



รายงานวิจัยฉบับสมบูรณ์

โครงการ การเตรียมพร้อมรับมือภัยพิบัติในประเทศไทย: ศึกษาการ
รับรู้ความเสี่ยงจากภัยพิบัติและพฤติกรรมการเตรียมความพร้อมของ
องค์กรปกครองส่วนท้องถิ่น ธุรกิจห้างร้าน และครัวเรือน

Disaster Preparedness in Thailand: Examining Risk Perception
and Preparedness Behavior among Thai Local Governments,
Business Organizations and Households

โดย ดร.สมพร คุณวิชาติ

มิถุนายน 2560

สัญญาเลขที่ TRG5880127

รายงานวิจัยฉบับสมบูรณ์

โครงการ การเตรียมพร้อมรับมือภัยพิบัติในประเทศไทย: ศึกษาการรับรู้ความเสี่ยงจากภัยพิบัติและพฤติกรรมการเตรียมความพร้อมขององค์กรปกครองส่วนท้องถิ่น ธุรกิจห้างร้าน และครัวเรือน

Disaster Preparedness in Thailand: Examining Risk Perception and Preparedness Behavior among Thai Local Governments, Business Organizations and Households

ดร.สมพร คุณวิชิต

คณะวิทยาการจัดการ มหาวิทยาลัยสงขลานครินทร์

สนับสนุนโดยสำนักงานกองทุนสนับสนุนการวิจัยและ
มหาวิทยาลัยสงขลานครินทร์

(ความเห็นในรายงานนี้เป็นของผู้วิจัย
สกว.และต้นสังกัดไม่จำเป็นต้องเห็นด้วยเสมอไป)

Abstract

Project Code : TRG5880127

Project Title : Disaster Preparedness in Thailand: Examining Risk Perception and Preparedness Behavior among Thai Local Governments, Business Organizations and Households

Investigator: Dr. Somporn Khunwishit, Department of Public Administration,
Faculty of Management Sciences, Prince of Songkla University

E-mail Address: somporn.kh@psu.ac.th

Project Period: 2 Years

The objective of this research projects was to examine disaster preparedness among Thai local governments, business organizations and households. Since 2004, disasters have continued their ways to pose a threat to the well-being of Thai people, especially flooding in 2011. In fact, a series of floods that occurred in the year 2011 was considered Thailand's most destructive disaster in terms of number people affected and economic damage. With the effect of climate change, it has been speculated that climate-related disasters such as flood, storm and extreme weather events will be more frequent, server and more difficult to predict. To be able to respond effectively to and recover quickly from such disasters, we all need to be prepared. Thus, this research examined strategies and the extent to which local governments, businesses and households have been prepared for the flood disasters that might occur in the future. To accomplish this research objective, both qualitative and quantitative research methods were employed. Qualitative data were collected using a series of in-depth interviews with 52 key informants from local governments and businesses in seven provinces across the four regions of Thailand. Quantitative data were collected through survey questionnaires that distributed to 367 local governments, 280 business organizations and 1,594 households across Thailand. Qualitative data were analyzed using grounded theory approach and quantitative data were analyzed employing descriptive statistics and multiple regression analysis.

Results revealed that local governments in Thailand seemed to prefer to choose structural mitigation strategies than non-structural measures. This indicates that, in case of a heavy rain, these cities might be able to reduce the impact of flooding only up to a point of flood protection capacity of these structures. However, if the floodwater exceeds the capacity of these structural protection systems, losses can be huge as people's dwelling, property and buildings are still located in those flood prone areas. In terms of preparedness, research showed that, most of local governments in Thailand chose to implement all typical preparedness strategies, except for developing business continuity plan and practicing business continuity management. This suggests that, if a flooding occurred, local governments might be able to perform warning, evacuation, sheltering, search & rescue and mass care operations effectively. However, their ability to continue doing their normal jobs in providing governmental services to the citizens would be uncertain as most of them did not manage to plan for continuity of operations and practice business continuity management.

In the private/business sectors, research showed that, Thai companies located in the 7 flood prone industrial estates had done a variety of preparedness activities. This could help ensure their response ability in performing the tasks of warning and evacuating the employees and protecting the five key resources of the companies. However, their ability to reduce or mitigate the impact of flood disaster was quite minimal as most of them did not implement any structural mitigation which was important in helping the company to minimize flood impact. In addition, as most of them reported that they did not have business continuity management systems (BCMS), their long-term ability to produce and deliver goods and services to clients could be problematic.

At the household level, findings suggest that Thai households tend to choose basic, low-cost and self-managed activities such as storing food and basic medical supplies and tracking weather information through multiple sources as their first choices. Choices that require higher budget, extra effort and rely on other organizations will be, however, less likely chosen. As a result, if flooding occurred in the future, Thai households would be able to provide mass care and first aids by themselves in a short period. However, if flooding prolonged, their daily life activities could be problematic as they had not planned for transportation, had no information about evacuation and shelters, and had no extra money to spend on emergency needs during the flood. By only choosing the basic, self-managed, and low-cost preparedness activities, their ability to repair or rebuild their premises as well as their occupational recovery ability would be limited as well.

Regarding flood risk perception, research suggests that the three most influential factors affecting the way Thai households perceive the flood risk are the weather or flood information tracking behavior, flood experience and the impact of previous floods on household's property and asset, respectively. In terms of preparedness intention, findings indicate that the intention to prepare for flooding of Thai households depends on several factors. The factors that seem to have the most influence on their preparedness intention, however, are environmental cue, flood risk perception and the level of weather and flood information tracking. This suggests that the decision of Thai households to take preparedness actions depends heavily on the level of flood risk they perceive, the information they receive and the interpretation of the environmental conditions they are observing.

Finally, to gain deeper insight, it is recommended that, future research should examine the factors that enhance disaster risk reduction implementation progress, explore the successful cases of disaster preparedness in business organizations to gain best practices or lessons learned and examine the relational mechanism that explains how disaster risk perception affects intention to prepare for disaster.

Keywords: Emergency Management, Disaster Preparedness, Disaster Risk Perception, Community Resilience, Flood

Acknowledgment

Disaster resilience is a research area that I have been interested since 2008 when I did my PhD in the Department of Public Administration, University of North Texas. My first research in disaster resilience (my dissertation) was a case study conducted to explain why the city stricken by massive flooding was able to respond effective and recover quickly. The results of that first study informed practitioners and scholars the factors that helped promote resilience of a city. In this recent study, resilience had been explored across the country by quantitatively examining preparedness practices and behavior at the local government, business organization and household levels. It is thus one the studies that analyzed the data obtained from the biggest dataset (of households) in Thailand. This research project has shed light on how Thai local governments, businesses and households chose preparedness strategies to implement for improving response and recovery capability as well as to reduce disaster risk and build resilience. The research had been done successfully and I would like to express my deepest appreciation and gratitude to the following organizations and individuals:

1. First, I would like to thank Academic Research Division, The Thailand Research Fund (TRF), the Faculty of Management Sciences and Prince of Songkla University for financially supporting this research project.

2. I would also like to thank Assistant Professor Dr. Chanisada Choosuk, my research mentor who helped me in getting access to municipality data across Thailand. She was a great mentor who has always been supportive and kind.

3. Finally, I would like to thank all research participants or key informants for allowing me to interview and completing the survey questionnaires for me. This research could not be completed without your kind support. Thank you so much.

Table of Contents

Abstract	i
Acknowledgment	iii
Table of Contents	iv
List of Tables	vi
List of Illustrations	viii
Chapter 1 Introduction	1
Statement of the Problems and Research Significance	1
Research Questions	6
Research Objectives	6
Chapter 2 Literature Review and Theoretical Frameworks	7
The Concept of All-Hazard	7
Comprehensive Emergency Management.....	7
Disaster Preparedness.....	8
Disaster Risk Reduction	10
Previous Research on Disaster Preparedness in Thailand.....	11
Gaps in the Literature	13
Research's Conceptual Frameworks	14
Disaster Preparedness in Local Governments and Business Organizations	14
Risk Perception	16
Factors Affecting Risk Perception	17
Household Preparedness	18
Factors Affecting Household Preparedness	18
Chapter 3 Methodology	21
Scope of Research	21
Data and Sample.....	21
Data Analysis	22
Chapter 4 Results	24
Findings From Qualitative Data Analysis.....	24
Flood Mitigation.....	24

Flood Preparedness	25
Findings From Quantitative Data Analysis	27
Flood Preparedness Implementation	28
Flood Mitigation Implementation	30
Disaster Risk Reduction and Resilience Building Implementation	31
Respondents' Information and Company Profile.....	33
Preparedness Activities Implemented since Flooding 2011	35
Characteristics of Flood Response Planning & Business Continuity Management System Implementation.....	36
Contingency Planning for 5 Key Resources to Ensure Business Continuity.....	37
Perceived Business Resilience of the Company	37
Respondents' Characteristics	40
Preparedness Activities Implemented in Households	42
Intention to Prepare for Future Flooding.....	42
Flood Risk Perception	43
Factors Affecting Flood Risk Perception	43
Factors Affecting Intention to Prepare for Flood Disaster	46
Chapter 5 Conclusion & Discussion	51
Flood Preparedness of Local Governments	51
Flood Preparedness of Business Organizations	55
Flood Preparedness Behavior of Thai Households	57
Academic and Practical Contributions.....	60
Policy Recommendations and Suggestions for Future Research.....	61
References.....	65
Appendix1 Local Government Survey Questionnaire	71
Appendix 2 Business Survey Questionnaire.....	75
Appendix 3 Household Survey Questionnaire.....	83
Appendix 4 Pictures of Field Trips	91
Appendix 5 Manuscript.....	93

List of Tables

Table 1 Impacts of Storms around the World (2000-2012).....	1
Table 2 Impacts of Floods around the World (2000-2012)	2
Table 3 Impacts of Floods in Thailand (2001-2011)	2
Table 4 Impacts of Storms in Thailand (2001-2010).....	3
Table 5 Impacts of Landslides in Thailand in 2011.....	3
Table 6 Natural Disasters in Thailand January 2005 - May 2014	5
Table 7 Examples of Preparedness Activities in Different Organizations	9
Table 8 Literature on Disaster Preparedness	12
Table 9 Preparedness Activities Local Governments and Business Organizations.....	15
Table 10 Preparedness Activities in Households.....	18
Table 11 Flood Mitigation Strategies Implemented in Thai Municipalities Since 2011	24
Table 12 Flood Preparedness Strategies Implemented in Thai Municipalities Since 2011.....	25
Table 13 Type of Municipality	27
Table 14 Location (Region) of Municipality	27
Table 15 Municipality Risk Profile.....	27
Table 16 Gender of Respondents.....	28
Table 17 Position of Respondents.....	28
Table 18 Educational Level of Respondents	28
Table 19 Field of Study of Respondents.....	28
Table 20 Percentage of Thai Municipalities that have implemented ‘Preparedness’ Measures after the 2011 Floods	29
Table 21 Percentage of Thai Municipalities that have implemented Mitigation Strategies since 2011.....	30
Table 22 Mean Score of Disaster Risk Reduction Implementation of Local Governments.....	32
Table 23 Company Location	33
Table 24 Position of Respondents	33
Table 25 Types of Business	34
Table 26 Number of Employees	34
Table 27 Company Ownership	34
Table 28 Nationality of Mother Company	34
Table 29 Impact of flooding in 2011	35
Table 30 Emergency Exercise	35
Table 31 Company’s Department Responsible for Emergency Management	35
Table 32 Preparedness Activities Implemented since Flooding 2011	36
Table 33 Disaster Response Planning & Business Continuity Management System Implementation	36
Table 34 Contingency Planning for 5 Key Resources	37
Table 35 Inter-Item Correlation Matrix for Perceived Business Resilience Index.....	38
Table 36 Perceived Business Resilience	38

Table 37 Status in Family	40
Table 38 Sex of Respondents.....	40
Table 39 Education	40
Table 40 Occupation	41
Table 41 Family Income	41
Table 42 Type of local government where residence is located	41
Table 43 Flood Disaster Experience	41
Table 44 Preparedness Activities Implemented in Households	42
Table 45 Intention to Prepare for Future Flooding (Preparedness Intention)	43
Table 46 Flood Risk Perception	43
Table 47 Inter-Item Correlation Matrix for Flood Risk Perception Index (FRP).....	44
Table 48 Inter-Item Correlation Matrix for Flood Information Tracking Index	44
Table 49 Results of regression of Flood Risk Perception Index (FRP) on selected variables.....	45
Table 50 Inter-Item Correlation Matrix for Preparedness Intention Index	47
Table 51 Inter-Item Correlation Matrix for Trust in Flood Protection Systems Index.....	47
Table 52 Inter-Item Correlation Matrix for Environmental Cue Index	47
Table 53 Inter-Item Correlation Matrix for Social Cue Index.....	47
Table 54 Inter-Item Correlation Matrix for Perceived Flood Warning Content Quality Index....	48
Table 55 Results of regression of Preparedness Intention on selected variables.....	49

List of Illustrations

Figure 1 Four Phases of Comprehensive Emergency Management	8
Figure 2 Conceptual Framework for Local Government and Business Organization Preparedness	15
Figure 3 Model of Risk Perception	17
Figure 4 Conceptual Framework for Factors Influencing Risk Perception	17
Figure 5 Conceptual Framework of Factors Affecting Preparedness of Households.....	20
Figure 6 Interviewing with Subdistrict Municipality Mayor	91
Figure 7 Taking a Site Visit to Provincial Administrative Organization’s Emergency Response Vehicles Garage	91
Figure 8 Interviewing Company’s Representatives Regarding Disaster Preparedness and Business Continuity Practices	92
Figure 9 Exploring Flood Protection Systems of an Industrial Estate in Ayuttaya Province	92

Chapter 1 Introduction

Statement of the Problems and Research Significance

The well-being of humankind in the 21st century is being threatened by natural disasters. Disasters in this modern age seem to occur more often and produce more deadly impacts. The United Nations International Strategy for Disaster Reduction (UNISDR) reported that from 2000 to 2012 natural disasters have caused 1.2 million deaths, 2.9 billion people affected and 1.7 trillion U.S. dollars in total damage (United Nations Office for Disaster Risk Reduction, 2013a). Natural disasters have threatened us for decades and continued their path of making destructive impacts. EM-DAT The International Disaster Database showed that the number of natural disasters and the amount of estimated damage (in U.S. dollars) from 1900 to 2012 have been in a rising trend (Center for Research on Epidemiology of Disasters, 2013a; Center for Research on Epidemiology of Disasters, 2013b). Lists of natural disasters of the 21st century that produced remarkable impacts can include the 2004 Indian Ocean Tsunami, Hurricane Katrina in 2005, super cyclone Nargis that hit Myanmar in 2008, Sichuan earthquake in China (2008) and the 2011 earthquake and tsunami in Japan. Typhoon Haiyan that hit the Philippines on Friday 8, 2013 should be added in the list of most costly disasters once data on dead toll, people affected, and estimate damage are finalized.

It seems that natural disasters continue their ways to impact us all and disasters of this modern era happen more frequently with more severe impacts. A report from UNISDR reveals that, from 1980 to 2011, the world has faced 3,455 floods, 2,689 storms, 470 droughts, and 395 extreme temperature events (United Nations Office for Disaster Risk Reduction, 2013b). Scientists admitted that the frequent occurrences and more severity of natural disasters may be, in part, resulted from the effects of climate change. Although, climate change might not be accounted for all occurrences of such disasters, scientists suggest that it may be responsible for the production of some more severe meteorological and hydrological disasters such as storms and floods, respectively (Riebeek, 2005). From 2000 to 2012, storms and floods have continued to produce enormous impacts on humans. Data have showed that each year, from 2000 to 2012, storms and floods caused lots of life losses, people injured, affected, and displaced. More importantly, the total damage (in U.S. dollars) associated with these extreme events tended to have steadily increased (Center for Research on Epidemiology of Disasters, 2013).

Table 1 Impacts of Storms around the World (2000-2012)

Year	Occurrence	Deaths	Injured	Affected	Homeless	Total Affected	Total Damage ('000 USD)
2000	102	1,354	4,321	14,686,946	445,461	15,136,728	12,459,580
2001	108	1,914	92,008	31,391,888	506,875	31,990,771	14,520,012
2002	123	1,385	3,997	111,111,880	46,820	111,162,697	14,745,852
2003	85	1,028	9,835	10,589,723	493,057	11,092,615	21,333,890
2004	128	6,653	18,803	20,423,349	940,895	21,383,047	84,189,365
2005	130	5,250	6,907	48,698,109	412,268	49,117,284	184,793,461
2006	76	4,329	14,248	66,474,501	620,483	67,109,232	17,702,835
2007	105	6,035	57,003	23,811,033	106,209	23,974,245	29,558,736
2008	111	140,985	23,460	15,354,941	273,373	15,651,774	60,673,103
2009	87	3,287	10,454	50,326,452	245,872	50,582,778	26,134,655
2010	91	1,498	2,592	7,968,950	777,608	8,749,150	28,124,083
2011	84	3,103	12,306	38,234,824	297,752	38,544,882	50,872,148
2012	90	3,102	6,771	19,564,571	606,542	20,177,884	86,480,646
Totals	1,320	179,923	262,705	458,637,167	5,773,215	464,673,087	631,588,366

Source of data: EM-DAT, The International Disaster Database, Center for Research on Epidemiology of Disasters-CRED (2013c).

Table 2 Impacts of Floods around the World (2000-2012)

Year	Occurrence	Deaths	Injured	Affected	Homeless	Total Affected	Total Damage ('000 USD)
2000	158	6,025	1,509	73,110,359	793,068	73,904,936	25,803,502
2001	157	5,014	4,768	34,219,047	327,831	34,551,646	4,752,612
2002	172	4,236	38,895	167,634,876	96,952	167,770,723	26,825,511
2003	159	3,886	153,152	167,547,976	1,760,451	169,461,579	20,865,648
2004	129	6,984	15,877	116,518,021	457,117	116,991,015	10,383,038
2005	193	5,754	1,921	74,324,539	700,349	75,026,809	17,939,670
2006	226	5,843	2,199	25,668,207	4,638,942	30,309,348	7,805,942
2007	218	8,607	6,650	176,859,051	970,247	177,835,948	24,586,067
2008	166	4,009	973	42,450,074	2,547,797	44,998,844	19,475,144
2009	151	3,654	2,003	57,544,310	112,670	57,658,983	8,148,878
2010	183	8,446	10,383	187,802,803	670,720	188,483,906	48,026,147
2011	155	6,154	2,024	135,234,092	1,209,286	136,445,402	70,757,047
2012	137	3,541	8,918	63,957,227	214,038	64,180,183	25,609,173
Totals	2,204	72,153	249,272	1,322,870,582	14,499,468	1,337,619,322	310,978,379

Source of data: EM-DAT, The International Disaster Database, Center for Research on Epidemiology of Disasters-CRED (2013d).

In Thailand, the impacts of weather-related disasters followed the global trend. According to Thailand's Department of Disaster Prevention and Mitigation (DDPM), floods and storms continue to be the major disasters that took lots of lives and property of the Thai people. The data suggested that, although the number of occurrence has not been in a rising trend, the impacts of these storms and floods tend to be more severe as the number of people affected and total damage costs have risen since 2001. More importantly, flooding in 2011 has been recorded the costliest disaster in Thailand's history as the cost of total damage associated with that event was the highest among all natural disasters that ever happened in this country. Table 3 and Table 4 illustrate how floods and storms have produced impacts on the Thai people since 2001.

Table 3 Impacts of Floods in Thailand (2001-2011)

Year	Occurrence	Deaths	People Affected	Total Damage (Thai Baht)
2001	14	244	3,454,265	3,666,285,247
2002	5	216	5,127,652	13,385,316,549
2003	17	44	1,882,017	2,050,262,243
2004	12	28	2,524,441	850,659,584
2005	12	75	2,874,673	5,982,283,276
2006	6	446	6,050,674	9,627,418,620
2007	13	36	2,326,179	1,687,865,982
2008	6	113	7,921,127	7,601,796,302
2009	5	53	8,881,758	5,252,613,976
2010	7	266	13,485,963	16,336,772,341
2011	4	1,026	16,224,302	23,839,219,356
Totals	101	2,547	70,753,051	90,280,493,476

Source of data: Statistics of Floods in Thailand (1989-2011) (Department of Disaster Prevention and Mitigation-DDPM (2011).

Table 4 Impacts of Storms in Thailand (2001-2010)

Year	People Affected	Total Damage (Thai Baht)
2001	80,940	501,018,658
2002	70,156	213,337,876
2003	454,318	457,429,782
2004	181,512	398,416,887
2005	61,429	148,871,750
2006	148,849	92,244,108
2007	245,619	234,547,154
2008	242,944	227,549,741
2009	360,152	207,373,975
2010	407,271	198,845,310
Totals	2,253,190	2,679,635,241

Source of Data: Statistics of Storms in Thailand (1989-2010), Department of Disaster Prevention and Mitigation-DDPM) (2010).

In addition to floods and storms, some areas in Thailand are also vulnerable to landslides. According to Thailand's Department of Mineral Resources (MMR), 51 provinces in northern, western and southern regions are at risk of being affected by landslide. During the monsoon season when precipitation level was high, some areas in these provinces were often affected by devastating landslides. Whenever this sort of disaster occurred, it often caused severe damage to lives, farm lands, human settlements, and property. Areas that were severely affected by landslides in 2011 included Nam-Pad District (Uttaradit Province), Dok Kham Tai (Pa Yao Province), Sob Moey (Mae Hong Sorn Province) in the North, Si-chon District, Noppitam District (Nakhon Sri Thammarat Province), and Kao Panom District (Krabi Province) in the South. Table 5 presents landslide occurrence in Thailand in 2011.

Table 5 Impacts of Landslides in Thailand in 2011

Areas Affected	Extent of Damage
Nam-Pad District (Uttaradit Province, Northern Region)	6 residents were killed, one was missing, 705 households (2,028 people) were affected. - Other damages: 77 settlements (fully damaged), 27 settlements (partially damaged), 1 school (3 buildings), 21 roads, 4 natural creeks, 8 community waterworks facilities, 2 temples, 6.72 kilometer squares of farmlands, and 1,959 heads of livestock
Dok Kham Tai District (Pa Yao Province, Northern Region)	More than 1.6 kilometer squares of farmlands were damage.

Sob Moey District (Mae Hong Sorn Province, Northern Region)	• 3 residents were killed, 4 missing, 12 injured. • 11 settlements were wiped out.
Si-chon District (Nakhon Sri Thammarat Province, Southern Region)	• Flood and ensuing landslide caused an extensive damage in 7 communities of Si-chon District. • Physical damages: 124 settlements (fully damaged), 3,000 settlements (partially damaged), 287.75 kilometer squares of farmlands, 150,000 heads of livestock, 440 roads, 21 bridges, 24 small dams, 180 sewages. • Estimated damage: 320 million Baht.
Noppitam District (Nakhon Sri Thammarat Province, Southern Region)	• Flood and ensuing landslide severely affected 2,800 households and 8,000 residents • In some sub-districts, settlements and infrastructures were completely destroyed.
Kao Panom District (Krabi Province, Southern Region)	• 10 residents were killed, 100 residents were missing. • More than 100 settlements were damaged.

Sources: Uttaradit Province's Office of Disaster Prevention and Mitigation (2011); Matichon Online (2011); Krobkruakao Online (2011); Khaosod Online (2011); Department of Mineral Resources (2011a); Department of Mineral Resources (2011b); Bangkokbiznews (2011); Thaipost (2011).

These pieces of evidence suggest that, for more than a decade, Thailand has been at risk of being hit by various types of natural disasters. In fact, from 1980 to 2010, the Land of Smiles had experienced 105 events of natural disasters (3.4 events per year). These disasters killed 11,922 people (385 people killed per year), affected about 65 million people (2.1 million people affected per year), and caused more than 6 billion U.S. dollars in economic damage (194 million U.S. dollars loss per year) (PreventionWeb, n.d.). The rates of people killed, affected, and economic losses would have increased considerably if floods in 2011, 2012 and the earthquake that just happened on the 5th of May 2014 were added to the list. Flooding in 2011 that affected about 5.2 million households (or 16.2 million people) (DDPM, 2011) and caused about 1.4 trillion baht (Bangkok Post, 2011) was considered the nation's worst disaster. The earthquake (magnitude of 6.3 in Richer Scale) that just occurred in early May this year has been recorded the most destructive quake in the country's history. Again, the number of occurrence, people killed and affected, and economic losses suggest that Thailand is not a disaster-free country. Instead, natural disasters like these can happen in this country at any time and, with the impacts of climate change, they may happen more frequently and become more unpredictable. In short, 10 years after the event of the Indian Ocean Tsunami in 2004, natural disasters have continued to pose a threat to this country. While floods are extreme events that the country faced the most, earthquakes are emerging as the hazards that potentially create the huge impacts on the lives of Thai people and their property. Table 6 briefly summarizes natural disasters that happened in Thailand within the last 10 years, since the occurrence of the Indian Ocean Tsunami in 2004.

Table 6 Natural Disasters in Thailand January 2005 - May 2014

Year	Disaster	Areas Affected (Provinces)	Number of People Killed	Number of People Affected	Total Damage (THB)
2005	Floods	63	75	2,874,673	5,982,283,276
2006	Floods	58	446	6,050,674	9,627,418,620
2007	Floods	54	36	2,326,179	1,687,865,982
2008	Floods	65	113	7,921,127	7,601,796,302
2009	Floods	64	53	8,881,758	5,252,613,976
2010	Floods (and Landslides)	74	266	13,485,963	16,338,772,341
2011	Floods (and Landslides)	74	1,026	16,224,302	23,839,219,356
2013	Floods	47	86	4,095,725	Not reported
2014	Earthquakes (May 5, 2014)	6	1	24 people were injured (Assessment of total affected people is in progress)	11,760 residences and 163 buildings and infrastructures were damaged

*Note:

1) Not included droughts 2) No major disasters reported in 2012

Sources: DDPM (2011). *Statistics of Floods in Thailand 1989-2011 (as of December 31, 2011)*;

DDPM (2013). *Summary of Floods from September 17, 2013 – November 15, 2013*; NNT

(2014). *DDPM to report the damage from earthquakes (as of May 15, 2014)*.

As the data suggested, natural disasters have affected Thai communities considerably, especially in these recent years. In addition, with the effect of climate change, disasters could continue to threaten the well-being of Thai people in the future. It is, thus, important that Thai people are aware of their impacts and learn how to deal with them if they want to be less affected. Preparedness, a state of readiness, is one strategy that people can employ to cope with such crises. Preparedness activities build or strengthen response capacity of the people to deal with a disaster once it happens, thus, helping them protect their lives and property. Effective preparedness strategies can help build communities that are more resilient to the impacts of natural disasters.

Research Questions

In recognizing the importance and efficacy of preparedness in creating community more resilient to natural disasters, this research project was thus developed to examine how local governments, businesses and households have prepared themselves to respond to disasters that might happen in the future. In this study, the researcher focuses on flooding. Thus, the research questions that guide this research are as follows:

1. What are those flood preparedness strategies that have been chosen to implement at the local government, business and household levels?
2. To what extent Thai local governments, businesses and households have attempted to prepare themselves for responding to flooding that might occur in the future?
3. What are the factors that influence the flood risk perception of households?
4. What are the factors that influence flood preparedness of households?

Research Objectives

This research was conducted to achieve the following objectives:

1. To examine the flood preparedness strategies chosen to implement by Thai local governments, business organizations and households since the flooding in 2011.
2. To examine the extent to which those preparedness strategies were implemented.
3. To examine the factors that affect flood risk perception of Thai households.
4. To examine the relationships among household's risk perception, preparedness intention and other selected variables.

Chapter 2 Literature Review and Theoretical Frameworks

To examine the capabilities of local governments, businesses and households in preparing themselves for disasters that might happen in the future, the researcher reviewed theories/concepts and literature that are related to disaster preparedness. The subsequent section discusses the concept of all-hazard, comprehensive emergency management (CEM), and disaster preparedness and related literature.

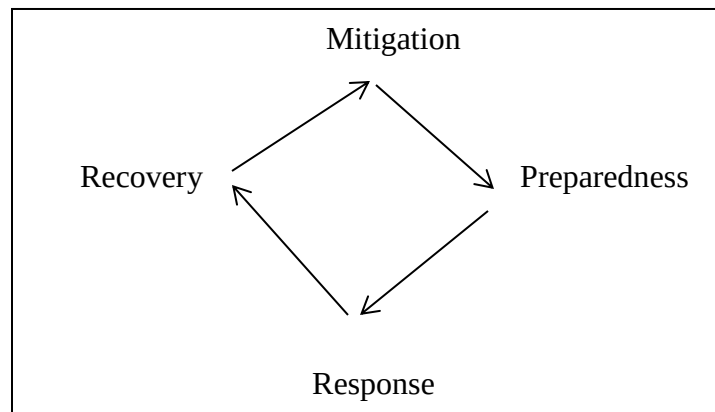
The Concept of All-Hazard

All-hazard is adopted in developed countries such as the United States of America as underlying concept for developing strategies to deal with disasters. The Federal Emergency Management Agency (FEMA), the U.S.'s main organization responsible for emergency management, has incorporated this concept into its development of emergency management systems. The concept of all-hazards recognizes all types of hazards (natural and man-made) as having the potential to produce the same impacts on humans. Another word, it suggests that both natural hazards (e.g., severe storms, massive floods, and earthquakes) and man-made/technological hazards (e.g., plant explosions, chemical oil leaks, bombings or acts of terrorism), when they happen, generate similar response demands such as evacuation, sheltering, search and rescue, and mass care/basic medical services, to name a few. In addition, emergency management strategies developed for dealing with one hazard situation can be also applied in other hazard situations. Thus, given the common impacts or response needs generated by extreme events, nations, states, cities, or organizations can develop one, general emergency management plan but can use to address both types of hazards simultaneously (Schwab et al., 2007; Lindell et al., 2007). Put simply, planning for one (hazard) means planning for all. The concept of all-hazards is the fundamental basis for developing the Comprehensive Emergency Management approach, which is discussed below.

Comprehensive Emergency Management

With the acceptance that all hazards create similar impacts or demands for response, FEMA, states, cities, and organizations responsible for disaster management in the United States of America adopt an approach called Comprehensive Emergency Management (CEM) to manage emergencies or disasters that caused by those hazards. The CEM is believed to have the ability to manage all aspects of disaster impacts. In the CEM approach, there are four phases or groups of management activities. These include mitigation/prevention, preparedness, response and recovery. These four groups of activities are, theoretically, interconnected and affect each other as illustrated in Figure 1.

Figure 1 Four Phases of Comprehensive Emergency Management



Source: Four Phases of Emergency Management, (City of St. Paul, Minnesota, USA, N.D.).

Mitigation is referred to as any initiatives or projects implemented to reduce the chance of disaster occurrence or to lessen the impacts of disasters. Preparedness covers all activities that build or improve the ability of nations, cities, organizations, and individuals to respond to a disaster that might happen. Mitigation and preparedness activities are undertaken before disaster events. In the third phase, during the time a disaster is happening and threatening people in the society, response activities such as warning, evacuation, search and rescue, sheltering and mass care are performed to protect lives and property. In the last phase, recovery, activities such as damage assessment, building and infrastructure repairs, government service and business recovery are performed to help communities and organizations return to normalcy or a state before disaster events (Schwab et al., 2007; Lindell et al., 2007). Theoretically, these groups of activities are interconnected and each affects or links to other phases. For examples, mitigation can reduce the effects or lessen the impacts of disasters, which help minimize the cost of recovery. Preparedness helps people or organizations know what to do when a disaster happens. If people are prepared for a disaster such as having enough resources and learning how to respond, they can be able to protect their lives and property. This, in turn, not only ensures the effectiveness of response but also saves recovery cost as people can contain the crisis and control damage from expanding to other parts of their organizations or communities. The focus of this study is on preparedness. Thus, the section that follows discusses the concept of preparedness in detail.

Disaster Preparedness

Preparedness can be thought of as a state of readiness to respond to emergencies, disasters or other extreme events that might happen and threaten a community or an organization (Schwab et al., 2007; Lindell et al., 2007). Preparedness activities are taken beforehand to improve improvised response and recovery. Typically, it involves anticipating what might happen during the hazard events, making sure we have a plan to deal with any possibilities that might occur during the incident, training and educating everyone involved about their roles in emergency response operations.

