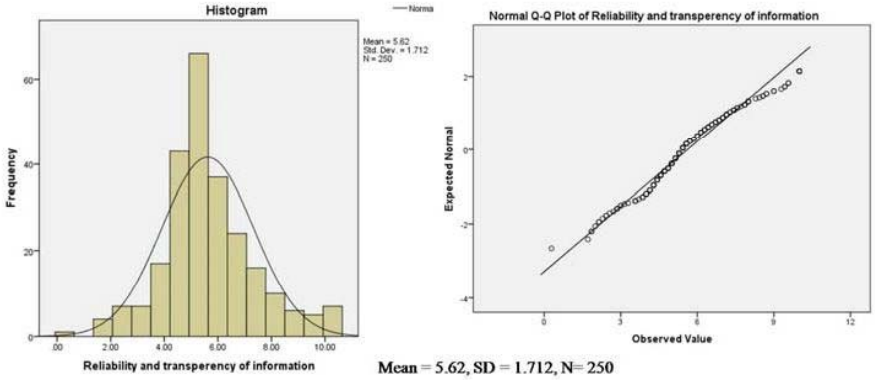

Fig. 4.3 Histogram and normal distribution plot of reliability and transparency of information (X_2)

Source: Author, 2014

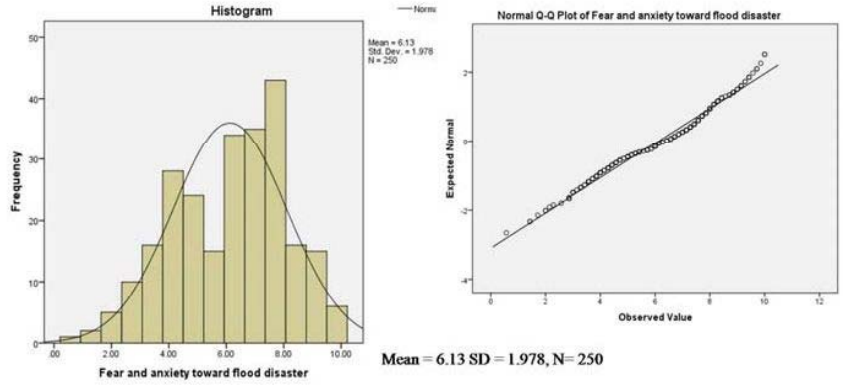

Fig. 4.4 Histogram and normal distribution plot of fear and anxiety toward flood disaster (X_3)

Source: Author, 2014

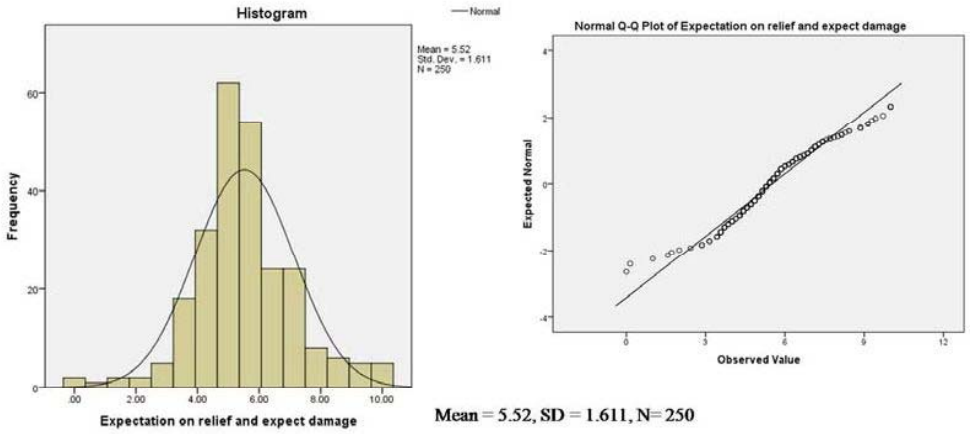

Fig. 4.5 Histogram and normal distribution plot of Expectation of relief and damage (X_4)

Source: Author, 2014

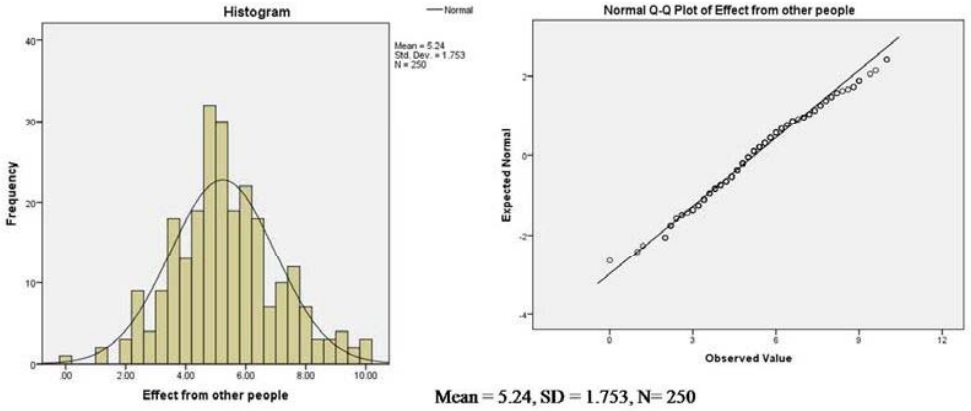

Fig. 4.6 Histogram and normal distribution plot of Effect from other people (X_5)

Source: Author, 2014

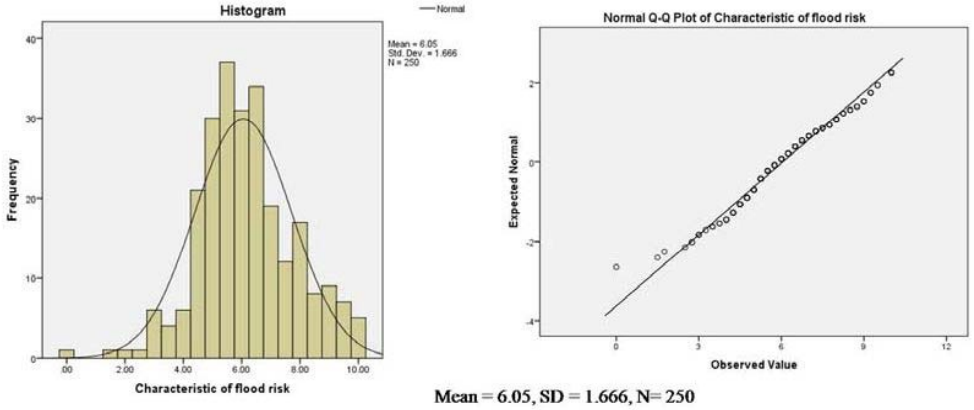

Fig. 4.7 Histogram and normal distribution plot of Characteristics of flood risks (X_6)

Source: Author, 2014

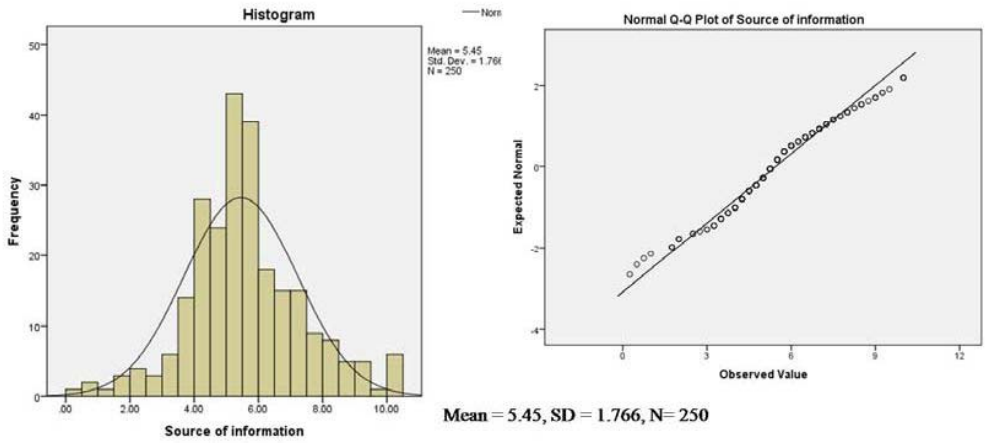

Fig. 4.8 Histogram and normal distribution plot of Source of information (X_7)

Source: Author, 2014

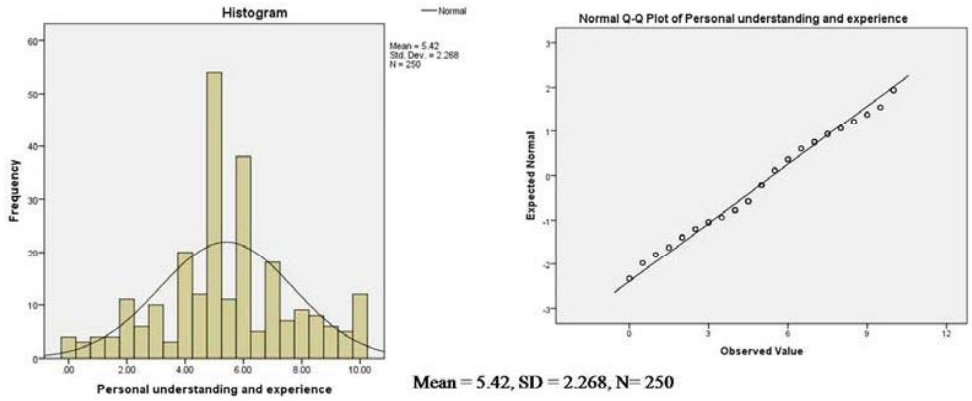

Fig. 4.9 Histogram and normal distribution plot of Personal understanding and flood experience (X_8)

Source: Author, 2014

According to the attributes of dependent variable are flood risk reduction activities which considered as dichotomous variables (taking action or not) and due to the non-normal distribution of independent variables, this research has applied a binomial logistic regression model in order to explain how independent variables affect the intention to take action toward flood risks. A logistic regression equation could apply in the explanation of the relationship between independent variables and dependent variables, and in the case of non-linear distribution.

4.4 The effect of social pressure, self-evaluation and attitude toward risk on CBDRR

There are 8 independent variables and 10 dependent variables which are shown in table 4.8. According to data in this research, the decision of respondents (dependent variable) to participate in flood risk reduction has been described as a dichotomous variable (yes or no). In contrast, independent variables are classified through scaling (0 represents no effect on respondent's intention and 10 represents significant effect on respondent's intention) Thus, this research applies binomial logistic regression to analyze and predict between influence factors and respondents' decision to participate in flood risk reduction activity.

Table 4.8 Classification of variables in this analysis

		Variable	Attribute
Independent variable	X_1	Leadership and performance of government and supporters	Scaling (0-10) 0 = not influence 10 =highly influence
	X_2	Reliability and transparency of information	
	X_3	Fear and anxiety toward flood disaster	
	X_4	Expectation of relief and damage	
	X_5	Effect from other people	
	X_6	Characteristics of flood risks	
	X_7	Source of information	
	X_8	Personal understanding and flood experience	
Dependent variable	D1	Sharing information	Yes (1) or no (0)
	D2	Donate stuffs to flood victims	
	D3	Volunteer to help the community	
	D4	Check survival kits	
	D5	Plan evacuation routes or destination points	
	D6	Apply insurance	
	D7	Apply sandbags for flood protection	
	D8	Participate in evacuation drills	
	D9	Participate in Community-Based Disaster Risk Reduction (CBDRR) activity	
	D10	Volunteer for cleaning or recovery after flood incident	

Source: Author, 2014

Binomial logistic regression is based on a linear relationship between the natural logarithm (ln) of the probability of an event (Y) which is equal to zero or

one, and a numerical independent variable. To analyze intention of respondents to take action in flood preparation and response. This study applying multinomial logit model to analyze how each influence factors affecting to decision to take respond of community members. The multinomial model had adapt from binomial logit models. In this study, there are seven influence factors (scoer from zero to ten) and seven flood risk reduction activities. (not taking action, take action when confront to disaster, take action since receive information or annoucement from government, and take action in normal period) This study employ logit model to predict intention to take action in exponential form. Odd ratio or exponential Beta are determine the occurrence of the outcome of interest. Odd ratio could measure in terms of exponential of beta value (Exp(B)) in logit regression model. (Exp(B) <1 is representing that exposure associated with lower odds of outcome; Exp(B)=1 is representing that exposure do not associated with odds of outcome. And; Exp(B)>1 is representing that exposure associated with higher of odds of outcome). Multinomial logit regression model can shown belows

$$L = \ln(o) = \ln(\frac{p}{1-p}) = \beta 0 + \beta_1 X_1 + \beta_2 X_2 + ... \beta_p X_p + \varepsilon$$ ....Logit Probability equation

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_p X_p + \varepsilon \quad (Y \in 0,1)$$ ...Binomial Logistic Regression Equation

Where
- Y is binary and represents the event of interest (response)
- P is the proportion of success,
- 0 is the odds of event,
- L is the ln(odds of event),
- X is the independent variable,
- β are the Y-intercept and the slope
- ϵ, is the random error

Thus, to establish binomial logistic regression model to analyze between dependent variables (Decisions to participate in flood risk reduction activities) and a set of independent variables are leadership and performance of government and supporters; X_1, Reliability and transparency of information; X_2, Fear and anxiety toward flood disaster; X_3, Expectation of relief and damage; X_4, Effect from other people; X_5, Characteristics of flood risks; X_6, Source of information; X_7, and Personal understanding and flood experience; X_8. The Binomial logistic regression model is described as follows

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \varepsilon$$

Where Y is the binary and represents the participation in flood risk reduction Activity
X_1 is the Leadership and performance of government and supporters
X_2 is the Reliability and transparency of information
X_3 is the Fear and anxiety toward flood disaster
X_4 is the Expectation of relief and damage
X_5 is the Effect from other people
X_6 is the Characteristic of flood risk
X_7 is the Source of information
X_8 is the Personal understanding and flood experience
β are the Y-intercept and the slope for variable X
ϵ, is the random error

(1) Sharing information

The eight predictors are (1) Leadership and performance of government and supporters, (2) Reliability and transparency of information, (3) Fear and anxiety toward flood disaster, (4) Expectation of relief and damage, (5) Effect from other people, (6) Characteristics of flood risks, (7) Source of information and, (8) Personal understanding and flood experience. And one dependent variable; sharing information (D1) Binary logistic regression equation to analyze the relationship between the attitude and the respondents' intention to share information can be explained as follows

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \varepsilon$$

Where Y is the intention of respondents to share information
X_1 is the Leadership and performance of government and supporters
X_2 is the Reliability and transparency of information
X_3 is the Fear and anxiety toward flood disaster
X_4 is the Expectation of relief and damage
X_5 is the Effect from other people
X_6 is the Characteristic of flood risk
X_7 is the Source of information
X_8 is the Personal understanding and flood experience
β are the Y-intercept and the slope for variable X
ϵ, is the random error

The classification table (Table 4.9) shows the value between the observed case and the predicted case in dependent variables. It was shown that 89.0% were correctly classified for the participating group and 92.9% were correctly classified for those not taking action. Overall 66.8% were correctly classified. Implies that the predictor model is improved from the 65.6% correct classification with the constant model (no predictors), and it could prove that the predictor model is significantly better.

Table4.9 Cross tabulation between predicted and observed data for the decision to share information in relevance to flood situation between the constant model and predictor model

Observed		Predicted		
		Non-taking action	Taking action	Percentage correct
Sharing information in relevance to flood situation (Constant)	Non-taking action	0	86	0.0
	Taking action	0	164	100.0
	Overall percentage			65.6
(Model) Omnibus test Chi-square= 26.383, sig.=0.001				
Observed		Predicted		
		Non-taking action	Taking action	Percentage correct
Sharing information in relevance to flood situation (Predictor)	Non-taking action	21	65	24.4
	Taking action	18	146	89.0
	Overall percentage			66.8
(Model) Omnibus test Chi-square= 26.383, sig.=0.001				

Source: Author, 2014

The significant value of Hosmer and Lemoeshow (H-L statistic) is equal to 0.967 (H-L sig.= 0.967 >0.05), showing that this model of prediction is well-fit, thus there are differences between the observed and model-predicted values. (Table 4.10) Precisely, the value of exponential B (EXP B) or odd ratio shown in this case, if the score of influence on respondent due to the effect of other people (X_5) is increased by 1, (1 score) the odds ratio is 1.413 times the initial ratio, therefore respondents are 1.413 times more likely to share information with other people ($EXP(B)_{X5}$ = 1.413). Fear and anxiety toward flood disaster influence respondents decision to share information by 1.111 more times per one score increase ($EXP(B)_{X3}$ = 1.111). Expectation of relief and damage cause respondent to share information by 1.138 more times per one score increase ($EXP(B)_{X4}$ = 1.138), and personal understanding and flood experiences affect respondents' decision to share information by 1.15 times more per single score increase ($EXP(B_{)X8}$ = 1.155) However, fear and anxiety toward flood disaster (X3), Expectation of relief and damage (X5), and personal understanding and flood experience (X8) are insignificant in their affect on the decision to share information in this case

Table 4.10 Coefficients of the model predicting toward decision to sharing information in relevance to flood situation

	b	Wald	Sig.	95% Confidence Interval for odd Ratio		
				Lower	EXP(B)	Upper
Included						
Constant	-0.818	1.556	0.212		0.441	
X1- Leadership and performance of government and supporters	**-0.311**	**6.050**	**0.014**	**0.572**	**0.733**	**0.393**
X2- Reliability and transparency of information	-0.009	0.005	0.944	0.763	0.991	1.286
X3- Fear and anxiety toward flood disaster	0.106	1.226	0.268	0.922	1.111	1.340
X4- Expectation of relief and damage	0.129	0.967	0.325	0.879	1.138	1.473
X5 - Effect from other people	**0.345**	**8.349**	**0.004**	**1.118**	**1.413**	**1.786**
X6- Characteristic of flood risk	-0.102	0.666	0.415	0.706	0.903	1.155
X7- Source of information	-0.029	0.050	0.824	0.753	0.971	1.254
X8- Personal understanding and flood experience	0.144	3.537	0.060	0.994	1.155	1.341

Note: R^2= 0.967 (Hosmer&Lemeshow) 0.1 (Cox&Snell) 0.138 (Nagelkerke) Model X^2 =26.383, Model sig. =0.00, p<0.001 *p<0.01, N=250

Source: Author, 2014

A logistic regression analysis was conducted to predict the intention to share information for 250 respondents upon these factors; leadership and performance of government and supporters; reliability and transparency of information; fear and anxiety toward flood disaster; expectation of relief and damage; effect from other people; characteristics of flood risks; source of information; and personal understanding and flood experiences as predictors. According to the test, results proved that the predictor model is better than the constant model and it reliably distinguished between people who decide to share information and people who decide not to (chi-square= 26.383, sig.=0.001)

Nagelkerke's R^2 is equal to 0.138 indicated a weak relationship between prediction and dependent variable. Prediction success overall was 66.8% (89.0% for participation and 24.4% for inaction). And the results show that the effect from other people significantly influence the decision to share information, whereas personal understanding and experience, fear and anxiety toward flood

situations, expectation of relief and damage are insignificantly affect on the decision of respondents to share information at a 95% confidence level.

