Has Thailand Disaster Management, from Tsunami to Flood, Been Better?

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Abstract

The government of Thailand has also been under the notion of making a huge amount of efforts to the improvement and development in disaster management for the past several years. In the past, Thailand may believe to be less prone to hazards and disaster. The awareness and realization in disaster risks of all level within a country were rare. Unfortunately, the effective disaster management starts with recognition of the risk and its consequences. Evidently, for the past 10 years, Thailand has confronted with variety of disasters in various scales that severely damaged the nation and left a lot of lessons learned. Tsunami in 2004 has awakened the nation to a nightmare of unexpected deaths and losses. The lesson was learned that the nation was less prepared and lack of knowledge. Improvement and development have been done tremendously in order to prepare the nation in the different interpretation of disaster risk from the past. Until 2011 Flood, although familiar and well experienced, did the nation learn the road it underwent may have some fallbacks to manage and response effectively.

The article aims to share the knowledge, lessons and analyses of disaster management in Thailand over the years. The writer chooses two case-studies, Indian Ocean Tsunami 2004 and Flood 2011, to not only reflect how Thais response and perform differently but also how much improvement and adaptive capacity have been enhanced. Complex Adaptive System (CAS) approach helps evaluate the system performance and identify the improvement needed. The analysis identifies tsunami operation as non-adaptive system and flood management as emergent-adaptive one. Although Thailand disaster management has improved, ineffectiveness, fallbacks, and problems are presence.

Keywords: Risk, Disaster Management/ Complex Adaptive System/ Socio-technical Component

Governments around the world have recognized the importance of public safety, including how well communities cope with extreme phenomena (e.g., natural disasters, threats of manmade hazards) and how effectively emergency response agencies respond to such crises. There are many severe, unexpected consequences of these extreme events, including large-scale destruction, dramatic changes of geography, and destruction of communications and electrical infrastructure. All of these problems are exacerbated by a lack of understanding the risks communities face. Natural disasters may create heavy damage across wide areas, requiring local and national public agencies, and not governmental organizations working together to manage states of emergency. Such crises require agencies to have a clear

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understanding of risks and to be able to skillfully coordinate operations in order to return the situation to normal. When time is short and lives are threatened, organizations involving in managing disaster needs to know how to perform quickly, accurately, and effectively.

The government of Thailand has also been under the notion of making a huge amount of efforts to the improvement and development in disaster management for the past several years. In the past, Thailand may believe to be less prone to hazards and disaster. The awareness and realization in disaster risks of all level within a country were rare. Unfortunately, the effective disaster management starts with recognition of the risk and its consequences. Evidently, for the past 10 years, Thailand has confronted with variety of disasters in various scales that severely damaged the nation and left a lot of lessons learned. Tsunami in 2004 has awakened the nation to a nightmare of unexpected deaths and losses. The lesson was learned that the nation was less prepared and lack of knowledge. Improvement and development have been done tremendously in order to prepare the nation in the different interpretation of disaster risk from the past. Until 2011 Flood, although familiar and well experienced, did the nation learn the road it underwent may have some fallbacks to manage and response effectively.

Questions, then, are certainly and frequently asked whether we learned and performed better over the years. To the people who study Public Administration, Public Policy and Disaster Management, we seek to investigate, understand, and analyze how effective and efficient disasters are managed to find gaps and ways to further improve. Lessons learned each event helps lay out all operations done in every phases of disaster management as well as identify problems and recommendation to the solutions. With all regards, disaster management is to build resilient communities at all level so that they are self-managed and adapted to the threats they have to cope with.