Preparedness plays an important role in emergency management and has implications for the two subsequent phases-response and recovery. There are some important reasons for why

nations, states, cities, communities, organizations, households and individuals should care about disaster preparedness. First, although mitigation has the potential to minimize the impacts of future disasters, it does not eliminate all hazard risks and vulnerabilities. Thus, preparedness helps people to react appropriately to emergency threats that have not been mitigated away. Second, preparedness can help facilitate effective emergency response and to guide recovery process (Lindell et al., 2007). By taking certain actions beforehand, emergency response and recovery operations can be more successful as individuals, households, and all organizations involved in response and recovery have learned and practiced to behave during the time of a crisis. Knowing how to take appropriate protective actions during a disaster help lessen loss and damage. Moreover, disasters are complex phenomena which often produce a highly changing operational context for response organizations. Thus, during response, activities need to be quick (time-sensitive) and smoothly coordinated. Preparedness plays a role here. With a plan and upon a regular plan testing/exercising, all related organizations can launch a timely, coordinated response operation. In short, “the more planning that can be done ahead of a disaster makes the response to that particular disaster more efficient” (Schwab et al., 2007, p.377).

Cities or municipalities can conduct a wide range of preparedness activities. These include: developing emergency response and recovery plans; training emergency managers, first responders, public officials, employees; exercising the plan (e.g., field drills, functional, full-scale exercises); building disaster awareness and educating the public about disaster risks and how to take protective actions; establishing warning systems, and emergency alert systems (Schwab et al., 2007). Individuals and households can take preparedness actions such as storing food and water (Paton, 2003), creating a family’s communication plan during an emergency, and preparing emergency kit. Disasters or crises can affect businesses as well. These extreme events can cause disruption in operations, property/production facility damage, and financial losses. Thus, businesses should also be prepared and one example of preparedness for business organization is to assess risk, conduct a business impact analysis and develop a business continuity plan (also known as contingency plan, continuity of operation plan) (Schwab et al., 2007). Table 7 outlines examples of preparedness activities in local governments, households, and business organizations.

Table 7 Examples of Preparedness Activities in Different Organizations/Social Units

Preparedness Activities in Households	Preparedness Activities in Business Organizations	Preparedness Activities in Local Governments, Related Public Agencies, or Community Level
- storing food and water - creating a family’s communication plan during an emergency - preparing emergency kit (Paton, 2003; Schwab et al., 2007).	- assessing risk - conducting a business impact analysis (BIA) - developing a business continuity plan (also known as contingency plan, continuity of operation plan)	- developing emergency response and recovery plans - training emergency managers, first responders, public officials, employees - exercising the plan (e.g., field drills, functional, full-scale exercises)

• Be always informed (by learning what protective measures to take before, during, and after an emergency) (FEMA, N.D)	• exercising those plans (Schwab et al., 2007) • organizing, developing and administering organization's preparedness program • identifying regulations that establish minimum requirements for an organization's emergency management/ business continuity management (BCM) program • gathering information about hazards and assess risks • examining ways to prevent hazards and reduce risks • testing and evaluating business continuity management (BCM) plan (FEMA, N.D.)	• building disaster awareness and educating the public about disaster risks and how to take protective actions • establishing warning systems, and emergency alert systems (Schwab et al., 2007)
--	---	---

Disaster Risk Reduction

Another concept that is related and can guide this research is Disaster Risk Reduction (DRR). Introduced by United Nations Office for Disaster Risk Reduction (also known as UNISDR), DRR is “the concept and practice of reducing disaster risks through systematic efforts to analyze and reduce the causal factors of disasters” (UNISDR, N.D.). Such activities as reducing exposure to hazards, lessening vulnerability of people and property, wise management of land and the environment, and improving preparedness and early warning for adverse events are some good examples how nations and communities can take to reduce disaster risk and thus, enhance resilience. In the second World Conference on Disaster Risk Reduction, members of United Nations agreed to adopted the Hyogo Framework for Action 2005-2015 (HFA) as a framework for creating disaster resilience of nations and communities. The expected outcome of HFA is to substantially reduce disaster losses (in lives) and in the social, economic, and environmental assets of communities and countries. This expected outcome can be achieved by if the three strategic

goals are met. These are: (1) integrating disaster risk reduction into sustainable development policies and planning; (2) developing and strengthening DRR institutions/mechanisms and capacities to build resilience for hazards; and (3) systematically incorporating risk reduction approaches into the implementation of emergency preparedness, response and recovery programs (UNISDR, 2005). HFA also outlines 5 groups of Priorities for Action that nations and communities around the world can take to reduce disaster risk. These Priorities for Action include a wide variety of both mitigation and preparedness strategies. Examples of preparedness activities specified in these 5 Priorities for Action that nations and communities are recommended to undertake include: reviewing and exercising their preparedness/contingency plans, establishing emergency funds, promoting volunteerism and public participation, providing disaster education for school children, providing training DRR for community members and local authorities, building disaster awareness among the public, developing and improving early warning system. There is also a lot of mitigation and other disaster management activities elaborated in the 5 Priorities of Action. However, they not discussed here because mitigation and other aspects of disaster management (i.e., response and recovery) are not the focus of this research.

Although HFA is ended in February 2015, Disaster Risk Reduction (DRR) concept has continued to be adopted as an important and underlying theory for building disaster resilience as UNISDR introduced Sendai Framework for Disaster Risk Reduction 2015-2030 in its Third UN World Conference on Disaster Risk Reduction in Sendai City, Miyagi Prefecture, Japan on 18 March 2015. Briefly, Sendai Framework for Disaster Risk Reduction specifies 4 Priorities for Action. These include: (1) understanding disaster risk; (2) strengthening disaster risk governance to manage disaster risk; (3) investing in disaster risk reduction for resilience; (4) enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction. If these priorities for actions are accomplished, it is expected that the “the substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries” can be achieved (United Nations 2015).

Previous Research on Disaster Preparedness in Thailand

Disaster preparedness has gained attention from academic writers and researchers since the event of tsunami in 2004. This interest in preparedness has grown even more when the country was hit again by floods in 2010 and 2011. However, most of the literature on disaster preparedness in Thailand is in the form of academic writings or practical reports, not empirical research. Previous writings on disaster preparedness often dealt with such issues as the need for installation of effective warning systems and strengthening disaster response capabilities at national, provincial and community levels (Chotchuan et al., 2012), preparedness for better provision of emergency medical services during the time of disasters (Saiyarod, 2012), the lack of and the need for business continuity plans in both government agencies and business organizations (Platthadet & Jitkasemsaran, 2012), cooperation among all related agencies in planning for responses (Ngern-Charoen, 2012), insufficient preparedness, lack of long term water management, and flood risk management plan (Techapanadon & Jansuwan, 2012), low level of household preparedness and the need for self-reliance (Sirishrisak, 2012). Table 8 provides brief summaries of previous literature on preparedness in Thailand.

Table 8 Literature on Disaster Preparedness

Authors	Summaries of Important Points/Main Arguments
Chotchuang et al. (2012)	• Putting highly effective warning systems in place would help reduce the risk of being impacted by future disasters. • Warning system can be effective if it is people-centric. It must be designed to address the needs of people in each area. This is because there is no one-size-fit-all warning system that can serve the needs created by all types of disasters. Thus, warning systems must be tailored to the need of the people living in an area that is prone to specific type of disaster. An effective warning system should also focus on the development of disaster related knowledge, dissemination of warning information to residents in risk areas, and strengthening disaster response capabilities at national, provincial and community levels.
Saiyarod (2012)	• Responses to past disasters showed how ineffective Thailand's emergency medical service systems were. Delayed arrival, unsmooth operations in moving patients, inappropriate practices in basic medical treatments, and poor communication clearly depicted the problems that occurred in Thailand's emergency medical services in disaster situations. The author urged that Thailand has better preparedness systems so that losses could be minimized in the future.
Platthadet & Jitkasemsaran (2012)	• Among Thai public agencies, there were only financial institutes that have developed business continuity plans (BCPs) and exercised the plans on a regular basis. This was because they were controlled and supported by the Bank of Thailand. Other public agencies have not developed their BCPs because the lack of both personnel who have the knowledge of BCP and standardized procedures for developing the plans. • In business sector, big corporations have the plans and procedures for dealing with crises but lack of integration with the nation's disaster management plan. Most of small and medium businesses has not developed BCPs because they did not think the plan was important to their business and also lacked of the knowledge and budget for developing the plans.
Ngern-Charoen (2012)	• Flooding in 2011 caused damages to 311 historical sites around the nation. • All related agencies should cooperate in planning for responses and to develop short and long term mitigation strategies.

Techapanadon & Jansuwan (2012)	• The contributing causes of the destructive impacts of flooding in 2011 included poor land-use planning, ineffective management of water resource, lack of a good decision support system and database that could provide clear and accurate information, and insufficiency of risk and crisis communication leading to social conflicts. • Failure in responding to the floods in 2011 was primarily due to insufficient preparedness, lack of long-term water management, and flood risk management plan. • Flooding in 2011 that caused destructive impacts on lives, property, economic and social systems, natural resources and environment indicated that Thailand was not well prepared for disaster response. Thus, everyone has to learn from this event so that we can work together to prevent such a disaster from happening again.
Sirishrisak (2012)	• Flood disaster in 2011 had caused extensive damages to various sectors including agriculture, industry, and tourism and had destructively produced economic, social, and psychological impacts on Thai people in many parts of the country. • These dramatic losses and impacts were due to mismanagement of water resource prior to the flooding event, too much centralization of crisis decision making power, inadequacy and inaccuracy of information about the situation, lack of evaluation of the situation and effective provision of warning from related agencies, and low level of household preparedness. • Using these failures in responding to the 2011 flooding as lessons learned, the Thai government should improve its disaster management plans. Likewise, communities and people should also prepare for disasters that might happen and learn to rely on themselves in case assistance from government agencies could not be able to reach affected areas, at least at the beginning of the impact phase.

Gaps in the Literature

In summary, there have been some efforts to educate and disseminate information to Thai people through writings about disaster preparedness. Several issues regarding preparedness have been discussed in previous literature on disaster management in Thailand. However, efforts to examine the issue of disaster preparedness empirically are minimal. The arguments and conclusions made in previous literature were not based on empirical data and, hence, could not provide the answer to the questions of what influences the risk perception and preparedness behavior of local governments, business organizations, and households. Also, previous research did not empirically investigate the issues of how and to what extent local governments, business organizations, and households have prepared themselves to the next disasters. Thus, empirical study that employs scientific methods (both quantitative and qualitative) is worth conducting.

Empirically examining this important issue not only provides the practical knowledge that policy makers and emergency management practitioners can use as guidance for better management of future disasters, it would also contribute to the literature on disaster management in Thailand, which would help students and researchers understand this important area of study better.

Research's Conceptual Frameworks

Disaster Preparedness in Local Governments and Business Organizations

To examine disaster preparedness in local governments and business organizations, the researcher employed the adapted version of preparedness cycle originally initiated by the U.S.'s Federal Emergency Management Agency (FEMA) as the main conceptual framework. FEMA (2005) has introduced a few versions of preparedness cycle. Although groups of preparedness activities in each of these versions are labeled differently or given different names, all preparedness models share or reflect common themes. For examples, in its 2005 case study document, FEMA incorporated five groups of activities into its preparedness planning cycle. These include assessment (assessing threat and vulnerability), planning (identifying shortfalls and requirements), preparation (implementing enhancements, training and exercising) and evaluation (evaluating preparedness activities). FEMA also introduced another model of disaster preparedness in its Comprehensive Preparedness Guide 101 Version 2.0: Developing and Maintaining Emergency Operations Plans dated November, 2010. In this document, the preparedness cycle includes five groups of activities: planning, organizing & equipping, training, exercising, and evaluating & improving (FEMA, 2010). In another training document, however, preparedness cycle comprises four elements or groups of activities, which include planning, organizing/training/equipping, exercising, and evaluating/improving (FEMA, n.d.). According to FEMA, these groups of activities help build disaster preparedness capability of organizations. Drawing on three versions of FEMA's preparedness cycle, the researcher developed the conceptual framework that was used to examine disaster preparedness capability of local governments and business organizations. In this adapted model of preparedness, four groups of activities are conceptualized as essential functions that organizations need to perform if they want to better respond to a crisis that might occur. These groups of preparedness activities that build response capability of organizations include: threat and vulnerability assessment, planning (organizing and equipping), training and exercising the plan, and evaluating and improving those preparedness activities. This conceptual framework was employed as guidance for developing research tools or instruments for collecting both qualitative and quantitative data for analysis. Figure 2 illustrates the disaster preparedness conceptual framework. Table 9 gives details of preparedness activities in local governments and business organizations.

Figure 2 Conceptual Framework for Local Government and Business Organization Preparedness



Table 9 Preparedness Activities Local Governments and Business Organizations

Preparedness Activities in Business Organizations	Preparedness Activities in Local Governments
• assessing risk • conducting a business impact analysis (BIA) • developing a business continuity plan (also known as contingency plan, continuity of operation plan) • exercising those plans (Schwab et al., 2007) • organizing, developing and administering organization's preparedness program • identifying regulations that establish minimum requirements for an organization's emergency management/ business continuity management (BCM) program • gathering information about hazards and assess risks	• developing emergency response and recovery plans • training emergency managers, first responders, public officials, employees • exercising the plan (e.g., field drills, functional, full-scale exercises) • building disaster awareness and educating the public about disaster risks and how to take protective actions • establishing warning systems, and emergency alert systems (Schwab et al., 2007)

• examining ways to prevent hazards and reduce risks • testing and evaluating business continuity management (BCM) plan (FEMA, N.D.)	
---	--

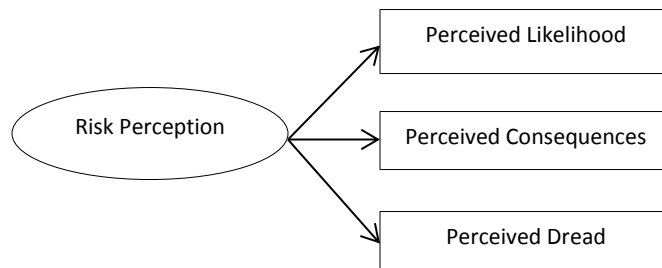
In addition to examining preparedness in local governments and business organizations, the researcher also assessed preparedness behavior of households. When examining preparedness activities at individual or household level, not only types of preparedness activities and the level of implementing those activities are assessed, the issue of risk perception should be also investigated. The reason why this issue is worth studying is that, in theory, risk perception links with the decision of individuals to take protective actions. Another word, the extent to which people perceive about disaster risk (the chance of occurrence and/or its level of severity or impact) determines whether and how much they take actions to protect their lives (e.g., evacuation) and property.

Risk Perception

Risk perception can be thought of as a belief held by an individual, group, or society about the chance of occurrence of a risk or about the extent, magnitude, and timing of its effects. Perception of risk influences the decision to take protective actions. If people perceived that the risk was low, they might not take actions to protect their lives and property. Thus, in a certain disaster situation, “people will not protect themselves if they don’t believe their lives are at risk” (Lindell et al., 2007, p.77). Put simply, people’s belief about the likelihood of disaster occurrence and its severity or level of impact affect their behavior (i.e., people may not store food and essential supply if they perceive the flood risk as low or they might not evacuate if they think the possibility that a storm will hit their community is low). One research has shown that, in the event of Hurricane Katrina in the United States of America, some of the victims admitted that they decided not to evacuate because they misjudged the severity of the storm (Eisenman et al., 2007).

Important issues for researching risk perception can be ranged from how much people perceive about particular risk or different risks, how citizen judgments of different risks are interrelated, do people agree with judgments of officers from public agencies, and how risk perceptions affect protective action adoption. These are examples of issues related to disaster risk perception that need more studies (Weinstein, 1999 as cited in Perry & Lindell, 2008, p.172). Studying risk perception is important because if we understand risk perception of our citizens, we can work on improving our risk communication practices to help build disaster awareness and promote preparedness among individuals or households. In this research, the level of risk perception of heads of households, its determining factors, and its relationships with protective or preparedness behavior were also be examined. To examine the level of risk perception of family heads, the researcher will measure risk perception based on three components, namely, perceived dread, perceived consequences, and perceived likelihood (Terpstra, 2010). Figure 3 illustrates the conceptual framework used for measuring the risk perception of individuals.

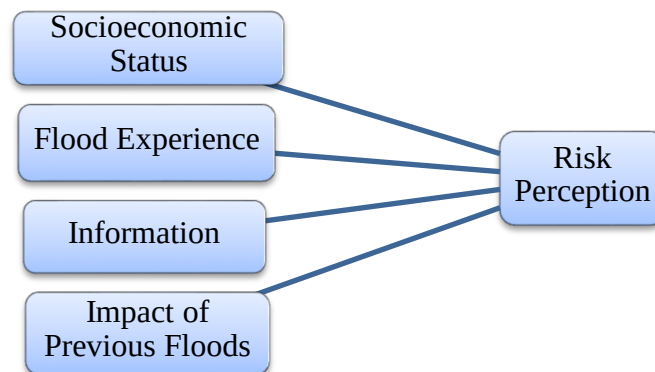
Figure 3 Model of Risk Perception



Factors Affecting Risk Perception

To examine factors influencing risk perception, the researcher relies on the Protective Action Decision Model (PADM) introduced by Lindell & Perry (2004). Lindell and Perry (2004) developed the PADM to comprehensively explain why individuals decide to take protective action to save their life and property from the potential impacts of a disaster. According to the PADM, whether or not people perceive the environmental threats as real or having the potential to affect them and decide to take short-term protective actions and/or adopt long-term hazard adjustments depends on six variables. These include environmental cues, social context, information sources, information channels, message content (these are called warning variables), and receiver (or individual) characteristics. The work of Ho et al. (2008) also provides an empirical evidence to support the notion that individual characteristics (e.g., gender, education, income, and disaster experience) have an influence on people's risk perception. Ho et al. (2008) also add disaster type in their hypothesized model of disaster risk perception. Some variables in the PADM and from the research conducted by Ho et al. (2008) were used to develop a conceptual framework for this study (Figure 4). As showed in Figure 4, the variables selected for this research included socioeconomic status, flood experience, impact of previous floods and information.

Figure 4 Conceptual Framework for Factors Influencing Risk Perception



Household Preparedness

Lastly, to answer the question of how much individuals or households have been prepared for the next disasters, it is important to examine the level of preparedness behaviors and the factors that affect such behavior. Preparedness behaviors, in this research, incorporate the concepts of hazard adjustments, risk reduction behavior and adaptive behavior. Hazard adjustment is used in disaster research as if it is the operationalization of preparedness at the individual or household level. Hazard adjustments can be thought of as “risk reduction actions consisting of hazard mitigation actions taken to provide passive protection at the time of hazard impact” (Lindell & Perry, 2004, p. x). Sometimes hazard mitigation actions are referred to as risk reduction behaviors (Martin et al., 2009). Thus, in this case, hazard mitigation is equated to risk reduction behavior or action, which is a part of hazard adjustments.

Hazard adjustments also include “emergency preparedness actions taken to support active response after hazard impact and recovery preparedness actions (e.g., hazard insurance) taken to provide the financial resources needed to recover from disaster impact” (Lindell & Perry, 2004, p. x). Lindell & Perry (2004) try to make it clear that risk reduction behaviors and preparedness actions are elements of hazard adjustment and argue that hazard adjustment is long term action which is different from protective action, which is short-term behavior. However, an extensive review of related literature shows that disaster researchers have used the terms protective actions, hazard adjustments, preparedness behaviors, risk reduction behaviors, and adaptive behavior as if they were the same. Thus, in this research, these terms are used interchangeably. Individuals and households can take preparedness actions such as storing food and water (Paton, 2003), creating a family’s communication plan during an emergency, preparing emergency kit (Schwab et al., 2007) and keeping themselves informed (by learning what protective measures to take before, during, and after an emergency) (FEMA, N.D). Table 10 gives details of preparedness activities in households.

Table 10 Preparedness Activities in Households

Preparedness Activities in Households
• storing food and water • creating a family’s communication plan during an emergency • preparing emergency kit (Paton, 2003; Schwab et al., 2007). • learning what protective measures to take before, during, and after an emergency (FEMA, N.D)

Factors Affecting Household Preparedness

Studying the level and the factors that influence households’ preparedness behaviors is important because this would help us (scholars, educators, public administrators, policy makers, community and organizational leaders) design programs that promote preparedness in households, which would, increase their adaptive capacity for better coping with future disasters that might occur. To examine the factors that influence households’ preparedness behaviors, the researcher relies on previous literature and research on risk communication and hazard adjustment adoption, risk reduction behaviors, risk perception, and preparedness intention. We have learned from the Protective Action Decision Model and the work of Ho et al. discussed earlier that environmental cues, social context, information sources, information channels, message content, receiver

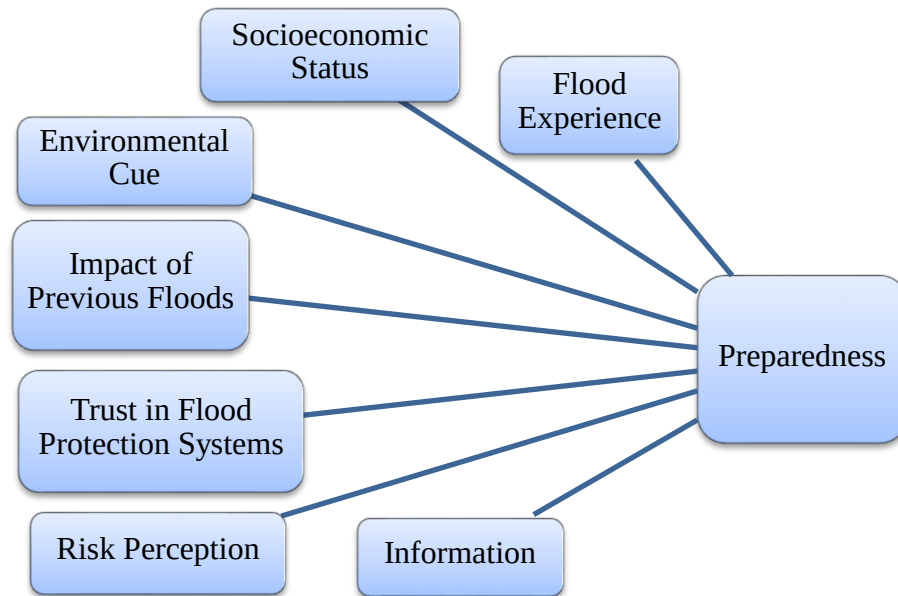
characteristics, and disaster types shape risk perception of people, which in turn, affects their decision to take protective actions or adopt hazard adjustments (Lindell & Perry, 2004; Ho et al., 2008). We also learned from Martin et al. (2009) that subjective knowledge that individuals have (something similar to warning variables appeared in the Lindell & Perry's PADM), locus of responsibility (a belief that risk reduction should be responsible by individuals/households or by the governments or public sector), self-efficacy, type of residents (fulltime or seasonal), and disaster experience directly affect risk reduction behaviors and have an indirect impact through risk perception.

The Effect of Risk Perception on Preparedness of Households

Previous literature and research also suggest that perception of risk influences the decision to take protective actions (preparedness behaviors). If people perceived that the risk was low, they might not take actions to protect their lives and property. Thus, in a certain disaster situation, "people will not protect themselves if they don't believe their lives are at risk" (Lindell et al., 2007, p.77). Put simply, people's belief about the likelihood of disaster occurrence and its severity or level of impact affect their behavior (i.e., people may not store food and essential supply if they perceive the flood risk as low or they might not evacuate if they think the possibility that a storm will hit their community is low). One research has shown that, in the event of Hurricane Katrina in the United States of America, some of the victims admitted that they decided not to evacuate because they misjudged the severity of the storm (Eisenman et al., 2007). Other empirical studies also support this thesis. For example, Terpstra (2010) argues that feelings (such as negative emotions) and people's trust in public disaster protection works or systems affect risk perception, which in turn, affects their preparedness intention. A survey conducted in the U.S. in 2010 to examine household risk perception, preferences, and preparedness found that non-coastal residents were more likely to think a disaster would not happen to them and that preparing was not worth the cost (Donahue, 2010). Other theoretical and empirical supports for this thesis of risk perception influence on preparedness can be also found in the works of Grothmann and Reusswig (2006), Bradford et al. (2012), Raaijmakers et al. (2008), Shen (2009), and Miceli et al. (2008). Thus, it is expected in this study that risk perception has a positive influence on preparedness of household.

Relying on previous theoretical model and research findings, some of variables mentioned above were used to develop a conceptual framework for examining the factors affecting preparedness of households (Figure 5). As showed in Figure 5, the variables selected for this research included socioeconomic status, flood experience, impact of previous floods, information, flood risk perception, trust in flood protection system, environmental cue, social cue and perceived flood warning content quality.

Figure 5 Conceptual Framework of Factors Affecting Preparedness of Households



Chapter 3 Methodology

In examining how local governments, households, and businesses have prepared themselves for responding to future disasters, both qualitative and quantitative research methods were employed. This section discusses methods and strategies that were used for selecting research participants, collecting and analyzing data.

Scope of Research

Initially, this research was proposed to mainly examine preparedness of Thai local governments, businesses and households in the context of flooding. Preparedness is a state of readiness to respond to any emergency or disaster. Preparedness can be operationalized as activities to improve the ability to respond effectively to and recover quickly from a disaster. At the local level, preparedness activities can include the development of emergency response procedures or plans, conducting plan exercises to test emergency response and recovery capabilities, training of emergency personnel, resources acquisition and allocation, educating people, designing and installation of warning systems. Preparedness activities are implemented before a disaster happens. However, there is another group of activities that is undertaken before a hazard event as well. These activities are known in academic world as mitigation measures. Mitigation measures are sustained actions taken to reduce or eliminate the risk to human life and property. These include activities that eliminate or reduce the chance of occurrence or the effects of a disaster. Mitigation involves identification of potential hazards and assessment of possible impacts. The aim of mitigation is to reduce the exposure to, probability of or potential loss from hazard events. It often focuses on where and how to build. Academically, they are not the same as preparedness. In a real world, however, people often perceive they are the same and talk about them as if they were preparedness. Thus, mitigation was also included in this study so that a more comprehensive view of protective actions was achieved. That is while researching on preparedness helps us to understand the disaster response and recovery capabilities, mitigation provides insight on disaster impact minimizing behavior. All in all, examining both preparedness and mitigation allowed the researcher to unveil disaster risk reduction and preparedness behavior of Thai local governments, businesses and households.

Data and Sample

Local Governments

To examine disaster preparedness at the local government level, the researcher began with field research to qualitatively explore what strategies were being implemented out there. 7 field trips were taken to 7 provinces in 4 regions of Thailand. These included Pitsanulok Province in the North, Nonthaburi Province and Ayuttaya Province in Central Region, Udontani Province and Khonkaen Province in Northeast, Songkhla Province and Nakhon Sri Thammarat Province in the South. All these provinces were either affected by flooding in 2010 or 2011. Using the interview guide developed before taking the field trips, the researcher interviewed 52 key informants. These research participants were municipality mayors, deputy mayors, members of municipal committee, municipal clerks, departmental directors, senior officers, and village

representatives, all actively involved or were responsible for disaster management in there municipalities. All participants were above 18 years old and were reached by purposive sampling method.

After the field trips were done, a survey questionnaire as developed by using the preliminary results of qualitative data analysis obtained from the field trips and complemented by the 10 Essentials framework for Making Cities Resilient, which was developed by UNISDR. The questionnaire included 4 parts: respondent information and municipality profile, flood mitigation, flood preparedness and disaster risk reduction. Survey questionnaires were then distributed to 367 municipalities all over the country. From August to November 2016, there were 104 questionnaires returned to us making the return rate of about 28%. However, a total of 100 questionnaires was the final sample size used in the analysis as 4 questionnaires contained invalid information for some items.

Business Organizations

To examine disaster preparedness in business organizations, data were collected through a survey method. First, a survey questionnaire was developed using FEMA's preparedness cycle (FEMA, N.D.) and Schwab et al.'s concept of business continuity planning (Schwab et al., 2007) as theoretical bases. The survey questionnaire consisted of 5 parts including: respondent information and company profile, preparedness activities implemented after flooding in 2011, business continuity management practices of the company, perceived business resilience of the company, and strategies for protecting the 5 key resources. Survey questionnaires were then distributed to 280 companies located in 7 industrial estates in Ayuttaya Province and Patumtani Province. These 7 industrial estates were severely affected by flooding in 2011. Of these 280 companies, there were 65 companies that sent back the questionnaires to us, making the return rate of 23.21%.

Households

To examine disaster preparedness of households in Thailand, 1,600 survey questionnaires were sent to households in 4 regions across Thailand. 1,594 questionnaires were sent back to the researcher, making the return rate of 99.63%. However, only 1,592 questionnaires were used as the final sample size for this study as 2 questionnaires contained invalid data. The survey questionnaires contained 84 items and organized into 13 parts: part 1 (respondent and household's information), part 2 (flood risk perception), part 3 (flood preparedness activities implemented), part 4 (intention to prepare for future flood disaster), part 5 (confidence on flood information sharing & warning from different sources), part 6 (weather information tracking habit), part 7 (opinion on flood warning content provided related government agencies), part 8 (decision to take action after receiving warning message), part 9 (experience with flooding), part 10 (flood impact on family), part 11 (trust in flood protection system), and 12 (environmental and social cues).

Data Analysis

Local Governments

Data analyses were divided into two parts: interview transcripts were qualitatively analyzed and data obtained from survey questionnaires were quantitatively analyzed.

Qualitative data analysis for the field research began with the initial coding process. The procedures for initial coding involved literally reading every line of each transcript, condensing

data into manageable segments (such as lines, sentences, or paragraphs), and carefully coding each of these segments. The aim of this process was to obtain initial codes, which were used for the next step of data analysis. In the second step, initial codes were reexamined so that larger topics or themes could be determined. This process can be called focused coding (Hesse-Biber and Leavy, 2006). Focus coding started with reconsidering the initial codes to identify similar or repeating ideas expressed by different participants. These similar ideas were then combined or linked. By grouping similar ideas, conceptual theme emerged. Each of these conceptual themes can be thought of as a larger topic that organizes or connects those similar ideas or expressions (Pasquini et al., 2013). The conceptual themes obtained from this analytical step were then comparatively analyzed against the 10 Essentials framework for Making Cities Resilient to explore what disaster risk reduction choices have been chosen to be implemented by these municipalities.

In the quantitative part, data from survey questionnaires were coded and recoded as appropriated. Missing data, skewness and kurtosis were then checked to ensure centrality before analysis. After the data were cleaned, some new variables were computed. Frequencies and descriptive statistics were then obtained to explore the characteristics of survey respondents, municipality profile, mitigation and preparedness strategies implemented and the level of disaster risk reduction in these municipalities. More details of data analysis steps are also provided in Chapter 4.

Business Organizations

Data from survey questionnaires were first coded and some items were recoded as appropriated. Missing data, skewness and kurtosis were then checked to ensure centrality. After the data were clean, some new variables were computed as needed such as those dummy and scale variables. Then descriptive statistics including frequencies, percentage, mean and standard deviation were obtained for analysis. Since the final sample size was too small (65), regression analysis to explore relationship among variables was not be performed. More details of measurement and data analysis steps are also provided in Chapter 4.

Households

Data from survey questionnaires were first coded and some items were recoded as appropriated. Missing data, skewness and kurtosis were then checked to ensure centrality. After the data were clean, some new variables were computed as needed such as those dummy and scale variables. Then descriptive statistics including frequencies, percentage, mean and standard deviation were obtained for analysis. Then, relationships among selected variables were analyzed using multiple regression analysis. More details of measurement and data analysis steps are also provided in Chapter 4.

Chapter 4 Results

Results of this study are organized into 3 major parts: disaster preparedness of local government, disaster preparedness of business organizations and disaster preparedness of households. Both qualitative and quantitative analyses were integrated in explaining disaster preparedness of local governments and business organizations. Disaster preparedness of households, however, is only explained by quantitative analysis.

4.1 Disaster Preparedness of Local Governments

Findings From Qualitative Data Analysis

Flood Mitigation

In this research, flood mitigation is referred to as sustained actions taken to reduce or eliminate the risk to human life and property. These include activities that eliminate or reduce the chance of occurrence or the effects of a disaster. Mitigation involves identification of potential hazards and assessment of possible impacts. The aim of mitigation is to reduce the exposure to, probability of or potential loss from hazard events. It often focuses on where and how to build. In the field research, the researcher asked research participants what flood mitigation strategies were implemented in your municipalities. Table 11 revealed the themes that emerged from the qualitative analysis. These themes represent flood hazard mitigation strategies that have been implemented in Thai municipalities since 2011.