(2) To donate stuff to flood victims

The eight predictors are (1) Leadership and performance of government and supporters, (2) Reliability and transparency of information, (3) Fear and anxiety toward flood disaster, (4) Expectation of relief and damage (5) Effect from other people, (6) Characteristics of flood risks, (7) Source of information, and (8) Personal understanding and flood experience, and one dependent variable; donate stuff to flood victims (D2). Binary logistic regression equation is used to analyze the relationship between the attitude and respondents' intention to donate stuff to flood victims. The equation is explained as below:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \varepsilon$$

Where Y is the intention of respondent to donate stuff to flood afflict victims
X_1 is the Leadership and performance of government and supporters
X_2 is the Reliability and transparency of information
X_3 is the Fear and anxiety toward flood disaster
X_4 is the Expectation of relief and damage
X_5 is the Effect from other people
X_6 is the Characteristics of flood risks
X_7 is the Source of information
X_8 is the Personal understanding and flood experience
β are the Y-intercept and the slope for variable X
ϵ, is the random error

The classification table (Table 4.11) shows the value between the observed case and the predicted case for the dependent variable. In this case, it is shown that 61.7% were correctly classified for the group taking action and 57.4% were correctly classified for those not taking action. Overall 59.6% were correctly classified. This table shows that the predictor model has improved from 51.2%

correct classification with the constant model (no predictors), and could suggest that the predictor model is significantly better.

Table 4.11 Cross tabulation between predicted and observed data for the decision to Donate stuff to flood victims in relevance to flood situations

Observed		Predicted		
		No action	Taking action	Percentage correct
Donate stuff to flood victims (Constant)	No action	0	122	0.0
	Taking action	0	128	100.0
	Overall percentage			51.2
(Model) Omnibus test Chi-square= 17.897, sig.=0.022				
Observed		Predicted		
		No action	Taking action	Percentage correct
Donate stuff to flood victims (Predictor)	No action	70	52	57.4
	Taking action	49	79	61.7
	Overall percentage			59.6
(Model) Omnibus test Chi-square= 17.897, sig.=0.022				

Source: Author, 2014

The significant value of Hosmer and Lemoeshow (H-L statistic) is equal to 0.919 (H-L sig.= 0.919 >0.05) which proves that this model of prediction is well-fit, thus there are differences between the observed and model-predicted values. (Table 4.12) In particular, the value of exponential B (EXP B) or odd ratio shows that in this case, if the score of fear and anxiety towards the flood disaster is increased by 1, (1 score) the odds ratio is 1.325 times the initial ratio, therefore respondents are 1.325 times more likely to donate stuff to flood victim per single score increase ($EXP(B)_{X3}$ = 1.325). Leadership and performance of government and supporters affect respondents' decision to donate stuff for flood victims by 1.055 times more per single score increase ($EXP(B)_{X1}$ = 1.055). The effect from other people influences respondents' decision to donate stuff for flood victims by 1.077 times more per single score increase ($EXP(B)_{X5}$ = 1.077). Characteristics of flood risks affect respondents' decision to donate stuff for flood victims by 1.050 times more per one score increase ($EXP(B)_{X6}$ = 1.050). And personal

understanding and flood experience increase respondents' decision to donate stuff for flood victims by 1.097 times more per single score increase ($EXP(B)_{X8}$ = 1.097) However, leadership and performance of government and supporters (X1), effect from other people (X5), characteristics of flood risks (X6), and personal understanding and flood experience (X8) have an insignificant effect on the decision to donate stuff for flood victims in this case.

Table 4.12 Coefficients of the model predicting toward decision to donate stuffs to flood victims

	b	Wald	Sig.	95% Confidence Interval for odd Ratio		
				Lower	EXP(B)	Upper
Included						
Constant	-1.001	2.815	0.093			
X1- Leadership and performance of government and supporters	0.053	0.269	0.604	0.862	1.055	1.291
X2- Reliability and transparency of information	-0.137	1.338	0.247	0.691	0.872	1.100
X3- Fear and anxiety toward flood disaster	**0.282**	**9.449**	**0.002**	**1.107**	**1.325**	**1.586**
X4- Expectation of relief and damage	-0.153	1.686	0.194	0.681	0.858	1.081
X5 - Effect from other people	0.007	0.005	0.942	0.825	1.007	1.230
X6- Characteristic of flood risk	0.049	0.185	0.667	0.840	1.050	1.312
X7- Source of information	-0.030	0.066	0.797	0.772	0.970	1.220
X8- Personal understanding and flood experience	0.093	1.797	0.180	0.958	1.097	1.257

Note: R^2= 0.919 (Hosmer&Lemeshow) 0.069 (Cox&Snell R2) 0.092 (Nagelkerke R2) Model X^2 =17.897, Model sig.= 0.022, p<0.001 *p<0.01, N=250

Source: Author, 2014

A logistic regression analysis was conducted to predict the intention to donate stuff to flood victims for 250 respondents upon these factors; leadership and performance of government and supporters; reliability and transparency of information; fear and anxiety toward flood disaster; expectation of relief and damage; effect from other people; characteristics of flood risks; source of information; and personal understanding and flood experience as predictors. This test has proven that the predictor model is better than the constant model

and it reliably distinguishes between people who decide to donate stuff to flood victims and those who do not (chi-square= 17.897, sig.=0.022)

Nagelkerke's R^2 value is equal to 0.092 indicated a weak relationship between prediction and dependent variable. Prediction success overall was 59.6% (61.7% for participation and 57.4% for no action). The results show that fear and anxiety toward flood disaster significantly influence the decision to donate stuff to flood victims, whereas leadership and performance of government and supporters, effect from other people, characteristics of flood risks, and personal understanding and flood experience. Those are insignificantly effect on the decision of respondents to donate stuff for flood victims at a confidence level of 95%.

(3) Be volunteer to help community

The eight predictors are (1) Leadership and performance of government and supporters, (2) Reliability and transparency of information, (3) Fear and anxiety toward flood disaster, (4) expectation of relief and damage (5) Effect from other people, (6) Characteristics of flood risks, (7) Source of information, and (8) Personal understanding and flood experience, and one dependent variable; volunteer to help the community (D3) Binary logistic regression equation to analyze the relationship between influence factors and intention to volunteer to help the community could be explained as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \varepsilon$$

Where Y is the intention of respondent to be volunteer to help community
X_1 is the Leadership and performance of government and supporters
X_2 is the Reliability and transparency of information
X_3 is the Fear and anxiety toward flood disaster

X_4 is the Expectation of relief and damage
X_5 is the Effect from other people
X_6 is the Characteristics of flood risks
X_7 is the Source of information
X_8 is the Personal understanding and flood experience
β are the Y-intercept and the slope for variable X
ϵ, is the random error

The classification table (Table 4.13) shows the value between the observed case and the predicted case in dependent variables. In this case, 58.9% were correctly classified for the group participating and 59.5% were correctly classified for those not taking action. Overall 59.2% were correctly classified. This table shows that the predictor model improved from the 50.4% correct classification with the constant model (no predictors), and could infer that the predictor model is significantly better.

Table 4.13 Cross tabulation between predicted and observed data for the decision to be volunteer to help community

Observed		Predicted		
		No action	Taking action	Percentage correct
Volunteer to help the community	No action	126	0	100.0
	Taking action	124	0	0.0
	Overall percentage			50.4
(Model) Omnibus test Chi-square= 16.818, sig.=0.032				
Observed		Predicted		
		No action	Taking action	Percentage correct
Volunteer to help the community	No action	75	51	59.5
	Taking action	51	73	58.9
	Overall percentage			59.2
(Model) Omnibus test Chi-square= 16.818, sig.=0.032				

Source: Author, 2014

The significant value of Hosmer and Lemoeshow (H-L statistic) is equal to 0.186 (H-L sig.= 0.186 >0.05) showing that this model of prediction is well-fit. There are differences between the observed and model-predicted values. (Table 4.14) The value of exponential B (EXP B) or odd ratio shows that in this case, if the score of fear and anxiety towards flood disaster is increased by 1, (1 score)

the odds ratio is 1.203 times greater. Therefore respondents are 1.203 times more likely to volunteer to help the community ($EXP(B)_{X3}$ = 1.203). Personal understanding and flood experiences affecting respondent's decision to volunteer to help the community by 1.199 more times per one score increase ($EXP(B)_{X8}$ = 1.199). The effect from other people influencing respondents' decisions to volunteer to help the community by 1.094 more times per single score increase ($EXP(B)_{X5}$ = 1.094). However, the effect from other people (X5) insignificantly affects the decision to volunteer to help the community in this case.

Table 4.14 Coefficients of the model predicting toward decision to be volunteer to help community

	b	Wald	Sig.	95% Confidence Interval for odd Ratio		
				Lower	EXP(B)	Upper
Included						
Constant	-0.666	1.290	0.256		0.514	
X1- Leadership and performance of government and supporters	-0.121	1.405	0.236	0.725	0.886	1.082
X2- Reliability and transparency of information	-0.078	0.439	0.508	0.735	0.925	1.164
X3- Fear and anxiety toward flood disaster	**0.185**	**4.272**	**0.039**	**1.010**	**1.203**	**1.433**
X4- Expectation of relief and damage	-0.092	0.621	0.431	0.726	0.912	1.146
X5 - Effect from other people	0.089	0.779	0.377	0.897	1.094	1.334
X6- Characteristic of flood risk	-0.024	0.043	0.836	0.782	0.977	1.220
X7- Source of information	-0.044	0.141	0.707	0.759	0.957	1.205
X8- Personal understanding and flood experience	**0.182**	**6.293**	**0.012**	**1.040**	**1.199**	**1.382**

Note: R^2= 0.186 (Hosmer&Lemeshow) 0.065 (Cox&Snell) 0.087 (Nagelkerke) Model X^2 =16.818, Model sig.=0.032, p<0.001 *p<0.01, N=250

Source: Author, 2014

A binary logistic regression analysis was conducted to predict the intention to volunteer and help the community for 250 respondents upon these factors; leadership and performance of government and supporters; reliability and transparency of information; fear and anxiety toward flood disaster; expectation of relief and damage; effect from other people; characteristics of flood risks; source of information; and personal understanding and flood experience as

predictors. According to the test, it is shown that the predictor model is better than the constant model and it reliably distinguishes between people who decide to volunteer to help the community and those who do not (chi-square= 16.818, sig.=0.032).

Nagelkerke's R^2 value is equal to 0.092 indicated a weak relationship between prediction and dependent variable. Prediction success overall was 59.2% (58.9% for those participating and 59.5% for those taking no action). The results have shown that fear and anxiety towards flood disaster, and personal understanding and experience can significantly affect the decision to volunteer to help the community, whereas the effect from other people minimally affects the decision of respondents to volunteer at a 95% confidence level.

(4) Checking survival kit

The eight predictors are (1) Leadership and performance of government and supporters, (2) Reliability and transparency of information, (3) Fear and anxiety towards flood disaster, (4) expectation of relief and damage (5) Effect from other people, (6) Characteristics of flood risks, (7) Source of information, and (8) Personal understanding and flood experiences. And one dependent variable; check survival kits (D4) Binary logistic regression equation to analyze the relationship between the attitude and the intention to check survival kits could be explained as follows

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \varepsilon$$

Where Y is the intention of respondent to check survival kit
X_1 is the Leadership and performance of government and supporters
X_2 is the Reliability and transparency of information
X_3 is the Fear and anxiety toward flood disaster

X_4 is the Expectation of relief and damage
X_5 is the Effect from other people
X_6 is the Characteristics of flood risks
X_7 is the Source of information
X_8 is the Personal understanding and flood experience
β are the Y-intercept and the slope for variable X
ϵ, is the random error

The classification table (Table 4.15) shows the values between the observed case and the predicted case in dependent variables. In this case, 81.3% were correctly classified for the group taking action and 37.8% were correctly classified for those not taking action. Overall 62.0% were correctly classified. This table shows that the predictor model improved from the 55.6% correct classification with the constant model (no predictors), and could suggest that the predictor model is significantly better.

Table 4.15 Cross tabulation between predicted and observed data regarding the decision to check survival kits

Observed		Predicted		
		No action	Taking action	Percentage correct
Check survival kits	No action	139	0	100.0
	Taking action	111	0	0.0
	Overall percentage			55.6
(Model) Omnibus test Chi-square= 17.648, sig.=0.024				
Observed		Predicted		
		No action	Taking action	Percentage correct
Check survival kits	No action	113	26	81.3
	Taking action	69	42	37.8
	Overall percentage			62.0
(Model) Omnibus test Chi-square= 17.648, sig.=0.024				

Source: Author, 2014

The significant value of Hosmer and Lemoeshow (H-L statistic) is equal to 0.727 (H-L sig.= 0.727 >0.05) proving that this model of prediction is well-fit, thus there are differences between the observed and model-predicted values. (Table 4.16) In particular, the value of exponential B (EXP B) or odd ratio shows that in this case, if the score of personal understanding and flood experience is

increased by 1, (1 score) the odds ratio is 1.150 times greater, therefore respondents are 1.150 times more likely to check survival kits ($EXP(B)_{X8}$ = 1.150). Leadership and performance of government and supporters affects respondents' decision to check survival kits by 1.016. ($EXP(B)_{X1}$ = 1.016). Expectations of relief and damage mean the respondents are 1.040 times more likely to checking survival kits ($EXP(B)_{X4}$ = 1.040). The effect from other people influences respondents' decision to volunteer to checking survival kit by 1.206 more times per one score increase ($EXP(B)_{X5}$ = 1.206). Characteristics of flood risks increase respondents' decision to check survival kits by 1.004 times per one score increase ($EXP(B)_{X6}$ = 1.004). Source of information makes respondents' 1.079 times more likely to check survival kits per one score increase ($EXP(B)_{X7}$ = 1.079). However, the Leadership and performance of government and supporters (X1), expectation of relief and damage (X4), effect from other people (X5), Characteristics of flood risks (X6), and Source of information (X7) have an insignificant effect on the decision to check survival kits in this case.

Table 4.16 Coefficients of the model predicting the decision to check survival kits

	b	Wald	Sig.	95% Confidence Interval for odd Ratio		
				Lower	EXP(B)	Upper
Included						
Constant	-1.795	8.653	0.003		0.166	
X1- Leadership and performance of government and supporters	0.016	0.024	0.877	0.834	1.106	1.237
X2- Reliability and transparency of information	-0.157	1.668	0.196	0.674	0.855	1.084
X3- Fear and anxiety toward flood disaster	-0.006	0.005	0.945	0.835	0.994	1.184
X4- Expectation of relief and damage	0.040	0.116	0.734	0.828	1.040	1.308
X5 - Effect from other people	0.188	3.308	0.069	0.986	1.206	1.477
X6- Characteristic of flood risk	0.004	0.001	0.971	0.803	1.004	1.256
X7- Source of information	0.076	0.441	0.506	0.861	1.079	1.353
X8- Personal understanding and flood experience	**0.139**	**3.925**	**0.048**	**1.002**	**1.150**	**1.320**

Note: R^2= 0.727 (Hosmer&Lemeshow) 0.068 (Cox&Snell) 0.091 (Nagelkerke) Model X^2 =17.648, Model sig.=0.024, p<0.001 *p<0.01, N=250

Source: Author, 2014

A binary logistic regression analysis was conducted to predict the intention to check survival kits for 250 respondents by using these factors; leadership and performance of government and supporters; reliability and transparency of information; fear and anxiety towards flood disaster; expectation of relief and damage; effect from other people; characteristics of flood risks; source of information; and personal understanding and experience as predictors. According to the test, the predictor model is better than the constant model and can reliably distinguish between people who are willing to check survival kits and people who are not (chi-square= 17.648, sig.=0.024).

Nagelkerke's R^2 value is equal to 0.068 indicated a weak relationship between prediction and grouping. Prediction success overall was 62.0% (37.8% for those taking action and 81.3% for those not taking action). The results show that personal understanding and flood experience significantly affects the decision to check survival kits, whereas leadership and performance of government and supporters, expectation of relief and damage, effect from other people, characteristics of flood risks, and source of information are insignificantly effect on the decision of respondents to check survival kits at a 95% confidence level.