This article aims to share the knowledge, lessons and analyses of disaster management in Thailand over the years. The writer chooses two case-studies, Indian Ocean Tsunami 2004 and Flood 2011, to not only reflect how Thais response and perform differently but also how much improvement and adaptive capacity have been enhanced. Although it becomes fashionable that the researchers would deploy comparative cases to study disaster essence, concerns remain on level of scale and conceptual tools used to assess them (Peacock, 1997; Kreps and Drabek, 1996). Tsunami 2004 and Flood 2011, although do differ in scale and scope of severity, and duration of interruption in which the analysis takes into account, shares the same units of analysis, disaster agencies and relevant organizations. This article, therefore, discusses the difference in disaster essences and analyzes the two cases using criteria developed to investigate disaster management performance.

Disaster management is a complex system because multiple stakeholders are responding to the unexpected situation simultaneously and differently with the dramatic changes of geography in a timely basis. It requires high level of knowledge and recognition, experience and problem-solving skill, and readiness and ability to improvise of all operative personnel. This article investigates an adaptive capacity of Thailand disaster management overtime from tsunami to flood disasters using the Complex Adaptive Capacity (CAS) as conceptual framework.

The article is organized into four parts. First, the writer presents the two-dimensional conceptual framework of Disaster Management and Complex Adaptive System to identify criteria used to assess the system of disaster management. Second, the article describes and discusses the differences of scale, scope, and duration of Tsunami and Flood whether difficulties presence to cost the ineffectiveness or inefficiency of the emergency operations. Third, the analysis of CAS is deployed to set the level of adaptive capacity of the Thai disaster management system and its changes from the previous event to the latter. Lastly, this article discusses ways forward to build more resilient community and nation corresponds to the new era of disaster and risk reduction.

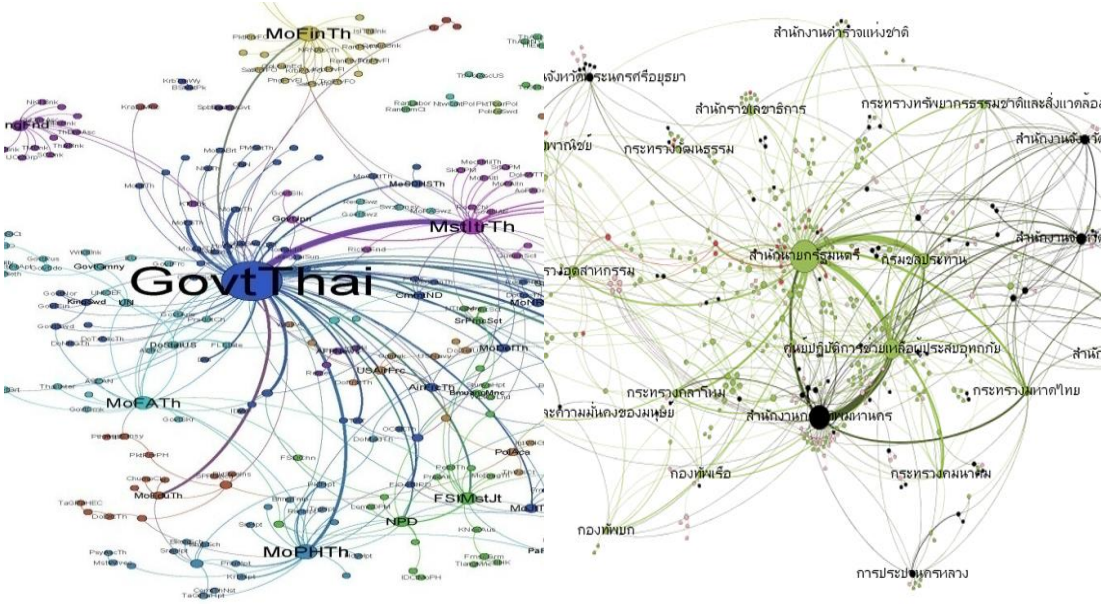
I. Disaster Management and Complex Adaptive System

To better understand, this article emphasizes on non-structural approach of disaster management. Theoretically, disaster management focuses on structural and non-structural approaches to create the solution to effectively and efficiently cope with unexpectedly severe events. The former focuses on hard-structures which are considered as protection and prevention measures while the latter signifies the need of sharing multidisciplinary knowledge through integrated management. This article examines the entire cycle of disaster management including 1) pre-disaster: prevention, mitigation, and preparedness 2) during-disaster: response and relief and 3) post-disaster: recovery and rehabilitation. This three-phase-cycle is non-linear and connected. Theoretically, the more investment and efforts put into the pre-disaster phase, the less difficulty the response and recovery are. Thus, there is the need for this article to show if the nature of Tsunami and Flood creates a certain degree of differences in physical conditions, complication in techniques, and the urgency of response and to what extent these affect disaster management performance.