Table 11 Flood Mitigation Strategies Implemented in Thai Municipalities Since 2011

Flood Mitigation Strategies*	Type**	Compatibility with 10 Essentials Framework for City Resilience
(1) Build water retention systems	Structural	Essential 4: Investing in risk reducing infrastructure
(2) Build or improve drainage systems (i.e., water channelization)	Structural	Essential 4: Investing in risk reducing infrastructure
(3) Build flood protection facilities (i.e., levee, barrier, dyke, floodwall)	Structural	Essential 4: Investing in risk reducing infrastructure
(4) Creating hazard maps	Nonstructural	Essential 3: Updating hazard and vulnerability data
(5) Creating vulnerability map and database	Nonstructural	Essential 3: Updating hazard and vulnerability data
(6) Utilizing regulations/ordinances to mitigate flood risk	Nonstructural	Essential 6: Enforcing risk-compliant building regulations and land use planning

*Mitigation = Sustained actions taken to reduce or eliminate the risk to human life and property. These include activities that eliminate or reduce the chance of occurrence or the effects of a disaster. Mitigation involves identification of potential hazards and assessment of possible impacts. The aim of mitigation is to reduce the exposure to, probability of or potential loss from hazard events. It often focuses on where and how to build.

**Type = structural mitigation, nonstructural mitigation

Results from qualitative data analysis showed that Thai local governments chose both structural and nonstructural mitigation strategies to implement for reducing flood risk. Structural mitigation strategies included building water retention systems, building or improving drainage systems such as water channelization, and building flood protection facilities such as levee, barrier, dyke, and floodwall. In terms of nonstructural mitigation strategies, Thai local governments chose to create vulnerability map and database and utilize regulations/ordinances to mitigate flood risk. These mitigation strategies reflected Essentials 3 (updating hazard and vulnerability data), 4 (investing in risk reducing infrastructure) and 6 (enforcing risk-compliant building regulations and land use planning) of UNISDR's 10 Essentials Framework for Making Cities Resilient.

Flood Preparedness

In this study, preparedness is a state of readiness to respond to any emergency or disaster. Preparedness can be operationalized as activities to improve the ability to respond effectively to and recover quickly from a disaster. Preparedness activities can include the development of emergency response procedures or plans, conducting plan exercises to test emergency response and recovery capabilities, training of emergency personnel, resources acquisition and allocation, educating people, designing and installation of warning systems. To examine preparedness of Thai local governments, the researcher asked research participants about the preparedness strategies that were implemented in their municipalities. Table 12 revealed the themes that emerged from the qualitative analysis. These themes represent flood disaster preparedness strategies implemented in Thai municipalities since 2011.

Table 12 Flood Preparedness Strategies Implemented in Thai Municipalities Since 2011

Flood Preparedness Strategies*	Type**	Compatibility with 10 Essentials Framework for City Resilience
(1) Making response & recovery plans	A	Essential 1: Organization and coordination for resilience
(2) Conducting emergency plan exercises, emergency drills	A	Essential 7: Ensuring education programs and training on disaster risk reduction
(3) Pre-identifying emergency shelters	A	Essential 9: Installing early warning systems and emergency management capacities
(4) Preparing flood response equipment & materials	A	Essential 9: Installing early warning systems and emergency management capacities
(5) Preparing financial resource, budget allocation for disaster management	A	Essential 2: Providing budget and incentives for risk reduction
(6) Recruiting and maintaining volunteers, building networks and partnerships with related organizations	A	Essential 1: Organization and coordination for resilience
(7) Providing disaster response & adaptation trainings for people in the communities	B	Essential 7: Ensure education programs and training on disaster

		risk reduction are in place in schools and communities
(8) Improve crisis communication and warning systems	C	Essential 9: Installing early warning systems and emergency management capacities
(9) Public consultation, public participation, meeting & engaging with people	C	Essential 1: Organization and coordination for resilience Essential 10: Ensuring that the needs and participation of the affected population are at the center of reconstruction

*Preparedness = Preparedness is a state of readiness to respond to any emergency or disaster. Preparedness can be operationalized as activities to improve the ability to respond effectively to and recover quickly from a disaster. Preparedness activities can include the development of emergency response procedures or plans, conducting plan exercises to test emergency response and recovery capabilities, training of emergency personnel, resources acquisition and allocation, educating people, designing and installation of warning systems.

**Type

A = preparedness strategies implemented to strengthen response capacity of the municipality office
B = preparedness strategies implemented to strengthen response capacity of people in communities/villages

C = preparedness strategies implemented to strengthen response capacity of both the municipality office and communities/villages

Findings from qualitative study showed that preparedness activities implemented by Thai local governments since the flooding in 2011 could be categorized into 3 types: type A (preparedness strategies implemented to strengthen response capacity of the municipality office), type B (preparedness strategies implemented to strengthen response capacity of people in communities/villages), and type C (preparedness strategies implemented to strengthen response capacity of both the municipality office and communities/villages). Type-A preparedness activities that Thai local governments chose to implement included making flood response & recovery plans, conducting emergency plan exercises, emergency drills, pre-identifying emergency shelters, preparing flood response equipment & materials and preparing financial resource, budget allocation for disaster management. Type-B preparedness activity that Thai local governments chose to implement was to provide flood response & adaptation trainings for people in the communities. Type-C preparedness activities that Thai local governments chose to implement included improving crisis communication and warning systems and engaging with people in flood preparedness such as public consultation, public participation and having a meeting with citizens and other stakeholders. These preparedness strategies implemented in Thai local governments reflected Essentials 1 (organization and coordination for resilience), 2 (providing budget and incentives for risk reduction), 7 (ensuring education programs and training on disaster risk reduction), 9 (installing early warning systems and emergency management capacities) and 10 (ensuring that the needs and participation of the affected population are at the center of reconstruction) of UNISDR's 10 Essentials Framework for Making Cities Resilient.

Findings From Quantitative Data Analysis

In addition to qualitative study, the researcher also relied on quantitative data analysis to analyze flood preparedness of Thai local governments. To accomplish this research objective, a survey questionnaire was developed using results of qualitative data analysis and supplemented that by UNISDR's 10 Essentials Framework for Making Cities Resilient. The survey questionnaire consisted of 5 parts including: municipality profile, mitigation and preparedness activities implemented after flooding in 2011, disaster risk reduction activities according to 10 essential tasks for making cities resilient, leadership role in disaster risk reduction and respondent information. Then, the survey questionnaires were distributed to 367 municipalities all over Thailand. From August to November 2016, there were 104 questionnaires returned to us making the return rate of about 28%. However, a total of 100 questionnaires was the final sample size used in the analysis as 4 questionnaires contained invalid information for some items.

Of these 100 samples, 93% were sub-district municipalities, 5% were town municipalities, and 2% were city municipalities. 50% of these municipalities were from the northern region, 18% from the northeast, 16% from the central, 9% from the south and 6% from the east. In term of risk profile, 34% were affected by flooding in 2010 and/or 2011 while 66% reported that they were not affected by these two catastrophic disasters.

Respondents of this survey consisted of 88% males and 12% females. 42% of them were mayors, 4% were deputy mayors, 32 were municipal clerks, and 22% were other positions involved in disaster management functions. Respondents had mixed levels of education and earned different fields of study. 47% of respondents had a bachelor degree while 53% had a master degree or higher. 97% of respondents reported that they graduated a social sciences degree while 3% reported they graduated a sciences degree. Table 13 to 19 presented profiles of local governments and information survey respondents.

Table 13 Type of Municipality

Type	Frequency	Percentage
City Municipality	2	2
Town Municipality	5	5
Sub-district Municipality	93	93
Total	100	100

Table 14 Location (Region) of Municipality

Region	Frequency	Percentage
North	50	50
Northeast	18	18
Central	16	16
South	9	9
East	7	7
Total	100	100

Table 15 Municipality Risk Profile (Affected by Flooding in 2010 and/or 2011, Not Affected)

Risk Profile	Frequency	Percentage
Affected by Flooding in 2010 and/or 2011	34	34
Not Affected	66	66
Total	100	100

Table 16 Gender of Respondents

Gender	Frequency	Percentage
Male	88	88
Female	12	12
Total	100	100

Table 17 Position of Respondents

Position	Frequency	Percentage
Mayor	42	42
Deputy Mayor	4	4
Municipal Clerk	32	32
Others	22	22
Total	100	100

Table 18 Educational Level of Respondents

Educational Level	Frequency	Percentage
Undergrad	47	47
Postgrad	53	53
Total	100	100

Table 19 Field of Study of Respondents

Field of Study	Frequency	Percentage
Social Sciences	97	97
Sciences	3	3
Total	100	100

Flood Preparedness Implementation

To examine flood preparedness practices in Thai local governments, the researcher asked respondents which were representatives of Thai local governments to answer if they had (yes) or had not (no) implemented the following 12 flood preparedness strategies:

1. Developing emergency response plan
2. Testing or exercising emergency response plan
3. Pre-identifying emergency shelters
4. Identifying assembly point for evacuation and evacuation routes

5. Preparing equipment and materials for flood response and recovery
6. Preparing or assigning workforce that is enough for flood response and recovery
7. Setting budget or allocating financial resource that is enough for flood response and recovery
8. Building networks and promoting public participation in flood preparedness effort
9. Providing disaster education or training for the public
10. Developing or improving emergency warning systems
11. Organizing meetings or dialogues with the public to solve flood problems mutually (collaboration)
12. Developing business continuity plan (BCP)

Table 20 Percentage of Thai Municipalities that have implemented 'Preparedness' Measures after the 2011 Floods

Implementation of Preparedness Measures*	Yes (%)	No (%)	Total (%)
Develop emergency response plan	78	22	100
Test or exercise emergency response plan	71	29	100
Pre-identify emergency shelters	58	42	100
Identify assembly point for evacuation and evacuation routes	56	44	100
Prepare equipment and materials for flood response and recovery	73	27	100
Prepare or assign workforce that is enough for flood response and recovery	79	21	100
Set a budget or allocate financial resource that is enough for flood response and recovery	79	21	100
Build networks and promote public participation in flood preparedness effort	83	11	100
Provide disaster education or training for the public	81	19	100
Develop or improve emergency warning systems	61	39	100
Organize meetings or dialogues with the public to solve flood problems mutually (collaboration)	70	30	100
Develop business continuity plan (BCP)	35	65	100

Note:

*Preparedness = Preparedness is a state of readiness to respond to any emergency or disaster. Preparedness can be operationalized as activities to improve the ability to respond effectively to and recover quickly from a disaster. Preparedness activities can include the development of emergency response procedures or plans, conducting plan exercises to test emergency response and recovery capabilities, training of emergency personnel, resources acquisition and allocation, educating people, designing and installation of warning systems.

Data analysis results revealed that most of local governments in Thailand reported that, to prepare for flood response and recovery, they chose to implement all of these preparedness strategies. The only preparedness strategy that most of Thai local governments participating in this

research chose “not” to do was developing business continuity plan (BCP) (65%). Details are presented in Table 20.

Flood Mitigation Implementation

In addition to preparedness, the researcher also additionally examined mitigation activities in Thai local governments. Academically, mitigation and preparedness are different concepts. Although performed or done before a disaster happens, their characteristics and purposes are different. Preparedness is done to strengthen the ability of social entities to respond when a disaster is occurring and to recover after a disaster has gone. Mitigation is aimed at minimizing the impact of hazard by means of structural and non-structural measures. It is about where and how structures such as dwellings and buildings should be built in order to reduce loss if a disaster occurs. Although they are conceptually different, it was included in this study because the researcher wanted to know how and to what extent local governments in Thailand have done to minimize impact of the flood hazard.

To examine flood mitigation practices in Thai local governments, the researcher asked respondents which were representatives of Thai local governments to answer if they had (yes) or had not (no) implemented the following 8 flood mitigation strategies:

1. Building or improving water retention systems
2. Building or improving flood drainage systems
3. Building or improving area protection systems such as levee, dyke, floodwall
4. Developing risk maps
5. Surveying and developing database of vulnerable population
6. Enacting any laws, regulations or ordinances that help mitigate flooding
7. Adjusting urban plans that support flood mitigation
8. Utilizing taxation and other financial strategies for mitigating flood impacts

Data analysis showed that most of local governments in Thailand reported that, to mitigate the flood impact, they chose to build/improve water retention systems (75%), build/improve flood drainage systems (91%), build/improve area protection systems such as levee, dyke, and floodwall/barrier (76%), develop risk maps (75%), and survey and develop database of vulnerable population (60%). Mitigation strategies that most of Thai local governments chose “not” to implement included enacting laws, regulations or ordinances that helped mitigate flooding (70%), adjusting urban plans that supported flood mitigation (76%) and utilizing taxation and other financial strategies for mitigating flood impacts (69%).

Table 21 Percentage of Thai Municipalities that have implemented Mitigation Strategies since 2011

Implementation of Mitigation Measures*	Type*	Yes (%)	No (%)	Total (%)
Build/improve water retention systems	S	75	25	100
Build/improve flood drainage systems	S	91	9	100
Build/improve area protection systems such as levee, dyke, floodwall/barrier	S	76	24	100
Develop risk maps	N	75	25	100
Survey and develop database of vulnerable population	N	60	40	100

Enact any laws/regulations/ordinances that help mitigate flooding	N	30	70	100
Adjust urban plans that support flood mitigation	N	24	76	100
Utilize taxation and other financial strategies for mitigating flood impacts	N	31	69	100

Note:

*Mitigation = Sustained actions taken to reduce or eliminate the risk to human life and property. These include activities that eliminate or reduce the chance of occurrence or the effects of a disaster. Mitigation involves identification of potential hazards and assessment of possible impacts. The aim of mitigation is to reduce the exposure to, probability of or potential loss from hazard events. It often focuses on where and how to build.

**Type = Type S = Structural Mitigation, Type N = Nonstructural Mitigation

Disaster Risk Reduction and Resilience Building Implementation

The state of readiness or preparedness for disasters can also be thought of as how much local governments have done to reduce disaster risk and increase their resilience. UNRSDR suggested that disaster risk in cities could be reduced and resilience could be enhanced if cities performed 10 essential tasks for making cities resilient. These 10 essential tasks included:

Essential 1: Put in place organization and coordination to clarify everyone's roles and responsibilities.

Essential 2: Assign a budget and provide incentives for homeowners, low-income families and the private sector to invest in risk reduction.

Essential 3: Update data on hazards and vulnerabilities, prepare and share risk assessments.

Essential 4: Invest in and maintain risk reducing infrastructure, such as storm/ flood drainage.

Essential 5: Assess the safety of all schools and health facilities and upgrade these as necessary.

Essential 6: Enforce risk-compliant building regulations and land use planning, identify safe land for low-income citizens.

Essential 7: Ensure education programs and training on disaster risk reduction are in place in schools and communities.

Essential 8: Protect ecosystems and natural buffers to mitigate hazards, adapt to climate change.

Essential 9: Install early warning systems and emergency management capacities.

Essential 10: Ensure that the needs and participation of the affected population are at the center of reconstruction.

The researcher asked representatives of local governments how much they had implemented each of these 10 essential tasks for reducing disaster risk and building resilience for the cities. The choices that respondents could choose to rate their implementation of each essential task ranged from 1 to 5. The descriptions for each of these 5 choices are as follows:

5 = Comprehensive achievement has been attained, with the commitment and capacities to sustain efforts at all levels.

4 = Substantial achievement has been attained, but with some recognized deficiencies in commitment, financial resources or operational capacities.

3 = There is some institutional commitment and capacities to achieving DRR, but progress is not comprehensive or substantial.

2 = Achievements have been made but are incomplete, and while improvements are planned, the commitment and capacities are limited.

1 = Achievements are minor and there are few signs of planning or forward action to improve the situation.

Results of data analysis are presented in Table 22.

Table 22 Mean Score of Disaster Risk Reduction Implementation of Local Governments (N = 100)

10 Essentials	Mean	S.D.	Interpretation
Essential 1	3.13	.849	Moderate
Essential 2	2.64	1.069	Moderate
Essential 3	3.03	.937	Moderate
Essential 4	3.22	1.097	Moderate
Essential 5	3.03	1.096	Moderate
Essential 6	2.59	1.026	Moderate
Essential 7	2.99	.990	Moderate
Essential 8	3.07	1.027	Moderate
Essential 9	2.60	1.101	Moderate
Essential 10	2.92	1.107	Moderate
Average of All	2.92	.781	Moderate

Note.

Interpretation of Mean Score is based on the following criteria:

1.00-2.33 = Low Progress

2.34-3.67 = Moderate Progress

3.68-5.00 = High Progress

According to the results showed in Table 22, on average, local governments in Thailand had made a “moderate level” of progress in disaster risk reduction and resilience building implementation in all 10 essentials. The overall score (average scores of all 10 essentials) was also at a “moderate level” ($M = 2.92$, $SD = .781$). The 3 essentials that received the highest scores were essential 4 (investing in and maintain risk reducing infrastructure, such as storm/ flood drainage) ($M = 3.22$, $SD = 1.097$), essential 1 (putting in place organization and coordination to clarify everyone’s roles and responsibilities) ($M = 3.13$, $SD = .849$) and essential 8 (protecting ecosystems and natural buffers to mitigate hazards, adapt to climate change) ($M = 3.07$, $SD = 1.027$). The 3 essentials that received the lowest scores included essential 6 (enforcing risk-compliant building regulations and land use planning, identifying safe land for low-income citizens) ($M = 2.59$, $SD = 1.026$), essential 9 (installing early warning systems and emergency management capacities) ($M = 2.60$, $SD = 1.101$) and essential 2 (assigning a budget and providing incentives for homeowners, low-income families and the private sector to invest in risk reduction) ($M = 2.64$, $SD = 1.069$).

4.2 Disaster Preparedness of Business Organizations

Results from the study of business preparedness were presented in 4 topics. These included: Respondents' Information and Company Profile, Preparedness Activities Implemented since Flooding 2011, Disaster Response Planning & Business Continuity Management Practices, and Strategies for Protecting 5 Key Resources.

Respondents' Information and Company Profile

To examine disaster preparedness in business organizations, data obtained from 65 companies in 7 industrial estates in Ayuttaya Province and Patumtani Province that were affected by flooding in 2011 were analyzed. Respondents of the surveys consisted of 13.8% safety managers, 53.8% human resource and administration managers, 12.3% ISO department managers, 9.2% business continuity management managers, and 10.8% were managers from other departments or functions.

In terms of company profile, the data showed that, most of them were manufacturing companies (90.8%), had 101-500 employees (33.8%), multinational corporation type of company (78.5%) and 60% of these multinational corporations were Japanese. Most of these companies were affected by the flooding in 2011 (98.5%). Most of them reported that they conducted emergency exercise or tested emergency response plan once a year (70.8%) and about 20% reported they had never conducted emergency exercise or tested emergency response plan. In terms of emergency management organization, 41.5% reported that emergency and disaster management functions were responsible by human resource and administration department, 18.5% responsible by safety department, 18.5% responsible by business continuity department, 6.2% responsible by environmental management department, and 15.4% responsible by other departments. Table 23-31 provides information of respondents and company profile.

Table 23 Company Location (N = 65)

Company Location	Frequency	Percent
Saharattana	4	6.2
Hitech (Ban Wa)	13	20.0
Bangpa In	8	12.3
Rojana	7	10.8
Nava Nakorn	25	38.5
Factory Land	7	10.8
Bang Kadee	1	1.5
Total	65	100

Table 24 Position of Respondents (N = 65)

Positions	Frequency	Percent
Safety Manager/Director	9	13.8
HR & Admin Manager/Director	35	53.8
ISO Dept. Manager/Director	8	12.3

BCM Dept. Manager/Director	6	9.2
Others	7	10.8
Total	65	100

Table 25 Types of Business (N = 65)

Types of Business	Frequency	Percent
Manufacturing	59	90.8
Service	3	4.6
others	3	4.6
Total	65	100

Table 26 Number of Employees (N = 65)

Number of Employees	Frequency	Percent
less than 50	16	24.6
50-100	12	18.5
101-500	22	33.8
501-1000	5	7.7
1001 up	10	15.4
Total	65	100

Table 27 Company Ownership (N = 65)

Company Ownership	Frequency	Percent
100% Thai	14	21.5
Multinational	51	78.5
Total	65	100

Table 28 Nationality of Mother Company (N = 65)

Nationality of Mother Company	Frequency	Percent
Japan	39	60.0
USA	2	3.1
China	1	1.5
South Korea	1	1.5
ASEAN Countries	1	1.5
European Countries	3	4.6
Thai	14	21.5
Others	4	6.2
Total	65	100

Table 29 Impact of flooding in 2011

Emergency Exercise	Frequency	Percent
Affected	64	98.5
Not affected	1	1.5
Total	65	100

Table 30 Emergency Exercise (N = 65)

Emergency Exercise	Frequency	Percent
Never	13	20
Rarely or once in 2-3 years	2	3.1
Once a year	46	70.8
2 times per year	3	4.6
3 times per year or more	1	1.5
Total	65	100

Table 31 Company's Department Responsible for Emergency Management (N = 65)

EM Responsibility	Frequency	Percent
Safety Dept.	12	18.5
HR & Admin Dept.	27	41.5
Environmental Mgt. Dept.	4	6.2
BCM Dept.	12	18.5
Others	10	15.4
Total	65	100

Preparedness Activities Implemented since Flooding 2011

When examining preparedness activities that companies implemented since flooding in 2011 to strengthen their disaster response and recovery capabilities, most of these companies implemented almost all preparedness activities such as preparing hazard data (69.2%), conducting disaster risk assessment (84.6%), developing strategies for disaster risk reduction (81.5%), having flood or disaster insurance (84.6%), moving out or lifting up machines to safe places (61.5%), having reliable data backup systems (95.4%), having an emergency response plan (84.6%) and preparing equipment and materials (84.6%). However, only 47.7% reported that they strengthened flood structural mitigation systems such as building flood wall and buying movable stainless steel flood barrier but 52.3% said that they did not implement any structural mitigation. Details of preparedness activities implemented since flooding 2011 are presented in Table 32.

Table 32 Preparedness Activities Implemented since Flooding 2011

Preparedness Activities Implemented	Yes (%)	No (%)
Hazard data preparation	69.2	30.8
Risk assessment	84.6	15.4
Develop strategies for disaster risk reduction	81.5	18.5
Have flood or disaster insurance	84.6	15.4
Strengthen flood structural mitigation systems	47.7	52.3
Move out or lift up machines to safe places	61.5	38.5
Have reliable data backup systems	95.4	4.6
Have emergency response plan	84.6	15.4
Equipment and material preparedness	96.9	3.1
Check equipment, material and facilities for emergency response	90.8	9.2
Tracking information about flood and other hazards on a regular basis	95.4	4.6
Collaborate with other agencies and participate in emergency exercise organized by the industrial estate	76.9	23.1

Characteristics of Flood Response Planning & Business Continuity Management System Implementation

When exploring the characteristics of disaster response planning in business organizations, the analysis revealed that, 73.8% of these companies had a plan that clearly outlined strategies, structures, resources, responsibilities and procedures for emergency response, 80% had a response plan that clearly outlined crisis communication strategies, 52.3% had a response plan that clearly outlined strategies for ensuring business continuity, 69.2% clearly identified IT recovery strategies in a response plan, 70.8% clearly identified employee protection strategies in a response plan and 90.3% clearly identified assembly point and evacuation strategies in a response plan. However, when asking if they implemented business continuity management system (BCMS) in the company, most of them reported that they did not implement business continuity management system (BCMS) (64.6%).

Table 33 Disaster Response Planning & Business Continuity Management System Implementation

Disaster Response Planning & BCMS Implementation	Yes (%)	No (%)
Having a plan that clearly outlines strategies, structures, resources, responsibilities and procedures for emergency response	73.8	26.2
Having a response plan that clearly outlines crisis communication strategies	80	20
Having a response plan that clearly outlines strategies for ensuring business continuity	52.3	47.7

Clearly identify IT recovery strategies in response plan	69.2	30.8
Clearly identify employee protection strategies in a response plan	70.8	29.2
Clearly identify assembly point and evacuation strategies in a response plan	92.3	7.7
Implement business continuity management system (BCMS) in the company	35.4	64.6

Contingency Planning for 5 Key Resources to Ensure Business Continuity

Whenever a disaster occurs, the ability of a company to respond to and recovery from that disaster depends heavily on 5 types of resources. These include human resource, premises (office buildings, production buildings, warehouses, etc.), production and management technologies, business data/information, and suppliers. Thus, it is critical that these key resources are protected, substituted or replaced in case of emergency so that business operations of a company can be continued. Though most of these companies participating in the survey reported that they did not have business continuity management system, they had some kind of planning that addressed the protection of 5 key resources necessary for ensuring business continuity. As presented in Table 34, 73.8% had a contingency plan for human resource, 75.4% had a contingency plan for premises, 84.6% had a contingency plan for production and management technologies, 89.2% had a business data/information and 78.5% had a contingency plan for suppliers.

Table 34 Contingency Planning for 5 Key Resources

Contingency Planning for 5 Key Resources	Yes (%)	No (%)
Having contingency plan for human resource	73.8	26.2
Having contingency plan for premises	75.4	24.6
Having contingency plan for technologies	84.6	15.4
Having contingency plan for business data/information	89.2	10.8
Having contingency plan for suppliers/business partners	78.5	21.5

Perceived Business Resilience of the Company

In addition to preparedness activities implemented, characteristics of disaster response planning and contingency planning for 5 key resources, the researcher also examined business resilience of these companies. Business resilience in this research was defined as the ability of a company to respond to and recovery from a disaster as well as the ability to ensure its business continuity. To measure business resilience, 6 items in a survey questionnaire were used to create Business Resilience Index (BRI). Scores from these 7 items were summed and averaged to create BRI, which was a scale variable. Scores of BRI ranged from 1 to 5, which 1 reflected the lowest level and 5 reflected the highest level of company's business resilience. The 6 items used to create the BRI included: (1) perceived emergency response capability, (2) perceived disaster recovery capability, (3) perceived capability of equipment and facility, (4) perceived capability of emergency management staff, (5) perceived financial capability for emergency response and recovery, and (6) perceived contingency planning ability for 5 key resources. Before computing the BRI, reliability test was conducted to evaluate the internal consistency of these 6 items. Results

from reliability analysis yielded an acceptable value of Cronbach's alpha (0.861), suggesting that these selected items had internal consistency and were acceptable to be used to create BRI. The inter-item correlation matrix of the items used to create the Business Resilience Index is showed in Table 35 below.

Table 35 Inter-Item Correlation Matrix for Perceived Business Resilience Index

	1	2	3	4	5	6
1	1.000					
2	.490	1.000				
3	.608	.524	1.000			
4	.493	.421	.643	1.000		
5	.344	.439	.518	.610	1.000	
6	.480	.406	.617	.476	.539	1.000

To evaluate the level of business resilience of a company, criteria for evaluating mean score were created using the following formula:

$$\begin{aligned}\text{Interval} &= \text{Max-Min/Number of Interval} \\ &= 5-1/5 \\ &= 0.80\end{aligned}$$

Thus, interpretations for each score interval are as follows:

Score interval 1.00 – 1.80	Very low
Score interval 1.81 – 2.60	Low
Score interval 2.61 – 3.40	Moderate
Score interval 3.41 – 4.20	High
Score interval 4.21 – 5.00	Very high

Table 36 Perceived Business Resilience (N = 65)

Business Resilience Capability	Min	Max	<i>M</i>	<i>SD</i>
Perceived emergency response capability	3.00	5.00	3.57	.612
Perceived disaster recovery capability	1.00	5.00	3.71	.824
Perceived capability of equipment and facility	1.00	5.00	3.22	.800
Perceived capability of emergency management staff	2.00	5.00	3.43	.728
Perceived financial capability for emergency response and recovery	2.00	5.00	3.46	.812
Perceived contingency planning ability for 5 key resources	2.00	5.00	3.58	.659
Perceived Overall Business Resilience (BRI)	2.33	5.00	3.45	.568

According to Table 36, on average, the samples which manufacturing companies experiencing the flood disaster in 2011 perceived their Overall Business Resilience as high. When looking in detail, data analysis showed that, these companies were most confident in their ability in recovering from a disaster ($M = 3.71$, $SD = .824$), ability in contingency planning for 5 key resources ($M = 3.58$, $SD = .659$), and ability in responding to an emergency ($M = 3.57$, $SD = .612$), respectively.

4.3 Disaster Preparedness of Households

Respondents' Characteristics

Survey respondents for this study were heads of families (29.3%), spouses of family heads (20.9%) and members of the families (49.9%). 43% of the respondents were males and 56.1% were females. Most of the respondents graduated with an elementary school (31.4%) and secondary school (26.7%). 26.1% of them reported they owned a business or self-employed while 25.2% were daily workers. In addition, most of respondents reported that their family income was about 10,000 Thai Baht per month (22.3%) and 15,000 Thai Baht per month (19.1%), respectively. These households were located in city municipality areas (22.7%), town municipality areas (17.8%), sub-district municipality (22%) and sub-district Administrative Organization (SAO) (37.5%). Most of the respondents reported that they and/or their families had experienced flooding at least once in my lifetime (76.6%) and, interestingly, most of them were affected by flooding in 2011 (54.9%). Table 37-43 provides information of respondents.

Table 37 Status in Family (N = 1592)

Status in Family	Frequency	Percent
Head of Family	466	29.3
Spouse	332	20.9
Member	794	49.9
Total	1592	100

Table 38 Sex (N = 1592)

Sex	Frequency	Percent
Male	699	43.9
Female	893	56.1
Total	1592	100

Table 39 Education (N = 1592)

Education	Frequency	Percent
Elementary	500	31.4
Secondary	425	26.7
Vocational	234	14.7
Undergrad	348	21.9
Postgrad	85	5.3
Total	1592	100

Table 40 Occupation

Occupation	Frequency	Percent
Own a business (self-employed)	415	26.1
Daily worker	401	25.2
Company's employee	79	5
Public servant	144	9
Farmer	243	15.3
University student	138	8.7
Others	172	10.8
Total	1592	100

Table 41 Family Income per Month (approximately) (N = 1592)

Family Income	Frequency	Percent
10000	355	22.3
15000	304	19.1
20000	235	14.8
25000	178	11.2
30000	110	6.9
35000	103	6.5
40000	85	5.3
45000	222	13.9
Total	1592	100

Table 42 Type of local government where your residence is located (N = 1592)

Type of Local Government	Frequency	Percent
City municipality	362	22.7
Town municipality	283	17.8
Sub-district municipality	350	22
Sub-district Administrative Organization (SAO)	597	37.5
Total	1592	100

Table 43 Flood Disaster Experience (N = 1592)

Flooding Experience	Yes (%)	No (%)
I had experienced flooding at least once in my lifetime	76.6	23.4
I and my family were affected by flooding in 2011	54.9	45.1

Preparedness Activities Implemented in Households

Results from data analysis showed that households in Thailand chose to take simple, low-cost or self-managed preparedness activities. As data suggested, 57% of these households reported that they stored food (57.5%), basic medical supplies for emergency (57.5%) and kept tracking weather information (79.9%). These preparedness activities are low-cost and families can rely on their own ability and resources without increased effort and budget. However, most households in Thailand chose not to take preparedness activities that were more complicated, high-cost, reliant on other agencies and required higher-effort. As data analysis revealed, 52.4% of households said they did not adjust or improve their dwelling to mitigate the impact of flooding on their residences, 52.9% did not save money for emergency, 70.6% did not prepare for transportation in case of flooding, 87.2% did not have an insurance that covered flooding, 61.3% did not keep tracking information about shelter, 59.9% did not keep tracking information about warning and evacuation, and 66.8% said that they had never participated in any flood preparedness training. Table 44 presents details of preparedness activities implemented in Thai households.