(5) Planning evacuation route or destination point

The eight predictors are (1) Leadership and performance of government and supporters, (2) Reliability and transparency of information, (3) Fear and anxiety toward flood disaster, (4) Expectation of relief and damage (5) Effect from other people, (6) Characteristics of flood risks, (7) Source of information,

and (8) Personal understanding and flood experience, with one dependent variable; evacuation planning (D5) Binary logistic regression equation to analyze the relationship between the factors and the intention to plan evacuation routes or destination points could be explained as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \varepsilon$$

Where Y is the intention of respondent to planning evacuation route or destination point
X_1 is the Leadership and performance of government and supporters
X_2 is the Reliability and transparency of information
X_3 is the Fear and anxiety toward flood disaster
X_4 is the Expectation of relief and damage
X_5 is the Effect from other people
X_6 is the Characteristics of flood risks
X_7 is the Source of information
X_8 is the Personal understanding and flood experience
β are the Y-intercept and the slope for variable X
ϵ, is the random error

The classification table (Table 4.17) shows the values between the observed case and the predicted case in dependent variables. In the case shown, 66.9% were correctly classified for the group taking action and 55.8% were correctly classified for those not taking action. Overall 61.6% were correctly classified. This table shows that the predictor model improved from 52.0% correct classification with the constant model (no predictors), and could suggest that the predictor model is significantly better.

Table 4.17 Cross tabulation between predicted and observed data regarding the decision to plan evacuations

Observed		Predicted		
		No action	Taking action	Percentage correct
Planning evacuation routes or destination points	No action	0	120	0.0
	Taking action	0	130	100.0
	Overall percentage			52.0
(Model) Omnibus test Chi-square= 28.382, sig.=0.000				
Observed		Predicted		
		No action	Taking action	Percentage correct
Planning evacuation routes or destination points	No action	67	53	55.8
	Taking action	43	87	66.9
	Overall percentage			61.6
(Model) Omnibus test Chi-square= 28.382, sig.=0.000				

Source: Author, 2014

The significant value of Hosmer and Lemoeshow (H-L statistic) is equal to 0.662 (H-L sig.= 0.662 >0.05) proving that this model of prediction is well-fit, There are differences between the observed and model-predicted values. (Table 4.18) Specifically, the value of exponential B (EXP B) or odd ratio has shown that in this case, if the score of personal understanding and flood experience is increased by 1, (1 score) the odds ratio is 1.244 times greater, therefore respondents are 1.244 times more likely to plan evacuations route per one score increase ($EXP(B)_{X8}$ = 1.244). Fear and anxiety toward flood disaster affects respondents' decision to plan evacuations by 1.166 more times per single score increase ($EXP(B)_{X3}$ = 1.166) respectively.

Effect from other people increase respondents' decision conducting evacuation planning by 1.096 more times per one score increase ($EXP(B)_{X4}$ = 1.096). Characteristics of flood risks are influencing for respondents' decision to plan evacuations route by 1.113 more times per single score increase ($EXP(B)_{X6}$ = 1.113). Source of information affecting respondents' decision to carry out evacuation planning by 1.113 more times per one score increase ($EXP(B)_{X7}$ =

1.113). However, fear and anxiety toward flood disaster (X3), effect from other people (X5), characteristics of flood risks (X6), and source of information (X7) are insignificantly effect on respondents' decision to conduct evacuation planning in this case.

Table 4.18 Coefficients of the model prediction for decision to plan evacuations

	b	Wald	Sig.	95% Confidence Interval for odd Ratio		
				Lower	EXP(B)	Upper
Included						
Constant	-1.386	5.001	0.025		0.250	
X1- Leadership and performance of government and supporters	-0.064	0.360	0.549	0.761	0.938	1.156
X2- Reliability and transparency of information	-0.233	3.385	0.066	0.618	0.792	1.015
X3- Fear and anxiety toward flood disaster	0.153	2.856	0.091	0.976	1.166	1.393
X4- Expectation of relief and damage	-0.131	1.169	0.280	0.692	0.877	1.112
X5 - Effect from other people	0.091	0.762	0.383	0.892	1.096	1.345
X6- Characteristic of flood risk	0.107	0.811	0.368	0.881	1.113	1.406
X7- Source of information	0.107	0.778	0.378	0.877	1.113	1.412
X8- Personal understanding and flood experience	**0.219**	**8.484**	**0.004**	**1.074**	**1.244**	**1.442**

Note: R^2= 0.662(Hosmer&Lemeshow) 0.107 (Cox&Snell) 0.143 (Nagelkerke) Model X^2 =28.382, Model sig.=0.00, p<0.001 *p<0.01, N=250

Source: Author, 2014

A binary logistic regression analysis was conducted to predict the intention to plan evacuations for 250 respondents upon these factors; leadership and performance of government and supporters; reliability and transparency of information; fear and anxiety toward flood disaster; expectation of relief and damage; effect from other people; characteristics of flood risks; source of information; and personal understanding and experiences as predictors. According to the test, results have shown that the predictor model is better than the constant model and it reliably distinguishes between people who decide to plan evacuations and people who do not (chi-square= 28.382, sig.=0.000)

Nagelkerke's R^2 value is equal to 0.143 indicated a weak relationship between prediction and dependent variable. Overall, prediction success was 61.6% (55.8% for those taking action and 66.9% for those not taking action). The results show that personal understanding and experience is significantly influential for the decision to plan evacuations whereas fear and anxiety toward flood disaster, effect from other people, characteristics of flood risks, and source of information have little effect on the decision of respondents to plan evacuations at 95% confidence level.

(6) Apply insurance

The eight predictors are (1) Leadership and performance of government and supporters; (2) Reliability and transparency of information; (3) Fear and anxiety toward flood disaster; (4) Expectation of relief and damage; (5) Effect from other people; (6) Characteristics of flood risks; (7) Source of information; and (8) Personal understanding and flood experience, alongside one dependent variable; apply insurance (D6) A binary logistic regression equation to analyze the relationship between influencing factors and the intention to apply insurance could be explained as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \varepsilon$$

Where Y is the intention of respondent to apply insurance
X_1 is the Leadership and performance of government and supporters
X_2 is the Reliability and transparency of information
X_3 is the Fear and anxiety toward flood disaster
X_4 is the Expectation of relief and damage
X_5 is the Effect from other people
X_6 is the Characteristics of flood risks
X_7 is the Source of information
X_8 is the Personal understanding and flood experience
β are the Y-intercept and the slope for variable X
ϵ, is the random error

The classification table (Table 4.19) shows the value between the observed case and the predicted case in dependent variables. In this case, it is shown that 85.9% were correctly classified for the group that applying insurrance and 29.9% were correctly classified for those not taking action. Overall 66.4% were correctly classified. This table shows that the predictor model has improved from the 65.2% correct classification with the constant model (no predictors), and could mean that the predictor model is significantly better.

Table 4.19 Cross tabulation between predicted and observed data regarding the decision to apply insurance

Observed		Predicted		
		No action	Taking action	Percentage correct
Apply insurance	No action	0	87	0.0
	Taking action	0	163	100.0
	Overall percentage			65.2
(Model) Omnibus test Chi-square= 28.373, sig.=0.000				
Observed		Predicted		
		No action	Taking action	Percentage correct
Apply insurance	No action	26	61	29.9
	Taking action	23	140	85.9
	Overall percentage			66.4
(Model) Omnibus test Chi-square= 28.373, sig.=0.000				

Source: Author, 2014

The significant value of Hosmer and Lemoeshow (H-L statistic) is equal to 0.268 (H-L sig.= 0.268 >0.05) demonstrating that this model of prediction is well-fit. There are differences between the observed and model-predicted value. (Table 4.20) In particular, the value of exponential B (EXP B) or odd ratio proves that in this case, if the score of fear and anxiety towards the flood disaster is increased by 1, (1 score) the odds ratio is 1.434 times more likely to apply insurance, therefore respondents are 1.434 times more likely to apply insurance per one score increase ($EXP(B)_{X8}$ = 1.434). Leadership and performance of government and supporters encourage respondents' to apply insurance by 1.166

times more per single score increase ($EXP(B)_{X1}$ = 1.008). Reliability and transparency of information affecting respondents' decision to apply insurance by 1.150 times more per one score increase ($EXP(B)_{X2}$ = 1.150). The effect from other people influences respondents' decision to apply insurance by 1.078 times more per single score increase ($EXP(B)_{X5}$ = 1.078). Source of information has an effect upon respondents' decisions to apply insurance; being 1.113 times more likely per one score increase ($EXP(B)_{X7}$ = 1.113). Personal understanding and flood experiences cause respondents' decision to apply insurance to increase by 1.055 times more per one score increase ($EXP(B)_{X8}$ = 1.055). However, leadership and performance of government and supporters (X1), reliability and transparency of information (X2), effect from other people (X5), source of information (X7), and personal understanding and experience (X8), are insignificantly effect the decision to apply insurance in this case.

Table 4.20 Coefficients of the model predicting the decision to apply insurance

	b	Wald	Sig.	95% Confidence Interval for odd Ratio		
				Lower	EXP(B)	Upper
Included						
Constant	-1.120	3.012	0.083		0.326	
X1- Leadership and performance of government and supporters	0.008	0.005	0.945	0.812	1.008	1.250
X2- Reliability and transparency of information	0.139	1.266	0.260	0.902	1.150	1.466
X3- Fear and anxiety toward flood disaster	**0.360**	**12.882**	**0.000**	**1.178**	**1.434**	**1.745**
X4- Expectation of relief and damage	**-0.268**	**4.647**	**0.031**	**0.600**	**0.765**	**0.976**
X5 - Effect from other people	0.075	0.472	0.492	0.871	1.078	1.333
X6- Characteristic of flood risk	-0.183	2.214	0.137	0.656	0.833	1.060
X7- Source of information	0.130	1.143	0.285	0.897	1.139	1.444
X8- Personal understanding and flood experience	0.053	0.544	0.461	0.916	1.055	1.215

Note: R^2= 0.268 (Hosmer&Lemeshow) 0.107 (Cox&Snell) 0.148 (Nagelkerke) Model X^2 =28.373, Model sig.=0.000, p<0.001 *p<0.01, N=250

Source: Author, 2014

A binary logistic regression analysis was conducted to predict the intention to apply insurance for 250 respondents upon these factors; leadership and performance of government and supporters; reliability and transparency of information; fear and anxiety toward flood disaster; expectation of relief and damage; effect from other people; characteristics of flood risks; source of information; and personal understanding and flood experience as predictors. According to the test, the predictor model is better than the constant model and it reliably distinguishes between people who decide to apply insurance and people who do not (chi-square= 28.373, sig.=0.000)

Nagelkerke's R^2 value is equal to 0.148, indicated a weak relationship between prediction and grouping. Prediction success overall was 66.4% (85.9% for the group taking action and 29.9% for those not taking action). The result shows that fear and anxiety toward flood disaster is significantly affecting the decision to apply insurance, whereas leadership and performance of government and supporters, reliability and transparency of information, effect from other people, source of information, and personal understanding and flood experiences are insignificantly affecting on the decision of respondents to apply insurance at a 95% confidence level.

(7) Apply sandbags for protection

The eight predictors are (1) Leadership and performance of government and supporters, (2) Reliability and transparency of information, (3) Fear and anxiety toward flood disaster, (4) Expectation of relief and damage (5) Effect from other people, (6) Characteristics of flood risks, (7) Source of information,

and (8) Personal understanding and flood experience, compared with one dependent variable; apply sandbags for protection (D7) Binary logistic regression equation to analyze the relationship between the attitude and the intention to apply sandbags for protection could be explained as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \varepsilon$$

Where Y is the intention of respondent to apply sandbags for protection
X_1 is the Leadership and performance of government and supporters
X_2 is the Reliability and transparency of information
X_3 is the Fear and anxiety toward flood disaster
X_4 is the Expectation of relief and damage
X_5 is the Effect from other people
X_6 is the Characteristics of flood risks
X_7 is the Source of information
X_8 is the Personal understanding and flood experiences
β are the Y-intercept and the slope for variable X
ϵ, is the random error

The classification table (Table 4.21) shows the value between the observed case and the predicted case in dependent variables. In this case, it has been shown that 59.6% were correctly classified for the group taking action and 73.5% were correctly classified for those not taking action. Overall 67.2% were correctly classified. This table shows that the predictor model has improved from the 54.4% correct classification with the constant model (no predictors), and it could suggest that the predictor model is significantly better.

Table 4.21 Cross tabulation between predicted and observed data regarding the decision to apply sandbags for flood protection

Observed		Predicted		
		No action	Taking action	Percentage correct
Apply sandbags for flood protection	No action	136	0	100.0
	Taking action	114	0	0.0
	Overall percentage			54.4
(Model) Omnibus test Chi-square= 43.213, sig.=0.000				
Observed		Predicted		
		No action	Taking action	Percentage correct
Apply sandbags for flood protection	No action	100	36	73.5
	Taking action	46	68	59.6
	Overall percentage			67.2
(Model) Omnibus test Chi-square= 43.213, sig.=0.000				

Source: Author, 2014

The significant value of Hosmer and Lemoeshow (H-L statistic) is equal to 0.552 (H-L sig.= 0.552 >0.05) showing that this model of prediction is well-fit, thus there are differences between the observed and the model-predicted values. (Table 4.22) Specifically, the value of exponential B (EXP B) or odd ratio shows that in this case, if the score of the effect from other people is increase by 1, (1 score) the odds ratio is 1.468 times greater. Therefore respondents are 1.468 times more likely to apply sandbags for flood protection ($EXP(B)_{X5}$ = 1.434). Personal understanding and experiences affects respondents' decisions to apply sandbags for flood protection by 1.388 more times per one score increase ($EXP(B)_{X8}$ = 1.388). Leadership and performance of government and supporters encourage respondents to apply sandbags for flood protection by 1.063 more times per single score increase ($EXP(B)_{X1}$ = 1.063). Expectation of relief and damage influence respondents' decision to apply sandbags for flood protection by 1.006 more times per one score increase ($EXP(B)_{X4}$ = 1.006). However, leadership and performance of government and supporters (X1), and expected relief and

damage (X4) are insignificantly effect the decision to apply sandbags for flood protection in this case.

Table 4.22 Coefficients of the model predicting the decision to apply sandbags for flood protection

	b	Wald	Sig.	95% Confidence Interval for odd Ratio		
				Lower	EXP(B)	Upper
Included						
Constant	-0.281	0.202	0.653		0.755	
X1- Leadership and performance of government and supporters	0.061	0.329	0.566	0.862	1.063	1.311
X2- Reliability and transparency of information	**-0.323**	**5.601**	**0.018**	**0.554**	**0.724**	**0.946**
X3- Fear and anxiety toward flood disaster	**-0.214**	**4.786**	**0.029**	**0.667**	**0.808**	**0.978**
X4- Expectation of relief and damage	0.006	0.002	0.965	0.785	1.006	1.289
X5 - Effect from other people	**0.384**	**11.035**	**0.001**	**1.170**	**1.468**	**1.841**
X6- Characteristics of flood risks	-0.034	0.073	0.787	0.757	0.967	1.235
X7- Source of information	-0.132	1.097	0.295	0.685	0.877	1.122
X8- Personal understanding and flood experience	**0.328**	**15.070**	**0.000**	**1.176**	**1.388**	**1.639**

Note: R^2= 0.552 (Hosmer&Lemeshow) 0.159 (Cox&Snell) 0.212 (Nagelkerke) Model X^2=43.213, Model sig.=0.00, p<0.001 *p<0.01, N=250

Source: Author, 2014

A binary logistic regression analysis was conducted to predict the intention to apply sandbags for flood protection for 250 respondents by using leadership and performance of government and supporters, reliability and transparency of information, fear and anxiety towards flood disaster, expectation of relief and damage, effect from other people, characteristics of flood risks, source of information, and personal understanding and flood experiences as predictors. The test has shown that the predictor model is better than the constant model and can reliably distinguish between people who decide to apply sandbags for protection and people who do not (chi-square= 43.213, sig.=0.000)

Nagelkerke's R^2 value is equal to 0.212, indicated a weak relationship between prediction and grouping. Prediction success overall was 67.2% (59.6% for those taking action and 73.5% for the group taking no action). The results

show that effect from other people and personal understanding and experience significantly affect the decision to apply sandbags for protection, whereas leadership and performance of government and supporters and expectation of relief and damage are insignificantly effect on the decision of respondents to apply sandbags for protection at a confidence level of 95%.

(8) Participate in evacuation drills

The eight predictors are (1) Leadership and performance of government and supporters, (2) Reliability and transparency of information, (3) Fear and anxiety toward flood disaster, (4) Expectation of relief and damage (5) Effect from other people, (6) Characteristics of flood risks, (7) Source of information, and (8) Personal understanding and flood experiences, alongside one dependent variable; participation in evacuation drills (D8) Binary logistic regression equation to analyze the relationship between the attitude and the intention to participate in evacuation drills could be explained as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \varepsilon$$

Where Y is the intention of respondents to participate in evacuation drills
X_1 is the Leadership and performance of government and supporters
X_2 is the Reliability and transparency of information
X_3 is the Fear and anxiety toward flood disaster
X_4 is the Expectation of relief and damage
X_5 is the Effect from other people
X_6 is the Characteristic of flood risk
X_7 is the Source of information
X_8 is the Personal understanding and flood experience
β are the Y-intercept and the slope for variable X
ϵ, is the random error

The classification table (Table 4.23) shows the value between the observed case and the predicted case in dependent variables. In this case, it is shown that

48.6% were correctly classified for the group participating evacuation drill, and 80.9% were correctly classified for those not taking action. Overall 67.2% were correctly classified. This table shows that the predictor model has improved from the 66.8% correct classification with the constant model (no predictors), and it could suggest that the predictor model is significantly better.