Disaster is usually overloading and more likely to require additional assistant to be better and more efficient managed. The network of disaster management, domestic or international, require the mutual understanding among all actors of a coherent policy, operations, and capacities to deal with the situation so that the coordination and cooperation can be conducted in the same direction. Multi-organizational arrangements are solutions for independent problems that cannot be achieved by single organization (Radin et al., 1996). Managing states of emergency requires multiple participants across jurisdictions and organizational sectors. Many tasks in emergency management such as evacuation, medical care, transporting victims, and recovery operations need effective coordination across sectors of organization. It involves engaging multiple organizations simultaneously in many types of actions to address a complex problem (Simon, 1981, Comfort, 1991).

Shown in diagram 1, both tsunami and flood operation are complex systems. Hundreds and thousands of organization across jurisdiction and sector are involving in disaster operations. The collective actions toward the mutual goal of managing the emergency back to normal require an effective network of collaboration. There is less number of organizations participating in tsunami operation than flood due to the duration of the attack and interruption of social activities is far less. Although the prime minister plays more important role in tsunami than in flood management, social network analysis still says that flood management network is more connected and delegated (Kamolvej, 2006, 2012).

Diagram 1: Thailand Intergovernmental Networks of Tsunami 2004 and Flood 2011 Management



Source: Kamolvej, 2006, 2012

Therefore, the article takes into account both single and collaborative operations. Both national and local levels of emergency operations are expected to have cooperation from each other. The approach of intergovernmental management requires mutual understanding and partnership practice among all the agencies as well as communities. Effective coordination is limited by spatial distance and simultaneous operation. The use of information and computation technology produces virtual access to the geographical area and facilitates continuous communication among the agencies. This study explores the existing emergency management plans and operations that are currently in practice. As the Thai government is working at both national and local levels to accomplish the same goal of public safety by preparing effective crisis and emergency management policies, officials will need to understand their capability and limitations. This understanding will assist them in developing alternative for improving their emergency structure and operations to manage states of emergency more effectively and appropriately.

The complex adaptive system (CAS) model recognizes that social systems engage in continuous learning and self-organization in reciprocal interactions with the environment in which they are embedded (Comfort, 2000). Axelrod and Cohen (1999) attempt to explore how the dynamism of a Complex Adaptive System can be used for productive ends in order to help managers and policy makers harness complexity in rapidly changing and hard-to-predict environments. CAS assumes an infrastructure for communication and decision support among participants in the system along with the flexibility to adapt to the changing conditions. Once the balance of the structure and the flexibility is set, it is crucial to anticipate of the resistance to the transition. Change in any one level may be perceived as a threat to the security and privileges at other levels. Specifically, in a developing country, the characteristics of the bureaucratic

system and the learning environment of the organizations are likely to create the resistance and obstruction to transition and change. Comfort agrees on importance of information infrastructure and organizational flexibility as the main factors in enhancing the capability of the organizations to deal with uncertainty such as natural disaster (Kauffman 1993). However Comfort also points out that cultural openness is a crucial component in developing an adaptive organization.