Table 44 Preparedness Activities Implemented in Households (N = 1592)

Household's Preparedness	Yes (%)	No (%)
Dwelling adjustment	47.6	52.4
Food preparedness	57.5	42.5
Medical preparedness	57.5	42.5
Money preparedness	47.1	52.9
Transportation preparedness	29.4	70.6
Weather information preparedness	79.9	20.1
Insurance preparedness	12.8	87.2
Shelter information preparedness	38.7	61.3
Warning and evacuation information preparedness	40.1	59.9
Training and education preparedness	33.2	66.8

Intention to Prepare for Future Flooding

When examining the extent to which Thai households intend to take actions to prepare for future flooding, data analysis showed, on average, Thai households had a high intention to keep themselves updated on flood or weather situations ($M = 3.62$, $SD = .931$) and their intention to store food, water, medical and essential supplies was at a moderate level ($M = 3.33$, $SD = .940$). However, their intention to buy an insurance that covers losses from flooding and/or other disasters was low ($M = 2.12$, $SD = 1.17$) (See Table 45). Criteria for evaluating mean score of preparedness intention are as follows:

Score interval 1.00 – 1.80	Very low
Score interval 1.81 – 2.60	Low
Score interval 2.61 – 3.40	Moderate
Score interval 3.41 – 4.20	High
Score interval 4.21 – 5.00	Very high

Table 45 Intention to Prepare for Future Flooding (Preparedness Intention) (N = 1592)

Preparedness Intention	Min	Max	<i>M</i>	<i>SD</i>
Your intention to keep yourself updated on flood or weather situations	1	5	3.62	.931
Your intention to prepare for flooding (such as store food, water, essential supplies, etc.)	1	5	3.33	.940
Your intention to buy an insurance that covers losses from flooding and/or other disasters	1	5	2.12	1.17

Flood Risk Perception

One important purpose of this study was to examine disaster risk perception of Thai households (as reflected by heads or members of families). Disaster risk perception was measured by 3 dimensions: perceived dread, perceived likelihood, and perceived impact. The data analysis revealed that, on average, Thai households had a high level of perceived flood dread ($M = 3.80$, $SD = 1.05$) and perceived impact ($M = 3.58$, $SD = 1.14$) but had a moderate level of perceived flood likelihood ($M = 3.01$, $SD = 1.21$) (See Table 46). Criteria for evaluating mean score of flood risk perception of Thai households are as follows:

Score interval 1.00 – 1.80	Very low
Score interval 1.81 – 2.60	Low
Score interval 2.61 – 3.40	Moderate
Score interval 3.41 – 4.20	High
Score interval 4.21 – 5.00	Very high

These findings suggested that respondents which were heads or members of families in Thailand perceived that the chance that flooding would occur (in their living locations) was moderate (not too low, not too high) but their fears of flooding was high and, if it occurred, would result in a high impact on them.

Table 46 Flood Risk Perception (N = 1592)

Flood Risk Perception	Min	Max	<i>M</i>	<i>SD</i>
Perceived flood dread	1	5	3.80	1.05
Perceived flood likelihood	1	5	3.01	1.21
Perceived flood impact	1	5	3.58	1.14

Factors Affecting Flood Risk Perception

In addition to exploring how Thai people perceived flood risk, the research was also interested to examine the factors that influenced flood risk perception. To accomplish this research objective, the researcher tested the relationships among selected variables which included flood risk perception (as dependent variables), information tracking, sex, education, income, age, flood experience, impact of 2011 flooding, level of previous flood impact on property and assets and number of day being affected by previous floods (as predictor variables). Before testing the

relationships, two scale variables were created. The first scale variable was Flood Risk Perception Index. This index was created by averaged scores of three items including perceived flood dread, perceived flood likelihood, and perceived flood impact. Results from reliability analysis yielded an acceptable value of Cronbach's alpha (0.764), suggesting that these 3 selected items had internal consistency and were acceptable to be used to create a Flood Risk Perception Index. Another scale variable was Flood Information Tracking Index. This scale variable was created by average scores of tracking information on television, radio, community wire-communication systems, municipality announcement cars, and newspaper. Results from reliability analysis yielded an acceptable value of Cronbach's alpha (0.723), suggesting that these 5 selected items had internal consistency and were acceptable to be used to create a Flood Information Tracking Index. The inter-item correlation matrix of the items used to create the Flood Risk Perception Index and Flood Information Tracking Index are showed in Table 47 and 48 below.

Table 47 Inter-Item Correlation Matrix for Flood Risk Perception Index (FRP)

	1	2	3
1	1.000		
2	.435	1.000	
3	.589	.534	1.000

Table 48 Inter-Item Correlation Matrix for Flood Information Tracking Index

	1	2	3	4	5
1	1.000				
2	.175	1.000			
3	.231	.536	1.000		
4	.167	.486	.624	1.000	
5	.130	.333	.328	.416	1.000

After preparing all variables, the relationships among these variables were tested using multiple regression analysis. The researcher analyzed only one model, which all predictor variables were tested at the same time. The result was statistically significant ($F = 61.299$, $p < .001$). The model explained about 25.9 percent of the variation in the dependent variable Flood Risk Perception Index ($R^2 = .259 \times 100 = 25.9\%$). Results of regression are presented in Table 49.

Table 49 Results of regression of Flood Risk Perception Index (FRP) on selected variables (N = 1592)

Variables	b	Beta
Sex Dummy (Male)	-.124** (.041)	-.066
Edu Dummy (Elementary & Secondary)	-.007 (.046)	-.004
Income Dummy (10000-20000)	.063 (.044)	.033
Age	.001 (.001)	.012
Flood Experience Dummy (Yes)	.412*** (.057)	.187
Affected by 2011 Flood Dummy (Yes)	.027 (.050)	.015
Level of Flood Impact on Property & Asset	.117*** (.019)	.169
No. of Day Affected by Flood	.046* (.018)	.072
Level of Information Tracking	.361*** (.027)	.312
Constant	1.562	
R ²	.259	

Note. N = 1592; b = unstandardized regression coefficient with standard error in parentheses; Beta = standardized regression coefficient.

*p < .05, **p < .01, ***p < .001 (two-tailed tests)

As showed in Table 49, there were 5 variables that had a statistically significant effect on flood risk perception of Thai households including sex, flood experience, level of flood impact on property and asset, the length of flood impact (as measured by the number of they receiving flood impact), and flood information tracking. Sex (male) had a statistically significant, negative effect on flood risk perception ($b = -.124$, $p < .01$). This indicated that Thai men tended to perceive the dread, likelihood, and impact of flooding as lower than women did. Flood experience ($b = .412$, $p < .001$), the level of flood impact on property and asset ($b = .117$, $p < .001$), the length of flood impact ($b = .046$, $p < .05$), and flood information tracking ($b = .361$, $p < .001$) all had a statistically significant, positive effect on flood risk perception. Those that had experience flooding before tended to perceive the dread, likelihood, and impact of flooding as higher than those lacking of flood experience did. Likewise, households whose property and asset were highly affected by the previous floods tended to perceive the dread, likelihood, and impact of flooding as high. Finally, those who had a higher level of flood information tracking tended to perceive the dread, likelihood, and impact of flooding as higher than those who seldom tracked flood information. The first 3 variables that had the highest effect were information tracking (beta = .312), flood experience (beta = .187) and the level of flood impact on property and asset (beta = .169), respectively. Education, income, and age were not found to be predictive of flood risk perception.

Factors Affecting Intention to Prepare for Flood Disaster

The most important objective of this study is to examine the factors that predict intention of Thai people to prepare for disasters. To accomplish this objective, relationships among selected variables were hypothesized and tested. These variables included preparedness intention (scale) (as dependent variable), flood experience (dummy variable), impact of 2011 flooding (dummy), level of previous flood impact on property and assets, number of day being affected by previous floods, level of flood information tracking (scale), trust in city's flood protection systems (scale), environmental cues (scale), social cues (scale), perceived quality of flood warning content (scale), sex (dummy), education (dummy), income (dummy), age (as predictor variables). To test the relationships among these variables, 5 scale variables were additionally created: Preparedness Intention Index, Trust in Flood Protection Systems Index, Environmental Cue Index, Social Cue Index, and Perceived Flood Warning Content Quality Index. Preparedness Intention Index was created by averaged scores of 2 items in the questionnaire: intention to keep tracking weather information and intention to store food, medical and essential supplies. Results from reliability analysis yielded an acceptable value of Cronbach's alpha (.787), suggesting that these 2 selected items had internal consistency and were acceptable to be used to create a Preparedness Intention Index.

Trust in Flood Protection Systems Index was created by averaged scores of 10 items in the questionnaire: trust in flood protection structure maintenance, trust in the efficacy of flood protection structure, trust in the sufficiency (number) of disaster response staff, trust in the competence of disaster response staff, trust in the sufficiency of flood response equipment, trust in the ability of municipality office in providing enough food in emergency, trust in the effectiveness of municipality's flood warning system, trust in the ability of municipality in performing evacuation, trust in the ability of municipality office in providing shelter and mass care, and trust in the ability of municipality office in financially supporting for dwelling repair and recovery. Results from reliability analysis yielded an acceptable value of Cronbach's alpha (.943), suggesting that these 10 selected items had internal consistency and were acceptable to be used to create a Trust in Flood Protection Systems Index.

Environmental Cue Index was created by averaged scores of 3 items in the questionnaire: observing water level in the river, observing sky and wind conditions, and observing the rain. Results from reliability analysis yielded an acceptable value of Cronbach's alpha (.885), suggesting that these 3 selected items had internal consistency and were acceptable to be used to create an Environmental Cue Index. Social Cue Index was created by averaged scores of 2 items in the questionnaire: observing flood protection and essential supply preparedness behaviors of neighbors and observing evacuation behaviors of neighbors. Results from reliability analysis yielded an acceptable value of Cronbach's alpha (.818), suggesting that these 2 selected items had internal consistency and were acceptable to be used to create a Social Cue Index.

Perceived Flood Warning Content Quality Index was created by averaged scores of 5 items in the questionnaire: perceived appropriateness of flood warning content, perceived consistency of flood warning content, perceived persistency of flood warning content, perceived clarity of flood warning content, and perceived accuracy of flood warning content. Results from reliability analysis yielded an acceptable value of Cronbach's alpha (.915), suggesting that these 5 selected items had internal consistency and were acceptable to be used to create a Perceived Flood Warning Content Quality Index. The inter-item correlation matrix of items used to create these 5 scale variables are showed in Table 50 and 54 below.

Table 50 Inter-Item Correlation Matrix for Preparedness Intention Index

	1	2
1	1.000	.649
2	.649	1.000

Table 51 Inter-Item Correlation Matrix for Trust in Flood Protection Systems Index

	1	2	3	4	5	6	7	8	9	10
1	1.000									
2	.811	1.000								
3	.718	.736	1.000							
4	.698	.699	.793	1.000						
5	.679	.678	.751	.740	1.000					
6	.624	.643	.700	.708	.758	1.000				
7	.581	.589	.596	.629	.649	.674	1.000			
8	.596	.556	.585	.613	.612	.634	.587	1.000		
9	.511	.509	.543	.586	.567	.594	.550	.752	1.000	
10	.478	.452	.496	.517	.518	.552	.468	.663	.680	1.000

Table 52 Inter-Item Correlation Matrix for Environmental Cue Index

	1	2	3
1	1.000		
2	.692	1.000	
3	.733	.731	1.000

Table 53 Inter-Item Correlation Matrix for Social Cue Index

	1	2
1	1.000	
2	.693	1.000

Table 54 Inter-Item Correlation Matrix for Perceived Flood Warning Content Quality Index

	1	2	3	4	5
1	1.000				
2	.764	1.000			
3	.682	.725	1.000		
4	.666	.692	.708	1.000	
5	.613	.639	.642	.707	1.000

After all variables in the model were prepared, the relationships among these variables were tested using multiple regression analysis. The researcher analyzed only one model, which all predictor variables were tested at the same time. The result was statistically significant ($F = 65.603$, $p < .001$). The model explained about 36.8 percent of the variation in the dependent variable Flood Risk Perception Index ($R^2 = .368 \times 100 = 36.8\%$). Results of regression are presented in Table 55.

Table 55 Results of regression of Preparedness Intention on selected variables (N = 1592)

Variables	b	Beta
Sex Dummy (Male)	-.071** (.035)	-.041
Edu Dummy (Elementary & Secondary)	-.148*** (.039)	-.086
Income Dummy (10000-20000)	.035 (.037)	.020
Age	.005*** (.001)	.093
Flood Experience Dummy (Yes)	.184*** (.051)	.092
Affected by 2011 Flood Dummy (Yes)	-.056 (.043)	-.033
Level of Flood Impact on Property & Asset	.006 (.016)	.010
No. of Day Affected by Flood	.030* (.015)	.052
Information Tracking	.162*** (.026)	.154
Flood Risk Perception	.170*** (.022)	.187
Trust in Flood Protection System	.149*** (.024)	.143
Environmental Cue	.170*** (.022)	.196
Social Cue	-.003 (.019)	-.004
Perceived Flood Warning Content Quality	.160*** (.028)	.140
Constant	.460	
R ²	.368	

Note. N = 1592; b = unstandardized regression coefficient with standard error in parentheses; Beta = standardized regression coefficient.

*p < .10, **p < .05, ***p < .001 (two-tailed tests)

As showed in Table 55, all predictor variables in the model (except for income, impact of flood in 2011, level of previous flood impact on property and assets, and social cue) had a statistically significant effect on Thai households' preparedness intention. Sex (male) had a statistically significant, negative effect on preparedness intention (b = -.071, p < .05). This indicated that Thai male heads of families were less likely than female heads of families to prepare for future flooding. Education (Elementary & Secondary) had a statistically significant, negative

effect on preparedness intention ($b = -.148, p < .001$). This suggested that Thai heads of households who graduated with elementary and secondary schools were less likely than those graduated with higher educations to prepare for future flooding.

Age had a statistically significant, positive effect on preparedness intention ($b = .005, p < .001$). This suggested that older heads of households were more likely than younger heads of households to prepare for future flooding. Experience with previous flooding also had a statistically significant, positive effect on preparedness intention ($b = .184, p < .001$). This indicated that heads of households who experienced flooding before were more likely than those without flood experience to prepare for future flooding. The length of impact received from previous floods (as measured number of day being affected by previous floods) also had a statistically significant, positive effect on preparedness intention ($b = .030, p < .10$). This indicated that the longer the households used to be affected by flooding, the more they were prepared for future flooding.

Level of flood information tracking had a statistically significant, positive effect on preparedness intention ($b = .162, p < .001$). The more households kept tracking with weather and flood information, the more they intended to prepare for future flooding. Flood risk perception also had a statistically significant, positive effect on preparedness intention ($b = .170, p < .001$). This indicated that heads of households who had a higher level of flood risk perception were more likely to prepare for future flooding. Environmental cue had a statistically significant, positive effect on preparedness intention ($b = .170, p < .001$). This suggested that household's intention to prepare for flooding also depended on the interpretation of the environmental conditions they observed. Finally, results of data analysis also revealed that households' intentions to prepare for future flooding were affected by their trust in the city's flood protection systems ($b = .149, p < .001$) and their perception on the quality of flood warning content ($b = .160, p < .001$).

The first 3 variables that had the highest effect on household's intention to prepare for future flooding were environmental cue (beta = .196), flood risk perception (beta = .187) and level of flood information tracking (beta = .154), respectively. And, again, income, impact of flood in 2011, level of previous flood impact on property and assets, and social cue were not found to be predictive of preparedness intention. Discussions of these regression results were presented in detail in Chapter 5.

Chapter 5 Conclusion & Discussion

In the wake of climate change and today's uncertain conditions of the environment, disasters such as storms and floods seem to happen more frequently and severely. Since tsunami disaster in 2004, Thailand has experienced more disasters especially flooding almost every year. The floods in 2010 and 2011 had posed tremendous impacts on households, businesses, and cities in almost every part of the country. It is very important that all stakeholders are prepared for response and recovery from flooding and other disasters that might occur in the future. If we are all prepared, we can cope with disasters well and losses can be minimized. Thus, this research project examined the state of readiness (preparedness) of households, businesses, and local governments for responding to and recovering from the future flooding. In this concluding chapter, findings from the research are explained and discussed. The Chapter starts with preparedness of local governments, followed by preparedness of business organizations and then preparedness of households.

Flood Preparedness of Local Governments

Flood Preparedness Strategies Implemented

In terms of preparedness, Thai local governments implemented 3 types of preparedness strategies:

1) Type A Preparedness Strategies

Type A preparedness strategies were strategies implemented to help strengthen response capacity of the municipality office. Type A Preparedness Strategies implemented by local governments included making flood response & recovery plans, conducting emergency plan exercises, emergency drills, pre-identifying emergency shelters, preparing flood response equipment & materials and preparing financial resource, budget allocation for disaster management.

2) Type B Preparedness Strategies

Type B preparedness strategies were strategies implemented to help strengthen response or coping capacity of the people in communities/villages. The only one Type B Preparedness Strategy implemented by local governments was to provide flood response & adaptation trainings for people in the communities.

3. Type C Preparedness Strategies

Type C Preparedness Strategies were strategies implemented to strengthen response capacity of both the municipality office and communities/villages at the same time. Type C Preparedness Strategies implemented by local governments included improving crisis communication and warning systems and engaging with people in flood preparedness such as public consultation, public participation and having a meeting with citizens and other stakeholders.

Besides, findings from the survey also revealed the most popular preparedness strategies chosen to implement by Thai local governments. The top 5 preparedness strategies most chosen by Thai local governments to implement for mitigating flood impacts were:

Number 1 Chosen: Building networks and promoting public participation in flood preparedness effort (83% of municipalities chose this strategy)

Number 2 Chosen: Providing disaster education or training for the public (81% of municipalities chose this strategy)

Number 3 Chosen: Preparing or assigning workforce that is enough for flood response

- and recovery (79% of municipalities chose this strategy)
- Number 4 Chosen: Setting a budget or allocating financial resource that is enough for flood response and recovery (79% of municipalities chose this strategy)
- Number 5 Chosen: Developing an emergency response plan (78% of municipalities chose this strategy)

The only one preparedness strategy that seemed not to be popular among Thai local government was developing business continuity plan (BCP) (65% of municipalities did not choose this strategy)

Mitigation Strategies Implemented

In addition to preparedness, the researcher also additionally examined mitigation activities in Thai local governments. Academically, mitigation and preparedness are different concepts. Although performed or done before a disaster happens, their characteristics and purposes are different. Preparedness is done to strengthen the ability of social entities to respond when a disaster is occurring and to recover after a disaster has gone. Mitigation is aimed at minimizing the impact of hazard by means of structural and non-structural measures. It is about where and how structures such as dwellings and buildings should be built in order to reduce loss if a disaster occurs. Although they are conceptually different, it was included in this study because the researcher wanted to know how and to what extent local governments in Thailand have done to minimize impact of the flood hazard.

Findings from the research revealed that Thai local governments chose both structural and nonstructural mitigation strategies to implement for reducing flood risk and mitigating flood impact that might occur in the future. Structural mitigation strategies implemented included building water retention systems, building or improving drainage systems such as water channelization, and building flood protection facilities such as levee, barrier, dyke, and floodwall. In terms of nonstructural mitigation strategies, Thai local governments chose to create vulnerability map and database and utilize regulations/ordinances to mitigate flood risk.

Besides, findings from the survey also revealed the most popular mitigation strategies chosen to implement by Thai local governments. The 3 mitigation strategies most chosen by Thai local governments to implement for mitigating flood impacts were:

- Number 1 Chosen: Building/improving flood drainage systems (91% of municipalities chose this strategy)
- Number 2 Chosen: Building/improving area protection systems such as levee, dyke, flood barrier (76% of municipalities chose this strategy)
- Number 3 Chosen: Building/improving water retention systems (75% of municipalities chose this strategy)

However, there were 3 mitigation strategies that were not popular among Thai local governments. These 3 mitigation choices that were less likely to be chosen to implement were:

- Number 1 Unchosen: Adjusting urban plans that supported flood mitigation (76% of municipalities did not choose this strategy)
- Number 2 Unchosen: Enacting laws, regulations, ordinances that helped mitigate flooding (70% of municipalities did not choose this strategy)
- Number 3 Unchosen: Utilizing taxation and other financial strategies for mitigating flood

impacts (69% municipalities did not choose this strategy)

Disaster Risk Reduction & Resilience Building Progress

As UNISDR (2005; 2015) recommended in the Hyogo and Sendai Frameworks that the better and more effective way in managing disasters was not to react with them but to proactively manage the risks that might lead to such disasters. Under this approach, local governments could cope better with disasters by reducing disaster risk and building resilience (of all social entities including households, villages/communities, businesses, local government itself and all related organization within the city). Thus, it was also important to explore how well local governments in Thailand worked out to reduce disaster risk and build resilience. Findings of the 10 Essentials-Based Survey revealed that, on average, local governments in Thailand had made a “moderate level” of progress in disaster risk reduction and resilience building implementation in all 10 essentials for building cities resilience. The overall progress (average scores of all 10 essentials) was also at a “moderate level”. The most progressed essentials were essential 4 (investing in and maintain risk reducing infrastructure, such as storm/ flood drainage), essential 1 (putting in place organization and coordination to clarify everyone’s roles and responsibilities) and essential 8 (protecting ecosystems and natural buffers to mitigate hazards, adapt to climate change), respectively. The least progressed essentials included essential 6 (enforcing risk-compliant building regulations and land use planning, identifying safe land for low-income citizens), essential 9 (installing early warning systems and emergency management capacities) and essential 2 (assigning a budget and providing incentives for homeowners, low-income families and the private sector to invest in risk reduction).

Discussion

Since the flooding in 2011, local governments in Thailand have been more interested in disaster management issues. They have implemented some mitigation strategies aiming at minimizing the impact of flooding that might occur in the future. However, most mitigation strategies that local governments chose to implement were structural. Non-structural mitigation measures were less chosen. This partly suggests that local governments in Thailand still have limited hazard mitigation capability. They may be able to reduce the impact of flooding as long as the floodwater does not exceed the capacity of their levee, flood barrier, draining systems and other flood protection structures. However, if the floodwater exceeds the capacity of these structural protection systems, losses can be huge as people’s dwelling, property and buildings are still located in those flood-prone areas. It is hard to avoid impact and loss.

Generally, hazard mitigation can be done in two ways. It can be done through structural measures such as building area protection systems such as levee, dyke, concrete wall or other kinds of flood barrier, building flood draining systems like water channels or flood way, and building water retention systems. Another way is to mitigate flood impacts by means of non-structural measures such as adjusting planning and zoning the city, relocation of people and structures from hazard-prone areas, enforcing building code or similar regulations intended to reduce a structure’s, a site’s, or a neighborhood’s vulnerability to disasters, and utilizing taxation, insurance or other incentives.

In theory, local governments should find the balance in implementing both types of mitigation as both have their own strengths and weaknesses. Structural mitigation measures can help maintain the depth and location of navigation channel (dikes), protect low-lying lands from flooding (levee) and act as a barrier against floodwater (floodwalls). However, these flood

protection structures can provide false sense of security, reduce the mitigation function of natural resources, be very expensive, cause damage to nature, and worsen the situation or can be a disaster waiting to happen. Likewise, non-structural mitigation can be considered a more sustainable strategy for minimizing flood impact and disaster loss and less expensive. However, implementing these non-structural measures can be too difficult. For example, it is quite challenging to relocate villagers from the areas they have been living for their whole life and finding places for them to live and make a living after relocation is even more difficult. Thus, choosing and implementing the right mixture of structural and nonstructural mitigation measures would contribute more to the cities in terms of flood hazard mitigation capability.

In terms of preparedness, when looking through preparedness-cycle lens, Thai local governments have implemented almost every activities of the preparedness cycle. They have done threat & vulnerability assessment, planning (organizing, equipping) and training & exercising. The only activity that had not seen to be done is to evaluate and improve the plan. When investigating closely into each preparedness activity they have implemented, most of local governments in Thailand chose to implement all “typical” preparedness strategies. Examples of these “typical” preparedness activities are:

- Developing emergency response plan
- Testing or exercising emergency response plan
- Pre-identifying emergency shelters
- Identifying assembly point for evacuation and evacuation routes
- Preparing equipment and materials for flood response and recovery
- Preparing or assigning workforce that is enough for flood response and recovery
- Setting budget or allocating financial resource that is enough for flood response and recovery
- Building networks and promoting public participation in flood preparedness effort
- Providing disaster education or training for the public
- Developing or improving emergency warning systems
- Organizing meetings or dialogues with the public to solve flood problems mutually (collaboration)

The only preparedness strategy that most of Thai local governments participating in this research chose “not” to do is the development of business continuity plan (BCP) and practicing business continuity management (BCM). This makes sense because BCM is quite new to them. Developing BCP and implementing BCM in an organization require investments in both personnel and management infrastructure. Personnel need to be trained and educated to earn BCM knowledge so that they can perform new tasks. Implementing BCMS means an organization needs more staff and new organizational structure may also be needed. This choice requires more budget and effort. Thus, it had been less chosen by most Thai local governments. This indicates that, when flooding occurs, local governments have some level of confidence that they can handle with response and recovery demands quite well as their coping capacity have been developed and strengthened through many typical preparedness measures. With these preparedness strategies being done, effectiveness in warning, evacuation, sheltering, search & rescue and mass care operations can be ensured if a food disaster occurs. However, their ability to continue doing their normal jobs in providing governmental services to the citizens is uncertain as most of them did not manage to plan for service continuity and practice business continuity management.

Finally, when using the 10 Essentials Framework for Making Cities Resilience as the lens for analysis, flood preparedness of Thai local governments as measured by progress in implementation of the 10 Essentials is at the moderate level (between 2-3 levels of progress). This means that, regarding disaster risk reduction and resilience building in Thailand, achievements have been made but were incomplete, and while improvements were planned, the commitment and capacities are limited. In addition, there might be some institutional commitment and capacities to achieving disaster risk reduction, but progress was not comprehensive or substantial. According to UNISDR (2012), disaster risk can be much reduced and the ability of cities to respond to and recovery from a disaster (known as resilience) can be significantly increased if the implementation progress of all these 10 essential tasks in making cities resilient achieves level 4 (substantial achievement has been attained, but with some recognized deficiencies in commitment, financial resources or operational capacities) or 5 (comprehensive achievement has been attained, with the commitment and capacities to sustain efforts at all levels). Thus, to significantly reduce disaster risk and achieve higher level of flood preparedness, Thai local governments should work harder to lift up the progress of disaster risk reduction and resilience building.

Flood Preparedness of Business Organizations

Flood Preparedness Strategies Implemented

Findings from the research revealed that business organizations in Thailand implemented both strategies that helped them to minimize flood impact of flood hazard and strategies that helped them respond to and recovery from flooding that might occur.

Flood impact mitigation strategies that were most chosen to implement by Thai business organizations since flooding in 2011 included 3 following strategies:

- Having a reliable data backup system (95.4% of business organizations chose this strategy)
- Conducting risk assessment (84.6% of business organizations chose this strategy)
- Having an insurance that covered loss from flooding (84.6% of business organizations chose this strategy)

The mitigation strategy that was not chosen by most of business organizations in Thailand was strengthening flood structural mitigation systems. 52.3% of businesses reported that did not choose to implement this option as the means for minimizing the impacts of future flooding.

In terms of strategies for strengthening response and recovery capabilities, preparedness activities that were most chosen to implement by business organizations in Thailand were:

- Buying equipment and materials necessary for flood response and recovery (96.9% of business organizations chose this strategy)
- Tracking information about flood and other hazards on a regular basis (95.4% of business organizations chose this strategy)
- Checking if equipment, material and facilities for emergency response were functional (9.8% of business organizations chose this strategy)
- Having an emergency response plan (84.6% of business organizations chose this strategy)

Flood Response Planning & Business Continuity Management System Implementation

When looking at disaster response planning into detail, research findings showed that, since 2011, most business organizations in Thailand had flood response plans that:

- Clearly identified assembly point and evacuation strategies (92.3%)
- Clearly outlined crisis communication strategies (80%)
- Clearly outlined strategies, structures, resources, responsibilities and procedures for emergency response (73.8%)
- Clearly identified employee protection strategies (70.8%)
- Clearly identified IT recovery strategies in response plan (69.2%)

The only strategy that had not been implemented in most of business organizations was business continuity management system (BCMS) (64% of business organizations did NOT implement this strategy). This indicated that most business organizations in Thailand had not implemented business continuity systems in their companies. What they had, however, was some kinds of contingency or backup plans that addressed the protection of all 5 critical resources needed for continually providing services and delivering products to clients. These included:

- Contingency plan for business data/information (89.2%)
- Contingency plan for technologies (84.6%)
- Contingency plan for suppliers/business partners (78.5%)
- Contingency plan for premises (75.4%)
- Contingency plan for human resource (73.8%)

Perceived Business Resilience of Business Organizations

One more important think that the research wanted to accomplish was to evaluate the level of perceived business resilience of business organizations. Business resilience can be thought of as the capability a business organization in responding effectively to and quickly recovery from a disaster that affected the company. In this research, business resilience was measured or evaluated by 6 capabilities including emergency response capability, disaster recovery capability, capability of equipment and facility for emergency response, capability of emergency management staff, financial capability for emergency response and recovery, and contingency planning ability for 5 key resources. Results of survey data analysis revealed that, on average, Thai companies perceived themselves as having a high level of overall business resilience. Perceived disaster recovery capability received the highest score and perceived capability of equipment and facility received the lowest score.

Discussion

After the massive flooding in 2011, Thai companies located in flood risk areas had done a variety of preparedness activities to strengthen their response and recovery ability. In this sense, if flooding happened in the future, Thai companies in these 7 flood-prone industrial estates would be able to perform all emergency response and recovery quite well. In addition, they could also be confident that, if flooding occurred, they could be able to protect or ensure that the 5 critical resources were available for production and delivery to their clients as they had put some kinds of contingency plans in place for the 5 key resources to be protected. In short, Thai companies affected by flooding in 2011 were quite confident in their ability in dealing with future flooding. Especially, they were confident in their recovery ability. This might due to the fact that, after facing the flood in 2011, they had invested in strengthening flood protection systems such as buying

stainless steel flood barrier and other equipment and facilities. They had a plan that clearly identified strategies necessary functions that needed to be done during an emergency, had an insurance policy that covered loss from flooding, had a reliable data backup system and kept themselves updated on flood hazard information on a regular basis.

However, the ability of most business organizations to reduce or mitigate the impact of flood disaster was still minimal. As the research showed, 52.3% said that they did not implement any structural mitigation which was important in helping the company minimize flood impact. For example, floodwall or stainless steel flood barrier can prevent the floodwater from entering the company area and inundate its premises. However, since structural mitigation is quite expensive, high cost. Companies might not be able to afford that and choose not to implement this choice.

In addition, as most of them reported that they did not have business continuity management systems (BCMS), their long-term ability to produce and deliver goods and services to clients may be problematic. Implementing BCMS is challenging as this management practice is new and not many people know how to do it. To implement it, the company needs to send its employees to get training to gain the knowledge. It needs to also set up a new organizational structure to be responsible for implementing this management system directly. It has to also produce necessary documents, develop the plan, test the plan, evaluate and update it as necessary. This choice requires additional effort and budget. It was thus less likely to be chosen to implement. However, it is good to the company in the long run. It is recommended in this research that Thai companies located in flood risk areas get to have the business continuity plan and implement the comprehensive business continuity management system at some points.

Flood Preparedness Behavior of Thai Households

Flood Preparedness Activities Implemented in Thai Households

Findings from the research revealed that there were only three preparedness strategies that had been chosen by most of Thai households. These included tracking weather information on a regular basis (chosen by 79.9% of households), storing dried food items (chosen by 57.5% of households) and storing basic medical supplies (chosen by 57.5% of households). Most Thai households, however, did not choose to buy insurance that covered loss from flooding (not chosen by 87.2% of households), prepare vehicle for transportation in time of flooding (not chosen by 70.6% of households), participate in flood response training (not chosen by 66.8% of households), acquire emergency shelter information (not chosen by 61.3% of households), acquire warning and evacuation information (not chosen by 59.9% of households), save money for emergency use in times of flooding (not chosen by 52.9% of households) and adjust dwellings (not chosen by 59.9% of households).

Risk Perception of Thai Households

Findings revealed that the perception of Thai households regarding the chance that flooding would occur within their living locations was neither high nor low. However, their perceptions on flood dread and impact were high. When examining the factors that influenced flood risk perception of Thai households, research showed that, sex, flood experience, level of flood impact on property and asset, the length of flood impact and flood information tracking had a statistically significant effect on flood risk perception.

Preparedness Intention of Thai Households

When examining the intention of Thai households to prepare for respond to flooding that might occur in the future, data analysis revealed that on average, Thai households had a high intention to keep themselves updated on flood or weather situations and their intention to store food, drinking water, medical and essential supplies was at a moderate level. However, their intention to buy insurance that covered loss from flooding and/or other disasters was low.

Factors Affecting Preparedness Intention of Thai Households

One important objective of this research was to find out what influenced the intention of Thai households to prepare for disaster response. Findings from an analysis of survey data showed that sex, education, age, flood experience, length of previous flood impact, weather & flood information tracking, environmental cue and, as hypothesized, flood risk perception had a statistically significant effect on intention to prepare for flooding.

Discussion

What are the strategies that Thai households like choose as the means for preparing themselves to respond to and recover from flooding? Findings of this research suggest that, when it comes to flood preparedness, Thai households tend to choose low-cost and self-managed activities as their first choices. Examples of these activities are storing food and basic medical supplies and tracking weather information through multiple sources such as television, radio and community's wired communication systems. However, choices that require higher budget, extra effort and reliant on other organizations are less likely chosen by households. Put simply, high-cost and extra-effort preparedness activities are less likely to be chosen as they are less convenient for households, too expensive to afford and households might think these activities are not their direct responsibilities and, thus, should be provided or supported by government agencies.