Table 4.23 Cross tabulation between predicted and observed data regarding the decision to participate in evacuation drills

Observed		Predicted		
		No action	Taking action	Percentage correct
Participate in evacuation drills	No action	141	0	100.0
	Taking action	109	0	0.0
	Overall percentage			56.4
(Model) Omnibus test Chi-square= 36.759, sig.=0.000				
Observed		Predicted		
		No action	Taking action	Percentage correct
Participate in evacuation drill	No action	114	27	80.9
	Taking action	56	53	48.6
	Overall percentage			66.8
(Model) Omnibus test Chi-square= 36.759, sig.=0.000				

Source: Author, 2014

The significant value of Hosmer and Lemoeshow (H-L statistic) is equal to 0.788 (H-L sig.= 0.788 >0.05) demonstrating that this model of prediction is well-fit, thus there are differences between the observed and model-predicted values. (Table 4.24) Precisely, the value of exponential B (EXP B) or odd ratio shows that in this case, if the score of the effect from other people is increased by 1, (1 score) the possibility of respondent deciding to participate in evacuation drill is 1.468 times greater. Therefore respondents are 1.259 times more likely to participate in evacuation drills ($EXP(B)_{X5}$ = 1.259). Personal understanding and experience influences respondents' decisions to participate in evacuation drills by 1.272 more times per one score increase ($EXP(B)_{X2}$ = 1.272). The leadership and performance of government and supporters encourage respondents to participate

in evacuation drills 1.069 more times for each score increase ($EXP(B)_{X1}$ = 1.069). Expectation of relief and damage affects respondents' decision to participate in evacuation drills by 1.184 more times per one score increase ($EXP(B)_{X4}$ = 1.184). Source of information causes respondents to participate in evacuation drills by 1.013 more times per one score increase ($EXP(B)_{X7}$ = 1.013). Finally, personal understanding and flood experiences influence respondents' decisions to participate in evacuation drills by 1.005 more times per one score increase ($EXP(B)_{X8}$ = 1.005). However, leadership and performance of government and supporters (X1), expectation of relief and damage (X4), Source of information (X7), and personal understanding and experience (X8) are insignificantly affecting on the decision to participate in evacuation drills in this case.

Table 4.24 Coefficients of the model predicting the decision to participate in evacuation drills

	b	Wald	Sig.	95% Confidence Interval for odd Ratio		
				Lower	EXP(B)	Upper
Included						
Constant	-3.672	26.721	0.000		0.025	
X1- Leadership and performance of government and supporters	0.067	0.395	0.530	0.868	1.069	1.316
X2- Reliability and transparency of information	**0.241**	**3.849**	**0.050**	**1.000**	**1.272**	**1.619**
X3- Fear and anxiety toward flood disaster	-0.015	0.024	0.876	0.820	0.985	1.185
X4- Expectation of relief and damage	0.169	1.851	0.174	0.928	1.184	1.512
X5 - Effect from other people	**0.230**	**4.212**	**0.040**	**1.010**	**1.259**	**1.569**
X6- Characteristic of flood risk	-0.073	0.360	0.549	0.732	0.929	1.181
X7- Source of information	0.013	0.012	0.912	0.801	1.013	1.263
X8- Personal understanding and flood experience	0.005	0.005	0.944	0.871	1.005	1.159

Note: R^2= 0.788 (Hosmer&Lemeshow) 0.137 (Cox&Snell) 0.183 (Nagelkerke) Model X^2 =36.759, Model sig.=0.000, p<0.001 *p<0.01, N=250

Source: Author, 2014

A binary logistic regression analysis was conducted to predict the intention to participate in evacuation drills for 250 respondents upon these factors are leadership and performance of government and supporters; reliability

and transparency of information; fear and anxiety toward flood disaster; expectation of relief and damage; effect from other people; characteristics of flood risks; source of information; and personal understanding and flood experiences as predictors. According to the test, the predictor model is better than the constant model and it reliably distinguished between people who decide to participate in evacuation drills and those who do not (chi-square= 36.759, sig.=0.000)

Nagelkerke's R^2 value is equal to 0.183, indicated a weak relationship between prediction and grouping. Prediction success overall was 66.8% (48.6% for the group taking action and 80.9% for those not participating). The results show that the effect from other people and personal understanding and flood experience significantly affect the decision to participate in evacuation drills, whereas leadership and performance of government and supporters, expectation of relief and damage, source of information, and personal understanding and experiences, are insignificantly impact on the decision of respondents to participate in evacuation drills at a 95% confidence level.

(9) Participate in Community-Based Disaster Risk Reduction (CBDRR) activities

The eight predictors are (1) Leadership and performance of government and supporters, (2) Reliability and transparency of information, (3) Fear and anxiety toward flood disaster, (4) Expectation of relief and damage (5) Effect from other people, (6) Characteristics of flood risks, (7) Source of information, and (8) Personal understanding and flood experiences, with one dependent

variable; participation in CBDRR activities (D9) The binary logistic regression equation to analyze the relationship between the attitude and the intention to participate in Community-Based Disaster Risk Reduction (CBDRR) activities can be explained as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \varepsilon$$

Where Y is the intention of respondent to participate in CBDRR activity
X_1 is the Leadership and performance of government and supporters
X_2 is the Reliability and transparency of information
X_3 is the Fear and anxiety toward flood disaster
X_4 is the Expectation of relief and damage
X_5 is the Effect from other people
X_6 is the Characteristics of flood risks
X_7 is the Source of information
X_8 is the Personal understanding and flood experience
β are the Y-intercept and the slope for variable X
ϵ, is the random error

The classification table (Table 4.25) shows the value between the observed case and the predicted case in dependent variables. It is shown that 20.5% were correctly classified for the group taking action group and 92.2% were correctly classified for those not participating. Overall 68.4% were correctly classified. The table shows that the predictor model has improved from the 66.8% correct classification with the constant model (no predictors), and it could suggest that the predictor model is significantly better.

Table 4.25 Cross tabulation between predicted and observed data regarding the decision to participate in Community-Based Disaster Risk Reduction (CBDRR) activities

Observed		Predicted		
		No action	Taking action	Percentage correct
Participation in Community-Based Disaster Risk Reduction (CBDRR) activities	No action	167	0	100.0
	Taking action	83	0	0.0
	Overall percentage			66.8
(Model) Omnibus test Chi-square= 27.184, sig.=0.001				
Observed		Predicted		
		No action	Taking action	Percentage correct
Participation in Community-Based Disaster Risk Reduction (CBDRR) activities	No action	154	13	92.2
	Taking action	66	17	20.5
	Overall percentage			68.4
(Model) Omnibus test Chi-square= 27.184, sig.=0.001				

Source: Author, 2014

The significant value of Hosmer and Lemoeshow (H-L statistic) is equal to 0.436 (H-L sig.= 0.436 >0.05), demonstrating that this model of prediction is well-fit. Thus there are differences between the observed and model-predicted values. (Table 4.26) In particular, the value of exponential B (EXP B) or odd ratio shows that in this case, if the score of leadership and performance of government and supporters is increased by 1, (1 score) the odds ratio is 1.187 times greater. Therefore respondents are 1.187 times more likely to participate in CBDRR activities ($EXP(B)_{X1}$ = 1.187) when leadership and performance of government are increase. Reliability and transparency of information influences respondents' decision to participate in CBDRR activities by 1.165 more times for each score increase ($EXP(B)_{X2}$ = 1.165). The effect from other people encourages respondents to participate in CBDRR activities 1.242 more times for every score increase ($EXP(B)_{X5}$ = 1.242). Source of information affects respondents' decision to participate in CBDRR activities by 1.245 more times for one score increase ($EXP(B)_{X7}$ = 1.245). Finally, personal understanding and experience impact upon

respondents' decision to participate in CBDRR activities by 1.053 more times for every score increase ($EXP(B)_{X8}$ = 1.053). However, leadership and performance of government and supporters (X1), reliability and transparency of information (X2), effect from other people (X5), Source of information (X7), and personal understanding and experience (X8) are insignificantly affect to the decision to participate in CBDRR activities in this case.

Table 4.26 Coefficients of the model predicting the decision to participate in Community-Based Disaster Risk Reduction (CBDRR) activities

	b	Wald	Sig.	95% Confidence Interval for odd Ratio		
				Lower	EXP(B)	Upper
Included						
Constant	-2.726	16.665	0.000		0.065	
X1- Leadership and performance of government and supporters	0.171	2.448	0.118	0.958	1.187	1.471
X2- Reliability and transparency of information	0.153	1.473	0.225	0.910	1.165	1.491
X3- Fear and anxiety toward flood disaster	-0.102	1.054	0.305	0.744	0.903	1.097
X4- Expectation of relief and damage	-0.150	1.393	0.238	0.671	0.861	1.104
X5 - Effect from other people	0.217	3.618	0.057	0.993	1.242	1.553
X6- Characteristic of flood risk	-0.152	1.451	0.228	0.67	0.859	1.100
X7- Source of information	0.219	2.824	0.093	0.964	1.245	1.606
X8- Personal understanding and flood experience	**0.052**	**0.454**	**0.500**	**0.906**	**1.053**	**1.224**

Note: R^2= 0.436 (Hosmer&Lemeshow) 0.103 (Cox&Snell) 0.143 (Nagelkerke) Model X^2 =27.184, Model Sig.=0.001, p<0.001 *p<0.01, N=250

Source: Author, 2014

A binary logistic regression analysis was conducted to predict the intention to participate in CBDRR activities for 250 respondents by using leadership and performance of government and supporters, reliability and transparency of information, fear and anxiety toward flood disaster, expectation of relief and damage, effect from other people, characteristics of flood risks, source of information, and personal understanding and experiences as predictors. It has been shown that the predictor model is better than the

constant model, and it reliably distinguishes between people who participate in CBDRR activities and those who choose not to (chi-square= 27.184, sig.=0.001)

Nagelkerke's R^2 value is equal to 0.143, indicated a weak relationship between prediction and grouping. Prediction success overall was 68.4% (20.5% for those taking action and 92.2% for the group not participating). The result has shown that leadership and performance of government and supporters, reliability and transparency of information, effect from other people, source of information, and personal understanding and flood experience have no significant impact upon the decision of respondents to participate in CBDRR activities at a 95% confidence level.

(10) Volunteer for cleaning or recovery after flood incident

The eight predictors are (1) Leadership and performance of government and supporters, (2) Reliability and transparency of information, (3) Fear and anxiety toward flood disaster, (4) Expectation of relief and damage (5) Effect from other people, (6) Characteristics of flood risks, (7) Source of information, and (8) Personal understanding and experience, alongside one dependent variable; volunteer for cleaning or recovery after flood incident (D10). The equation of binary logistic regression to analyze the relationship between the attitude and the intention to volunteer for cleaning or recovery after flood incident can be explained as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \varepsilon$$

Where Y is the intention of respondents to volunteer for cleaning or recovery after flood incident
X_1 is the Leadership and performance of government and supporters
X_2 is the Reliability and transparency of information
X_3 is the Fear and anxiety toward flood disaster
X_4 is the Expectation of relief and damage
X_5 is the Effect from other people
X_6 is the Characteristics of flood risks
X_7 is the Source of information
X_8 is the Personal understanding and experience
β are the Y-intercept and the slope for variable X
ϵ, is the random error

The classification table (Table 4.27) shows the value between the observed case and the predict case in dependent variables. Here it is shown that 36.7% were correctly classified for the participating group and 89.4% were correctly classified for those not taking action. Overall 70.4% were correctly classified. This table shows that the predictor model improved from the 64.0% correct classification with the constant model (no predictors), and could infer that the predictor model is significantly better.

Table 4.27 Cross tabulation between predicted and observed data regarding the decision to volunteer for cleaning or recovery after flood incident

Observed		Predicted		
		No action	Taking action	Percentage correct
volunteer for cleaning or recovery after flood incident	No action	160	0	100.0
	Taking action	90	0	0.0
	Overall percentage			64.0
(Model) Omnibus test Chi-square= 27.184, sig.=0.001				
Observed		Predicted		
		No action	Taking action	Percentage correct
volunteer for cleaning or recovery after flood incident	No action	143	17	89.4
	Taking action	57	33	36.7
	Overall percentage			70.4
(Model) Omnibus test Chi-square= 27.184, sig.=0.001				

Source: Author, 2014

The significant value of Hosmer and Lemoeshow (H-L statistic) is equal to 0.725 (H-L sig.= 0.725 >0.05) proving that this model of prediction is well-fit,

thus there are differences between the observed and model-predicted values. (Table 4.28) Specifically, the value of exponential B (EXP B) or odds ratio show that in this case, if the score of the effect from other people is increased by 1, (1 score) the odds ratio is 1.438 times greater. Therefore respondents are 1.438 times more likely to volunteer for cleaning or recovery after flood incidents per single score increase ($EXP(B)_{X5}$ = 1.438). Reliability and transparency of information affects respondents' decision to volunteer for cleaning or recovery after flood incidents by 1.219 more times per single score increase ($EXP(B)_{X2}$ = 1.219). Source of information influences respondents' decision to volunteer for cleaning or recovery after flood incident by 1.203 more times for each score increase ($EXP(B)_{X7}$ = 1.203). Lastly, personal understanding and experiences affect respondents' decision to volunteer for cleaning or recovery after flood incidents by 1.136 more times for one score increase ($EXP(B)_{X8}$ = 1.136). However, reliability and transparency of information (X2), source of information (X7), and personal understanding and experience (X8) are insignificantly affecting to respondents' decision to volunteer for cleaning or recovery after flood incidents in this case.

Table 4.28 Coefficients of the model predicting the decision to volunteer for cleaning or recovery after flood incidents

	b	Wald	Sig.	95% Confidence Interval for odd Ratio		
				Lower	EXP(B)	Upper
Included						
Constant	-2.738	17.151	0.000		0.065	
X1- Leadership and performance of government and supporters	-0.003	0.001	0.976	0.809	0.997	1.229
X2- Reliability and transparency of information	0.198	2.413	0.120	0.950	1.219	1.564
X3- Fear and anxiety toward flood disaster	-0.140	1.984	0.159	0.716	0.870	1.056
X4- Expectation of relief and damage	-0.056	0.203	0.652	0.741	0.946	1.206
X5 - Effect from other people	**0.363**	**9.875**	**0.002**	**1.147**	**1.438**	**1.804**
X6- Characteristic of flood risk	-0.237	3.517	0.061	0.616	0.789	1.011
X7- Source of information	0.185	2.133	0.144	0.939	1.203	1.541
X8- Personal understanding and flood experience	0.128	2.770	0.096	0.978	1.136	1.321

Note: R^2= 0.725 (Hosmer&Lemeshow) 0.134 (Cox&Snell) 0.184 (Nagelkerke) Model X^2=35.987, Model Sig.=0.000, p<0.001 *p<0.01, N=250

Source: Author, 2014

A binary logistic regression analysis was conducted to predict the intention of respondents to volunteer for cleaning or recovery after flood incidents for 250 respondents by using leadership and performance of government and supporters, reliability and transparency of information, fear and anxiety toward flood disaster, expectation of relief and damage, effect from other people, characteristics of flood risks, source of information, and personal understanding and flood experiences as predictors. The test has shown that the predictor model is better than the constant model and can reliably distinguish between people who would volunteer for cleaning or recovery after flood incidents and people who would not (chi-square= 35.987, sig.=0.000)

Nagelkerke's R^2 value is equal to 0.134 indicated a weak relationship between prediction and grouping. Prediction success overall was 70.4% (36.7% for those participating and 89.4% for those taking no action), The results have shown that the effect from other people is significant for the decision of

respondents to volunteer for cleaning or recovery after flood incidents, whereas leadership and performance of government and supporters, reliability and transparency of information, source of information, and personal understanding and flood experiences are insignificantly affect to decision of respondents to volunteer for cleaning or recovery after flood incidents at a confidence level of 95%.

4.5 Robust effect of public opinions and anxiety on CBDRR

The results of binary logistic regression model had shown that some factors causing respondents to accept threats from flooding and encourage participants to take action towards flood risk reduction activities, but at moderate level. Influence factors such as damage to life and assets, duration of flood incident, and possibility of income loss; are encouraging respondents to involve in flood risk reduction. While factors that relates to leadership and performance of government, municipality, or community leaders have the least influence for inspiring flood risk preparation.

The intention to take action in flood risk reduction and participate in disaster risk reduction activities is relates to self-preparation, such as planning evacuation routes or applying insurance, sharing information and donating stuff to flood victims as a form of collective or mutual help as well. However, most respondents did not intend to participate in Community-Based Disaster Risk Reduction activities; CBDRR (i.e., becoming a volunteer to help the municipality or community, or participating in evacuation drills or activities in the CBDRR approach) This outcome has shown that although some flood preparation

activities have been made, or intent to do by community members but local community is inclined not to participate in CBDRR activities. It could undermine the effectiveness of disaster risk reduction activities at a community level in relevance to mutual help approach.