Table 1: Level of Complex Adaptive System

Level of Adaptive Capacity of Disaster Management System	Organization Flexibility	Technical Infrastructure	Cultural Openness
Non-adaptive System	Low	Low	Low
Emergent adaptive system	Medium	Low	Low-Med
Operative adaptive system	Medium	Medium	Medium
Auto-adaptive system	High	High	High

Source: Share Risk (Comfort, 1999)

In her discussion of shared risk, Comfort applies a model to explain different combinations of crucial components in emergency operation. These components are technical infrastructure, organizational flexibility, and cultural openness. Comfort uses a three-dimensional model to capture the interaction among technical structure, organizational flexibility, and cultural openness that leads to successful transition for inter-organizational disaster response systems. Comfort introduces four types of response systems; non-adaptive, emergent adaptive, operative adaptive and auto-adaptive systems, which represent the dominant patterns found in actual cases. These four types of response systems provide a useful illustration of the process of transition, and the characteristics that both facilitate and hinder the emergence of self-organizing processes. This model will be used to analyze the performance of disaster management systems in Thailand.

Following the introduction of Comfort's socio-technical components as the indicators to level the capacity of complex adaptive system, Kamolvej, in her dissertation, developed several criteria, shown in Table 2, to be used to assess disaster management performance in Thailand. Her criteria are tested statistically to confirm validity and reliability appropriate to analyze the performance in Thai environment. With respect to the stronger influence of organizational flexibility and technical infrastructure one disaster management performance, the uniqueness of cultural openness component stands out in Thai system. This article also discusses what makes Thai safety culture differs from those of western we learn from as well as to what extent and how these cultural criteria affect performance in both events.

Table 2: Socio-technical Component of Disaster Management

ORGANIZATIONAL FLEXIBILITY	TECHNICAL INFRASTRUCTURE	CULTURAL OPENNESS
National emergency laws	Risk assessment	Shared value of humanitarian assistance
Special emergency regulations	Building codes	Commitment to goal of protecting life
Emergency integrated response plans	Structural inspection	Willingness to share information needed
Emergency commands and coordination	Alternative communication	Acceptance of new information
Emergency inter-organization for communities	Alternative electrical facilities	Openness to new methods
Emergency inter-organization for agencies	Special emergency operation and equipment	Willingness to review actions taken
Multi-ways of info exchange between agencies	Identification of major facilities	Willingness to correct mistakes
Multi-ways of info exchange across sectors	Alternative rescue or emergency response	Willingness to accept responsibility, solve conflicts
Trained professional managers on duty	Self-technical manual procedure	Willingness to service public
Trained reserved personnel on recall	Other technical support	Continual search for relevant, accurate info

Source: Kamolvej (2006)

These criteria are useful not only to the assessment of the adaptive capacity of disaster management system but also identify the components to investigate further. Although these criteria are developed quantitatively and become handy when the field investigation is conducted, qualitative field research is a must. Not because does the writer prefer mix-methodology research, the description and explanation on each criteria help to understand the condition of disaster management system and network, and its environment. The assessment and analysis using the socio-technical component to measure the level of the system are in vain if the analyst fails to deliver the detail how to improve the criterion indicated as a cause of the ineffectiveness or shortfall.

II. Are the two cases different in disaster essence?

2004 Indian Ocean Tsunami and 2011 Flood are different in disaster nature and the urgency of how the disaster management cycle is drawn due to the prior. Indian Ocean Tsunami was sudden to the Thai experience. In fact, Thailand was warned by the former Director General of the Thailand Meteorological Department, Dr. Smithi Dhammasaroja, that the coastline of Andaman is Tsunami risk prone area. Unfortunately, the warning was ignored and taken as the obstruction of tourism campaign Thailand was promoting. Hence, when tsunami came, the locals had less

knowledge of the threat and experience how to respond immediately, appropriately, and effectively. The devastation was at the maximum scale evidenced by the destruction of structures and lots of debris, and 6 provinces were under attacked in scope. The duration of tsunami lasted for 30 only minutes but left the nation and locals with year of recovery and rehabilitation. With all lessons the nation learned, lack of knowledge, information, and readiness are costly when disaster is ineffective.