These reasons can also apply to explain households' intention to prepare for flooding. That is intention to prepare depends on characteristics of preparedness activities. Basic, self-managed, and low-cost activities were more chosen than those that are more complex, reliant on others and require extra-effort and budget. As a result, if flooding occurred in the future, Thai households would be able to provide mass care and first aids by themselves as most of them store dried food items and basic medical supplies. However, by choosing these basic and self-managed preparedness strategies, they could only survive flooding in a short period. If flood impact prolonged, their daily life activities would be problematic as they have not planned for transportation, had no information about evacuation and shelters, and had no extra money to spend on emergency needs during the flood. The lack of preparedness on these activities would delay their recovery to get their lives to normal. In addition, their ability to repair or rebuild their premises might be limited as most of them did not or could not afford insurance that covered flood loss and they did not adjust their residence to reduce vulnerability to the impact of flooding.

In terms of flood risk perception, research suggests that, Thai men tend to perceive the dread, likelihood, and impact of flooding as lower than women do. Households that have experience with previous flooding tend to perceive the dread, likelihood, and impact of flooding as higher than those lacking of flood experience. Households whose property and asset were highly affected by the previous floods tend to perceive the dread, likelihood, and impact of flooding as high. Households that keep tracking flood information on a regular basis tend to perceive the dread, likelihood, and impact of flooding as higher than those who seldom tracks flood information. The most important factors that affect the way Thai households perceive flood risk are level of weather

or flood information tracking, flood experience and the level of flood impact on property and asset, respectively. These findings are consistent with what has been specified in Lindell & Perry (2004)'s Protective Action Decision Model (PADM) that information received influences the way people perceive disaster risk. Likewise, findings about the influences of flood experience and previous flood impact highlight the previous study's conclusion that individual characteristics (e.g., gender, education, income, and disaster experience) have an influence on people's risk perception (Ho et al. (2008).

In terms of households' flood preparedness intention, results of this research provide several interesting insights. These include:

1. Male heads of families are less likely than female heads of families to prepare for future flooding.

2. Heads of households who graduated with elementary and secondary schools are less likely than those graduated with higher educations to prepare for future flooding.

3. Older heads of households are more likely than younger heads of households to prepare for future flooding.

4. Households who experienced flooding before are more likely than those without flood experience to prepare for future flooding.

5. The length of previous impact affects preparedness intention. The longer the households used to be affected by flooding, the more they are willing to prepare for future flooding.

6. The more households keep tracking weather and flood information, the more they intend to prepare for future flooding.

7. Household's intention to prepare for flooding also depends on the interpretation of the environmental conditions they observe.

8. Heads of households who have a higher level of flood risk perception are more likely to prepare for future flooding. This finding supports the hypothesis.

Finally, the 3 most important factors that influence household's intention to prepare for future flooding are environmental cue, flood risk perception and level of weather and flood information tracking.

The most important finding of this study of household is flood risk perception affects intention to prepare for flood response, which supports the main research hypothesis. This is very important because disaster risk perception shapes household's decision to or not to take protective actions. That is, as Lindell et al. (2007) suggest, "people will not protect themselves if they don't believe their lives are at risk" (p.77). Previous research conducted by Donahue in 2010 seemed to support this claim when findings showed that non-coastal residents in the U.S. were more likely to think a disaster would not happen to them and that preparing was not worth the cost. Thus, it is essential that Thai households are aware that flooding and other climate related disasters could happen more frequently and severely in the future and that it is better that they are always prepared.

Another interesting finding is the role of information on promoting household preparedness. Findings from this research suggest that the more frequent that people obtain weather and flood information, the more they want to prepare themselves to respond to flooding in the future. This finding is quite similar to what Martin et al. (2009) has found that subjective knowledge that individuals have (something similar to disaster warning information) affected risk reduction behaviors. Thus, providing and sharing the right and accurate information about weather conditions and the flood hazard are essential as they make people aware of flood risk and help stimulate their preparedness intention.

Academic and Practical Contributions

Academic Contributions

This research project gives insight into flood preparedness in Thailand. Readers of this research should gain some knowledge and see the overall picture of how and how much Thai the Thai people are prepared for future flooding. The researcher has done this through conducting three studies of preparedness. These included the study of flood preparedness practices in Thai local governments, the study of flood preparedness practices in Thai business organizations and the study of flood preparedness behavior of Thai households. In this sense, this research report can be considered one of a very few Thailand's comprehensive academic documents that discuss disaster preparedness at 3 levels: government, business and household.

Another, and probably the most important, academic contribution of this research is that it provides empirical data on disaster preparedness in Thailand. These empirical data help students and researchers have better and deeper understandings of three phenomena:

- 1) Preparedness strategies implementation and preparedness level of Thai local governments.
- 2) Preparedness strategies implementation and preparedness level of Thai businesses.
- 3) The factors that affect disaster risk perception and preparedness intention of Thai households.

Through systematic methodology and explanation, students and researchers who read this research report should be able to see the linkage between theories and actual phenomena regarding disaster preparedness of Thai local governments, businesses and households.

Practical Contributions

This research provides at least 3 practical contributions:

- 1) This research is the first nation-wide survey report of flood preparedness in local government, business and households. National government can use data and findings from this research report as a resource for disaster management planning and policy development at the national level.
- 2) This research is the first report of survey on flood preparedness practices in businesses. National government can use data and findings from this research report as a supporting document for developing strategies or measures that help companies located in flood prone areas increase their ability to reduce disaster risk and ability to continue produce goods and provide services even in times of crisis.
- 3) This research is the first survey on household preparedness using largest sample size in Thailand. By reading this report, national, provincial and local governments will have a more understanding about flood risk perception, preparedness behavior and preparedness intention of households. These data and findings can be used as the foundation for developing strategies for raising disaster awareness and encouraging preparedness habit among Thai people.

Policy Recommendations and Suggestions for Future Research

Policy Recommendations

Local governments

1. Increase Continuity of Operations Capability

Findings of this research showed that the only preparedness option that had not been chosen by most of Thai local governments was business continuity planning (65% of municipalities did not do the business continuity planning). Thus, whenever massive floods occur and exceed the capacity of the municipality office to handle and the 5 key resources are damaged, governmental services may be suspended as the municipality office lack of the ability to continue to operate and provide services to the citizens. This suspension of governmental services may further affect the life and well-being of the people in the community. Thus, it is important that local governments plan for continuity of operations. In the United States of America, local governments and all government agencies at federal, state, and local levels are encouraged to plan for continuity of operations. According to U.S.'s Federal Agency of Emergency Management (FEMA) (n.d.), Continuity of Operations (COOP) is defined as an effort within individual executive departments and agencies to ensure that Primary Mission Essential Functions (PMEFs) continue to be performed during a wide range of emergencies, including localized acts of nature, accidents and technological or attack-related emergencies. To achieve the continuity of operations, governmental organizations have to identify their essential functions (EFs) and develop strategies to ensure that those functions can be continued throughout, or resumed rapidly after, a disruption of normal activities. To plan for the continuity of operations, briefly, governmental organizations need to address or meet the following continuity requirements: Essential Functions of the organizations, Orders of Succession, Delegations of Authority, Continuity Facilities, Continuity Communications, Vital Records Management, Human Capital, Tests, Training, and Exercises (TT&E), Devolution of Control and Direction, and Reconstitution.

2. Utilize More Non-Structural Mitigation Measures

As found in the research, most local governments in Thailand generally chose structural mitigation strategies as measures to prevent or mitigate flood risk. Examples of these structures are building levee, dyke, concrete wall or other kinds of flood barrier. Structural mitigation measures can help maintain the depth and location of navigation channel (dikes), protect low-lying lands from flooding (levee) and act as a barrier against floodwater (floodwalls). However, as discussed earlier, these flood protection structures can provide false sense of security, reduce the mitigation function of natural resources, be very expensive, cause damage to nature, and worsen the situation or can be a disaster waiting to happen. They do not sustainably protect the cities from the flood impact in the long run. The more sustainable way to mitigate the flood impact is call non-structural mitigation. There are a variety of non-structural measures that local government can choose such as adjusting planning and zoning the city, relocation of people and structures from hazard-prone areas, and enforcing building code or similar regulations intended to reduce a structure's, a site's, or a neighborhood's vulnerability to disasters. They are considered more sustainable and effective in the long run because these measures help remove people and property out of the hazard prone areas. Thus, in theory, when there is no human or property located in such

hazard prone areas, disaster impact and losses would be minimal as disaster risk has been reduced (through reducing exposure and vulnerability).

3. Reduce Risk and Increase Resilience

As showed in the research results that the overall level of progress in disaster risk reduction and resilience building among Thai local governments was relatively low to moderate. Local governments need to move the progress to higher levels (4 or 5). The 3 essential tasks that need to be significantly improved are Essential 6 (enforcing risk-compliant building regulations and land use planning, identifying safe land for low-income citizens), Essential 9 (installing early warning systems and emergency management capacities) and Essential 2 (assigning a budget and providing incentives for homeowners, low-income families and the private sector to invest in risk reduction). These 3 essential tasks received the lowest progress scores. If local governments could make more progress on Essential 6, disaster risk could be minimized as hazard exposure and vulnerability to the hazard impact are reduce. Likewise, if progress of Essential 2 could be made, homeowners, low-income families and private sectors could have a better access to financial resource that they could use to reduce disaster risk on their own. The progress in reducing disaster risk and building resilience of a city or a community also depends on how well households reduce the risk. Thus, providing incentives for homeowners, low-income families and the private sector to invest in risk reduction is important as well.

Business Organizations

1. Increase Flood Impact Mitigation Capability

Findings of this showed that most of businesses located in these 7 flood-risk industrial estates did not have reliable flood protection systems. 52.3% of these companies reported that they did not improve their concrete floodwall or acquire stainless steel flood barrier. Only big companies such as those multinational corporations did that. In this sense, except for few companies, premises, machines and equipment of most companies would still be at risk of being impacted by flooding in the future because they did not invest in those sturdy floodwall and stainless steel flood barrier. Massive floodwater could easily enter their factory premises just like what happened in 2011. One reason for why most of them did not invest in these robust flood protection systems might due to the high cost of building/improving floodwall or buying stainless steel flood barrier. These flood protection structures are expensive. Small and medium companies could not afford them. Thus, the national government should provide some kinds of financial supports or incentives to encourage these companies to invest in a more robust flood protection system.

2. Increase Business Continuity Capability

The most important thing for companies to survive disasters and keep their business running is business continuity capability. However, this research found that most companies in Thailand lacked this capability as most of them (64%) reported that they did not practice business continuity management. This is not unusual because business continuity management (BCM) is new to most people in Thailand. Currently there are not many companies practicing BCM and very few of these companies had been ISO 22301 certified, the international standard for Business Continuity Management Systems. BCMS, if fully implemented, would help the companies effectively protect the 5 key resources and ensure their abilities in producing and delivering goods and services following disruptions. Thus, it is recommended in this research report that, companies affected by flooding in 2011 and those located in flood prone areas take a short-term measure (developing business continuity plan), medium-term measure (practicing BCM) and long-term measure (getting ISO 22301 certified).

Households

There are a few recommendations to help boosting preparedness of Thai households.

1. Increase Ability to Mitigate Flood Impact

1.1 Providing financial support to low-income households to get insurance that covers loss from flooding.

1.2 Providing financial support to low-income households to be able to adjust their dwellings.

1.3 Establishing Community Disaster Management Fund. Community or Village Disaster Management Fund can serve as the source of low interest loan or fund that villagers can use for investing in dwelling adjustment to help mitigate the flood impact as well as to recover their lives and occupations following a disaster. Local governments may work with related agencies and the community to establish this kind of fund. Once the fund is established, it could be managed by people in that community or village. This way would help create a sense of ownership and encourage community participation in disaster preparedness.

2. Shape the Right Perception of Flood Risk

Perception of risk influences people's decision to take preparedness action. Findings from this research suggest that flood risk perception affects the intention of Thai households to prepare for flooding. Thus, shaping the right perception of flood risk is important. One way that the right perception of risk can be shaped is to provide and share information about weather conditions and flood hazard. This research clearly shows that the level of weather and flood information tracking increase flood risk perception of households. Local governments and related agencies should learn information receiving preference or behavior of people in the community and design the strategies that best serve the needs or preferences of each population group so that weather and flood information can be relayed to target population effectively.

3. Increase Disaster Awareness and Stimulate Preparedness Behavior of Young and Low-Educated Individuals

Results of this research suggest that heads of those who graduated with elementary and secondary schools will be less likely than those graduated with higher educations to prepare for future flooding. In addition, younger persons will be less likely than older persons to prepare for future flooding. Thus, flood response and recovery trainings or educations should focus or target

more on young and low-educated individuals. This should, in large part, help raise flood awareness and promote preparedness intention.

Suggestions for Future Research

This research has provided the overall picture of how and to what extent local governments, businesses and households have been prepared since the flooding in 2011. However, in order to gain deeper insight, it is recommended that, future research should:

1. Examine factors that enhance disaster risk reduction implementation progress. Researchers should employ quantitative research methods and use more sample size to increase generalizability of the research findings.

2. Examine successful cases in disaster preparedness in business organizations. The researchers should employ qualitative research methods to examine cases in detail so that lessons learned can be captured.

3. Examine the relational mechanism that explains how disaster risk perception affects intention to prepare for disaster. This could be done by using a more advanced analytical strategy like structural equation modeling or multivariate analysis.

References

- Baldoni, J. (2011). How a Good Leader Reacts to a Crisis. *Harvard Business Review*, January 04, 2011. Retrieved January 19, 2017 from <https://hbr.org/2011/01/how-a-good-leader-reacts-to-a>
- Bangkokbiznews (2011). Flood and Landslide in Krung Ching. Retrieved November 23, 2013 from <http://www.bangkokbiznews.com>
- Bangkok Post (November, 2011). *Economy Faces Flood Hit: World Bank Estimates Damage at Baht1.4 Trillion*. Retrieved February 19, 2012 from <http://www.bangkokpost.com/news/local/267933/economy-faces-flood-hit>
- Bradford, R. A., O'Sullivan, J. J., Van der Craats, I. M., Krywkow, J., Rotko, P., Aaltonen, J., ... & Schelfaut, K. (2012). Risk perception—issues for flood management in Europe. *Natural Hazards and Earth System Science*, 12(7), 2299-2309. Available online at <http://www.nat-hazards-earth-syst-sci.net/12/2299/2012/nhess-12-2299-2012.pdf>
- Center for Research on Epidemiology of Disasters (2013a). *Number of Natural Disasters Reported 1900-2012*. Retrieved June 9, 2014 from <http://imgur.com/a/KdyTV#6>
- Center for Research on Epidemiology of Disasters (2013b). Estimated Damage (US\$ Billion) Caused by Reported Natural Disasters 1900-2012. Retrieved June 9, 2014 from <http://imgur.com/a/KdyTV#5>
- Center for Research on Epidemiology of Disasters (2013c). Storm Occurrence and Impacts from 2000 to 2012. Retrieved November 22, 2013 from http://cred01.epid.ucl.ac.be:5317/?after=2000&before=2012&dis_group%5B%5D=Natural&dis_subgroup%5B%5D=Meteorological&dis_type%5B%5D=Storm&agg1=year&agg2=year
- Center for Research on Epidemiology of Disasters (2013d). Flood Occurrence and Impacts from 2000 to 2012. Retrieved November 22, 2013 from http://cred01.epid.ucl.ac.be:5317/?after=2000&before=2012&dis_group%5B%5D=Natural&dis_subgroup%5B%5D=Hydrological&dis_type%5B%5D=Flood&agg1=year&agg2=year
- Chotchuang, C., Monmaturapot, S., & Hatachoti, C. (2012). Warning Systems for Adaptation and Survival. *Journal of Economy & Society* 49, 2 April-June, 2012: 6-10.
- City of St. Paul, Minnesota, USA (N.D.). *Four Phases of Emergency Management*. Retrieved March 14, 2014 from (<http://www.stpaul.gov/index.aspx?nid=97>)
- Department of Disaster Prevention and Mitigation (DDPM). (2011). Statistics of Floods In Thailand (1989-2011). Retrieved November 24, 2013 from http://61.19.100.58/public/group4/disaster01/data20y/flood20y_5.pdf

- Department of Disaster Prevention and Mitigation (DDPM). (2010). Statistics of Storms In Thailand (1989-2010). Retrieved November 24, 2013 from http://61.19.100.58/public/group4/disaster01/data20y/storm20y_3.pdf
- Department of Disaster Prevention and Mitigation (DDPM) (2013). *Summary of Floods from September 17, 2013 – November 15, 2013*. Retrieved May 28, 2014 from <http://disaster.go.th/dpm/flood/flood.html>
- Department of Mineral Resources (2011a). Community Landslide Map: Nakhon Sri Thammarat Province. Retrieved November 23, 2013 from http://www.dmr.go.th/images/article/freetemp/article_20110801153957.pdf
- Department of Mineral Resources (2011b). Thailand's Landslide Map. http://www.dmr.go.th/main.php?filename=landslide_hazard, retrieved April 6, 2014.
- Donahue, A. K. (2010). *Household Risk Perception, Preferences, and Preparedness Survey Findings*. Retrieved May 30 from <http://dpp.uconn.edu/wp-content/uploads/sites/307/2013/11/Risk-Perceptions-and-Preparedness-Volume-1.pdf>
- Eisenman, D. P., Cordasco, K. M., Asch, S., Golden, J. F., & Glik, D. (2007). Disaster planning and risk communication with vulnerable communities: lessons from Hurricane Katrina. *American Journal of Public Health*, 97(Supplement_1), S109-S115.
- Federal Emergency Management Agency (FEMA) (2005). *Case Study Chapter 2: Preparedness*. Retrieved June 22, 2014 from <http://training.fema.gov/EMIWeb/downloads/casestudyChapter2020405.doc>
- Federal Emergency Management Agency (FEMA) (2010). *Comprehensive Preparedness Guide 101 Version 2.0: Developing and Maintaining Emergency Operations Plans*. Retrieved June 22, 2014 from http://www.fema.gov/media-library-data/20130726-1828-25045-0014/cpg_101_comprehensive_preparedness_guide_developing_and_maintaining_emergency_operations_plans_2010.pdf
- Federal Emergency Management Agency (FEMA) (n.d.). *IS-800.B: National Response Framework, An Introduction (Lesson 3: Response Action)*. Retrieved June 22, 2014 from http://emilms.fema.gov/IS800B/lesson3/L3_Print.htm
- Federal Emergency Management Agency (FEMA) (n.d.). Emergency Preparedness for Family. Retrieved May 30, 2015 from <http://www.ready.gov/>
- Federal Emergency Management Agency (FEMA) (n.d.). Emergency Preparedness for Business. Retrieved May 30, 2015 from <http://www.ready.gov/business>
- Federal Emergency Management Agency (FEMA) (n.d.). What is Continuity of Operations?

- Retrieved June 22, 2017 from
https://www.fema.gov/pdf/about/org/ncp/coop_brochure.pdf
- Grothmann, T. & Reusswig, F. (2006). People at risk of flooding: why some residents take precautionary action while others do not. *Natural Hazards*, 38, 101-120. Available online at <http://link.springer.com/article/10.1007/s11069-005-8604-6>
- Hesse-Biber, S.N. and Leavy, P. (2006). *The practice of qualitative research*. Thousand Oaks, CA: Sage Publications, Inc.
- Ho, M. C., Shaw, D., Lin, S., & Chiu, Y. C. (2008). How do disaster characteristics influence risk perception?. *Risk Analysis*, 28(3), 635-643.
Lindell et al., 2007, p.77
- Howe, P. D. (2009). *Hurricane Risk Perceptions and Preparedness Among Florida Business Owners* (Doctoral dissertation, The Pennsylvania State University).
- James, E. H., & Wooten, L. P. (2004). Leadership in turbulent times: Competencies for thriving amidst crisis. *Working Paper Series, Paper No.04-04*. Retrieved January 19, 2017 from <http://195.130.87.21:8080/dspace/bitstream/123456789/103/1/Leadership%20in%20turbulent%20times%20Hayes.pdf>
- Kendra, J.M. and Wachtendorf, T. (2003). Elements of resilience after the World Trade Center disaster: Reconstructing New York City's emergency operations center. *Disasters*, 27(1), 37-53.
- Khaosod Online (2011). Landslide in Sob Moey. Retrieved November 23, 2013 from http://www.khaosod.co.th/view_newsonline.php?newsid=TVRNeE1qTTJOakEzTmc9PQ
- Krobkruakao Online (2011). Landslide in Payao Province. Retrieved November 23, 2013 from <http://www.krobkruakao.com>
- Lindell, M.K. & Perry, R.W. (2004). *Communicating Environmental Risk in Multiethnic Communities*. Thousand Oaks, CA: SAGE Publications, Inc.
- Lindell, M. K., Prater, C., & Perry, R. W. (2007). *Wiley Pathways Introduction to Emergency Management*. Hoboken, NJ: John Wiley & Sons.
- Martin, W. E., Martin, I. M., & Kent, B. (2009). The role of risk perceptions in the risk mitigation process: the case of wildfire in high risk communities. *Journal of environmental management*, 91(2), 489-498.
- Matichon Online (2011). Summary of Landslide Situation in Nam Pad District. Retrieved November 23, 2013 from http://www.matichon.co.th/news_detail.php?newsid=1315972418&grpId=03&catid=03

- Miceli, R., Sotgiu, I., & Settanni, M. (2008). Disaster preparedness and perception of flood risk: A study in an alpine valley in Italy. *Journal of Environmental Psychology*, 28(2), 164-173.
- National News Bureau of Thailand (NNT) (May 15, 2014). *DDPM to Report the Damage from Earthquakes*. Retrieved May 28, 2014 from http://thainews.prd.go.th/centerweb/news/NewsDetail?NT01_NewsID=WNIOC5705150010001
- Ngern-Charoen, S. (2012). The Impacts of Flooding in 2011 on Cultural Environment. *Environmental Journal* 16, 4, October-December, 2012: 13-21
- Pasquini, L., Cowling, R. M., & Ziervogel, G. (2013). Facing the heat: barriers to mainstreaming climate change adaptation in local government in the Western Cape Province, South Africa. *Habitat International*, 40, 225-232.
- Paton, D. (2003). Disaster Preparedness: A Social-Cognitive Perspective. *Disaster Prevention and Management*, 12(3), 210-216.
- Patterson, J. L., Goens, G. A., & Reed, D. E. (2009). *Resilient leadership for turbulent times: A guide to thriving in the face of adversity*. R&L Education.
- Perry, R. W., & Lindell, M. K. (2008). Volcanic risk perception and adjustment in a multi-hazard environment. *Journal of Volcanology and Geothermal Research*, 172(3), 170-178.
- Platthadet, S. & Jitkasemsaran, S. (2012). A Study of Business Continuity Plan in Thailand. *Journal of Economy NN & Society* 49, 2 April-June, 2012: 11-14.
- Prayoonsit, K. (2012). Land Use Planning and Disaster Prevention *Journal of Economy & Society* 49, 2 April-June, 2012: 19-24.
- PreventionWeb (N.D.). *Thailand - Disaster Statistics*. Retrieved May 27, 2014 from <http://www.preventionweb.net/english/countries/statistics/?cid=170>
- Raaijmakers, R., Krywkow, J., & van der Veen, A. (2008). Flood risk perceptions and spatial multi-criteria analysis: an exploratory research for hazard mitigation. *Natural hazards*, 46(3), 307-322.
- Riebeek, H. (2005). *The Rising Cost of Natural Hazards*. Retrieved November 23, 2013 From <http://earthobservatory.nasa.gov/Features/RisingCost/printall.php>
- Salkin, A. (2014). *What is a Chief Resilience Officer?* Retrieved January 19, 2017 from <http://www.100resilientcities.org/blog/entry/what-is-a-chief-resilience-officer#/-/>
- Saiyarod, P. (2012). Emergency Medical Services for Disaster Response. *Journal of*

- Economy & Society* 49, 2 April-June, 2012: 11-14.
- Schumacker, R. E. & Lomax, R. G. (2004). *A beginner's guide to structural equation modeling*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Schwab, AK., Brower, DJ. & Eschelbac, K. (2007). *Hazard mitigation and preparedness: building resilient communities*. Hoboken, NJ: John Wiley & Son.
- Shen, X. (2009). *Flood risk perception and communication in different cultural contexts— a comparative case study between Wuhan, China and Cologne, Germany* (Doctoral dissertation, Ph. D. Dissertation, University of Bonn).
- Sirishrisak, T. (2012). Flooding in 2011 and its Implications for Disaster Response Planning. *Journal of Graduate Volunteer Center* 8 (2), January-June, 2012: 1-22
- Thaipost Online (2011). Landslide in Krabi Province. Retrieved November 23, 2013 from <http://www.thaipost.net/node/36466>
- Techapanadon, W. & Jansuwan, P. (2012). The Flood Crisis: Lessons from a Natural Disaster. *Journal of Economy & Society* 49, 1 January-March, 2012: 13-18
- Terpstra, Teun (2010). *Flood preparedness: thoughts, feelings and intentions of the Dutch public*. thesis. Retrieved June 22, 2014 from http://doc.utwente.nl/69492/1/thesis_T_Terpstra.pdf
- United Nations (2015). Sendai Framework for Disaster Risk Reduction 2015-2030. Retrieved May 25, 2015 from http://www.wcdrr.org/uploads/Sendai_Framework_for_Disaster_Risk_Reduction_2015-2030.pdf
- UNISDR (2005b). *Summary of the Hyogo Framework for action 2005-2015: Building the Resilience of nations and communities to disasters*. Retrieved May 24, 2015 from <http://www.preventionweb.net/english/professional/trainings-events/edu-materials/v.php?id=4539>
- UNISDR (2012). How to make cities more resilient: a handbook for local government leaders. Retrieved June 21, 2017 from <http://www.unisdr.org/we/inform/publications/26462>
- UNISDR (N.D.). *What is Disaster Risk Reduction?* Retrieved May 25, 2015 from <http://www.unisdr.org/who-we-are/what-is-drr>
- United Nations Office for Disaster Risk Reduction (2013a). *Disaster Impacts 2000-2012*. Retrieved November 22, 2013 from http://www.preventionweb.net/files/31737_20130312disaster20002012copy.pdf
- United Nations Office of Disaster Reduction (2013b). *Number of Climate-related*

Disasters Around the World (1980-2011). Retrieved June 5, 2014 from
http://www.preventionweb.net/files/20120613_ClimateDisaster1980-2011.pdf

Uttaradit Province's Office of Disaster Prevention and Mitigation (2011). *Report of Flood and Landslide in Nam Pad District and Relief Efforts*. Retrieved November 23, 2013 from
<http://webcache.googleusercontent.com/search?q=cache:YZnfde5ZUgYJ:www.uttaradit.go.th/acrobat/rep150954.doc+&cd=1&hl=en&ct=clnk&gl=th>

Waugh, W. L., & Streib, G. (2006). Collaboration and leadership for effective emergency management. *Public administration review*, 66(s1), 131-140.

Appendix1 Local Government Survey Questionnaire

เรียน ท่านนายกเทศมนตรี ผู้บริหารเทศบาล/ปลัดเทศบาล/

แบบสอบถามนี้ เป็นส่วนหนึ่งของงานวิจัย เรื่องการเตรียมความพร้อมรับมืออุทกภัยขององค์กรปกครองส่วนท้องถิ่น ซึ่งได้รับทุนสนับสนุนจากสำนักงานกองทุนสนับสนุนการวิจัย และมหาวิทยาลัยสงขลานครินทร์ ทางผู้วิจัยไม่มีเจตนาที่จะนำข้อมูลจากแบบสอบถามนี้ไปเผยแพร่เพื่อใช้ประโยชน์ทางธุรกิจหรือทำให้เกิดผลกระทบในทางลบต่อท่านหรือหน่วยงานของท่านแต่อย่างใด ผลการวิจัยจะใช้เพื่อจุดประสงค์ทางการศึกษาเท่านั้น จึงขอความกรุณาให้ท่าน ตอบคำถามแต่ละข้อให้ตรงกับความเป็นจริงมากที่สุด จักขอบพระคุณยิ่ง

ด้วยความนับถือ

คณะผู้วิจัย

กรุณาระบุชื่อเทศบาลของท่าน.....ตำบล.....

จังหวัด.....อำเภอ.....