To figure out the relationship between influence factors and intention to take part in flood risk reduction activities, this research applies a binomial logistic regression model to analyze which factors motivating people to participate in flood risk reduction activities. There are eight types of attitudes; leadership and performance of government and supporters; reliability and transparency of information; fear and anxiety toward flood disaster; expectation of relief and damage; effects from other people; characteristics of flood risks; source of information; and personal understanding and flood experiences. There are ten activities in this research which are sharing information; donating stuff to flood victims; volunteering to help communities in flood mitigation activities; checking survival kits; planning evacuation routes/destinations; applying insurance; applying sandbags for flood protection; participating in evacuation drills; participating in CBDRR activities; and volunteering for cleaning or recovery of the community after flood incidents. Results have shown that the most significant is the effect from other people (number of predictable variables= 10, and number of predictable with significant level at 0.05 = 4 factors), second is the personal understanding and flood experience that influences respondents' decision to take action in relevance to flood preparation and participate in Community-Based Disaster Risk Reduction activities (number of predictable variables= 10, and number of predictable with significant level at 0.05 = 3

factors). Third is fear and anxiety towards flood disaster, which causes respondent to take action in flood risk reduction activities (number of predictable variables= 5, and number of predictable with significant level at 0.05 = 3 factors). While the factors that are relevant to characteristics of flood risks are least predictable towards the intention of respondents to take action. Moreover, some factors such as leadership and performance of government and supporters and source of information are predictable but not significant in this case. This result shows that there are different attitudes between people who rely on sources of information and service providers and local people who least rely on them, and that motivates respondents' decision to take action or not in the different ways. (Table 4.29)

Table 4.29 Relevant factors which influence the intention to participate in flood risk reduction

Flood risk reduction activities	Independent variables															
	X1		X2		X3		X4		X5		X6		X7		X8	
	b	EXP (B)	b	EXP (B)	b	EXP (B)	b	EXP (B)	b	EXP (B)	b	EXP (B)	B	EXP (B)	b	EXP (B)
Sharing information	**-0.311***	**0.733**	-0.009	0.991	0.106	1.111	0.129	1.138	**0.345***	**1.413**	-0.102	0.903	-0.029	0.971	0.144	1.155
Donate stuff to flood victims	0.053	1.055	-0.137	0.872	**0.282***	**1.325**	-0.153	0.858	0.007	1.007	0.049	1.050	-0.030	0.970	0.093	1.097
Volunteer to help community in flood mitigation activities	-0.121	0.886	-0.078	0.925	**0.185***	**1.203**	-0.092	0.912	0.089	1.094	-0.024	0.977	-0.044	0.957	**0.182***	**1.199**
Checking survival kits	0.016	1.106	-0.157	0.855	-0.006	0.994	0.040	1.040	0.188	1.206	0.004	1.004	0.076	1.079	**0.139***	**1.150**
Planning evacuation route/destination	-0.064	0.938	-0.233	0.792	0.153	1.166	-0.131	0.877	0.091	1.096	0.107	1.113	1007	1.113	**0.219***	**1.244**
Apply insurance	0.008	1.008	0.139	1.150	**0.360***	**1.434**	**-0.268***	**0.765**	0.075	1.078	-0.183	0.833	0.130	1.139	0.053	1.055
Apply sandbags	0.061	1.063	**-0.323***	**0.724**	**-0.214***	**0.808**	0.006	1.006	**0.384***	**1.468**	-0.034	0.967	-0.132	0.877	0.328	1.388
Participate in evacuation drills	0.067	1.069	**0.241***	**1.272**	-0.015	0.985	0.169	1.184	**0.230***	**1.259**	-0.073	0.929	0.013	1.013	0.005	1.005
Participate in CBDRR Activities	0.171	1.187	0.153	1.165	-0.102	0.903	-0.150	0.861	0.217	1.242	-0.152	0.859	0.219	1.245	**0.052***	**1.053**
Volunteer for cleaning or recovery community after flood incident	-0.003	0.987	0.198	1.219	-0.140	0.870	-0.056	0.946	**0.363***	**1.438**	-0.237	0.789	0.185	1.203	0.128	1.136

Remark:
X1 Leadership and performance of government and supporter
X2 Reliability and transparency of information
X3 Fear and anxiety toward flood disaster
X4 Expectation of relief and damage
X5 Effect from other people
X6 Characteristics of flood risks
X7 Source of information
X8 Personal understanding and experience toward flood
EXP(B) exponential of beta
* Significant at 0.05 level (95 percent confidence level)

5. Conclusion

5.1 Summary of conclusion and findings

The study aims to confirm factors which many previous studies pointed out motivating community members to be involved in flood risk reduction activities at community level. There are four research questions: 1) How to integrate **Theory of Planned Behavior (TPB)** and **Flood Risk Acceptability** to identify willingness of community members to be involved in flood risk reduction activities?; 2) How can community member be involved in flood risk reduction activities during flood incident?; 3) What factors influence community members to respond during flood incident based on **Flood Risk Acceptability**?; and 4) What factors do motivate communities members to be involved in flood risk reduction activities in normal period based on **TPB**?

Research Question 1 How to integrate **Theory of Planned Behavior (TPB)** and **Flood Risk Acceptability** to identify willingness of community members to involve in flood risk reduction activities?

(1) Research objective 1: To establish the conceptual framework based on TPB and Flood Risk Acceptability for investigating intention of community members to involve in flood risk reduction activity.

The concept of resilience had first introduced 1973, from the environmental perspectives and later become applies in social perspectives. The concept of resilience is considering how well that systems could react to disturbances or challenges through its own resources. And how that system could restore or become to the prior stage before its

disturbance. Adaptation becomes necessary for improving the system itself after disturbance. The resilience concept has been introduced in the managerial perspective and become more practical and strategic. In relation to the public administration perspective, which are the governances, resource allocation, Incident Command Systems (ICS) are applied in order to raise the effectiveness of resilience in management approaches.

Aspects of risk acceptability were introduced during 1970s in industrial safety which is focusing toward how to minimize threats of risk to become acceptable since the reduction of risk to become zero- are impossible. Determination towards risk acceptability are relates to economic perspective, likelihood and occurrence, and the consideration of the decision-maker. However, risk acceptability, could be measured toward the attitude of local people due to disturbance matter, and how they intent to react to those disturbances. Some concepts which relateing to risk acceptability in terms of the decision model are necessary to determine how local people could overcome those threats or disaster in this case.

The importance of public participation for disaster risk reduction activities has been stated in contemporary disaster management issue. Not only increasing the coping capacity of residents (self-help), to achieve successfulness in disaster risk reduction at the local level (mutual level), but seeking how to improve and enhancing the sense of civil movement at the local level as well. Because in reality, each groups have specific potential for increasing sense of resilience To achieving the ultimate goal in disaster risk reduction, collaboration among stakeholders such as community residents, municipality officers, NPOs,

and NGOs are important. In case of community participation toward disaster risk reduction have shown that community members and residents should apply as manpower, information and an efficient response towards relief to their neighborhood in the initial period. Moreover, distributing local knowledge to other groups and increasing social cohesion among community members is needed to achieve this goal.

This research has applied concepts in relevance to flood risk acceptability and Theory of Planned Behavior (TPB) for establishing a conceptual framework to describe how local people tend to taking action in flood risk reduction activities. The study is based on two theories: 1) TPB based on Ajzen and Fishbein (1985), and 2) **Flood Risk Acceptability** (Slovic, 1974; Hunter and Fewtrell; 2001, Geiger; 2005). In the concept of TPB; there are three components: 1) Attitude toward risk: It covers characteristic of flood risk, expectation on damage, and fear and anxiety; 2) Self-estimation: It contains experience, interest toward risk reduction, understanding toward flood risk; and 3) Social pressure: It means effect from other people, reliability of information, and leadership of service provider. In the concept of **Flood Risk Acceptability**, the case study applied relevance factors to **Flood Risk Acceptability** which Zhai and Ikeda (2008) mentioned: It treats flood risk perception, personal characteristic, and flood disaster experience. Also, the case study considered factors that Motoyoshi (2005) pointed out as follows: fear, consideration of society, risk perception, trust in administrative organization, cost and benefit, and subjective norm.

According to the framework, there are three components influencing local people to decide to take flood risk preparation are (1) social pressure (leadership

and performance of government and supporters, reliability and transparency of information, effect from other people, and source of information), (2) self-evaluation of disaster (fear and anxiety toward flood disaster, and personal understanding and experience toward flooding), and (3) attitude towards risk or challenge (Expectation of relief and damage, and characteristic of flood risk)

Research Question 2 How can community members involve in flood risk reduction activities during flood incident?

Research objective 2: To identify types of flood risk reduction activities that communities be able to involve in current disaster management plan.

Due to geographical attribute and the location of Thailand which is locating in flood prone area, it had adopted and implemented various kinds of regulation and disaster management policies since 1900, from irrigation–oriented policies to a comprehensive disaster management framework. Thailand also adopted disaster management framework from the international level and tries to apply this as a strategic plan (Strategic National Action Plan for Disaster Risk Reduction) which are considering how to operate and coordinate among stakeholders such as government, local government, communities, Non-Profit Organizations, and so on. However, in the case of the flood situation in 2011, although the application of an Incident Command System (ICS) and Single Command (SC) were applied in flood affected areas, the problems regards to flood management policy and practice in flooding cases in 2011 revealed the issues with late operation and the unsuccessfulness of relief provision from the government, in the flood victims' perspectives.

Community members are able to participate in disaster risk reduction activities according to the content of the SNAP plan; such as disaster training, volunteering or informing emergency managers at the local level are relevant to flood incidents. Moreover, this collaboration between community members and municipality could be seen in the municipality action during flood incidents in 2011. In the case of Pak Kret Municipality, Nonthaburi Province, the municipality applied the Pak Kret model as an operation plan for flood preparation and response which is encouraging local people to collaborate with municipality officers. The local communities could able to be involved in this operation plan by informing municipality officer of actual situation, become volunteer, and re-examining damages caused by flood disaster in the recovery period. These activities shows the connectivity between residents, the community, and the municipality. For example people can directly inform the mayor about actual situations for decision-making in the public-help level, and residents are able to be volunteer or participate in flood protection efforts in the community level as a form of mutual help. However, while this area was expected to suffer severe flooding, it was not affected as much as expected. Thus, efforts related to self-help were not obviously found in flood incident in 2011.

Research Question 3 What factors influence community members to respond during flood incident based on **Flood Risk Acceptability?**

Research objective 3: To find out how early the community members starting to respond during flood incidents.

The study applied 22 variables related with **Flood Risk Acceptability** to identify factors that influenced community members to respond during flood incident. The study distributed questionnaires randomly to 200 respondents during August-September in 2013. Based on the concept of **Flood Risk Acceptability**, the study had adopted variables to analyze the correlation between influence factors that are personal characteristic (7 variables), flood risk perception (4 variables), flood disaster experience (1 variables), effects from other people or information sources (4 variables), fear, and uncertainties and expectation (3 variables), and the number of starting dates to respond. The analysis was classified by level of flood inundation (3 variables).

According to the results of the questionnaire, local people decide not to respond immediately when the flood incident started but instead took two or three days after the flood had inundated to act. Current flood preparations done by respondents are poor, local people did not prepare or take action much during normal periods; but they decide to take action when they perceived that they are likely to be affected by the flood or when they are confronted with the flood situation. This situation could undermine the effectiveness of respond in the local community regarding aspects of self-help.

Research objective 4: To analyze the relationship between personal characteristics, influence factors, and the starting dates to respond since flood incident start based on **Flood Risk Acceptability**

Factors such as the number of persons in a household and the number of vehicles are positively correlated to the decision of respondents to become involved in flood response, while the occupation of respondents, personal

perception towards flood prone area, and age of respondents are negatively correlated to the decision of flood response. According to influential factors, experience; lifestyle of respondents; understanding of flood management; sense of insecurity; influences from other people, groups, and information; actual flood situation; and level of severity. Each has an impact on respondents to become involved in flood response. Although personal characteristics and influencing factors affect the decision of respondents to take action, it does however depend on the perceived risk of the situation; the level of flood inundation in this case. The results of the correlation analysis shows that age, perception of flood risk area, experience and lifestyle in normal period; are negatively correlated to the starting date of the response, whereas number of persons in household, vehicles, understanding of flood management, sense of insecurity, effect from other people's actions, actual flood situation, and level of flood severity all influence local people to act. Effects from colleagues, information, expectations, and incomes are not significantly correlated to the starting date of flood response.

Research Question 4 What factors do motivate communities members to involve in flood risk reduction activities in normal period based on **TPB?**

Research objective 5: To identify factors that motivates community members to involve in flood risk reduction activities based on **TPB**

Based on the theoretical framework, the three components that are relevant to the decision to take action in flood risk reduction activities are (1) social pressure (i.e., Source of information, leadership and performance of government and supporters, and reliability and transparency of information), (2)

self-evaluation of disaster (i.e., experience and understanding of flood management, and expectation of relief and damage), and (3) attitude towards risk or challenge. (i.e., characteristics of flood risks, fear and anxiety toward flood disaster). According to the results, fear and anxiety towards the flood disaster are the most influent to respondents compared to other factors while least influent factor is the factor that relates to reliability on leadership and performance of government and supporters.

Research objective 6: To predicting the intention of community members to involve in flood risk reduction activities based on **TPB**

to investigating intention of community members towards flood reduction activity, the study focused on the viewpoint of TPB which applied 43 variables relating to **Flood Risk Acceptability**, and applied factor analysis to categorize those variables based on **TPB**: 1) Attitude toward risk (Fear and anxiety toward flood risk: X_3, Expectation of relief and damage: X_4, Characteristic of flood risk: X_6): 2) Self-estimation (Personal understanding and flood experience, X_8): and 3) Social pressure (Leadership and performance of government and supporter: X_1, Reliability and transparency of information: X_2, Effect from other people: X_5, and Source of Information: X_7). The study distributed questionnaires randomly to 250 respondents during January – March in 2014. Results of binomial regression model shown that the effect from other people, respondents' personal understanding and experiences towards flood risk management, and fear and anxiety of flood disaster cause respondents to take action in flood risk reduction activities (number of predictable variables= 5, and number of predictable with

significant level at 0.05 = 3 factors). In contrast, factors that are relevant to characteristics of flood risks are least able to predict the intention of respondents to take action. Moreover, some factors such as leadership and performance of government and supporter and source of information are predictable but not significant in this case.

This dissertation contributed to confirm that **TPB** and **Flood Risk Acceptability** are applicable for a Thai case. The dissertation also achieved to establish the conceptual framework to identify intention of community members to be involved in flood risk reduction activities based on **TPB** and **Flood Risk Acceptability**. The dissertation also identified types of flood risk reduction activities that community members are able to collaborate with municipality officer based on SNAP for Disaster Risk Reduction. The dissertation confirmed that both of personal characteristic and flood disaster experience significantly correlated to **Flood Risk Acceptability**. Finally, the dissertation confirmed three components in **TPB** were able to predict intention of community members to take flood risk reduction activities in Thailand for responding to the next flood incident.

5.2. Policy implication: Recommendation for community-municipality collaboration in disaster risk reduction

The threat of political unrest in Thailand has affected the successfulness of the flood disaster management framework as a whole in flood incident in 2011, while some conflicts and dissatisfaction from communities towards the government response have been found during flood incidents as usual. However,

some collaborative efforts among community members, the municipality, and supporters have been made during flood incident which could considering as a success case while some cases showing possibility of community involvement. This circumstance reveals the positive aspects in relation to collaboration at the local level, precisely in the case of mutual help and public help. However, the current preparation and response level of community members is not ideal. Thus, community members might not achieve the successfulness of self-help in disaster situations. Although some efforts in mutual help are made, the intention of community members towards participation in Community Based Disaster Risk Reduction activities did not come from the leadership and performance of government or municipality in this case, where even the successfulness of collaboration between community and municipality had been carried out. This also shows the potential of collaboration in disaster management issues that could be found only during the disaster situation, instead of the comprehensive disaster management, especially in the case of the rare occurrence of flood affected areas. To increase the effectiveness of management of comprehensive disaster risk reduction in Thailand, there are some policy suggestions and consideration are necessaries toward flood risk reduction for the future:

(1) Governmental level

To reduce gaps in operation between government and subordinate organs, the common ground of disaster management are important, especially in operation. Thus, intensive training in accordance with the Incident Command System and Single Command should be properly practiced because these two approaches are applied in the SNAP plan which is currently being implemented.

Moreover, the case of flooding in Thailand in 2011 should be analyzed in order to adjust and apply as a case study to improve the competency of management under the command system. The management and allocation of relief packs should be revised to improve the effectiveness of relief allocation, and the consideration of transparency toward relief allocation should be clear. Since the approaches of relief in Thailand are reliant on subsidy, thus the flexibility of budget allocation and rapidity of subsidy are necessary. In accordance to aspects of flood risk acceptability, policies which refer to each flood area should be more specific, since the intention of respondents to participate in flood preparation and take part in Community-Based Disaster Risk Reduction activities are different. Moreover, political competition should be avoided in situations of flooding or any kind of disaster situation.

(2) Community level

The typical instance of Community-Based Disaster Risk Reduction activity should be changed, or other related activities should be applied in order to teach the local community the importance of flood preparation. According to the results of respondents regarding their intention to participate in Community-Based Disaster Risk Reduction activities, results have shown that local people are reluctant to participate, and the intention of the community toward participation in local activity might affect social cohesion, thus providing information and encouraging people to be aware are important. Moreover, the Hyogo Framework for Action (HFA) is expected to be revised in 2015. The additional approach will be relevant to conflict resolution as one component of disaster management in the community level, and various kinds of approach in

order to encourage community member to take part in community level, especially in the case of flood affected areas.