ส่วนที่ 1 ข้อมูลทั่วไปของเทศบาล

.1ตำแหน่งของท่าน [] นายกเทศมนตรี [] รองนายกเทศมนตรี [] ปลัดเทศบาล [] อื่นๆ

.2ประเภทของเทศบาล [] นคร [] เมือง [] ตำบล [] อื่นๆ

ส่วนที่ 2 หลังจากอุทกภัยปี เป็นต้นมา 2554 เทศบาลของท่าน ได้มีการดำเนินการในเรื่องต่อไปนี้หรือไม่

หลังจากปี 2554ท่านได้ดำเนิน มาตรการ/กิจกรรม เหล่านี้ หรือไม่	ดำเนินการ	ไม่ได้ดำเนินการ
.3สร้างปรับปรุง พื้นที่รับน้ำ/		
.4สร้างปรับปรุง ระบบระบายน้ำ/		
.5สร้าง ซ่อมแซม ระบบป้องกันน้ำท่วมพื้นที่ เช่น คันกั้นน้ำ/ แนวถนนยกสูง หรือ สิ่งก่อสร้างป้องกันน้ำท่วม ลักษณะอื่นๆ		
.6จัดทำแผนที่เสี่ยงภัย		
.7การสำรวจและจัดทำฐานข้อมูลประชากรกลุ่มเปราะบาง		
.8ออกกฎหมายเทศบัญญัติในการลดผลกระทบน้ำท่วม/คำสั่ง/		
.9ปรับเปลี่ยนผังเมืองใหม่เพื่อลดผลกระทบน้ำท่วม		
.10ใช้มาตรการทางภาษีหรือมาตรการทางการเงินอื่นๆ เพื่อลดผลกระทบน้ำท่วม		
.11จัดทำแผนรับมือและฟื้นฟูจากภัยพิบัติ		
.12ซ่อมแผนสถานการณ์ฉุกเฉิน เป็นประจำทุกที่		
.13มีการระบุสถานที่สำหรับจัดตั้งเป็นศูนย์พักพิงผู้ประสบภัยไว้ล่วงหน้า		
.14มีการกำหนดจุดรวมพล จุดอพยพ เส้นทางอพยพในแต่ละชุมชน		
.15เตรียมเครื่องมืออุปกรณ์สำหรับการรับมือและฟื้นฟู		
	ดำเนินการ	ไม่ได้ดำเนินการ
.16เตรียมกำลังคนให้เพียงพอต่อการรับมือและฟื้นฟูจากภัยพิบัติ		

.17จัดเตรียมงบประมาณให้เพียงพอสำหรับการรับมือและฟื้นฟูจากภัยพิบัติ		
.18สร้างความสัมพันธ์กับชุมชน สร้างเครือข่ายความร่วมมือกับชุมชน ให้ประชาชนมีส่วนร่วมในการเตรียมความพร้อมรับมือภัยพิบัติ		
.19ฝึกอบรม ให้ความรู้ในการรับมือการปรับตัวแก่ประชาชนในชุมชน/		
.20สร้างความมั่นคงทางอาหารเพื่อรับมือกับภาวะวิกฤต		
.21ปรับปรุงระบบสื่อสารในภาวะวิกฤต ปรับปรุงพัฒนาระบบเตือนภัย		
.22ประชุมปรึกษาหารือร่วมกับชุมชนและภาคส่วนต่างๆ จัดเวทีรับฟังความคิดเห็น รับทราบปัญหา หาทางแก้ไขร่วมกันกับทั้งชุมชนและภาคส่วนต่างๆ อยู่เป็นระยะ		
.23จัดทำแผนบริหารความต่อเนื่องทางธุรกิจ (Business Continuity Planning) ของเทศบาล		

.24แนวทางการเตรียมความพร้อมหรือมาตรการอย่างอื่นที่ท่านได้ดำเนินการ หากมี โปรดระบุ))

ส่วนที่ 3 การดำเนินการตามแนวทาง ประการเพื่อลดความเสี่ยงภัยพิบัติในปัจจุบัน 10

เทศบาลท่านมีการดำเนินการตาม ข้อปฏิบัติ ประการเพื่อลด 10 ความเสี่ยงภัยพิบัติ มากน้อยเพียงใด ให้ประเมินว่าได้ทำในแต่ละข้ออยู่ในระดับใด	ระดับการดำเนินการ				
	น้อยที่สุด (1)	น้อย (2)	ปานกลาง (3)	มาก (4)	มากที่สุด (5)
.25มีการจัดโครงสร้างองค์กรและการประสานงานสำหรับการลดความเสี่ยงภัยพิบัติ มีการระบุบทบาท อำนาจ หน้าที่ของแต่ละฝ่าย มีการอบรมให้เจ้าหน้าที่ที่เกี่ยวข้องมีรู้ ประสิทธิภาพ ความสามารถในการลดความเสี่ยงภัยพิบัติ					
.26 มีการจัดสรรงบประมาณและใช้มาตรการทางการเงินเพื่อจูงใจให้ครัวเรือนและธุรกิจห้างร้านปรับปรุงบ้านเรือน สถานประกอบการ หรือดำเนินมาตรการต่างๆ เพื่อลดความเสี่ยงหรือความสูญเสียต่อชีวิต ทรัพย์สิน จากภัยพิบัติ					
.27มีการพัฒนาข้อมูลเกี่ยวกับภัยชนิดต่างๆ ข้อมูลความเปราะบาง มีการประเมินความเสี่ยงและแบ่งปันข้อมูลเกี่ยวกับความเสี่ยงให้ทราบโดยทั่วกัน อยู่เสมอ					
	(1)	(2)	(3)	(4)	(5)
.28มีการลงทุนในการก่อสร้างและซ่อมแซมโครงสร้าง สาธารณูปโภคเพื่อลดความเสี่ยงอุทกภัย เช่น ระบบระบายน้ำท่วม					
.29มีการประเมินโรงเรียนและสถานพยาบาลทุกแห่งในเขตเทศบาล ว่ามีความปลอดภัยแก่นักเรียนในโรงเรียนหรือผู้ป่วยใน					

โรงพยาบาลในภาวะวิกฤตหรือภัยพิบัติ รวมทั้งมีการปรับปรุงให้ปลอดภัยยิ่งขึ้น					
.30มีการบังคับใช้กฎหมายและวางผังเมืองเพื่อลดความเสี่ยงภัยพิบัติ มีการระบุหรือกำหนดเขตพื้นที่พักอาศัยที่ปลอดภัยสำหรับคนจนหรือผู้มีรายได้น้อย					
.31ดำเนินการให้ความรู้ การศึกษา และฝึกอบรมเกี่ยวกับการลดความเสี่ยงภัยพิบัติทั้งในโรงเรียนและชุมชน					
.32มีการปกป้องรักษาไว้ซึ่ง ระบบนิเวศ เพื่อให้เป็น/กั้นชนทางธรรมชาติที่ช่วยลดผลกระทบจากภัยพิบัติและช่วยให้ปรับตัวต่อการเปลี่ยนแปลงสภาพภูมิอากาศได้					
.33มีการติดตั้งระบบเตือนภัยพิบัติล่วงหน้า และพัฒนาศักยภาพของเทศบาลในการจัดการสถานการณ์ฉุกเฉิน					
.34มีการนำเอาความต้องการและการมีส่วนร่วมของประชาชนที่ได้รับผลกระทบหรืออยู่ในพื้นที่เสี่ยงภัยพิบัติ มาเป็นตัวตั้งในการวางแผนฟื้นฟู ก่อสร้างสาธารณูปโภคหลังเกิดภัยพิบัติ					

ส่วนที่ 4 บทบาทของท่านในการลดความเสี่ยงภัยพิบัติในเขตเทศบาล

ท่านเห็นด้วยกับข้อความเหล่านี้ มากน้อยเพียงใด	ระดับความคิดเห็น ท่านเห็นด้วยมากน้อยเพียงใด				
	น้อยที่สุด (1)	น้อย (2)	ปานกลาง (3)	มาก (4)	มากที่สุด (5)
.35ท่านสามารถกระตุ้นและชักชวนให้ประชาชนและบุคลากรหันมาให้ความสำคัญและดำเนินการเพื่อสร้างความสามารถในการรับมือกับภัยพิบัติให้กับเทศบาลได้เป็นอย่างดี					
.36ท่านมีความเข้าใจชุมชนและลักษณะพื้นที่ในเขตเทศบาลสามารถสร้างและรักษาความร่วมมือกันระหว่างเจ้าหน้าที่ระดับสูงของเทศบาล ประชาชน และผู้มีส่วนได้ส่วนเสีย ได้เป็นอย่างดี					
	(1)	(2)	(3)	(4)	(5)
.37ท่านสามารถแสดงบทบาทเป็นตัวแทนของเทศบาลในการแบ่งปันข้อมูล แนวความคิด แนวปฏิบัติในเรื่องการลดความเสี่ยงภัยพิบัติที่เป็นเลิศ ให้กับเมืองอื่นๆ ในระดับนานาชาติ และสามารถพัฒนานวัตกรรมเพื่อสร้างความสามารถของเทศบาลให้รับมือกับภัยพิบัติได้เป็นอย่างดี					

.38ท่านสามารถสื่อสารและทำงานอย่างมีประสิทธิภาพกับส่วนงานหรือหน่วยงานต่างๆ ไม่ว่าจะเป็นส่วนงานที่ดูแลด้านการขนส่งพลังงาน สาธารณสุข การเคหะ การศึกษา และชุมชน ได้เป็นอย่างดี					
.39ท่านเป็นคนที่มีความคล่องแคล่ว พร้อมทั้งจะปรับเปลี่ยนเพื่อแก้ปัญหา กล้าทดลองทำสิ่งใหม่ มองหาแนวคิดใหม่ๆ และกล้าเสี่ยง					
.40ท่านสามารถสื่อสาร เจรจา สนทนา ชักชวนภาคส่วนต่างๆ และผู้มีส่วนได้ส่วนเสีย ให้มาร่วมสนับสนุนการดำเนินมาตรการเพื่อลดความเสี่ยงภัยพิบัติของบ้านเมือง ได้เป็นอย่างดี					
.41ท่านสามารถจัดการงานหรือโครงการหลายๆ โครงการ และสามารถจัดการความสัมพันธ์ระหว่างบุคลากรหรือหน่วยงานต่างๆ ได้อย่างมีประสิทธิภาพและมีประสิทธิผล					

ส่วนที่ 5 ข้อมูลอื่นๆ เกี่ยวกับผู้ตอบแบบสอบถาม (ข้อมูลเกี่ยวกับตัวท่าน)

42. เพศ ☐ ชาย ☐ หญิง
43. อายุ..... (โปรดระบุอายุเต็ม)
44. ระดับการศึกษาสูงสุด ☐ ตริ ☐ โท ☐ เอก
45. สาขาที่สำเร็จการศึกษา ☐ กลุ่มมนุษยศาสตร์/สังคมศาสตร์ ☐ กลุ่มวิทยาศาสตร์
46. ท่านดำรงตำแหน่งปัจจุบันมาแล้วกี่ปี.....(โปรดระบุจำนวนปีเต็ม)
47. อาชีพของท่านก่อนมาดำรงตำแหน่งปัจจุบันหรืออาชีพที่สอง
☐ ค้าขาย/ทำธุรกิจ ☐ รับราชการในตำแหน่งอื่น ☐ อาชีพอื่นๆ ☐ ไม่มีอาชีพที่สอง
48. ท่านอาศัยอยู่ในเขตเทศบาลนี้มาแล้วกี่ปี..... (โปรดระบุจำนวนปีเต็ม)
49. สถานที่เกิดของท่านอยู่ในเขตเทศบาลนี้ ใช่หรือไม่ ☐ ใช่ ☐ ไม่ใช่
- .50เขตเทศบาลของท่านเป็นพื้นที่เสี่ยงและเคยประสบอุทกภัยครั้งใหญ่ในปี 2554 ☐ ใช่ ☐ ไม่ใช่

Appendix 2 Business Survey Questionnaire

เรียน ท่านผู้บริหารเจ้าหน้าที่ที่เกี่ยวข้อง/ ที่เคารพอย่างสูง

แบบสอบถามนี้ เป็นส่วนหนึ่งของงานวิจัย เรื่องการเตรียมความพร้อมรับมือภัยพิบัติขององค์กรภาคธุรกิจ ซึ่งได้รับทุนสนับสนุนจากสำนักงานกองทุนสนับสนุนการวิจัย และมหาวิทยาลัยสงขลานครินทร์ ทางผู้วิจัยไม่มีเจตนาที่จะนำข้อมูลจากแบบสอบถามนี้ไปเผยแพร่เพื่อใช้ประโยชน์ทางธุรกิจหรือทำให้เกิดผลกระทบในทางลบต่อท่านหรือหน่วยงานของท่านแต่อย่างใด ผลการวิจัยจะใช้เพื่อจุดประสงค์ทางการศึกษาเท่านั้น จึงขอความกรุณาให้ท่าน ตอบคำถามแต่ละข้อให้ตรงกับความเป็นจริงมากที่สุด จักขอบพระคุณยิ่ง หากท่านมีข้อสงสัยหรือต้องการข้อมูลเพิ่มเติม กรุณาติดต่อ ดรสมพร คุณวิชาติ หัวหน้าโครงการวิจัย คณะวิทยาการจัดการ .
อีเมล 0808 758 093 .มหาวิทยาลัยสงขลานครินทร์ โทรsomporn.kh@psu.ac.th

ด้วยความนับถือ

) ดรสมพร คุณวิชาติ.)

หัวหน้าโครงการวิจัย

ส่วนที่ 1 ข้อมูลทั่วไปของท่านผู้ตอบแบบสอบถาม

.1ตำแหน่งหน้าที่การงานของท่านในบริษัท คือตำแหน่งหน้าที่ใด/

- [] ผู้อำนวยการ เจ้าหน้าที่ฝ่ายอาชีวอนามัยและความปลอดภัย/ผู้จัดการ/(Safety)
- [] ผู้อำนวยการ ธุรกิจ/เจ้าหน้าที่ฝ่ายทรัพยากรบุคคล/ผู้จัดการ/HR/Admin)
- [] ผู้อำนวยการ เจ้าหน้าที่ฝ่ายระบบ/ผู้จัดการ/ISO
- [] ผู้อำนวยการเจ้าหน้าที่ด้านการบริหารคว/ผู้จัดการ/ามต่อเนื่องทางธุรกิจ
- [] ผู้อำนวยการ.....เจ้าหน้าที่ฝ่ายอื่นๆ โปรดระบุ/ผู้จัดการ/

.2ลักษณะการดำเนินกิจการของบริษัทท่าน จัดอยู่ในประเภทใด

- [] การผลิต (Manufacturing Company)
- [] ธุรกิจบริการ (Service Company)
- [] บริษัทที่ปรึกษา (Consulting Company)
- [] อื่นๆ โปรดระบุ.....

.3ที่ตั้งของบริษัทอยู่ในนิคมอุตสาหกรรมใด

- [] นิคมอุตสาหกรรมสหรัตนนคร [] นิคมอุตสาหกรรมไฮเทค (บ้านหว้า)
- [] นิคมอุตสาหกรรมบางปะอิน [] นิคมอุตสาหกรรมโรจนะ [] นิคมอุตสาหกรรมนวนคร
- [] นิคมอุตสาหกรรมแพคตอรีแลนด์ [] นิคมอุตสาหกรรมบางกะดี

.4จำนวนบุคลากร ผู้บริหาร)+เจ้าหน้าที่+พนักงานทั้งหมดในบริษัท (มีประมาณกี่คน

- [] น้อยกว่า 50 คน 1-501 [] คน 500-101 [] คน 100-50 [] ,000 คน [] 1,001 คน ขึ้นไป

5. ลักษณะความเป็นเจ้าของ บริษัทมีลักษณะตามข้อใดต่อไปนี้

- ☐ บริษัทคนไทยเป็นเจ้าของ 100%
- ☐ บริษัทต่างชาติ 100%
- ☐ บริษัทร่วมทุน ชาติดั้งเดิม 2

6. หากเป็นบริษัทต่างชาติ หรือบริษัทร่วมทุนกับต่างชาติ บริษัทแม่หรือผู้ร่วมทุนรายใหญ่ที่เป็นต่างชาติ เป็นสัญชาติใด

- ☐ ญี่ปุ่น ☐ สหรัฐอเมริกา ☐ จีน ☐ เกาหลี ☐ ไต้หวัน
- ☐ ประเทศในอาเซียน เช่น มาเลเซีย สิงคโปร์
- ☐ ประเทศในยุโรป เช่น อังกฤษ ฝรั่งเศส และอื่นๆ
- ☐ อื่นๆ โปรดระบุ.....

7. บริษัทเคยได้รับผลกระทบจากอุทกภัยครั้งใหญ่ในปี 2554 ใช่หรือไม่ ☐ ใช่ ☐ ไม่ใช่ ☐

8. หน่วยงานใดในบริษัทเป็นผู้รับผิดชอบหรือมีหน้าที่หลักในการวางแผนและจัดการภัยพิบัติสถานการณ์ฉุกเฉิน/ (ข้อ 1 ตอบได้เพียง)

- ☐ หน่วยงาน Safety
- ☐ หน่วยงาน HR & Admin
- ☐ หน่วยงานด้านการจัดการสิ่งแวดล้อม
- ☐ หน่วยงานด้าน Business Continuity Management โดยตรง
- ☐ หน่วยงานอื่นๆ โปรดระบุ.....

9.ผู้บริหารระดับสูงในบริษัทให้ความสำคัญต่อการเตรียมความพร้อมรับมือภัยพิบัติสถานการณ์ฉุกเฉิน/ มากน้อยเพียงใด

- ☐ น้อยที่สุด
- ☐ น้อย
- ☐ ปานกลาง
- ☐ มาก
- ☐ มากที่สุด

10.พนักงานในบริษัทให้ความสำคัญหรือสนใจต่อการเตรียมความพร้อมรับมือภัยพิบัติ สถานการณ์ฉุกเฉิน/ มากน้อยเพียงใด

- ☐ น้อยที่สุด
- ☐ น้อย
- ☐ ปานกลาง

- [] มาก
[] มากที่สุด

.11บริษัทจัดให้มีการซ้อมแผนฉุกเฉินแผนรับมือภัยพิบัติ บ่อยครั้งแค่ไหน/แผนอพยพ/

- [] ไม่เคยเลย
[] นานๆ ครั้ง เช่น ครั้ง 1 ปี ซ้อม 3 หรือ 2
[] ครั้งต่อปี 1
[] ครั้งต่อปี 2
[] ครั้งต่อปี ขึ้นไป 3

ส่วนที่ 2 หลังจากอุทกภัยปี เป็นต้นมา 2554 บริษัทของท่าน ได้มีการดำเนินการในเรื่องต่อไปนี้หรือไม่

หลังจากปี บริษัทได้ดำเนิน มาตรการ 2554/กิจกรรม เหล่านี้ หรือไม่	ดำเนินการ/ มี	ไม่ได้ดำเนินการ/ ไม่มี
.12รวบรวมข้อมูลเกี่ยวกับภัยพิบัติหรือเหตุร้ายแรงต่างๆ ที่อาจกระทบหรือสร้างความเสียหายต่อบริษัทท่านได้		
.13วิเคราะห์หรือประเมินความเสี่ยงที่ภัยพิบัติหรือเหตุการณ์ต่างๆ จะส่งผลกระทบต่อฝ่ายหรือแผนกต่างๆ ของบริษัท		
.14ดำเนินการเพื่อหาหนทางหรือกลยุทธ์ในการลดผลกระทบหรือป้องกันภัยและลดความเสี่ยงภัยพิบัติ		
.15ซื้อประกันภัยที่ความคุ้มครองครอบคลุมถึงความสูญเสียจากภัยพิบัติทางธรรมชาติต่างๆ เช่น น้ำท่วม		
.16เสริมสร้างระบบป้องกันน้ำเข้าท่วมโรงงาน เช่น การจัดเตรียมซื้อ/แผงกันน้ำอลูมิเนียม เพื่อป้องกันน้ำเข้าโรงงานหากเกิดน้ำท่วม เป็นต้น		
.17ย้ายเครื่องจักรหรืออุปกรณ์สำคัญไว้บนอาคารชั้น 2หรือจัดวางไว้บนที่สูงที่น้ำท่วมไม่ถึง		
.18มีระบบสำรองข้อมูลที่ไว้ใจได้ เพื่อป้องกันข้อมูลสูญหายหากเกิดภัยพิบัติหรือสถานการณ์ฉุกเฉิน		
.19จัดทำแผนรับมือสถานการณ์ฉุกเฉิน/ภัยพิบัติ		
.20แผนรับมือสถานการณ์ฉุกเฉินของบริษัทท่านได้กำหนดแนวทาง/วิธีการ โครงสร้าง ทรัพยากร บทบาทหน้าที่ของบุคลากร และขั้นตอนการรับมือไว้อย่างละเอียด		
.21แผนรับมือสถานการณ์ฉุกเฉินของบริษัทท่านได้ระบุแนวทางหรือขั้นตอนการสื่อสารหรือการประสานงานยามเกิดเหตุฉุกเฉินไว้อย่างชัดเจน		
.22แผนรับมือสถานการณ์ฉุกเฉินของบริษัทท่านได้ระบุกลยุทธ์การบริหารความต่อเนื่องทางธุรกิจ (BCM) ไว้อย่างชัดเจน		

.23บริษัทได้ระบุแนวทางการฟื้นฟูระบบเทคโนโลยีสารสนเทศหรือข้อมูลสารสนเทศต่างๆ ไว้ในแผนรับมือสถานการณ์ฉุกเฉิน อย่างชัดเจน		
.24บริษัทได้ระบุแนวทางการช่วยเหลือพนักงาน ไว้ในแผนรับมือสถานการณ์ฉุกเฉิน อย่างชัดเจน		
.25บริษัทมีการกำหนดจุดรวมพลและจุดอพยพภายในบริเวณสถานประกอบการ ไว้ในแผนรับมือสถานการณ์ฉุกเฉิน ไว้อย่างชัดเจน		
.26เตรียมเครื่องมืออุปกรณ์ที่จำเป็นสำหรับรับมือสถานการณ์ฉุกเฉิน เช่น ระบบดับเพลิง สายฉีด ถังดับเพลิง/อุปกรณ์ขนย้ายสิ่งของหากเกิดน้ำท่วม เป็นต้น		
.27มีการตรวจตรา ทดสอบความพร้อมใช้งานของเครื่องมืออุปกรณ์ สำหรับการรับมือภัยพิบัติสถานการณ์ฉุกเฉินอยู่เป็นประจำ/		
.28มีการเฝ้าระวังโดยการติดตามข้อมูลข่าวสารเกี่ยวกับน้ำท่วมหรือภัยพิบัติอื่นๆ จากหน่วยงานภาครัฐที่เกี่ยวข้องอยู่เสมอ		
.29ประชุมหารือ ประสานงาน หรือร่วมฝึกซ้อมแผนฉุกเฉินกับการนิคมฯ และหน่วยงานภาครัฐต่างๆ ที่เกี่ยวข้อง อยู่เป็นประจำ		

ส่วนที่ 3 ข้อมูลเกี่ยวกับการบริหารความต่อเนื่องทางธุรกิจ (BCM)

.30บริษัทของท่านมีการจัดทำแผนความต่อเนื่องทางธุรกิจ (BCP) หรือได้นำระบบบริหารความต่อเนื่องทางธุรกิจ (BCM) มาปรับใช้ภายในองค์กร ใช่หรือไม่

[] ใช่ [] ไม่ใช่

กรณี ตอบว่า ไม่ใช่ หรือ ไม่มีแผนBCP กรุณาตอบคำถามต่อไปนี้ (42 แล้วข้ามไปข้อ)***

.31เพราะเหตุใดบริษัทของท่านจึงไม่ได้มีการวางแผนหรือดำเนินการบริหารความต่อเนื่องทางธุรกิจ

[] ขาดความรู้ความเข้าใจด้าน BCM

[] ขาดบุคลากรที่มารับผิดชอบงานด้าน BCM

[] ลูกค้านำหรือบริษัทลูกค้า ไม่ได้เรียกร้องหรือกำหนดให้ต้องทำ

[] เรื่อง BCM ไม่ได้เป็นเรื่องที่ทางบริษัทสนใจหรือให้ความสำคัญ

[] อื่นๆ โปรดระบุ.....

กรณีตอบว่า ใช่ หรือ มีแผน BCP ขอให้ท่านตอบคำถามต่อไปนี้

.32ประสบการณ์และความเสียหายจากอุทกภัย ปี ที่ผ่านมา เป็นเหตุผลหนึ่งที่ทำให้บริษัทตัดสินใจ 2554จัดทำแผน BCP หรือนำระบบบริหารความต่อเนื่องทางธุรกิจ (BCM) มาปรับใช้ภายในองค์กร ใช่ หรือ ไม่

[] ใช่ [] ไม่ใช่

.33เงื่อนไข ความคาดหวัง ความต้องการ หรือการเรียกร้อง จากบริษัทคู่ค้า ลูกค้า ผู้รับบริการ/เป็นเหตุผลหนึ่งที่ทำให้บริษัทตัดสินใจจัดทำแผน BCP หรือนำระบบบริหารความต่อเนื่องทางธุรกิจ (BCM) มาปรับใช้ภายในองค์กร ใช่ หรือ ไม่

[] ใช่ [] ไม่ใช่

.34ความต้องการลดความสูญเสีย ลดความเสี่ยงที่จะได้รับผลกระทบ ลดความเสียหายจากภัยพิบัติในอนาคต เป็นเหตุผลหนึ่ง ที่ทำให้บริษัทตัดสินใจจัดทำแผน BCP หรือนำระบบบริหารความต่อเนื่องทางธุรกิจ (BCM) มาปรับใช้ภายในองค์กร ใช่ หรือ ไม่

[] ใช่ [] ไม่ใช่

.35ความต้องการป้องกันการหยุดชะงักของกระบวนการผลิตและส่งมอบสินค้าและบริการ รวมทั้งลดการหยุดชะงักของกระบวนการในการดำเนินงาน เป็นเหตุผลหนึ่ง ที่ทำให้บริษัทตัดสินใจจัดทำแผน BCP หรือนำระบบบริหารความต่อเนื่องทางธุรกิจ (BCM) มาปรับใช้ภายในองค์กร ใช่ หรือ ไม่

[] ใช่ [] ไม่ใช่

.36เหตุผลหลักที่สำคัญที่สุด ที่บริษัท ตัดสินใจจัดทำแผน BCP หรือนำระบบบริหารความต่อเนื่องทางธุรกิจ (BCM) มาปรับใช้ภายในองค์กร คืออะไร [ตอบได้เพียง ข้อ 1]

[] ต้องการลดความสูญเสียหรือความเสี่ยงที่จะได้รับผลกระทบ ความเสียหายจากภัยพิบัติในอนาคต

[] บริษัทคู่ค้า ลูกค้าผู้รับบริการ/ เรียกร้องหรือกำหนดให้ต้องมี

[] ป้องกันการหยุดชะงักของกระบวนการผลิตและส่งมอบสินค้าและบริการ รวมทั้งกระบวนการในการดำเนินงาน

[] ต้องการมีภาพลักษณ์ที่ดีด้านความพร้อมในการบริหารความต่อเนื่องทางธุรกิจและการเตรียมความพร้อมรับมือภัยพิบัติขององค์กร

[] อื่นๆ โปรดระบุ.....

.37หน่วยงานใดในบริษัทของท่านเป็นผู้รับผิดชอบหรือมีหน้าที่หลักในการวางแผนหรือดำเนินการบริหารความต่อเนื่องทางธุรกิจ (Business Continuity Management: BCM) (ข้อ 1 ตอบได้เพียง)

[] หน่วยงาน Safety

[] หน่วยงาน HR & Admin

[] หน่วยงานด้านการจัดการสิ่งแวดล้อม

[] หน่วยงานด้าน Business Continuity Management โดยตรง

[] หน่วยงานที่ดูแลด้านระบบ ISO

[] หน่วยงานอื่นๆ โปรดระบุ.....

.38บริษัทของท่าน มีการดำเนินการบริหารความต่อเนื่องทางธุรกิจอยู่ในขั้นใด

- ☐ มีเฉพาะแผน BCP แต่ไม่มีการทดสอบหรือซ้อมแผน
- ☐ มีแผน BCP และมีการทดสอบหรือซ้อมแผนเป็นประจำทุกปี แต่ไม่ได้พัฒนาต่อเพื่อขอ ISO 22301
- ☐ อยู่ระหว่างการเตรียมการหรือดำเนินการเพื่อขอ ISO 22301
- ☐ ยื่นขอ ISO 22301 ไปแล้ว อยู่ในการตอนการตรวจเพื่อทำการ Certification
- ☐ บริษัทได้รับการ Certified ระบบ ISO 22301 เรียบร้อยแล้ว

.39แผน BCP ของบริษัทท่านครอบคลุมการดำเนินงานของส่วนงานหรือฝ่ายใด (ข้อ 1 ตอบได้เพียง)

- ☐ ครอบคลุมทุกส่วนงานฝ่าย ทัวทั้งองค์กร/
- ☐ เฉพาะส่วนงานฝ่าย ที่สำคัญที่สุดลำดับต้นๆ หรือที่มีผลต่อความอยู่รอดขององค์กรเท่านั้น/
- ☐ ส่วนงาน IT และส่วนงานที่เกี่ยวข้องกับ IT เท่านั้น
- ☐ เฉพาะส่วนงาน IT เพียงอย่างเดียว
- ☐ ส่วนงานอื่นๆ โปรดระบุ.....

.40ผู้บริหารในบริษัทให้ความสำคัญต่อการวางแผน BCP หรือการบริหารความต่อเนื่องทางธุรกิจ (BCM) อยู่ในระดับใด

- ☐ น้อยที่สุด
- ☐ น้อย
- ☐ ปานกลาง
- ☐ มาก
- ☐ มากที่สุด ให้ความสำคัญอย่างยิ่ง

.41พนักงานในบริษัทของท่านให้ความสำคัญหรือสนใจในเรื่องการบริหารความต่อเนื่องทางธุรกิจ อยู่ในระดับใด

- ☐ น้อยที่สุด
- ☐ น้อย
- ☐ ปานกลาง
- ☐ มาก
- ☐ มากที่สุด ให้ความสำคัญ สนใจ/อย่างยิ่ง

ส่วนที่ 4 ความคิดเห็นเกี่ยวกับความพร้อมของบริษัทในการรับมือกับภัยพิบัติหรือสถานการณ์ฉุกเฉิน

ข้อคำถาม	ระดับความคิดเห็น				
	1= น้อยที่สุด	2= น้อย	3= ปานกลาง	4= มาก	5= มากที่สุด
.42ท่านคิดว่า บริษัทมีความพร้อมในการรับมือกับภัยพิบัติหรือสถานการณ์ฉุกเฉิน มากน้อยเพียงใด					

.43หากบริษัทประสบหรือได้รับผลกระทบจากภัยพิบัติ ท่านคิดว่า บริษัทมีความสามารถในการฟื้นฟูหรือฟื้นตัวให้กลับมาดังเดิม ได้มากน้อยเพียงใด					
.44ท่านคิดว่า ความพร้อมของบริษัทในด้าน <u>เครื่องมืออุปกรณ์</u> ในการรับมือกับภัยพิบัติหรือสถานการณ์ฉุกเฉิน อยู่ในระดับใด					
.45ท่านคิดว่า ความพร้อมของบริษัทในด้าน <u>บุคลากร</u> ที่มี ความรู้ความสามารถในการรับมือกับภัยพิบัติหรือสถานการณ์ฉุกเฉิน อยู่ในระดับใด					
.46ท่านคิดว่า ความพร้อมของบริษัทในด้าน <u>งบประมาณ</u> ที่เพียงพอสำหรับการรับมือกับภัยพิบัติหรือสถานการณ์ฉุกเฉิน อยู่ในระดับใด					
.47ในภาพรวม ท่านคิดว่าความสามารถของบริษัทในการ <u>ปกป้องโรงผลิต อาคารสำนักงาน เครื่องจักร อุปกรณ์ สำนักงาน เทคโนโลยีสำคัญ ข้อมูล และสินค้าคงคลัง</u> ให้รอดพ้นจากความเสียหายอันเกิดจากภัยพิบัติ อยู่ในระดับใด					
.48ท่านคิดว่า ความสามารถของบริษัทในการ <u>ปกป้องดูแลบุคลากร</u> ให้รอดพ้นจากอันตรายอันเกิดจากภัยพิบัติ อยู่ในระดับใด					

ส่วนที่ 5 การดำเนินการเกี่ยวกับทรัพยากรสำคัญ ประการสำหรับการบริหารความต่อเนื่องทางธุรกิจ 5

หลังจากปี บริษัทท่านได้ดำเนิน มาตรการ 2554/กิจกรรม เหล่านี้ หรือไม่	ดำเนินการ/มี	ไม่ได้ดำเนินการ/ไม่มี
.49มีแผนรองรับด้านกำลังคนหากเกิดภัยพิบัติ มีการวิเคราะห์และระบุจำนวนบุคลากรพนักงานที่จำเป็น พร้อมทั้งระบุแหล่งที่จะได้มาซึ่ง/กำลังคนที่ต้องใช้สำหรับการดำเนินงานในช่วงเกิดภัยพิบัติ เพื่อให้บริษัทมีบริการ ได้ในระดับที่กำหนดไว้/กำลังคนเพียงพอสำหรับผลิตสินค้า		
.50มีแผนรองรับด้านโรงผลิต อาคารสำนักงาน หรือ มีการกำหนดสถานที่ปฏิบัติงานสำรองเอาไว้ เพื่อให้บริษัทยังคงมีโรงผลิตหรือสถานที่ปฏิบัติงานที่ใช้ดำเนินการผลิตหรือดำเนินงานได้ กรณีเกิดภัยพิบัติ		
.51มีแผนรองรับด้านระบบปฏิบัติการหรือเทคโนโลยีที่สำคัญต่อการดำเนินงานของส่วนงานหรือฝ่ายต่างๆ เพื่อให้บริษัทยังคงมีระบบปฏิบัติการหรือเทคโนโลยี ที่ช่วยให้สามารถดำเนินการผลิตหรือดำเนินงานได้ กรณีเกิดภัยพิบัติ		

.52มีแผนรองรับด้านข้อมูลและสารสนเทศที่สำคัญ เพื่อให้บริษัทยังคงมีข้อมูลสารสนเทศ ที่ช่วยให้สามารถ/ดำเนินการผลิตหรือดำเนินงานได้กรณีเกิดภัยพิบัติ		
.53มีแผนรองรับด้าน Suppliers และบริษัทคู่ค้าที่เป็นผู้รับเหมา เพื่อให้บริษัทยังคงมีผู้จัดส่งวัตถุดิบ รวมทั้งสาธารณูปโภค เช่น น้ำประปา ไฟฟ้า หรือบริการต่างๆ ที่ช่วยให้บริษัทสามารถดำเนินการผลิตหรือดำเนินงานได้กรณีเกิดภัยพิบัติ		

ขอกราบขอบพระคุณท่านเป็นอย่างสูง ที่สละเวลาในการทำแบบสอบถามการวิจัยในครั้งนี้

(สมพร คุณวิจิต.ดร)
หัวหน้าโครงการวิจัย

Appendix 3 Household Survey Questionnaire

ภาค []เหนือ []อีสาน []กลาง []ใต้

กราบเรียน ผู้ให้ข้อมูลที่เคารพทุกท่าน

โครงการวิจัยนี้ได้รับการสนับสนุนจากสำนักงานกองทุนสนับสนุนการวิจัย ให้ดำเนินการเก็บข้อมูลเกี่ยวกับการเตรียมความพร้อมรับมือภัยพิบัติของครัวเรือนในประเทศไทย ผู้วิจัยขอความกรุณาท่านกรอกข้อมูลตามความเป็นจริง ข้อมูลที่ท่านตอบจะไม่มีนำไปเผยแพร่ในทางลบให้เกิดความเสียหายต่อท่านแต่อย่างใด หากมีข้อสงสัย กรุณาติดต่อผู้วิจัย คือ ดร.สมพร คุณวิจิต คณะวิทยาการจัดการ มหาวิทยาลัยสงขลานครินทร์ ต.คอหงส์ อ.หาดใหญ่ จ.สงขลา 90112 อีเมล somporn.kh@psu.ac.th

ขอแสดงความนับถือ

ดร.สมพร คุณวิจิต

คำชี้แจง กรุณากรอกข้อมูลหรือทำเครื่องหมาย **V** ตรงช่องคำตอบตามความคิดเห็นหรือความรู้สึกของท่านมากที่สุด

1. ปัจจุบันท่านอายุกี่ปี.....(กรุณาใส่จำนวนปีเต็ม)
2. เพศของท่าน [] ชาย [] หญิง
3. บทบาทของท่านในครัวเรือน [] เป็นหัวหน้าครัวเรือน [] เป็นคู่สมรสของหัวหน้าครัวเรือน [] เป็นสมาชิกในครัวเรือน
4. ระดับการศึกษาของท่าน คือ [] ประถมศึกษา [] มัธยมศึกษา [] ปวช./ปวส.
[] ปริญญาตรี [] สูงกว่าปริญญาตรี
5. ที่บ้านท่านมีสมาชิกในครอบครัวรวมทั้งหมดกี่คน (รวมตัวท่านด้วย) กรุณาใส่ตัวเลข.....คน
6. ครัวเรือนของท่านมีรายได้ประมาณกี่บาทต่อเดือน (รวมของทุกคนในครอบครัว)
[] 10,000 บาท/เดือน [] 15,000 บาท/เดือน [] 20,000 บาท/เดือน [] 25,000 บาท/เดือน
[] 30,000 บาท/เดือน [] 35,000 บาท/เดือน [] 40,000 บาท/เดือน [] 45,000 บาท/เดือน ขึ้นไป
7. ท่าน (ผู้ตอบแบบสอบถาม) ประกอบอาชีพอะไร [] ค้าขาย/ทำธุรกิจส่วนตัว [] รับจ้าง/ลูกจ้างทั่วไป
[] พนักงานบริษัทเอกชน [] รับราชการ [] เกษตรกร/ทำนา/ทำสวน/ทำไร่/ประมง [] นักศึกษา
[] อื่นๆ
8. ที่บ้านท่านมีผู้พิการอาศัยอยู่ที่กี่คน กรุณาใส่ตัวเลข.....คน
9. ที่บ้านท่านมีผู้สูงอายุ (60 ปีขึ้นไป) อาศัยอยู่ที่กี่คน กรุณาใส่ตัวเลข.....คน

10. ท่านและครอบครัวอาศัยอยู่ในชุมชนนี้ประมาณกี่ปีแล้ว(กรุณาใส่จำนวนปีเต็ม)

11. ชุมชนของท่านอยู่ในเขตองค์กรปกครองส่วนท้องถิ่นประเภทใด

[] เทศบาลนคร [] เทศบาลเมือง [] เทศบาลตำบล [] องค์การบริหารส่วนตำบล (อบต.) [] อบจ.

การรับรู้ความเสี่ยงอุทกภัย	ระดับความรู้สึก/ความคิดเห็น				
	น้อยที่สุด	น้อย	ปานกลาง	มาก	มากที่สุด
12. ท่านคิดว่าน้ำท่วมเป็นภัยที่น่ากลัวมากน้อยแค่ไหน					
13. ท่านคิดว่าน้ำท่วมมีโอกาสจะเกิดในชุมชนของท่านมากน้อยแค่ไหน					
14. ท่านคิดว่าน้ำท่วมจะสร้างความเสียหายต่อชีวิต ความเป็นอยู่และทรัพย์สินของท่านมากน้อยแค่ไหน					

การรับรู้ความเสี่ยงภัยธรรมชาติอื่นๆ	ระดับความเสี่ยงที่ท่านรู้สึกหรือคิดว่าจะเกิดภัยแต่ละอย่าง				
	ไม่มี/แทบไม่มี	มีน้อย	ปานกลาง	สูง	สูงมากที่สุด
15. ท่านคิดว่าลมพายุ/พายุฤดูร้อนมีโอกาสที่จะเกิดในชุมชนของท่านมากน้อยเพียงใด					
16. ท่านคิดว่าดินโคลนถล่มมีโอกาสที่จะเกิดในชุมชนของท่านมากน้อยเพียงใด					
17. ท่านคิดว่าแผ่นดินไหวมีโอกาสที่จะเกิดในชุมชนของท่านมากน้อยเพียงใด					
18. ท่านคิดว่าสึนามิมีโอกาสที่จะเกิดในชุมชนของท่านมากน้อยเพียงใด					
19. ท่านคิดว่าภัยแล้งมีโอกาสที่จะเกิดในชุมชนของท่านมากน้อยเพียงใด					

การเตรียมความพร้อมรับมือน้ำท่วม	ทำ	ไม่ได้ทำ
20. ท่านได้ปรับหรือสร้างบ้านเป็น 2 ชั้น เพื่อบรรเทาความเสียหายหากเกิดน้ำท่วมหรือไม่		
21. ท่านได้เตรียมข้าวสาร อาหารแห้งต่างๆ ไว้เพื่อบริโภคหากเกิดน้ำท่วมหรือไม่		
22. ท่านได้เตรียมยารักษาโรคและอุปกรณ์ฉุกเฉินต่างๆ ไว้ใช้หากเกิดน้ำท่วมหรือไม่		

23. ท่านได้เก็บเงินสำรองไว้ใช้ยามเกิดน้ำท่วม ไว้ซ่อมแซมบ้านและฟื้นฟูอาชีพหลังน้ำลด หรือไม่		
24. ท่านได้เตรียมพาหนะ เช่น เรือ ไว้ใช้สัญจรไปมา หากเกิดน้ำท่วม หรือไม่		
25. ท่านได้ติดตามข่าวสารเกี่ยวกับสภาพดินฟ้าอากาศหรือข่าวน้ำท่วมอยู่เป็นประจำ หรือไม่		
26. ท่านได้ซื้อประกันภัยน้ำท่วมไว้บ้างแล้วหรือไม่		
การเตรียมความพร้อมรับมือน้ำท่วม	ทำ	ไม่ได้ทำ
27. ท่านได้หาข้อมูลเกี่ยวกับศูนย์พักพิงของชุมชนยามเกิดภัยพิบัติไว้บ้างหรือไม่		
28. ท่านได้หาข้อมูลเกี่ยวกับระบบเตือนภัยและเส้นทางอพยพของชุมชนไว้บ้างหรือไม่		
29. ท่านหรือคนในครอบครัวได้รับการฝึกอบรม เรียนรู้วิธีการปฏิบัติตัวหากเกิดภัยธรรมชาติขึ้นหรือไม่		

ความสนใจหรือความตั้งใจของท่านที่จะเตรียมพร้อมรับมือน้ำท่วม	ระดับความสนใจ/ความตั้งใจ				
	น้อยที่สุด	น้อย	ปานกลาง	มาก	มากที่สุด
30. ท่านสนใจติดตามข่าวสารเกี่ยวกับน้ำท่วมมากน้อยเพียงใด					
31. ท่านมีความสนใจอยากค้นหาข้อมูล ข่าวสารเกี่ยวกับการเตรียมความพร้อมรับมือน้ำท่วมมากน้อยเพียงใด					
32. ท่านมีความสนใจที่จะซื้อประกันภัยน้ำท่วมมากน้อยเพียงใด					

ท่านมีความเชื่อมั่นหรือเชื่อถือ การแจ้งข่าวสาร การเตือนภัยน้ำท่วม จาก “แหล่งข่าวสาร” ต่อไปนี้ มากน้อยเพียงใด	ระดับความเชื่อเชื่อมั่น/เชื่อถือ				
	ไม่เชื่อมั่นเลย	เชื่อมั่นน้อย	ปานกลาง	มาก	มากที่สุด
33. ฝ่ายปกครอง เช่น อบต. เทศบาล อบจ. อำเภอ จังหวัด					
34. หน่วยงานราชการอื่นๆ เช่น ปภ. กรมอุตุฯ กรมชลฯ กรมทรัพยากรน้ำ ศูนย์เตือนภัยพิบัติแห่งชาติ					
35. นักข่าวหรือสำนักข่าวช่องต่างๆ					
36. คนรอบข้าง เช่น เพื่อนญาติ เพื่อนบ้าน เพื่อนร่วมงาน					
37. ผู้นำชุมชน ผู้ใหญ่บ้าน กำนัน					
38. ผู้นำศาสนา เช่น พระสงฆ์ โต๊ะอิหม่าม บาทหลวง					

ท่านชอบรับฟังข่าวสารเกี่ยวกับสภาพดินฟ้าอากาศ และการเตือนภัยน้ำท่วมจากสื่อต่อไปนี้มากน้อยเพียงใด	ระดับความชอบรับฟังข่าวสารจากสื่อต่างๆ				
	ชอบน้อยที่สุด	น้อย	ปานกลาง	มาก	ชอบมากที่สุด

39. โทรศัพท์					
40. วิทย์					
41. เสียงตามสายของชุมชน					
42. รถกระจายเสียงเคลื่อนที่ของทางเทศบาล/อบต					
43. หนังสือพิมพ์					
ท่านชอบรับฟังข่าวสารเกี่ยวกับสภาพดินฟ้าอากาศ และการเตือนภัยน้ำท่วมจากสื่อต่อไปนี้มากน้อยเพียงใด	ชอบน้อยที่สุด	น้อย	ปานกลาง	มาก	ชอบมากที่สุด
44. ข้อความทางโทรศัพท์มือถือ					
45. เว็บไซต์หน่วยงานต่างๆ					
46. เฟสบุ๊ก/ทวิตเตอร์					
47. บ้ายประกาศตามถนนหรือริมทาง					

48. ท่านมองว่าการแจ้งเตือนภัยของหน่วยงานภาครัฐ ที่ผ่านมา มีเนื้อหาของข่าวสารเพียงพอ ต่อการเตรียมความพร้อมรับมือ น้ำท่วม ของท่าน หรือไม่ ☐ เพียงพอ ☐ ไม่เพียงพอ

ความคิดเห็นของท่านต่อ “เนื้อหาข่าวสารการแจ้งเตือนภัยน้ำท่วม” จากหน่วยงานภาครัฐ	ระดับความคิดเห็น				
	ไม่เลย	น้อย	ปานกลาง	มาก	มากที่สุด
49. ท่านมองว่า เนื้อหาของข่าวสารการแจ้งเตือนภัยน้ำท่วมของหน่วยงานภาครัฐที่ผ่านมา มีความเหมาะสมมากน้อยเพียงใด					
50 เนื้อหาของข่าวสารการแจ้งเตือนภัยน้ำท่วมของหน่วยงานภาครัฐต่างๆ ที่ผ่านมา มีความสอดคล้องต้องกันมากน้อยเพียงใด					
51. การแจ้งเตือนภัยน้ำท่วมของหน่วยงานภาครัฐต่างๆ ที่ผ่านมามีความสม่ำเสมอ ต่อเนื่อง มากน้อยเพียงใด					
52. เนื้อหาของข่าวสารการแจ้งเตือนภัยน้ำท่วมของหน่วยงานภาครัฐ ที่ผ่านมามีความชัดเจน ช่วยให้ท่านเข้าใจสถานการณ์น้ำท่วมมากน้อยเพียงใด					
53. ท่านมองว่าเนื้อหาของข่าวสารการแจ้งเตือนภัยน้ำท่วมของหน่วยงานภาครัฐ ที่ผ่านมามีความถูกต้อง เพียงตรง มากน้อยเพียงใด					

การปฏิบัติตัวเมื่อได้รับฟังข่าวสารแจ้งเตือนภัยพิบัติ	ใช่	ไม่ใช่
54. เมื่อรับฟังข่าวแจ้งเตือนภัยจากหน่วยงานราชการใดหน่วยงานหนึ่งแล้ว แล้วทำตามเลยทันที		

55. ท่านมักจะตรวจสอบข่าวสารกับหน่วยงานอื่น หลายๆ หน่วยงาน ก่อนที่จะตัดสินใจดำเนินการใดๆ		
56. ท่านจะตรวจสอบข่าวกับสำนักข่าวต่างๆ ก่อนที่จะตัดสินใจดำเนินการใดๆ		
57. ท่านจะตรวจสอบข่าวกับ <u>คนรอบข้าง</u> เช่น เพื่อน ญาติ เพื่อนบ้าน เพื่อนร่วมงาน ก่อนที่จะตัดสินใจดำเนินการใดๆ		

ท่านเคยประสบกับภัยธรรมชาติเหล่านี้หรือไม่	เคย	ไม่เคย
58. ลมพายุพัดถล่ม		
59. แผ่นดินไหว		
60. ดินโคลนถล่ม		
61. คลื่นยักษ์สึนามิ		
62. ภัยแล้ง		
63. ภัยหนาว		
64. น้ำท่วม		

65. ท่านเป็นผู้ประสบภัยน้ำท่วมปี 2554 ใช่หรือไม่

[] ใช่ [] ไม่ใช่

66. เหตุการณ์น้ำท่วมที่รุนแรงที่สุดในชีวิตของท่าน ทำให้ครอบครัวได้รับผลกระทบมากน้อยเพียงใด (ตอบเพียง 1 ข้อ)	ทำเครื่องหมาย ✓ ลงในช่องที่ตรงกับผลกระทบที่ท่านได้รับ
ได้รับผลกระทบระดับ 5 คือ บ้านเรือน อาคาร ทรัพย์สินข้าวของเสียหาย <u>เกือบทั้งหมด (เกือบ 100%)</u> อยู่บ้านไม่ได้ ต้องอพยพ	
ได้รับผลกระทบระดับ 4 คือ บ้านเรือน อาคาร ทรัพย์สิน ข้าวของเสียหาย <u>มากพอสมควร (ประมาณ 70-80)</u> อยู่บ้านไม่ได้ ต้องอพยพ	
ได้รับผลกระทบระดับ 3 คือ บ้านเรือน อาคาร ทรัพย์สิน ข้าวของเสียหาย <u>บางส่วน (ประมาณ 50%)</u> แต่ยังอาศัยอยู่ภายในบ้านได้ ไม่ได้อพยพ แต่ใช้ชีวิตประจำวันได้ยากลำบากพอสมควร	
ได้รับผลกระทบระดับ 2 คือ บ้านเรือน อาคาร ทรัพย์สิน ข้าวของเสียหาย <u>เพียงเล็กน้อย (ประมาณ 5-10%)</u> สามารถอาศัยอยู่ในบ้าน การใช้ชีวิตประจำวันลำบากเล็กน้อย	
ได้รับผลกระทบระดับ 1 คือ บ้านเรือน อาคาร ทรัพย์สิน ข้าวของ <u>แทบไม่เสียหาย</u> อาศัยอยู่ในบ้านได้ ใช้ชีวิตได้เกือบเหมือนปกติ	

67. เหตุการณ์น้ำท่วมที่รุนแรงที่สุดในชีวิตของท่าน น้ำท่วมบ้านท่านนานกี่วัน? (ทำเครื่องหมาย V ลงในช่องที่ตรงกับผลกระทบที่ท่านได้รับ)

ไม่เกิน 3 วัน	ประมาณ 7 วัน	ประมาณ 14 วัน	ประมาณ 21 วัน	30 วัน เป็นต้นไป

ความคิดเห็นของท่านต่อความรับผิดชอบในการป้องกันและเตรียมความพร้อมรับมือ น้ำท่วม	ความคิดเห็น				
	ท่านคนเดียว	ส่วนมากเป็นหน้าที่ของท่าน	ท่านกับหน่วยงานภาครัฐร่วมกัน	ส่วนมากเป็นหน้าที่หน่วยงานภาครัฐ	หน่วยงานภาครัฐแต่เพียงผู้เดียว
68. ท่านคิดว่า การป้องกันและลดผลกระทบความเสียหายของน้ำท่วมต่อบ้านเรือนทรัพย์สินของท่าน ควรเป็นหน้าที่หรือความรับผิดชอบของใคร					
69. ท่านคิดว่า การเตรียมความพร้อมให้ท่านและครอบครัว สามารถรับมือกับน้ำท่วมได้ ควรเป็นหน้าที่หรือความรับผิดชอบของใคร					

ความคิดเห็นของท่านต่อโครงสร้างและระบบป้องกันน้ำท่วมในชุมชน	ระดับความเชื่อมั่น				
	ไม่เลย	เล็กน้อย	ปานกลาง	มาก	มากที่สุด
70. ท่านเชื่อมั่นมากน้อยเพียงใด ว่าพนักงานน้ำ เชื้อนรอบแม่น้ำ ระบบท่อระบายน้ำ สถานีสูบน้ำในชุมชน ได้รับการทำนุบำรุงรักษาซ่อมแซมให้คงทนแข็งแรง อยู่เสมอ					
71. ท่านเชื่อมั่นมากน้อยเพียงใด ว่าพนักงานน้ำ เชื้อนรอบแม่น้ำ ระบบท่อระบายน้ำ สถานีสูบน้ำในชุมชน สามารถป้องกันน้ำท่วมได้					
72. ท่านเชื่อมั่นมากน้อยเพียงใด ว่าหน่วยงานภาครัฐที่ดูแลจัดการน้ำท่วมในเขตพื้นที่ที่ท่านอาศัยอยู่มีจำนวนเจ้าหน้าที่เพียงพอต่อการรับมือ น้ำท่วม					
73. ท่านเชื่อมั่นมากน้อยเพียงใด ว่าเจ้าหน้าที่ภาครัฐที่ดูแลจัดการน้ำท่วมในเขตพื้นที่ที่ท่านอาศัยอยู่มีความรู้ความสามารถมีทักษะ ที่จำเป็นต่อการบริหารจัดการปัญหาน้ำท่วมเป็นอย่างดี					

74. ท่านเชื่อมั่นมากน้อยเพียงใด ว่าเทศบาล หรือ อบต. มี <u>เครื่องมืออุปกรณ์</u> เพียงพอ ต่อรับมือกับน้ำท่วม เช่น กระสอบทราย เรือท้องแบน รถบรรทุกยกสูง รถดับเพลิงสำหรับขนน้ำ ใช้น้ำดื่ม เครื่องสูบน้ำ และอื่นๆ					
75. ท่านเชื่อมั่นมากน้อยเพียงใดว่า หากเกิดน้ำท่วม เทศบาล หรือ อบต. จะสามารถดูแลเรื่องอาหารการกิน เรื่องชีวิตความเป็นอยู่ของท่านขณะเกิดน้ำท่วมได้เป็นอย่างดี					
76. ท่านเชื่อมั่นมากน้อยเพียงใด ว่า เทศบาล หรือ อบต. มี <u>ระบบเตือนภัยน้ำท่วม</u> ที่ดี					
ความคิดเห็นของท่านต่อโครงสร้างและระบบป้องกันน้ำท่วมในชุมชน	ไม่ เลย	เล็กน้อย	ปาน กลาง	มาก	มาก ที่สุด
77. ท่านเชื่อมั่นมากน้อยเพียงใด ว่าเทศบาล หรือ อบต. สามารถช่วยท่านและครอบครัวอพยพออกจากพื้นที่เสี่ยงภัย หากเกิดน้ำท่วม ได้เป็นอย่างดี					
78. ท่านเชื่อมั่นมากน้อยเพียงใดว่า หากเกิดน้ำท่วมและต้องอพยพไปอยู่ศูนย์พักพิง เทศบาล หรือ อบต. จะสามารถ จัดการศูนย์พักพิง ดูแลเรื่องอาหารการกินยารักษาโรคการปฐมพยาบาล ได้เป็นอย่างดี					
79. ท่านเชื่อมั่นมากน้อยเพียงใด ว่าเทศบาล หรือ จะสามารถช่วยเหลือท่าน ในการให้เงินสนับสนุนการซ่อมแซมบ้านเรือนและฟื้นฟูการประกอบอาชีพหลังน้ำลดได้อย่างดี					

สิ่งบอกเหตุทางธรรมชาติและพฤติกรรมเพื่อนบ้าน	ระดับความคิดเห็น				
	ไม่เคย เลย	ทำ น้อย	ทำบ้าง บางครั้ง	ทำมาก/ บ่อย	ทำเป็น ประจำ
80. ท่านมักจะสังเกตระดับน้ำในคลองใกล้บ้านทุกครั้งก่อนที่จะตัดสินใจว่าจะเตรียมความพร้อมรับมือกับน้ำท่วมหรือไม่					
81. ท่านมักจะสังเกต <u>ท้องฟ้า</u> เสียงหรือลักษณะลม ก่อนที่จะตัดสินใจว่าจะเตรียมตัวรับมือกับลมพายุหรือน้ำท่วมที่อาจจะตามมา					
82. ท่านมักจะสังเกตการตกของฝนว่าตกหนักแค่ไหน ตกกี่วันก่อนที่จะตัดสินใจว่า จะเตรียมตัวรับมือกับน้ำท่วมหรือไม่					
83. หากท่านเห็นเพื่อนบ้านใกล้ๆ กัน เตรียมกระสอบทราย ข้าวสารอาหารแห้ง เพื่อเตรียมตัวรับมือกับน้ำท่วม ท่านก็จะทำตามเช่นกัน					

84. หากท่านเห็นเพื่อนบ้านใกล้เคียงกัน เตรียมเดินทางอพยพไปอยู่ที่ปลอดภัย ท่านก็จะเตรียมการอพยพเช่นกัน					
--	--	--	--	--	--

Appendix 4 Pictures of Field Trips

Figure 6 Interviewing with Subdistrict Municipality Mayor



Figure 7 Taking a Site Visit to Provincial Administrative Organization's Emergency Response Vehicles Garage



Figure 8 Interviewing Company's Representatives Regarding Disaster Preparedness and Business Continuity Practices



Figure 9 Exploring Flood Protection Systems of an Industrial Estate in Ayuttaya Province



Appendix 5 Manuscript

Title:

The Effect of Leadership on Disaster Resilience: Evidence from Thailand

Authors:

Somporn Khunwsihit, Prince of Songkla University

Chanisada Choosuk, Prince of Songkla University

Gary Webb, University of North Texas

(Please see the attached file/document)

Manuscript Details

Manuscript number	LEAQUA_2017_382
Title	The Effect of Leadership on Disaster Resilience: Evidence from Thailand
Article type	Short communication

Abstract

This study investigates the role of leadership in enhancing disaster resilience. Based on related literature and research, DRL and RI scales were developed as measures to capture the level of disaster resilience leadership and the progress level of disaster risk reduction and resilience building, respectively. Then, the relationships of these two variables were examined together with other selected variables. Using multiple regression technique to analyze data obtained from a survey questionnaire administered with 100 municipalities in Thailand, we found that disaster resilience leadership ability had a statistically significant, positive effect on disaster resilience of a municipality. Our findings underlined the role of leadership in making cities more resilient and had shed some light on how local government leaders could contribute to the progress of disaster risk reduction. At the end of the paper, we discussed academic implications and practical contributions of our research.

Keywords	Leadership; Disaster Risk Reduction; Resilience; Emergency Management; Public Administration
Taxonomy	Disaster Management, Public Administration, Emergency Management, Leadership, Local Government, Crisis Management
Corresponding Author	Somporn Khunwishit
Corresponding Author's Institution	Prince of Songkla University
Order of Authors	Somporn Khunwishit, Chanisada Choosuk, Gary Webb

Submission Files Included in this PDF

File Name [File Type]

Cover letter_Khunwishit 2017.pdf [Cover Letter]

Title Page_Khunwishit 2017.docx [Title Page (with Author Details)]

LD and Resilience_Khunwishit 2017_LQ.docx [Manuscript (without Author Details)]

Tables_Khunwishit 2017.docx [Table]

To view all the submission files, including those not included in the PDF, click on the manuscript title on your EVISE Homepage, then click 'Download zip file'.

Professor Dr. John Antonakis
Editor in Chief
The Leadership Quarterly

June 28, 2017

Dear Professor Dr. Antonakis:

I am pleased to submit an original research article entitled “The Effect of Leadership on Disaster Resilience: Evidence from Thailand” by Somporn Khunwishit, Chanisada Choosuk and Gary Webb for consideration for publication in The Leadership Quarterly.

As the paradigm of disaster management has evolved from focusing on emergency response and recovery to a more proactive approach known as disaster risk reduction and resilience building, a new set of leadership skills or abilities is thus required for city leaders to perform such new tasks more effectively. We argue that, in this new era of disaster management, the role of a leader is not just controlling or commanding. Instead, the leader needs to possess multiple skills or abilities in order to collaborate and coordinate efforts from various stakeholders in reducing disaster risk and building resilience of a city. In this manuscript, we show how Disaster Resilience Leadership abilities help municipality mayors to promote disaster resilience.

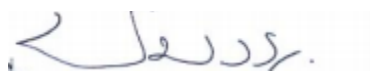
We believe that this manuscript is appropriate for publication by The Leadership Quarterly. Our manuscript creates a paradigm for future studies of leadership in the context of disasters.

This manuscript has not been published and is not under consideration for publication elsewhere. This study was supported by a grant from The Thailand Research Fund and Prince of Songkhla University, Thailand. We have no conflicts of interest to declare.

Please address all correspondence to:
Somporn Khunwishit
Faculty of Management Sciences,
Prince of Songkla University,
Hat Yai District, Songkhla Province, Thailand 90112
Tel.: +66 937 580 808
E-mail address: somporn.kh@psu.ac.th

We shall look forward to hearing from you at your convenience.

Sincerely,



Somporn Khunwishit, PhD, Department of Public Administration,
Faculty of Management Sciences, Prince of Songkla University

The Effect of Leadership on Disaster Resilience: Evidence from Thailand

Somporn Khunwishit^a, Chanisada Choosuk^b, Gary Webb^c

^a *Prince of Songkla University, Thailand*

^b *Prince of Songkla University, Thailand*

^c *University of North Texas, USA*

Corresponding Author:

Somporn Khunwishit

Full Postal Address of Corresponding Author:

Faculty of Management Sciences,

Prince of Songkla University,

Hat Yai District, Songkhla Province, Thailand 90112

Tel.: +66 937 580 808

E-mail address: somporn.kh@psu.ac.th

Funding: This work was supported by The Thailand Research Fund [TRF] [grant number TRG5880127] and Prince of Songkla University.

The Effect of Leadership on Disaster Resilience: Evidence from Thailand

Abstract

This study investigates the role of leadership in enhancing disaster resilience. Based on related literature and research, DRL and RI scales were developed as measures to capture the level of disaster resilience leadership and the progress level of disaster risk reduction and resilience building, respectively. Then, the relationships of these two variables were examined together with other selected variables. Using multiple regression technique to analyze data obtained from a survey questionnaire administered with 100 municipalities in Thailand, we found that disaster resilience leadership ability had a statistically significant, positive effect on disaster resilience of a municipality. Our findings underlined the role of leadership in making cities more resilient and had shed some light on how local government leaders could contribute to the progress of disaster risk reduction. At the end of the paper, we discussed academic implications and practical contributions of our research.

Keywords: Leadership; Disaster Risk Reduction; Resilience; Emergency Management;
Public Administration

1. Introduction

For decades, earthquakes, floods, storms and other climate-related crises have become one of the major sources of property damage and life loss around the world. These extreme events have not only increased in the frequency, but also in severity. The United Nations international Strategy for Disaster Reduction (UNISDR) has reported that, from 2000-2012, natural disasters have caused a total damage for about 1.7 trillion U.S. dollars, affected 2.9 billion people and killed 1.2 million people around the world. Put simply, each year, natural disasters caused a total damage of about 13.1 billion U.S. dollars, affected 223 million people and killed 92,308 people (UNISDR, 2012a). Examples of catastrophes that produced remarkable impacts within the last 15 years are the Indian Ocean tsunami in 2004, hurricane Katrina in 2005, super cyclone Nargis in Myanmar in 2008, Sichuan earthquake in China in 2008, the 2011 earthquake and tsunami in Japan, typhoon Haiyan that hit the Philippines on Friday 8, 2013, and the earthquake in Nepal in 2015. Such increases in the frequency and impact of disasters have made city resilience building become more important at the global level.

In 2005, when the Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters was announced, disaster risk reduction has been acknowledged worldwide as the new approach to managing disasters at both local and national levels. In 2010, UNISDR launched a campaign called “Making Cities Resilient (MCR)” to encourage local government leaders around the world to adopt disaster risk reduction as an approach to reducing disaster risk and building resilience for their cities. As of May 19, 2017, there have been 3,564 cities signing up to participate in the campaign (UNISDR, 2017). This gradual increase in the number of cities participating in the MCR campaign has suggested that disaster risk reduction approach to disaster management have

been more accepted by those who are involved in city management as the new, sustainable, and more effective way in managing disasters.

However, risk reduction approach is not without flaws. Although, the efficacy of disaster risk reduction approach in minimizing the risk and increasing coping capacity is widely recognized, implementing disaster risk reduction and resilience building strategies is quite challenging and its achievements have been quite varied. For example, in 2011, World Bank has reported disaster risk reduction progress score of 168 countries that adopted the Hyogo Framework for Action (HFA) since 2005. Disaster risk reduction progress was assessed by scores which ranged from 1 (worst) to 5 (best or most progress). The report showed that only a few had made a good progress (received score of 4.5 and above) while more than half of them had made a moderate or low level of progress (World Bank, 2017).

Hence, it is interesting to understand the factors that are supportive to successful implementation of disaster risk reduction and resilience building. When it comes to disaster management, it is inevitably that local government leaders play a key role in leading and coordinating a variety of tasks or operations. Thus, in this research, we focus on the leadership factors and their effects on disaster resilience of a city. Our research question is simple, that is, can city resilience be enhanced by leadership? And, what are the types of quality, characteristics, or ability of a leader that help promote city resilience? Findings from our research could serve as a lesson that local government leaders can learn as they are trying to implement disaster risk reduction and promote resilience to the impact of future disasters that might occur.

2. Conceptual background and literature review

2.1 Disaster resilience

Disaster resilience is “the capacity of any entity—an individual, a community, an organization, or a natural system—to prepare for disruptions, to recover from shocks and stresses, and to adapt and grow from a disruptive experience” (Rodin, 2014). It is often used interchangeably with such terms as community resilience and city resilience. In academic world, community or disaster resilience as a research topic in the field of disaster study was first empirically examined by Paton and Johnston in 2001 and has gradually gained attentions from disaster management scholars since then. Thus, for more than a decade, disaster resilience researchers and scholars have been interested in explaining how social units such as groups, organizations, and communities could effectively cope with sudden shocks and identifying the factors that contributed to such adaptive and recovery capacities.

In practical realm, however, disaster resilience has just become an international agenda when the Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters was launched in 2005 (UNISDR, 2005) and then, in 2015, substituted by the Sendai Framework for Disaster Risk Reduction 2015-2030 (UNISDR, 2015). By providing expected outcome, strategic goals, and priorities of action as practical guidelines for reducing disaster risk, the HFA and the Sendai Framework help local government leaders build resilience of their cities.

To help achieving expected outcome, strategic goals, and priorities of action for disaster reduction, UNISDR launched the Making Cities Resilient (MCR) Campaign in 2010 to encourage local governments to adopt its guiding practices in building resilience of a city. In its “How to Make Cities More Resilient: A Handbook for Local Government Leaders”, UNISDR identifies 10 essential tasks that local government leaders need to perform to ensure that hazard risks are reduced and adaptive capacities are built in their cities. These essential tasks are: (1) organization and coordination for resilience; (2) providing budget and incentives for risk reduction; (3) updating hazard and vulnerability data; (4) investing in risk

reducing infrastructure; (5) assessing the safety of all schools and health facilities; (6) enforcing risk-compliant building regulations and land use planning; (7) ensuring education programs and training on disaster risk reduction; (8) protecting ecosystems and natural buffers to mitigate hazards and adapt to climate change; (9) installing early warning systems and emergency management capacities; and (10) ensuring that the needs and participation of the affected population are at the center of reconstruction. While disaster risk reduction and resilience building require a team effort that incorporates all related parties including local government, academia, citizens, community groups, private sector/business community, professional groups, civil society, non-governmental organizations, national government authorities and parliamentarians, and international organizations (UNISDR, 2012b), it is the direct responsibility of local government leaders to lead the implementation of disaster risk reduction and resilience building programs and turn such efforts into realistic outcomes.

2.2 Factors affecting disaster resilience

Disaster resilience has been empirically examined by researchers for more than 16 years. The aims of the previous studies were mainly to explain why some communities did better or were successful in responding to and bouncing back from the deadly disasters while others failed. Findings from previous studies have suggested that community's disaster resilience could be attributable to several factors. These included: a sense of community, problem-focused coping style, self- or collective efficacy (Tobin, 1999; Paton and Johnston, 2001), social support or social capital (Buckland and Rahman, 1999; Rhinard and Sundelius, 2010; Buckle et al., 2003), citizen participation in voluntary organizations (Childs, 2008), local leaders (Buckle et al., 2003; Paton and Auld, 2006; Boin, 2010), disaster management policies, plans and practices (Manyena, 2006), process-oriented hazard mitigation policies (Birkland, 2010), organizational preparedness (Kendra and Wachtendorf, 2003), cooperation

(Rhinard and Sundelius, 2010), learning and communication (Comfort et al., 2010; Buckle et al., 2003), local knowledge, experience, value, and culture (Jang and LaMendola, 2006; Jang and Wang, 2009), infrastructure and lifelines (Cutter et al., 2008; 2010; Johnston et al., 2006), and demographic characteristics of a community (Cutter et al., 2008; Lahad, 2008).