(3) Minimizing policy failure due to flood management policy

Municipality should become conflict managers, it is important to improve the public relations in the normal period to foster a closer relationship between the local government and community. Thus, building social relations between the local government and communities in the normal period through community activities, information sharing, public relations, and creating a sense of municipality-community friendly approach are necessary elements. Moreover, politically-free groups such as academics or religious leaders should become conflict managers rather than any groups in society with vested interests

5.3 Research limitations and further study

This research has contributes to the study of flood risk acceptability under the concept of resilience and Theory of Plan Behavior. It has also tried to extrapolate the intention of local community members towards flood preparation and their intention to participate in local activities. This research has contributed to the study of policy and practice in the case of flooding in Thailand, and to investigate what kinds of factors that influencing community members and residents to take part in flood preparation in flood prone areas.

According to the attitude of flood risk acceptability, some uniqueness in the personal and community levels has been revealed because of different background, experience, attitude towards flood situation, anxiety of local

community members towards risks and consequential hazards, expectation of relief, understanding of flood situation and personal characteristics, these kinds of aspect also relate to the determination of flood risk acceptability and to the decision to participate in flood response. Moreover, the sense of flood risk acceptability varies with each area, thus this study may be applied as one of the case studies in flood management in Thai society, while additional cases studies are necessary to define the characteristic of flood risk acceptability in Thailand as a whole. To examine more correctly toward decision analysis precisely in flood risk acceptability, large amount of respondents are needs. Moreover, other factors such as investment in self-flood protection effort, effect from governmental decision, and community relations among residents might be affecting decision of community people to prepare or participate in flood risk reduction activities.

The flood situation in Thailand 2011 could be considered as an important case study in flood management, under the circumstance of the command system and policy practice from the national level to the community level. Moreover, aspects of political conflicts and conflicts resolution should be investigated as a further case study in disaster situations. Here are some suggestions for further study:

(1) Failure of conflict management (e.g, who are likely to cause conflicts in disaster situation, and how risk preparedness and risk perception could minimize conflict in disaster situations)

(2) The ability to “absorb” and “bounce back” in governmental responses (e.g., the positive and negative performance of ICS and SC in relevance to

disaster responses in a practical way)

(3) Flood risk acceptability in terms of the government (e.g., What are the lessons learnt from past flood situations in terms of the limitations of mutual response under the single command framework and incident command system)

(4) The other resilience approaches which are relevant to recovery (E.g., How to change the attitude of local people towards the perception of risks that they are familiar with)

(5) The attitude of local communities towards their participation in flood risk reduction activities (e.g., comparison between flood prone areas and non-flood prone area, or the evaluation of participation likelihood in other kinds of hazard based on the decision model)

Further study regards to the disaster response should study more in other flood unaffected municipalities. Moreover, the comparative study between affected municipality and unaffected municipality towards direction of management should be figured out more clearly towards successful cases and non-successful cases of disaster response activity in municipality organs. The expansion study related to the strategy of increasing the collaboration between municipality and communities should be more focused in detail.

References

Asian Disaster Preparedness Center (ADPC), 2006, *Community-Based Disaster Risk Management: Rationale and Process, Community-Based Disaster Risk Management for Local Authorities,* Participant's Workbook, pp. 17-18

Albert Bandura, 1977, Self-efficacy: Toward a Unifying Theory of Behavioral Change, *Psychological Review*, 1977, Vol. 84, No.2, pp.191-215

Albert Bandura, 1993, Perceived Self-Efficacy in Cognitive Development and Functioning, *Educational Psychologist*, 28(2), pp.117-148. Lawren Erlbaum Association, Inc.

Alexander Pickering and Stephen P. Cowley. (2010). Risk Matrices: Implied Accuracy and False Assumption. *Journal of Health&Safety Research&Practice*, Vol. 2, Issue 1. October, pp. 9-16.

Ali Farazmand (2003) Chaos and Transformation Theories: A Theoretical Analysis with Implications for Organization Theory and Public Management, Public Organization Review: A Global Journal 3: (2003), Kluwer Academic Publishers. pp. 339 – 372

David A. McEntire, 2007, Disaster Response and Recovery, ISBN 13- 978-0-471-78974-7, pp. 87-108

Damon P. Coppola (2007), Introduction to International Disaster Management, 30 Corporate Drive, Suite 400, Burligton, Massachusetts 01803, USA, ISBN 13: 978-0-7506-7982-4. Pp. 134-251

David Levy (1994), Chaos Theory and Strategy: Theory, Application, and Managerial Implications, Strategic Management Journal, Vol. 15, pp 167-178 CCC 0143-2095/94/090167-12

Department of Drainage and Sewerage, *Flood Protection and Management Plan in Bangkok Metropolitan Area in FY 2011*, Bangkok Metropolitan Administration, pp. 1- 28

Derek Mowbray, 2011, Resilience and Strengthening Resilience in Individuals, Management Advisory Service, pp.2-7

Erik-Hans Klijin (2008), Complexity Theory and Public Administration: What's New?, Key Concepts in Complexity Theory Compared to their Counterparts in Public Administration Research, Public Management Review, Vol. 10 Issue 3 (2008:299-317) ISSN 1471-9037, ISSN 1471-9045, DOI 10.1080/14719030802002675

Gebhards Geiger. (2005). Risk Acceptance from Non-Linear Utility Theory. *Journal of Risk Research* Vol. 8, No. 13, pp. 225-252.

George D. Haddow, Jane A. Bullock and Damon P. Coppola. (2008). *Introduction to Emergency Management (Third Edition)*, Butterworth-Heinemann Printing, 30 Corporate Drive, Suite 400, Burligton, Massachusetts 01803, USA. ISBN 978-7526-8514-6. pp.4

Gerrit Van Waldt. (2009). Public Management and Disaster Risk Reduction: Potential Interdisciplinary Contributions, *JAMBA: Journal of Disaster Risk Studies*, vol. 2 No.1, March 2009.

Gilbert Fowler White, 1945 "*Human Adjustment to Floods: A Geographical Approach to the Flood Problem in the United States*". Chicago, Illinois, 1945.

G. Zhai and S. Ikeda, 2008. "*Empirical Analysis of Japan Flood Risk Acceptability within Multi-Risk Context*" Natural Hazards Earth System Science. Vol.8, pp 1049-1066.

Health Information System Development Office: 2012, *Annual Report*, pp.35

Herman et al., 2011, *"What is Resilience?"*, The Canadian Journal of Psychiatry, Vol. 56, No 5, May 2011, pp.258-265

Icek Ajzen and Martin Fishbein, 1977, The Influence of Attitudes on Behavior, Psychological Bulletin, pp.888-918

Institute of Food and Agricultural Sciences, University of Florida (1998), The Role of Government in a Disaster, The Disaster Handbook 1998, IFAS Publication DH307, Section 3.7, pp. 1 – 6

John Birkmann, 2006, Measuring Vulnerability to natural Hazards: Towards Disaster Resilient Societies, United Nations University Press, 2006, ISBN 978-92-808-1135-3

J. Zonensein, et al., (2008). *Flood Risk Index as an Urban Management Tool*, 11th International Conference on Urban Drainage, Edinburg, Scotland, 2008

Karlo L. Kumpfer, 1999. *"Factors and Process contributing to resilience: The Resilience Framework. Resilience and Development: Positive Life Adaptations"* Academic/Plenum Publisher, New York, 1999.

Lavell, A., M. Oppenheimer, C. Diop, J. Hess, R. Lempert, J. Li, R. Muir-Wood, and S. Myeong, 2012: Climate change: new dimensions in disaster risk, exposure, vulnerability, and resilience. In: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change

(IPCC). Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 25-64.
Lennart Sjoberg, Bjorg-Elin Moen, and Torbjorn Rundmo. (2004). *Explaining Risk Perception. An Evaluation of the Psychometric Paradigm in Risk Perception Research*, Norway: Rotunde.

Linda S. Gottfredson. (1983). Creating and Criticizing Theory. Journal of Vocational Behavior, 23. pp. 203-212

L. Gunderson, C.S. Holling, L. Pritchard and G.D. Peterson, 2002, *"Resilience"*, Vol.2, The Earth System: Biological and Ecological Dimensions of Global Environmental Change, Encyclopedia of Global Environmental Change, pp. 530-531

L. Thronley, J. Ball, L. Signal, K. Lawson-Te Aho, and E. Rawson, 2013, Building Community Resilience: Learning from the Canterbury Earthquake, Final Report to Health Research Council and Canterbury Medical Research Foundation, March 2013, pp., 3-7

Markus Kerk and Patrick Sakdapolrak, 2013, "*What is Social Resilience? Lesson Learned and Ways Forward*" Erdkunde, Vol. 67, No. 1 pp. 5-19

Nick Brooks, 2003, Vulnerability, risk and adaptation: A conceptual Framework, Tyndall Centre for Climate Change Research, Working paper 38, pp. 5

O. Patterson, F. Weil, and K. Patel, 2009, *The Role of Community in Disaster Response: Conceptual Models*, Popul Res Policy Review (2010) Vol. 29, pp. 127-141

Parker et al., 1997, Reducing Vulnerability Following Flood Disaster, Issue and Practices, Reconstruction After Disaster Issues and Practices, ISBN 1 85972 551 1, pp.23-25

Paul R. Hunter and Lorna Fewtrell, 2001, Acceptable Risk, Water Quality: Guidelines, Standards and Health, World Health Organization, IWA Publishing, London, UK, ISBN: 1 900222-28-0. pp. 207-227

Peter J. May and Walter Williams, 1986, Disaster Policy Implementation Managing Programs under Shared Governance, ISBN 0-306-42179-8

Rachel Lewis, Emma Donaldson-Feilder and Antonio Pangallo, 2011, Developing Resilience, Research Insight, May 2011, affinity Health at Work, pp. 3-5

Raungratanaamporn, et., Al, 2014, Government-Communities Collaboration in Disaster Management Activity: Investigation in the Current Flood Disaster Management Policy in Thailand, Procedia Environmental Sciences, vol. 20, 2014. Pp 658-667

Raungratanaamporn, 2014, An Investigation of the Circumstances of Flood Response in Thailand, Journal of Policy Science, Vol. 21, No, 2. Pp: 43-66

Raungratanaamporn, Determination toward decision of Public Response in Flood Situation: Case Study in Urban Flood Prone Area in Central Region in Thailand, Journal of Applied Environmental Research (Vol. 36 No.3, May-August 2014)

Robert J. Vallerand, et. Al. 1992, Ajzen and Fishbein's Theory of Reasoned Action as Applied to Moral Behavior: A Confirmatory Analysis, Journal of Personality and Social Psychology, 1992, Vol. 62, No.1, 98-109. The American Psychology Association, Inc.

Robert Kauer, Luciano Fabbri, Remy Giribone, and Jan Heering. (2002). Risk Acceptance Criteria and Regulatory Aspect. OMMI Vol. 1 Issue.2, pp.1-11.

S. Antonsen, 2009, *Safety Culture: Theory, Method and Improvement*, Ashgate Publishing ISBN: 978-0-7546-7695-9

Timothy L. Sellnow et, Al. (200) Chaos Theory, Information Needs, and Natural Disaster,

T. Kamolvej, 2011, *Roles and Responsibilities of Public Administrative Organization in terms of Regulation, Ordinances and Law*, Disaster Management in Local Level, King Prajadhipok' Institute. ISBN 978-974-449610-2. pp. 57-70

T. Mala, Walaiporn Chinasri and Wilailuk Ruangsom, 2013, *The Role of Local Government in Disaster Management: A Preliminary Investigation of The Flood Case in Pathum Thani Province*, Valailonkkorn Paritat Journal. Year 3, Vol.1, (Jan-Jun 2013), pp. 167-181. Access:

T. Motoyoshi, 2006. "*Public Perception of Flood Risk and Community-Based Disaster Preparedness*" A Better Integrated Management of Disaster Risks: Toward Resilient Society to Emerging Disaster Risks in Mega-Cities, pp.121-134, TERRAPUB and NIED, 2006

Internet

Adisorn Isarangkul Na Ayutthaya, Flooding Conflict and Violation [in Thai], Prachathai, 28 November 2011 via http://prachatai.com/journal/2011/11/38064

A. Mokkawej, 2009, *Disaster Management in Local Level* [in Thai]. Available at http://www.slideshare.net/taem/taem11-1723307

Assumption University's Academic Network for Community Happiness Observation and Research (ANCHOR), 2011, *Feedback from affected people*

towards relief organs, by N. Kannika, 2011, Assumption University [in Thai], Available at http://www.ryt9.com/s/abcp/1274661

Charnchao Chaiyanukitt, 'Flooding' the incident of conflict Do we have 'Minimizing conflict' yet?, 8 November 2011 via http://www.bangkokbiznews.com/home/detail/politics/opinion/charnchao/20111108/417885/%E0%B8%84%E0%B8%A7%E0%B8%B2%E0%B8%A1%E0%B8%82%E0%B8%B1%E0%B8%94%E0%B9%81%E0%B8%A2%E0%B9%89%E0%B8%87%E0%B8%81%E0%B8%B1%E0%B8%9A%E0%B8%9B%E0%B8%B1%E0%B8%8D%E0%B8%AB%E0%B8%B2%E0%B8%99%E0%B9%89%E0%B8%B3%E0%B8%97%E0%B9%88%E0%B8%A7%E0%B8%A1.html

Dailynews, 2012, *Public Administrative Organizations are Important toward Sustainable Flood Management: Scholars and Citizens' Point of View*, news [in Thai], available at http://www.dailynews.co.th/article/728/9754

Eivind Okstad and Per Hokstad, *Risk Assessment and Use of Risk Acceptance Criteria for the Regulation of Dangerous Substances*. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.195.4993&rep=rep1&type=pdf

European Union Agency for Network and Information Security (ENISA) "*Risk Acceptance*" http://www.enisa.europa.eu/activities/risk-management/current-risk/risk-management-inventory/rm-process/risk-acceptance

Federal Emergency Management Agency (FEMA), 2012, VII. Glossary of Terms, Available at http://www.fema.gov/vii-glossary-terms

Henny Osbahr, 2008, Building Resilience: Adaptation Mechanisms and Mainstreaming for the Poor, Human Development Report 2007/2008 http://hdr.undp.org/sites/default/files/osbahr_henny.pdf

H. Leichsenring, S. Noe, U. Brandenburg, Towards a Culture of Openness: Cultural Change of the Institution and the Impact of Widening Access Measures. Available at http://expandingopportunities.eu/sites/default/files/Towards%20a%20culture%20of%20openness.pdf

International Federation of Red Cross and Red Crescent Societies. (2014). *About disaster management.* Retrieved from http://www.ifrc.org/en/what-we-do/disaster-management/about-disaster-management/

King Prajadhipok' Institute, 2012, *Roles and Responsibility of Public Administrative Organization towards Strategic Disaster Management Issues*, Seminar, 13th – 14th March, 2012.

Kom Chut Luk News, 2011, *Pak Kret Model, the collaboration between Municipality, Temple and household*, News
National Statistic Office, 2012, *Flood-Affected Household Survey during July – December 2011*, available at http://service.nso.go.th/nso/nsopublish/themes/files/repFlood54.pdf

Laurence J.Kirmayer et., Al., 2011, *Community Resilience: Models, Metaphors and Measures*, National Aboriginal Health Organization (ANHO) http://www.naho.ca/jah/english/jah05_01/V5_I1_Community_04.pdf

OK Nation Blog, 15th November 2011, *Samut Sakorn dedicate in flood discharge, The prototype of the last province in flood management*
Available at: http://www.oknation.net/blog/chalee2/2011/11/15/entry-1

O. Nabangchang et al., 2012, *Household Economic Losses: A Case Study of Thailand's 2011 Flood*. International Conference on Climate Change Impacts and Adaptation for Food and Environmental Security, 2012. Available at http://icciafes.searcabackup.org/downloads/presentation/Parallel%20Session%203B/Household-Economic-Losses-A-Case-Study-of-Thailand-2011-Flood---Orapan-Nabangchang-Srisawalak.pdf

Paul Slovic, 1974. "*Decision process, Rationality, and Adjustment to Natural Hazards*" retrieved at http://www.scarp.ubc.ca/sites/default/files/Slovic%20et%20al.%201974.PDF

P. Hudson, 1999, *Safety Culture – Theory and Practice*, RTO HFM Workshop on "The human Factor in System Reliability – Is Human Performance Predictable", Siena, Italy. Available at http://ftp.rta.nato.int/public/PubFulltext/RTO/MP/RTO-MP-032/MP-032-08.pdf

R. Bell, T. Glade and M. Danscheid, 2005, *Challenges in defining acceptable risk level*,
http://homepage.univie.ac.at/thomas.glade/Publications/BellEtAl2005a.pdf

Robert T. Stafford, 2013, The Stafford Act, Federal Emergency Management Agency (FEMA) Available at http://www.mwcog.org/security/security/otherplans/stafford.pdf

Singha Raj Uprety. *(2012). Role of Public Administration in Disaster Management*. Retrieved from http://unpan1.un.org/intradoc/groups/public/documents/eropa/unpan045463.pdf

S. Kultanakulwong et.al. *Flood Annual Report*, 2012. Available at http://project-wre.eng.chula.ac.th/watercu_eng/sites/default/files/Report_flood2554%20_281154_.pdf

Suan Dusit Poll, 2011, *Perception towards Flooding in Thailand and Politics*, by Sukhum Chaloeisap, 2011, Suan Dusit Rajabhat University, Available at http://dusitpoll.dusit.ac.th/polldata/2554/25541322362158.pdf

Suchart Nawakawong, 'Flooding' cause of conflict, Does it had counter measurement? 21 February, 2012 via http://www.dailynews.co.th/Content/Article/103860/%E2%80%98%E0%B8%99%E0%B9%89%E0%B8%B3%E0%B8%97%E0%B9%88%E0%B8%A7%E0%B8%A1%E2%80%99%E0%B8%8A%E0%B8%99%E0%B8%A7%E0%B8%99%E0%B8%A7%E0%B8%B4%E0%B8%A7%E0%B8%B2%E0%B8%97+%E2%80%98%E0%B8%AA%E0%B8%81%E0%B8%B1%E0%B8%94%E0%B8%82%E0%B8%B1%E0%B8%94%E0%B9%81%E0%B8%A2%E0%B9%89%E0%B8%87%E2%80%99+%E0%B8%A1%E0%B8%B2%E0%B8%95%E0%B8%A3%E0%B8%81%E0%B8%B2%E0%B8%A3%E0%B8%A1%E0%B8%B5%E0%B8%AB%E0%B8%A3%E0%B8%B7%E0%B8%AD%E0%B8%A2%E0%B8%B1%E0%B8%87%3F%3F
T. Kamolvej, 2011. *Lesson Learnt towards Flood Management in 2011: Thailand*. Available at http://www.ocsc.go.th/ocsc/th/files/SES/AsstProfDr_Tawida.pdf

T. Kongchann, 2012, *What have we learn towards Thailand flood in 2011*?, Available at http://www.eric.chula.ac.th

Thailand Political Base, *Strategic Committee for Water Resources Management (SCWRM)*, 2011.Available at http://politicalbase.in.th/index.php/%E0%B8%84%E0%B8%93%E0%B8%B0%E0%B8%81%E0%B8%A3%E0%B8%A3%E0%B8%A1%E0%B8%81%E0%B8%B2%E0%B8%A3%E0%B8%A2%E0%B8%B8%E0%B8%97%E0%B8%98%E0%B8%A8%E0%B8%B2%E0%B8%AA%E0%B8%95%E0%B8%A3%E0%B9%8C%E0%B9%80%E0%B8%9E%E0%B8%B7%E0%B9%88%E0%B8%AD%E0%B8%A7%E0%B8%B2%E0%B8%87%E0%B8%A3%E0%B8%B0%E0%B8%9A%E0%B8%9A%E0%B8%9A%E0%B8%A3%E0%B8%B4%E0%B8%AB%E0%B8%B2%E0%B8%A3%E0%B8%88%E0%B8%B1%E0%B8%94%E0%B8%81%E0%B8%B2%E0%B8%A3%E0%B8%97%E0%B8%A3%E0%B8%B1%E0%B8%9E%E0%B8%A2%E0%B8%B2%E0%B8%81%E0%B8%A3%E0%B8%99%E0%B9%89%E0%B8%B3_(%E0%B8%81%E0%B8%A2%E0%B8%99.)