Drawing upon previous research and literature, Khunwishit (2013) has categorized disaster resilience factors into six groups. They were psychological factors, infrastructural factors, socio-economic factors, social-capability and social capital factors, managerial and organizational factors, and cultural factors. Leadership, a focus of this recent research, was grouped into the managerial and organizational group of factors.

2.3 Leadership and disaster resilience

There seems to be a common understanding among emergency management scholars that leadership can promote disaster resilience. Boin (2010), for example, argued that public leaders were responsible for creating social bonds between the community's members and their trust in societal institutions, which was the primary condition for building disaster resilience for the community. In addition, to improve community resilience, the job of local leaders was to make sure that basic response mechanisms were in place, potential responders were trained to act independently, all potential crisis management actors exercised on a regular basis, planning was continuous, mobile information-gathering units were in place, and administrative capacity existed to organize long-term reconstruction efforts (Boin, 2010 as cited in Khunwishit, 2013).

Other researchers found that leadership affected organizational resilience and team performance under crisis. Huettermann et al. (2014) examined the effect of leadership on team identification of UN Peace-building team members and found four dimensions of leadership that positively affected team identification: providing guidance, encouraging

involvement, role modeling, and administering teamwork. These four leadership behaviors were important because they helped promote cooperation among team members and mitigate dysfunctional team processes (van der Vegt & Bunderson, 2005 as cited in Huettermann et al., 2014). Another study examined the role of leadership in the context of terrorist attacks. Birkeland et al. (2017) conducted a longitudinal study to assess the impact of a terrorist attack on employees' perceptions of leadership. By analyzing the data collected from a sample of ministerial employees following the 2011 Oslo bombing, the results showed that, during a crisis, being supportive, fair, and empowering were the three leadership behaviors that helped increase organizational resilience. This finding was consistent with what has been found by Peus (2011) and Farooq Malik et al. (2014).

Findings from these previous studies clearly suggested that disaster resilience could be enhanced by leadership. However, what exactly the type of leadership ability that helps promote disaster resilience is not yet clearly answered and, hence, needed to be empirically examined. To initially respond to this research question, we reviewed two approaches to disaster management: traditional approach and disaster risk reduction approach.

In traditional approach to disaster management, on which emergency response and disaster recovery are the focus, community or city leaders are expected to lead in managing emergency response operations such as emergency warning, search and rescue, evacuation, sheltering, mass and medical cares, and handling the media. By position and responsibility, he or she will take a commanding role in responding to emergency incidents. Thus, crisis leadership is the type of leadership that suits local government role and responsibilities in responding to the crisis quite well. To lead effectively during a crisis, leaders need to have an ability to build trust, change corporate mindset, identify vulnerabilities, make a wise and rapid decision, act courageously, and learn to help promote change (James & Wooten, 2004). In additions, to ensure successful response operations, emergency manager needs to play a

collaborative role. As Waugh & Streib (2006) suggest, successful responses to an emergency depend on how well organizations, governments, and sectors in all sectors and at all levels are collaborated. Thus, the role of a leader is to be a collaborator that brings together efforts from all stakeholders into emergency response operations.

In disaster risk reduction approach, however, leaders are expected to do more than just responding to an emergency. Disaster risk reduction approach to disaster management has emerged since UNISDR announced the Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters in 2005. This approach strives to create a safe and sustainably growing city by means of reducing disaster risk and building resilience for the city. To achieve the goals in minimizing disaster risk and increasing resilience, local government leaders need to ensure that the following priorities of action are fully implemented and continually maintained: identification, assessment and monitoring disaster risks; reducing the underlying risk factors; building a culture of safety and resilience (UNISDR, 2005); strengthening disaster risk governance to manage disaster risk; investing in disaster risk reduction for resilience; enhancing disaster preparedness for effective response and to “Built Back Better” in recovery, rehabilitation and reconstruction (UNISDR, 2015).

To be more specific, Berkowitz (2015) suggests that the tasks of Chief Resilience Officer (CRO), a city’s key person responsible for developing and implementing resilience strategy, in reducing disaster risk and building resilience for a city should include: (1) working across government departments to help a city improve internal communication, address its own complexities, and surface new collaboration; (2) bringing together a wide array of stakeholders to learn about the city’s challenges and build support for individual initiatives that help the city build resilience; (3) leading the development of the city’s resilience strategy, which unites the city’s key resilience challenges and opportunities, and

spurs the city to act on them; and (4) ensuring the city applies a resilience lens to everything it does so that resources are leveraged holistically and projects planned for synergy. To accomplish these tasks of reducing disaster risk and building resilience, Salkin (2014) suggests that, a city's Chief Resilience Officer needs to rely on the following abilities:

1) Ability to inspire, influence, and enlist colleagues and city residents to activate the city's resilience strategy.

2) Ability to understand their community and local setting and to establish and maintain strong engagement from municipal leader, city residents, and key stakeholders.

3) Ability to represent the city in global forums in order to share information, ideas, best practices, and more effectively develop innovative solutions.

4) Ability to communicate with and be effective within multiple sectors and disciplines such as transportation, energy, healthcare, housing, education, and community engagement.

5) To be resourceful and willing to experiment, pursue new ideas and take risks.

6) Ability to communicate effectively to drive the resilience conversation in the city and engaging stakeholder support.

7) Ability to manage multiple streams of work and multiple relationships in an effective and efficient manner.

As disaster management paradigm has evolved from a traditional approach that focuses on managing an emergency to a more proactive approach that emphasizes the reduction of disaster risk and building resilience, we argued that it was these abilities that helped local government leaders get the tasks of disaster risk reduction and resilience building done effectively. Based on related literature and concepts elaborated above, we referred to a set of abilities that helped local government leaders to perform disaster risk

reduction and resilience building activities effectively as Disaster Resilience Leadership (DRL). We also hypothesized that DRL was the type of leadership ability that enhanced city's disaster resilience. We examined DRL among local government leaders which, in our research, not only referred to the municipality mayor, but also included other highly positioned administrators who were directly responsible or assigned for carrying out disaster management functions such as deputy mayor, municipal clerk as well an emergency manager. We then tested the effect of DRL on city's disaster resilience.

3. Methods

3.1 Data and sample

To examine the effect of leadership on disaster resilience, we developed a questionnaire using the results of qualitative data analysis obtained from interviews with mayors and representatives of 8 municipalities from four regions of Thailand and, then, supplemented by the 10 Essentials Framework for Making Cities Resilient developed by UNISDR and the concept of Chief Resilience Officer introduced by Salkin (2014). Our questionnaire consisted of three parts: respondent information and municipality profile, 10 Essentials of City Resilience (which reflected the progress of disaster risk reduction and resilience building), and Disaster Resilience Leadership abilities of local government leaders. Then, the survey questionnaires were distributed to 367 municipalities all over Thailand. From August to November 2016, there were 104 questionnaires returned to us making the return rate of about 28%. However, a total of 100 questionnaires was the final sample size used in our analysis as 4 questionnaires contained invalid information for some items.

Of these 100 samples, 93% were sub-district municipalities, 5% were town municipalities, and 2% were city municipalities. In Thailand's local government administrative system, the type of municipality reflects population size, area, budget and

income of the city. That is, among the three, city municipality is the biggest type while sub-district municipality is the smallest. 50% of these municipalities were from the northern region, 18% from the northeast, 16% from the central, 9% from the south and 6% from the east. In term of risk profile, 34% were affected by flooding in 2010 and/or 2011 while 66% reported that they were not affected by these two catastrophic disasters.

Respondents of our surveys consisted of 88% males and 12% females. 42% of them were mayors, 4% were deputy mayors, 32 were municipal clerks, and 22% were other positions involved in disaster management functions. Respondents had mixed levels of education and earned different fields of study. 47% of respondents had a bachelor degree while 53% had a master degree or higher. 97% of respondents reported that they graduated a social sciences degree while 3% reported they graduated a sciences degree.

3.2 Measures

3.2.1 Disaster resilience

To measure disaster resilience, our dependent variable, we relied on UNISDR's 10 Essentials for Making Cities Resilient. The 10 Essentials provides a comprehensive framework for cities to reduce disaster risk and increase resilience. This framework lays out 10 practical guidelines for local governments to ensure that:

- 1) Organization and coordination for resilience are put in place so that role and responsibility of everyone are clarified.
- 2) Disaster risk reduction budget is assigned and incentives for homeowners, low-income families and private sector to invest in risk reduction are provided.
- 3) Hazard and vulnerability data are updated and risk assessments are prepared and shared.
- 4) Risk reduction infrastructure was invested and maintained.

- 5) The safety of all schools and health facilities is assessed and updated.
- 6) Risk compliant building regulations and land use planning principles are applied and enforced.
- 7) Disaster risk reduction training and education programs are in place in schools and communities.
- 8) Ecosystems and natural buffers for mitigating hazards and adapting to climate change are protected.
- 9) Early warning systems are installed and emergency management capacities are established.
- 10) The needs and participation of the affected population are at the center of reconstruction following a disaster (UNISDR, 2012b).

We used these 10 essential tasks as a basis for developing 10 items (questions) that reflected disaster risk reduction and resilience building activities implemented by municipalities in Thailand. In our survey questionnaire, respondents were asked to rate the progress they have made in reducing disaster risk and building resilience according to these 10 essentials. The choices that respondents could choose to answer each question ranged from 1 to 5. The descriptions for each of these choices are as follows:

5 = Comprehensive achievement has been attained, with the commitment and capacities to sustain efforts at all levels.

4 = Substantial achievement has been attained, but with some recognized deficiencies in commitment, financial resources or operational capacities.

3 = There is some institutional commitment and capacities to achieving DRR, but progress is not comprehensive or substantial.

2 = Achievements have been made but are incomplete, and while improvements are planned, the commitment and capacities are limited.

1 = Achievements are minor and there are few signs of planning or forward action to improve the situation (UNISDR, n.d.).

To capture the concept of disaster resilience, scores from these 10 (items) questions were summed and averaged to create Resilience Index (RI), which was a scale variable. Scores of RI ranged from 1 to 5, which 1 reflected the lowest level and 5 reflected the highest level of city's disaster resilience. Before computing the RI variable, reliability test was conducted to evaluate the internal consistency of these 10 items. Results from reliability analysis yielded an acceptable value of Cronbach's alpha (0.917), suggesting that these selected items had internal consistency and were acceptable to be used to create RI. The inter-item correlation matrix of the items used to create the Resilience Index is showed in Table 1 below.

[Insert Table 1 about here]

2.4 Disaster resilience leadership (DRL)

The main predictor variable of this study is Disaster Resilience Leadership (DRL). As elaborated earlier, our concept of DRL was adapted from Berkowitz (2015)'s idea of Chief Resilience Officer's tasks and Salkin (2014)'s concept of Chief Resilience Officer's responsibilities. To measure DRL we created 7 items in the questionnaire and asked respondents to self-assess their DRL abilities by rating the following 7 items:

1) I am able to inspire, influence, and enlist department heads and employees within the municipality office as well as city residents to agree on and support disaster risk reduction and resilience building strategy of the city.

2) I am able to learn and understand risk profile and other local settings of the city, especially those that are related to disaster risk such as local hazards, hazard exposure, and vulnerabilities of the city.

3) I am able to represent the city in national and/or global forums in order to share information, ideas, and best practices in disaster risk reduction and resilience building.

4) I am able to work with multiple sectors and disciplines (e.g., transportation, energy, healthcare, housing, education, environmental management, construction, public works, law enforcement, social works and community engagement) and to effectively coordinate disaster risk reduction and resilience building efforts with all these sectors and disciplines.

5) I am willing to experiment, pursue new ideas and take risks.

6) I am able to communicate effectively to drive the resilience conversation in the city and engage stakeholder support.

7) I am able to manage multiple streams of work and multiple relationships in an effective and efficient manner.

The response categories for each item had 5 scales (1 = Not at all true of me, 2 = Slightly true of me, 3 = Moderately true of me, 4 = Very true of me, 5 = Completely true of me). Scores from these 7 items were summed and averaged to create Disaster Resilience Leadership Index (DRLI), which was a scale variable. Scores of DRLI ranged from 1 to 5, which 1 reflected the lowest level and 5 reflected the highest level of disaster resilience leadership that was possessed by each local government leader participating in our research. Before computing the DRLI, reliability test was conducted to evaluate the internal

consistency of these 7 items. Results from reliability analysis yielded an acceptable value of Cronbach's alpha (0.915), suggesting that these selected items had internal consistency and were acceptable to be used to create a DRLI. The inter-item correlation matrix of the items used to create the DRLI is showed in Table 2 below.

[Insert Table 2 about here]

Although Disaster Resilience Leadership ability was the main predictor variable that we were interested in, we also recognized that disaster resilience of a city could be affected by other leadership characteristics of local government leaders as well as other related factors. These factors could not simply be disregarded. Hence, we included age, sex, educational level, field of study, work experience (number of year working for the municipality office), and number of year living in the city of local government leaders in our model. In additions, resilience of a city could also be affected by the type of municipality. As discussed earlier that, in Thailand's local government administrative system, the type of municipality reflects population size, area, budget, income, resources and management capabilities of the city. That is, among the three, city municipality is the biggest, sub-district municipality is the smallest, and town municipality is in between the two. In this sense, it was likely that the progress of disaster risk reduction and resilience building might vary according to municipality types. Thus, we also included municipality type (dummy variable) as a control variable in our model.

3.4 Data analysis strategy

Data from survey questionnaires were first coded and some items were recoded as appropriated. Missing data, skewness and kurtosis were then checked to ensure centrality

before analysis. After the data were cleaned, new variables were computed as needed (e.g., dummy variables, Resilience Index, Disaster Resilience Leadership Index). Quantitative analysis began with obtaining frequencies and descriptive statistics to explore personal characteristics of survey respondents, municipality profile, level of city's disaster resilience (RI), and the level of disaster resilience leadership (DRLI) of the local government leaders. Then, multiple regression analysis was conducted to test the relationships among selected variables. We analyzed only one model, which all predictor variables were included and tested at the same time. Descriptive statistics for continuous variables and frequencies for dummy variables are presented in Table 3 and Table 4, respectively.

[Insert Table 3 about here]

[Insert Table 4 about here]

Our analysis of frequencies and descriptive statistics showed that most of the respondents were male (88%), had a postgraduate degree (53%) and graduated with social science majors (97%). The average age of respondents was about 53 years old. On average, these local government leaders had reported that had been working for the municipality office (work experience) for about 9 years and living in the city for about 27 years. Our analysis also revealed that the mean score of Disaster Resilience Leadership Index (DRLI), our main predictor variable, was 3.28 ($M = 3.28$, $SD = .77$). This indicated that, on average, local government leaders who participated in our research perceived themselves as having a moderate level of Disaster Resilience Leadership. In terms of Resilience Index (RI), our dependent variable, results showed that the mean score was 2.92 ($M = 2.92$, $SD = .78$). This suggested that, on average, municipalities in Thailand had made a moderate level of progress

in implementation of disaster risk reduction and resilience building. The value of RI mean score (2.92) implied that, in Thailand, there was some institutional commitment and capacities to achieving disaster risk reduction but progress was not comprehensive or substantial.

4. Results

To examine how leadership affect disaster resilience of a city, the dependent variable Resilience Index (RI) was regressed on 8 predictor variables, which included Disaster Resilience Leadership Index (DRLI), age, sex (dummy), educational level (dummy), field of study (dummy), work experience (number of year working for the municipality office), number of year living in the city of local government leaders and municipality type (dummy). Municipality type was treated as a control variable. The result was statistically significant ($F = 17.193, p < .001$). Our model explained about 60.2 percent of the variation in the dependent variable Resilience Index ($R^2 = .602 * 100 = 60.2\%$). Results of the multiple regression analysis are presented in Table 5.

[Insert Table 5 about here]

According to the results, Disaster Resilience Leadership Index had a statistically significant, positive effect on Resilience Index ($b = .734, p < .001$). This could be interpreted that, controlling for the effects of all other predictors, municipalities whose local government leaders possessed a higher level of Disaster Resilience Leadership tended to have a higher level of resilience. Each one-point increase in scores on Disaster Resilience Leadership Index was on average associated with a .734-point increase in scores on Resilience Index. In additions, our analysis also revealed that number of year that local government leader worked

for the municipality office had a statistically significant, positive effect on resilience of a city ($b = .032, p < .01$). However, local government leader's age, sex, educational level, field of study, and number of year living in the city as well as municipality type were not found to be predictive of city's disaster resilience.

5. Conclusion and discussion

Disaster risk reduction and resilience building have become the new focus of today's disaster management practice. Thus, practitioners and researchers are now more interested in how disaster risk reduction and resilience building can be enhanced. Previous literature and studies suggested that disaster resilience of a city could be attributable to several factors including leadership. However, what characteristics, skills or abilities of leaders that exactly helps promote resilience of a city has not yet empirically been examined. Answering this simple question is important because it would shed light on how local government leaders can contribute and speed up efforts in reducing disaster risk and building resilience of their cities.

To examine the effect of leadership on disaster resilience of a city, one main hypothesis was developed and eight predictor variables were employed to test the hypothetical relationship. Results showed that our hypothesis was empirically supported. Disaster Resilience Leadership (DRL) had a positive effect on disaster resilience of a city. Put simply, our findings suggested that municipalities whose local government leaders possessed a higher level of DRL tended to make more progress in reducing disaster risk and building resilience for the city. We also found that year of work experience in the municipality office of local government leader was predictive of city's disaster resilience. This indicated that the longer a local government leader had worked for the municipality

office, the more progress in disaster risk reduction and resilience building the city could make.

In the past, local government leaders were often expected to take a command and control role in responding to an emergency or a disaster. In the current approach to disaster management, however, local government leaders are expected to proactively perform multiple tasks to reduce disaster risk and increase resilience of the cities. Thus, the new set of leadership is required to perform such tasks effectively. Findings from our research revealed that Disaster Resilience Leadership possessed by local government leaders enhanced resilience of a city. Our DRL model, which is adapted from Salkin's concept of Chief Resilience Officer, encompasses 7 abilities that are supportive to performing the 10 essential tasks of making cities resilient (MCR) and, thus, achieving priorities of action identified in the Sendai Framework for Disaster Risk Reduction.

For examples, the DRL ability to learn and understand risk profile and other local settings of the city (DRL Ability 2) would help local government leaders to better perform the task of updating hazard and vulnerability data and preparing risk assessment (MCR Essential Task 3) as well as assessing and updating the safety of schools and health facilities (MCR Essential Task 5). Effectively performing such tasks would, in turn, contribute to the achievement of the Sendai Framework's Priority of Action 1 (understanding disaster risk).

Likewise, DRL ability to inspire, influence, and enlist department heads and employees within the municipality office as well as city residents to agree on and support disaster risk reduction and resilience building strategy of the city (DRL Ability 1), DRL ability to work with multiple sectors and to effectively coordinate disaster risk reduction and resilience building efforts with all these sectors (DRL Ability 4), DRL ability to communicate effectively to drive the resilience conversation in the city and engage stakeholder support (DRL Ability 6) and DRL ability to manage multiple streams of work and multiple

relationships in an effective and efficient manner (DRL Ability 7) would help local government leaders to better perform the tasks of applying and enforcing risk compliance building regulations and land use planning principles (MCR Essential Task 6), providing disaster risk reduction training and education programs in schools and communities (MCR Essential Task 7), protecting ecosystems and natural buffers for mitigating hazards and adapting to climate change (MCR Essential Task 8), establishing emergency management capacities and installing early warning systems (MCR Essential 9) and putting the needs and participation of the affected population at the center of reconstruction following a disaster (MCR Essential 10). Consequently, successfully performing such tasks would help achieve the Sendai Framework's Priority of Action 2 (strengthening disaster risk governance to manage disaster risk), Priority of Action 3 (investing in disaster risk reduction for resilience) and Priority of Action 4 (enhancing disaster preparedness for effective response and to "Built Back Better" in recovery, rehabilitation and reconstruction).

To be short, we argue here again that, our Disaster Resilience Leadership model provides a set of leadership abilities that are supportive to performing the 10 essential tasks for making cities resilient and achieving priorities of action identified in the Sendai Framework for Disaster Risk Reduction. Thus, in this current paradigm of disaster management, it is this set of leadership abilities that is more applicable for leading and organizing city's efforts. This is simply because successful disaster risk reduction and resilience building for the city rely more on communication, coordination, and collaboration abilities of local government leaders, not an ability to command and control.

Findings of our research inform local government leaders on how they can significantly promote city's disaster resilience. The tasks of reducing disaster risk and building resilience for the city are ongoing in nature. Thus, implementing disaster risk reduction and resilience building initiatives, projects, and activities requires continuing,

consistent and persistent efforts from multiple stakeholders and sectors. Hence, the role of a local government leader is more than just to “command and control” as he/she does in emergency response. Instead, he/she needs to be a project initiator, a resources mobilizer, an efforts coordinator or collaborator (Waugh & Streib, 2006), a teamwork promoter, and a driver of city resilience strategy at the same time. To accomplish all these challenging tasks, local government leaders need to have multiple abilities. Built upon previous literature and research, our Disaster Resilience Leadership (DRL) model identified those abilities that were supportive to effectively carrying out disaster risk reduction and resilience building tasks. More importantly, the results of our empirical study showed that local government leaders who possessed a higher level of Disaster Resilience Leadership (DRL) could contribute significantly to the progress of disaster risk reduction and resilience building efforts. Thus, we accordingly recommend that, developing DRL abilities for local government leaders is essential if the city wants to achieve its goals in reducing disaster risk and building resilience.

One way to develop DRL abilities for local government leaders is to provide trainings and educations. The 7 abilities identified in our DRL model can serve as guidelines for designing DRL competencies that fit with cultural and local contexts of each city or country. Cities can work with local universities or other academic institutions to design DRL competencies and provide the DRL-based training, accordingly. It is also recommended in this paper that DRL-based training should not only be provided to municipality mayor or city manager, it should also be extended to emergency management personnel, heads of all departments, public agencies and representatives of private organizations, and community groups involved in disaster risk reduction and resilience building of the city. If the representatives of all relevant organizations and stakeholders have disaster resilience leadership abilities, resources used for disaster risk reduction and resilience building efforts

could be mobilized in a more holistic way and, most importantly, more progress could be made.

6. Acknowledgement

This research project was financially supported by The Thailand Research Fund [TRF] [grant number TRG5880127] and Prince of Songkla University. We greatly appreciated this support.

7. References

- Berkowitz, Michael. (2015). What a Chief Resilience Officer Does. Retrieved May 21, 2017 from <http://www.100resilientcities.org/blog/entry/what-is-a-chief-resilience-officer1#/-/>
- Birkeland, M. S., Nielsen, M. B., Hansen, M. B., Knardahl, S., & Heir, T. (2017). The impact of a workplace terrorist attack on employees' perceptions of leadership: A longitudinal study from pre-to postdisaster. *The Leadership Quarterly*, 1-13.
- Birkland, T.A. (2010). Federal disaster policy: Learning, priorities, and prospects for resilience. In L.K. Comfort, A. Boin and C.C. Demchak (Eds.), *Designing resilience: Preparing for extreme events* (pp. 106-128). Pittsburgh, PA: University of Pittsburgh Press.
- Boin, A. (2010). Designing resilience: Leadership challenges in complex adaptive systems. In L.K. Comfort, A. Boin and C.C. Demchak (Eds.), *Designing resilience: Preparing for extreme events* (pp. 129-142). Pittsburgh, PA: University of Pittsburgh Press.
- Buckland, J. and Rahman, M. (1999). Community-based disaster management during

- the 1997 Red River Flood in Canada. *Disasters*, 23(3), 174-191.
- Buckle, P., Marsh, G. and Smale, S. (2003). *The development of community capacity as applying to disaster management capability (project 14/2002)*. Mt Macedon, Australia: Emergency Management Australia.
- Childs, I. (2008). Emergence of new volunteerism: Increasing community resilience to natural disasters in Japan. In K.Gow and D.Paton (Eds.), *The phoenix of natural disasters: Community resilience* (pp. 171-180). New York City, NY: Nova Science Publishers, Inc.
- Comfort, L.K., Boin, A, and Demchak, CC. (2010). *Designing resilience: Preparing for extreme events*. Pittsburgh, PA: University of Pittsburgh Press.
- Comfort, L.K., Oh, N., Ertan, G. and Scheinert, S. (2010). Designing adaptive systems for disaster mitigation and response: The role of structure. In L.K. Comfort, A. Boin and C.C. Demchak (Eds.), *Designing resilience: Preparing for extreme events* (pp. 33-61). Pittsburgh, PA: University of Pittsburgh Press.
- Cutter, S.L., Barnes, L., Berry, M., Burton, Evans, E., Tate, E. and Webb, J. (2008). A place-based model for understanding community resilience to natural disasters. *Global Environmental Change*, 18(2008), 598-606.
- Cutter, S.L., Burton, C.G. and Emrich, C.T. (2010). Disaster resilience indicators for benchmarking baseline conditions. *Journal of Homeland Security and Emergency Management*, 7(1), 1-22.
- Farooq Malik, O., Abdullah, H., & Anak Uli, J. (2014). The effects of terrorism on work attitudes and behaviors: A literature review and a proposed model. *Journal of Aggression Conflict and Peace Research*, 6(3), 143-163.
- Huettermann, H., Doering, S., & Boerner, S. (2014). Leadership and team identification: Exploring the followers' perspective. *The Leadership Quarterly*, 25(3), 413-432.

- James, E. H., & Wooten, L. P. (2004). Leadership in turbulent times: Competencies for thriving amidst crisis. *Working Paper Series, Paper No.04-04*. Retrieved January 19, 2017 from <http://195.130.87.21:8080/dspace/bitstream/123456789/103/1/Leadership%20in%20turbulent%20times%20Hayes.pdf>
- Jang, L. and LaMendola, W. (2006). The Hakka spirit as a predictor of resilience. In D. Paton and D. Johnston (Eds.), *Disaster resilience: An integrated approach* (pp. 174-189). Springfield, IL: Charles C. Thomas Publisher, Ltd.
- Jang, L. and Wang J. (2009). Disaster resilience in a Hakka community in Taiwan. *Journal of Pacific Rim Psychology*, 3(2), 55-65.
- Johnston, D., Becker, J. and Cousins, J. (2006). Lifelines and urban resilience. In D. Paton and D. Johnston (Eds.), *Disaster resilience: An integrated approach* (pp. 40-65). Springfield, IL: Charles C. Thomas Publisher, Ltd.
- Kendra, J.M. and Wachtendorf, T. (2003). Elements of resilience after the World Trade Center disaster: Reconstructing New York City's emergency operations center. *Disasters*, 27(1), 37-53.
- Khunwishit, S. (2013). *Community Resilience in Thailand: A Case Study of Flood Response in Nakhonsawan City Municipality, dissertation, May 2013*; Denton, Texas. Retrieved June 9, 2017 from digital.library.unt.edu/ark:/67531/metadc271841/
- Lahad, M. (2008). Post traumatic responses in disasters: A community perspective. In K.Gow and D.Paton (Eds.), *The phoenix of natural disasters: Community resilience* (pp. 33-46). New York City, NY: Nova Science Publishers, Inc.
- Manyena, S.B. (2006). The Concept of Resilience Revisited. *Disasters*, 30(4), 433-450.
- Paton, D. and Auld, T. (2006). Resilience in emergency management: Managing the

- flood. In D. Paton and D. Johnston (Eds.), *Disaster resilience: An integrated approach* (pp. 267-287). Springfield, IL: Charles C. Thomas Publisher, Ltd.
- Paton, D. and Johnston, D. (2001). Disasters and communities: Vulnerability, resilience and preparedness. *Disaster Prevention and Management*, 10 (November, 4), 270-277.
- Peus, C. (2011). Money over man versus caring and compassion? Challenges for today's organizations and their leaders. *Journal of Organizational Behavior*, 32(7), 955-960.
- Rhinard, M. and Sundelius, B. (2010). The limited of self-reliance: International cooperation as a source of resilience. In L.K. Comfort, A. Boin and C.C. Demchak (Eds.), *Designing resilience: Preparing for extreme events* (pp. 196-219). Pittsburgh, PA: University of Pittsburgh Press.
- Rodin, J. (2014). *The resilience dividend: Being strong in a world where things go wrong* (1st edition.). New York: PublicAffairs.
- Salkin, A. (2014). *What is a Chief Resilience Officer?* Retrieved January 19, 2017 from http://www.100resilientcities.org/blog/entry/what-is-a-chief-resilience-officer#/-/_/
- Tobin, G.A. (1999). Sustainability and community resilience: The holy grail of hazards planning. *Environmental Hazards* 1, 13-26.
- UNISDR. (2005). *Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters*. Geneva: United Nations, 2005.
- UNISDR. (2012a). *Disaster Impacts 2000-2012*. Retrieved November 22, 2013 from http://www.preventionweb.net/files/31737_20130312disaster20002012copy.pdf
- UNISDR. (2012b). *How To Make Cities More Resilient: A Handbook For Local Government Leaders*. Geneva: United Nations, 2012.
- UNISDR. (2015). *Sendai Framework for Disaster Risk Reduction 2015-2030*. Geneva: United Nations, 2015.

UNISDR. (2017). *Making Cities Resilient: My City is Getting Ready*. Retrieved May 19, 2017 from <http://www.unisdr.org/campaign/resilientcities/home/index>

UNISDR. (n.d.). Overview of the Local Government Self-Assessment Tool for Disaster Resilience. Retrieved 23 May, 2017 from <http://www.unisdr.org/applications/hfa/assets/lgsat/documents/Overview-of-the-LGSAT-English.pdf>

Waugh, W. L., & Streib, G. (2006). Collaboration and leadership for effective emergency management. *Public administration review*, 66(s1), 131-140.

World Bank. (2017). Disaster Risk Reduction Progress Score: 2011. Retrieved May 19, 2017 from <http://data.worldbank.org/indicator/EN.CLC.DRSK.XQ>

Table 1

Inter-Item Correlation Matrix for Resilience Index (RI)

	1	2	3	4	5	6	7	8	9	10
1	1.000									
2	.498	1.000								
3	.656	.667	1.000							
4	.533	.387	.495	1.000						
5	.528	.484	.609	.683	1.000					
6	.421	.463	.538	.584	.712	1.000				
7	.495	.379	.534	.476	.680	.613	1.000			
8	.418	.391	.533	.542	.617	.612	.756	1.000		
9	.489	.417	.531	.400	.529	.533	.552	.570	1.000	
10	.506	.300	.489	.455	.526	.504	.497	.520	.628	1.000

Table 2

Inter-Item Correlation Matrix for Disaster Resilience Leadership Index DRLI

	1	2	3	4	5	6	7
1	1.000						
2	.659	1.000					
3	.446	.431	1.000				
4	.500	.508	.681	1.000			
5	.560	.563	.618	.744	1.000		
6	.566	.473	.620	.740	.795	1.000	
7	.545	.469	.590	.679	.754	.790	1.000

Table 3

Descriptive statistics for continuous variables in the model (N = 100)

Variables	<i>Min</i>	<i>Max</i>	<i>M</i>	<i>SD</i>
Age	36	74	52.82	7.55
No. of Year	1	28	9.29	6.60
Working				
No. of Year	1	74	27.25	21.10
Living				
DRLI	1.71	5.00	3.28	.77
RI	1.20	5.00	2.92	.78

Table 4

Frequencies for dummy variables in the model (N = 100)

Variables	Code 1 (%)	Code 0 (%)
Municipality Type	Sub-district (93%)	Others (7%)
Sex	Male (88%)	Female (12%)
Educational Level	Undergrad (47%)	Postgrad (53%)
Field of Study	Social Sciences (97%)	Sciences/others (3%)

Table 5

Results of regression of Resilience Index (RI) on selected variables (N = 100)

Variables	<i>b</i>	Beta
Municipality Type (Sub-district)	-.207 (.208)	-.068
Age	-.002	-.015

	(.008)	
Sex (Male)	-.084	-.035
	(.166)	
Educational Level (Undergrad Degree)	.191	.123
	(.123)	
Field of Study (Social Sciences)	-.106	-.023
	(.315)	
No. of Year Working	.032**	.267
	(.009)	
No. of Year Living	.005	.139
	(.003)	
Disaster Resilience Leadership Index (DRLI)	.734***	.721
	(.069)	
Constant	.440	
R ²	.602	

Note. N = 100; b = unstandardized regression coefficient with standard error in parentheses;
Beta = standardized regression coefficient.

p < .01, *p < .001 (two-tailed tests)