Thailand Research Fund (TRF), 2012, *The Voice and Vulnerability: Political Debate in Flood Situation in 2011* Available at. http://pr.trf.or.th/index.php?option=com_content&view=article&id=1366:54-3--126-&catid=43:2010-06-10-02-38-55&Itemid=61

Thairath, 2012, *Public Administrative Organizations blame to Governments' flood delegation approach*, news, available at http://www.thairath.co.th/content/pol/245471

Thaiwater.net, 2012: *Data of Thailand Flooding in 2011*, Available at http://www.thaiwater.net/current/flood54.html

Thai Universities for Healthy Public Policy, *The Suggestion towards Flood management in Thailand*. Available at www.tuhpp.net

The Prime Minister's Officer, 2011, *The Establishment of Flood Relief Operation Center (FROC)*, Available at http://flood.mnre.go.th/download/direction193-2554.pdf

The United Nations Office for Disaster Risk Reduction. (2009). Acceptable Risk. *Terminology*. Retrieved from http://www.unisdr.org/we/inform/terminology

The United Nations Office for Disaster Risk Reduction. (2009). Disaster risk. *Terminology*. Retrieved from http://www.unisdr.org/we/inform/terminology

The United Nations Office for Disaster Risk Reduction. (2009). Disaster risk reduction. *Terminology*. Retrieved from http://www.unisdr.org/we/inform/terminology

The United Nations Office for Disaster Risk Reduction. (2009). Risk. *Terminology*. Retrieved from http://www.unisdr.org/we/inform/terminology

World Meteological Organization, 2013, Disaster Risk Reduction Definitions, Available at http://www.wmo.int/pages/prog/drr/resourceDrrDefinitions_en.html

Information from Conferences

King Prajadhipok' Institute, 2012, *Roles and Responsibility of Public Administrative Organization towards Strategic Disaster Management Issues*, Seminar, 13th – 14th March, 2012 Thailand Research Fund (TRF), 2012, *The Voice and Vulnerability: Political Debate in Flood Situation in 2011*

Appendix 1: Information relevant to public perception of flood incident in the 2011 Thai flood

There are some conflicts that occurred during the flood response in 2011 which are considered as the effect of political unrest in 2006 until 2011: before the flooding. Political conflict was caused by the dual perspectives of Thai Society between two political parties; the Democrat Party and the Thai Rak Thai Party (TRT) which since 2005-2006 have caused political crises in Thailand[18]. The crisis had progressed to conflicts among groups of people and groups of interest as well. This caused the establishment of political interest groups such as People's Alliance for Democracy (PAD) and the National United Front of Democracy against Dictatorship (UDD). Due to those conflicts, the effects from the unrest influenced economic and political perspectives. These political issues influenced citizens to take part and participate in political conflicts and these political conflicts become larger and are nowadays part of public interest (2014).

Since the political conflicts started in 2008, before the flood situation in 2011, it has spread to conflicts encompassing the policy level, local levels, and the community level. The conflicts between two different administrative bodies were also found during negotiation, especially between Bangkok Metropolitan Area and the nearby vicinity. Conflicts had risen due to the failure of negotiations between flood affected areas and non-flood affected areas in relevance to water gate control and decision regarding the discharge of water. (Isasangkul Na Ayutthaya, 2014) Conflicts during flood situation in 2011 were not only affected at the local level, community level, friends and colleagues, but also affected the policy level as well. Although political conflicts had been rising since 2006, they became manifest during the flood situation. (Chaiyanukitt, 2011) The passages and critics towards the flood response and political conflicts are outlined as follows

[18] Political Crisis in Thailand in 2005-2006 started from the result of the unrest of Thaksin Shinawatra due to his political issue such as Privatization, and human rights abuse during extrajudicial killing of the War of Drugs, (Wikipedia, 2014)

"According to flood situation, except the inner area of Bangkok, this flood situation does not cause only economic loss and devastation, but conflicts also arose widespread throughout Thai community. Conflicts which happened during flood situation such as breaking big bags in Don Mueng District in BMA, conflicts in Rama II road, conflicts between Amphoe Lum Lukka in Pathumthani and Sai Mai District and Klong Sam Wa District in BMA, conflicts between Pak Kret Municipality and Don Mueng District at Khlong Prapa, and the failure of negotiation between flood and non-flooded communities in water discharge and water gate control……"

Adisorn Isasangkul Na Ayutthaya[19]
Dean National Institute of Development Administration (NIDA)
and Counselor of Thailand Development Research Institute

"…. Conflicts that arose in the society during the flood situation in 2011 had occurred in the policy level, local level, community level, and among friends, colleagues, and family in some cases. Moreover, this situation reflected the political conflicts in the past 4-5 years (2007-2008) which caused the continuous conflict in Thai society, and obviously became apparent in flood situation in 2011…."

"….Precisely, if we would like to defy the natural conflicts towards the flood situation in 2011, most of those conflicts come from the failure of water gate control, decision of water discharge in policy level, managing flood barriers, hording goods, and the unjust price raises. These conflicts have their own characteristics, for which specific methods of conflict resolution are needed…"

Chanchao Chaiyanukitt[20]

Problems which occurred during the flood situation were also caused by the unclear information of flood management policies and response measures in terms of practice. The effect of unclear information and responses from service providers such as the government and local authorities caused anxiety in local communities who had experienced flooding. Moreover, the current flood management policies were successful in terms of "direction setting" but still lacking in their implementation method. Also, an additional task of government in all levels was to explain the proper reason to communities' members for designation of flood retention areas before the questions become large and difficult to answer. These incidents may cause conflicts to remain unsolved.

---

19 Adisorn Isarangkul Na Ayutthaya, Flooding Conflict and Violation, Prachathai, 28 November 2011 via http://prachatai.com/journal/2011/11/38064

20 Charnchao Chaiyanukitt, 'Flooding' the incident of conflict Do we have 'Minimizing conflict' yet?, 8 November 2011

"According to the experience of flooding in 2011, the 'quarrels' and 'conflict' occurred in many places, between citizens, and citizens and government. The anxiety of people who were affected by flood or people who had experiences of flood conflicts, might be anxious that those conflicts may raise again in the next flood situation…"

"… Due to the lack of clarity of current flood management plans, which intend to depict and give only the direction but not in practical or precise way in local plans, these cause anxiety to victims and peoples. The questions society comes up with are 'what are the exact solutions or plan? How will the government react towards these circumstances? Which area will the plan be implemented in? These questions still require an answer…"

"Government should declare more clearly their direction of response and management, or give the explanation why some area has been designated as flooded while another area has not, or if that area is expected to be flooded due to the management, what kinds of subsidy will flood victims receive in return? Until government are able to give clear and proper explanation, the conflict cannot be solved."

Suchard Anwakawong[21]

The problem of intergovernmental relations between the central government and local government occurred in the flood response of 2011, and was also found during operation. The flood emergency response which was established by the central government deputized local governments to tackle the situation as the first-hand respondent; however, the supportive instruments such as authority, budgets, proper communication, information management, coordination, and necessary equipment were not adequately provided, leading to the ineffectiveness of emergency responses. As a result of brainstorming among Public Administration Officers, executive organs summarized the ineffectiveness of flood response. The two issues were: (1) The decision maker in the case of flood response is decided at the provincial level, that is to say the local level; and (2) although canals became crucial players in the discharge of flood waters, their management was excluded from the tasks of Public Administration Organization because the Royal Irrigation Department had the authority on water discharge. The below statements reveal some parts of the findings:

21 Suchart Nawakawong, 'Flooding' cause of conflict, Does it have counter-measurement? 21 Feburary, 2012

"One problem that we found towards flood response is the limitation of the first-hand respondent in flood discharge, which is that some operations might be intrusive to other divisions, departments, or other organization. Although central government delegates its authority to public administrative organizations to operate, it is not practical since the limitation stated in legal basis might intervene to other organizations' tasks. Public Administration Organization in flood-prone provinces are not authorized to discharge flood water because this operation belongs to the Royal Irrigation Department (RID) or Marine Department (MD). Thus, Public Administration Organization could not intervene in this issue. Moreover, the Public Administration Organization has no authority to establish temporary shelter or take budget for preparation of flood response. The reason is according to the Disaster Relief Act (2007) which delegates power to Provincial governors for managing disaster management activities in Provincial administrative boundaries; if the Provincial governor does not declare a state of emergency, public administration organizations or municipalities cannot spend, or ask for the budget to apply for flood response or preparation in the local level."[22]

Orathai Kokphol
Director of Local Government King Prajadhipok's Institute

According to the results of a seminar entitled "Public Administration Organization towards disaster management strategy handled by King Prajadhipok's Institute during 13th – 14th March 2012, regarding the experiences of emergency management in flood situation in the year of 2011", there were seven lessons learned, which could be stated as follows: (1) The flood in the Bangkok Metropolitan Region was unexpected, which reveals the ineffectiveness of communication and a lack of information; (2) There was a lack of supportive systems such as database, equipment, and alternatives to apply in the Incident Command System and Single Command during the response period; (3) There was no strategy for protecting the transportation network, which was crucial for providing relief in terms of logistics; (4) Flood barriers such as sandbags might not be appropriate for flood protection; since the flood barriers leaked, the water volume flowed in rapidly and caused severe damage out of proportion to the effectiveness of reducing the inflow of water volume; (5) Community involvement and individual participation became a potential aspect of flood management; (6) Designated evacuation shelters were affected by the flood, which revealed the failure of risk assessment; and (7) Risk communication is important, as there are five factors (the rainfall intensity on the upstream level, the effect of tidal flooding in coastal or riverside areas, land subsidence, the ineffectiveness of land-use regulation, and the ineffectiveness of flood-

[22] King Prajadhipok' Institute, 2012, *Roles and Responsibility of Public Administrative Organization towards Strategic Disaster Management Issues*, Seminar, 13th – 14th March, 2012.

management systems) which stimulated the severity of flooding in the case of the 2011 Thai flood.

The consequences of the flood of 2011 revealed the ineffectiveness of flood management policies, information sharing, inaccuracy of information, and the difference of flood perceptions among different people and different communities, which led to conflict in flood-affected areas. However, there are some efforts being made to resolve those conflicts in emergency response mandates. According to the result of a study by the Thailand Research Fund[23], involving conflict resolution in flood responses, although some conflicts occurred, they did not go further and become violent, and communities and municipalities tried to collaborate with each other to minimize their deficiencies in responding to the flood. According to Prof. Dr. Chaiwat Sataanan, Faculty of Political Science, Thammasat University, and Assoc. Prof. Dr. Anuchat Puangsamlee, Faculty of Environment and Resource Studies, Mahidol University, most of the cases of conflict in flood responses came from affected communities that tried to claim their rights in flood-relief activities, and those kinds of situations influenced them to participate in flood-response activity. The below statements reveal some parts of that study:

> *"According to the 126 cases of conflicts which proceeded to riots in the local level, there are approximately five percent of politicians who were involved. Other cases are communities' involvement, which show the good sign of collaboration, and riots did not become violent but instead debated towards various kinds of flood management among local government, government officers, and communities' members."*[24]
>
> Chaiwat Sataanan
> Faculty of Political Science, Thammasat University

> *"Interestingly, only eight cases of 126 cases of conflict proceeded to violence, and communities tried to resolve their conflicts on their own in 74% of 126 cases. This result may reveal a sense of robustness among community members in conflict resolution, especially in flood management; or there is no other suitable system or structure in flood conflict resolution."*

> *"According to the study finding, those affected people decided not to gather on the road to reveal their demands or claims, rather to apply through a political process such as parliament or governmental offices. Although the problems or demands of affected people were related to the local level, they*

23 Thailand Research Fund (TRF), 2012, *The Voice and Vulnerability: Political Debate in Flood Situation in 2011*

24 Ibid., 2012

showed their attitudes towards flood management in the national level as a strategy of their declaration."[25]

Anuchat Poungsomlee
Faculty of Environment and Resource Studies, Mahidol University

Problems with the transparency of relief allocation provided by the government became questioned in society. Moreover the rumors from local communities regarding the unequal provision of flood suggested that the communities that supported the government were likely to get more relief and assistance than communities that did not support the government. Incidents of conflict become more severe as services providers such as government, authorities, the media, and communities started blaming each other. Moreover, the imbalance of information provided by the media, which broadcast flood situations in the Bangkok Metropolitan Area and its vicinities rather than other areas of flood affected communities, caused the resentment of communities in the upperstream level. Incidents of conflict caused by inequality of relief provision and information distribution are described as follows:

"Not only the economic loss due to flood devastation in 2011 had affected Thai society, but it also reflected the remnant from the political conflicts in 2006. The severity of conflicts might become larger if Thai government, media, and leaders of interest groups blame each other for the failure of flood management in 2011 caused by politics and attempts to apply this cause for political advantages. Moreover, if the government tries to prioritize relief to people who give support to them rather than managing it properly, the political conflicts will grow larger because of the different attitudes of political perspectives, which also undermining the ethnic in the society..."

"...There are numerous rumors during the flood situation in 2011 that if the victims are supporters of the different political parties from government, it could affect their relief or further assistance. To avoid that, the government ought to clarify to society as soon as possible. Another rumor relates to the duration of flood inundation; people who are living in Nakhon Sawan province, Ayutthaya, and Bangkok vicinities: Nonthaburi and Pathumthani province, tend to be effected due to floods being inundated approximately 2-3 meter high and approximately about a month or more because the Bangkok governor does not want Bangkok to become flooded. In addition the canal system of Bangkok is lower and could be applied to discharge the large amount of water to the Gulf of Thailand..."

[25] Thailand Research Fund (TRF), 2012, *The Voice and Vulnerability: Political Debate in Flood Situation in 2011*

"... There are some conflicts among communities which are caused by the level of flood inundation, as they tried to break sandbags or flood protection bags or big bags. Anxiety of local people towards the flood situation becomes severe, moreover political conflicts are stimulating the conflicts to become larger and harder to resolve..."

Surasak Thammo[26]
Post Today, 28 October 2011

The controversy between the making of policy decisions and the implementation that communities had seen during flood situation, and the lack of clarity between central decision makers and local negotiators are based on the flood response at the local level. Political interest groups are motivated to take part in flood response. The incidents of political interest groups participating in flood response are described as follows;

"13th November 2011, around 4.00 PM, people who are living in Don Mueng District, Bangkok, approached and broke the flood barricade along Viphavadi-Rangsit Road after declaring their demand to the government. People said that the representative of the political party had announced that the big bag could be moved. Nevertheless, Rangsan Prdaitphol, Don Mueng Police Station, had declared the negotiation between Karun Hosakul, representative of Pue Thai Party and Don Mueng people of around 300 persons who rallied and asked to remove the big bags. The result of negotiation was that FROC allowed the removal of big bags in accordance to the demands of local people. However, Miss Yingluck Shinnawattra, Prime Minister, said that there is no confirmation that FROC will partially remove the big bags in Don Mueng, and while the negotiation had happened no decision had been made yet. But the coordination of the Bangkok Governor pumping water for relief aid, also assigned the Bangkok Governor and Ministry of Interior to dispatch and give basic relief as soon as possible..."

Thai Rath via Prachathai[27]

26 Surasak Thammo, 2011, Flood conflict which leads to political crisis, Post Today, 28 October, 2011 via
27 Thai Rath, 2011, Don Mueng broke big-bags, FROC said its necessary. Monday 11th 2014,

Appendix 2: Questionnaire Survey "Roles of municipality in flood response activities"

This questionnaire is relevance to research topic "Roles of municipality in flood response activities" This research is a part of Doctoral dissertation. This questionnaire can separate into three part as follows (1) basic data of respondents, (2) attitude toward current flood management policy, (3) influence factors to participate in flood risk management. Your data and information will be confidential and will be use only necessary. On behalf of researcher, I appreciate for you to giving your valuable time to giving information

Mr I-soon RAUNGRATANAAMPORN
Graduate School of Policy Science, Ritsumeikan University
Graduate School of Policy Science
Ritsumeikan University, Japan

Please check to the boxes which meet your appropriate answer

1. Basic information

1.1 Sex ☐ Male ☐ Female

1.2 Age ☐ less than 20 year ☐ 20-30 years ☐ 30-40 years ☐ 40 -50 years
☐ 50-60 years ☐ older than 60 years

1.3 Education level ☐ Lower than junior high school ☐ Junior high school
☐ High school ☐ Vocational degree
☐ Bachelor degree ☐ Higher than Bachelor Degree

1.4 Income ☐ less than 10,000 THB/month ☐ 10,001 – 15,000 THB/month
☐ 15,001 – 20,000 THB/month ☐ 20,001 – 25,000 THB/month
☐ 25,001 – 30,000 THB/month ☐ 30,001 – 35,000 THB/month
☐ 35,001 – 40,000 THB/month ☐ more than 40,000 THB/month

1.5 No. of Household members _____No. of own vehicles _____

1.6 Occupation ☐ Student ☐ Civil servant ☐ Contractor/hired
☐ Shop owner ☐ Unemployed ☐ Housekeeper
☐ Employee ☐ State enterprise ☐ NPOS
☐ Other (โปรดระบุ)_____

1.7 Do you think are you living in flood risk area?

☐ Yes ☐ No ☐ Not sure

1.8 Have you ever participate in local community activity ☐ yes ☐ no

If yes, what kind of activities that you participated?

☐ Monthly meeting _____Times/month
☐ Cultural activity _____ Times/month
☐ Sport activities _____ Times/month
☐ Community development _____ Times/month
☐ Other activities _____ _____ Times/month

2. Attitude of respondent toward current flood management

2.1 Have you experience in participating toward flood management activity or not?

☐ Yes ☐ No ☐ Not sure

2.2.Who should be participating in flood management?

Direction: Non-involvement (follows rules or orders), involve in lowest level (partial support), **involve in moderate level** (participate in public hearing), **involve in high level** (Become major role in activity), **Highest involvement** (As an organizers)

Stakeholders	Non-involvement	Involve in lowest level	Involve in low level	Involve in moderate level	Involve in high level	Involve in highest level
Government						
Military, police						
Municipality						
NPOs						
Risk community						
Safe community						
Academic						
Business sector						
Private sector						
Local politicians						
Community leaders						
Respondents						

2.2.3 Response activities

Types of activities	Types of taking action			
	No taking action	Take action		
		Affected by flood	Unaffected by flood	Both
Checking survival kit				
Sharing information between colleagues				
Apply social network for sharing information				
Be volunteers				
Donate stuff				
Donate money				
Tracing information				

2.3 Preparation activities in normal period

Types of activities	Frequency					
	No taking action	Once per 6 months	Once per 2 months	Once per month	Once per week	Three times a week
Studying or searching for flood information						
Checking survival kits						
Sharing information among friends or colleague						
Participate in training drill						
Making any tentative plan for flood response						
Participate in CBDRR activities						
Other _____						

2.4 Please specify the starting date that you intent to take response during flood incident

Example

Level of flood inundation	**Number of date**														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	More than 2 week
0 – 30 cm			●												
31 – 60 cm					●										

Meaning that: In case of flood inundation (0-30 cm) you are intent to take response three days after flood had inundated

In case of flood inundation (31-60 cm) you are intent to take response five days after flood had inundated

Level of flood inundation	ระยะเวลา (วัน)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	More than 2 week
0 – 30 cm															
31 – 60 cm															
61 – 90 cm															
91 – 120 cm															
121 – 150 cm															
151 – 180 cm															
Higher than 180 cm															

2.5 Respondent attitude toward problem during flood response

Issues	Level of problem			
	No problem	Could be problem but not severe	Could be problem and severe	Problematic and could not resolve
Inconsistency between central government and local government				
Understanding in flood management				
Inconsistency between community member				
Unclear of flood relief policy				
Difficulties to asking for relief				
Accuracy of information				
Expectation of relief				
Variation of information				
Conflict in community				

2.6 Influence factors in relevance to flood involvement in local community

ปัจจัย อิทธิพล	Level of influence						
	Not to participate			No influence (0)	To participate		
	High (-3)	Moderate (-2)	Low (-1)		Low (+1)	Moderate (+2)	High (+3)
Experience							
Lifestyle in normal period							
Understanding in flood management							
Sense of unsecure							
Effect from other people action							
Effect from groups in local level							
Effect from nearby people or colleague							
Received information							
Actual flood situation							
Level of severity							
expectation to safe from flood							

4. Suggestion

_____

_____

_____

Thank you very much for your coperation

Appendix 3: A Study towards Public Involvement in Comprehensive Flood Disaster Management: Perception of Risk Acceptability in Urban Flood Risk Area

My name is I-soon RAUNGRATANAAMPORN from Graduate school of Policy Science, Ritsumeikan University, now I'm studying towards public involvement in comprehensive flood disaster management: Perception of Risk Acceptability in Urban Flood Risk Area. There are three objectives as follows (1) To measure flood risk acceptability in local community classified by each types of urban characteristic, (2) To measure perception of vulnerability in community level and (3) To compare between perception of flood risk acceptability and vulnerability in each types of community classify by urban characteristic. There are four main aspects in this research which could states as follows (1) Basic information of respondents, (2) Perception and attitude of respondents towards risk perception and preparedness activity, (3) level and decision of involvement in local activities, and (4) Attitudes of respondents towards decision to take action, and (5) suggestion. Your data and information will be confidential and will be use only necessary. On behalf of researcher, I appreciate for you to giving your valuable time to giving information

Mr I-soon RAUNGRATANAAMPORN
Graduate School of Policy Science, Ritsumeikan University
e-mail: rinarch-121@hotmail.com: หมายเลขติดต่อ +66-81-4561-1984

---

1. Basic information of respondent

1.1 Sex of respondent ☐ Male ☐ Female

1.2 Age of respondent

☐ 0- 20 Years ☐ 20-30 Years ☐ 30-40 Years ☐ 40-50 Years ☐ 50-60 Years ☐ Older than 60 Years

1.3 Average monthly income of respondent

☐ 0-15,000 THB ☐ 15,001-30,000 THB ☐ 30,001-45,000 THB ☐ 45,001-60,000 THB

☐ more than 60,000 THB

1.4 Average monthly expenditure of respondent

☐ 0-15,000 THB ☐ 15,001-30,000 THB ☐ 30,001-45,000 THB ☐ 45,001-60,000 THB

☐ more than 60,000 THB

1.5 Education level of respondent

☐ Primary school ☐ Junior high school ☐ High school ☐ Vocational school

☐ Diplomatic degree ☐ Bachelor degree ☐ Master degree ☐ Higher than master degree

1.6 Occupation or job of respondent

☐ Civil servant ☐ Private Entrepreneur ☐ Students ☐ Housekeeper

☐ Employer ☐ Private Officer ☐ Business own ☐ Unemployed

☐ Other (Please specify) _____

1.7 Number of household member _____ Persons

1.8 Period of stay 19_____ Duration of stay _____ Year

2. Perception and attitude of respondents towards risk perception and preparedness activity

2.1 Type of housing

☐ One-storey house ☐ Two-storey house ☐ three-storey house ☐ Apartment or dormitory

☐ Open space on first floor, living space on second floor ☐ All are living unit

2.2 Do you think that you are living in flood prone area?

☐ Yes ☐ No ☐ not sure

2.3 Have you ever experienced in flood situation? ☐ Yes _____Times ☐ No

2.4 Percentage of expenditure in each type of activities

Classification	Cost of living	Food consumption	Travel cost	Savings	Leisure cost	Disaster management activity	Insurance
Percentage							

2.5 Please check in the box you think you are able to operate or living as usual or normally in each level of flood inundation

Level of flood inundation	Duration of respondent could able to live as normal or usual				
	Less than one day	1-3 Days	3-5 Days	5-7 Days	More than one week
0-30 CM					
31-60 CM					
61-90 CM					
91-120 CM					
121-150 CM					
Higher than 150 CM					

2.6 Please check in the box in the approximate distance between your living place and destination

Destination	Approximate distance (meter)										
	0-50 M	50-100 M	100-150 M	150-200 M	200-250 M	250-300 M	300-350 M	350-400 M	400-450 M	450-500 M	More than 500 M
Hospital											
Municipality office											
Community center											
Park											
River or canal											

2.7 Please check in the box which suit to your attitude according to preparedness activities

Types of activity	Have you ever experienced?		If yes, when will you decide to take action?		
	Yes	No	In normal period	When received information or recognize	When you are confronting to threats
Checking survival kits					
Checking first aid					
Collect and secure the importance documents into safe place					
Sharing information among relatives or acquaintance towards flood management					
Types of activity	Have you ever experienced?		If yes, when will you decide to take action?		
	Yes	No	In normal period	When received information or recognize	When you are confronting to threats
Evacuation planning					
Tracing information provided by government in relevance to flood situation					
Donate money for helping flood victims					
Donate stuffs for helping flood victims					
Tracing information provided by public media in relevance to flood situation					
Tracing information provided by local radio/community radio in relevance to flood situation					
Tracing information provided by local government in relevance to flood situation					
Be volunteer to help local government in case of flood mitigation and response					
Be volunteer to help community in case of flood mitigation and response					
Collect savings					
Applying insurance					
Applying sandbags or water pump for flood protection					

Types of activity	Have you ever experienced?		If yes, when will you decide to take action?		
	Yes	No	In normal period	When received information or recognize	When you are confronting to threats
Apply social media to sharing your perceived information toward flood situation					

Other efforts (please specify)

_____

_____

_____

3. Level and decision of involvement in local activities

3.1 Please check in the box which suit to your attitude according to local activities

Types of activities	Roles and participation					
	Non-participate		Participate			
	Busy	Unwilling to participate	Observe	Participate (activity and share information)	Staff	Organizer or activity leaders
Participate in monthly meeting organize by municipality						
Participate in evacuation drill organize by municipality						
Types of activities	Roles and participation					
	Non-participate		Participate			
	Busy	Unwilling to participate	Observe	Participate (activity and share information)	Staff	Organizer or activity leaders
Participate in community recreation activities						
Participate in local cultural activities						
Participate in CBDRM in community						

Types of activities	Roles and participation					
	Non-participate		Participate			
	Busy	Unwilling to participate	Observe	Participate (activity and share information)	Staff	Organizer or activity leaders
Participate in local disaster protection activity						
Participate as volunteer for assist municipality						
Participate in local/municipal sports activities						
Participate in disaster conference which organize by government						
Participate in disaster conference which organize by academic						
Participate as volunteer for cleaning or recovery effort after disaster						
Participate in public hearing in urban planning process						

Other activity (If any)

_____

_____

_____

4. Please check in the box which suit to your attitude according to your attitude. According to measure scale "0" is represent that variable do not influent you to take action towards individual flood mitigation activity, and "10" is represent that variable is strongly influent you to take action towards individual flood mitigation activity

Variable	Measurement scale										
	0	1	2	3	4	5	6	7	8	9	10
Acquaintance influence respondent decide to take action											
Relatives influence respondent decide to take action											
Familiarity between respondent and neighborhood											
Inflicted damage to other people influence respondent decide to take action											
Sense of citizenship influence respondent decide to take action											
Cultural openness by government/municipalities influence response decide to take action											
Respondent realize the importance of CBDRM, then respondent decide to take action											
Respondent is willing to be a volunteer											
Lifestyle and current occupation of respondent influence respondent decide to take action											
Respondent would like to share or debate in flood management issue											
Local conflict influence respondent decide NOT TO TAKE ACTION											
Leadership of government influence respondent decide to take action											
Leadership of municipality executive/mayor influence respondent decide to take action											
Leadership of community leader influence respondent decide to take action											
Reliability of performance of government in flood disaster management influence respondent decide to take action											
Reliability of performance of local government in flood disaster management influence respondent decide to take action											
Reliability of performance of community leader in flood disaster management influence respondent decide to take action											

4. Please check in the box which suit to your attitude according to your attitude. According to measure scale "0" is represent that variable do not influent you to take action towards individual flood mitigation activity, and "10" is represent that variable is strongly influent you to take action towards individual flood mitigation activity

Variable	Measurement scale										
	0	1	2	3	4	5	6	7	8	9	10
Reliability of performance of academic in flood disaster management influence respondent decide to take action											
Reliability of media influence respondent decide to take action											
Economic damage in regional scale influence respondent decide to take action											
Economic damage in local scale influence respondent decide to take action											
Damage cause by flooding to respondent asset are larger than respondent could accept											
Respondent decide NOT TO PREPARE in normal time because the investment cost may be higher than expected damage caused by flooding											
Compensation provide by government is not enough for recovery											
Damage to life is influence respondent decide to take action											
Damage to asset is influence respondent decide to take action											
Sense of job security is influence respondent decide to take action											
Possibility of income loss influence respondent decide to take action											
Vulnerability towards historical sites by flooding influence respondent decide to take action											
Characteristic of regional feature influence respondent decide to take action											
Characteristic of community location influence respondent decide to take action											
Distance from living location and water body are influence respondent decide to take action											
Distance from living location and nearby threats are influence respondent decide to take action											

4. Please check in the box which suit to your attitude according to your attitude. According to measure scale "0" is represent that variable do not influent you to take action towards individual flood mitigation activity, and "10" is represent that variable is strongly influent you to take action towards individual flood mitigation activity

Variable	Measurement scale										
	0	1	2	3	4	5	6	7	8	9	10
Risk from excessive rainfall influence respondent decide to take action											
Technological risk (e.g., fire, accident) influence respondent decide to take action											
Societal risk (e.g., drug, criminal) influence respondent decide to take action											
Consequential hazard from flooding influence respondent decide to take action											
Duration of flood influence respondent decide to take action											
Level of flood inundation influence respondent decide to take action											
Decision which made by government/local government toward flood relief influence respondent decide to take action											
Convenient accessibility of information are influence respondent decide to take action											
Transparency and accuracy of prediction provide by task authorities are influence respondent decide to take action											
Reliability of information distribute by government influence respondent decide to take action											
Reliability of information distribute by local government influence respondent decide to take action											
Reliability of information distribute by academic influence respondent decide to take action											
Reliability of information distribute by neighborhood influence respondent decide to take action											
Reliability of information distribute by social network influence respondent decide to take action											
Source of information (TV) influence respondent decide to take action											
Source of information (radio) influence respondent decide to take action											

4. Please check in the box which suit to your attitude according to your attitude. According to measure scale "0" is represent that variable do not influent you to take action towards individual flood mitigation activity, and "10" is represent that variable is strongly influent you to take action towards individual flood mitigation activity

Variable	Measurement scale										
	0	1	2	3	4	5	6	7	8	9	10
Source of information (internet) influence respondent decide to take action											
Source of information (SMS) influence respondent decide to take action											
Personal experience toward flood situation influence respondent decide to take action											
Personal understanding toward flood management influence respondent decide to take action											
Fear and anxiety of flood disaster influence respondent decide to take action											
Fear and anxiety of global warming influence respondent decide to take action											
Familiarity of flood situation influence respondent decide to take action											
Current flood management policy influence respondent decide to take action											
Respondent DO NOT THINK that he or she could be affected by flood											
Seasonal or annual flood period influence respondent decide to take action											
Uncertainties of flood occurrence influence respondent decide to take action											
Respondent think that severe flooding do not occur frequently											
Frequently of flood occurrence influence respondent decide to take action											
Expectation of successfulness of flood protection projects influence respondent decide to take action											
The successful of applied flood management projects influence respondent decide to take action											
Willingness of respondent cause them to take action											

4. Please check in the box which suit to your attitude according to your attitude. According to measure scale "0" is represent that variable do not influent you to take action towards individual flood mitigation activity, and "10" is represent that variable is strongly influent you to take action towards individual flood mitigation activity

Variable	Measurement scale										
	0	1	2	3	4	5	6	7	8	9	10
Professionalism of government/municipality and authorities in flood management activities influence respondent decide to take action											
Respondent are devote him/herself to be part of flood management activity											
Expected damage which inflict to family are influence respondent decide to take action											
Expected damage which inflict to community are influence respondent decide to take action											
Respondent think that expected cost of recovery is more larger than protection investment											
Respondent expecting that government should compensate/relief as soon as possible after flood were affected											
Respondent expecting that local government should compensate/relief as soon as possible after flood were affected											
Respondent expecting that NGOs should compensate/relief as soon as possible after flood were affected											
Respondent think that they are able to cope to flood situation by themselves											
Respondent expecting that private sector should compensate/relief as soon as possible after flood were affected											
Respondent expecting that community member should compensate/relief as soon as possible after flood were affected											
Respondent think that the current of flood protection project could protect them from flood and they will not be affect from flood or consequential hazard											

5. Suggestions

_____

_____

_____

Thank you very much for spending your valuable time for answer