After the devastation, the geography of the damaged area was dramatically changed. It was difficult and complicated to get the rescue team into the area, especially with unskilled and inexperienced personnel. Main roads and bridges were washed away. The entire electrical system was blacked out. The communication systems went down as well. All agencies worked blindly, physically in the dark at night, and they could not communicate with each other simultaneously. Radio frequencies as well as cell phone networks were overloaded. During this time, the use of cell phone increased from 3 million connections a day to 33 million connections during such time (Manager, March 21, 2005). The lack of communication made it difficult for participating agencies to update the situation and transfer information needed for coordinating their operations from different areas and units.

To the disaster management cycle, long distance tsunami prone area usually takes advantage of early warning because the estimated time of arrival (ETA) of the first wave is calculable. That makes mitigation and preparedness of the end-to-end early warning system very significant to the effective response. Unfortunately, since Thailand did not take tsunami threat into account of preparedness, tsunami devastation was accelerated by its scale and local vulnerability. The response and relief operations were also difficult because of the lack of experience of local authorities as well as unorganized network of assistance. Less understanding of the situation and accurate information caused the delay of helps and inefficiency of search and rescue. Undoubtedly, the recovery and rehabilitation was time consuming. Physically, the damages were widespread because the structures were mostly not tsunami resistance, and, socially, the locals were not resilient to the disaster. The nation immediately turned to “build back better” concept of reconstruction so that it is well equipped and prepared. Knowledge, information, and exercises on tsunami disaster management were distributed and conducted to every level around the area. The tsunami end-to-end early warning system has been fully activated five months after the event.

On the other hands, Flood 2011 was difficult to the account of disaster cycle. The Thai government had to respond to the flood crisis in several areas with various stages. While struggling with the decision making for flood management at the time the water approached Bangkok, the affected areas, north to Bangkok, have already moved toward the recovery and rehabilitation processes. Therefore, to the government, handling the three phases in the same time was not an easy task due to the lack of manpower and equipment, and the difficulties of logistic and unable to respond to compound effects such as chemical leak, waste management, and disease, etc.

Although Thai agencies have a lot of experience in managing flood, at time was not sudden, the operations were ineffective and inefficient. Through disaster management processes, agencies are trained to hold eight principles, which are Comprehensiveness, Risk Driven, Progression, Integration, Coordination, Collaboration, Flexibility, and Profession, to make sure each operation executed effectively. To scholars, the principles of crisis management (PCM) (Wagh & Kamolvej, 2007) are in the checklist when examining the level of system competency in response to immediate crisis which Thailand flood management, by far, failed to translate into practices.

In order to cope with multiple tasks within the limit of time, the integration of multiple units' operations to respond to the emergency and crises is needed. However, the use of "integration" in "Thai" organizational culture redirect the attention to only designing a policy and operational plan to have every involving agency included. Without the coherent standard operating procedures (SOPs) to be followed under the incident command system (ICS), the true power of integrated multi-agency management disappears. To the network management approach, unclear direction and less detail of operations were communicated to the operational agencies with different code of conduct cause even more confusion and difficulty to coordinate.

Setting up Flood Relief Operation Center (FROC) led by the Minister of Justice as a Commander in Chief was too slow and doubtful decision. Such delay showed the incompetency to perceive and understand risk and inability to interpret and design a redundant approach if needed. Disaster is usually uncertain which requires an ability of the leaders or decision makers to alter their building-block to calculate all possible threats. Unfortunately, issue of flood in Thailand relates to multiple data and information retrieved from various organizations which hinder a capacity of decision support system at hand. In addition, the advisory board of FROC, during the first period, contained higher number of politicians than experts. Politicians made decision base on the interest of their jurisdictions and votes which led to hesitation on alternatives chosen. The delay, however, causes such alternative to be in vain when implemented because disaster is very dynamic and uncertain. Not until the flood was expected to surround Bangkok for several weeks did the politicians turn to use data and information more from scholars and technocrats rather than only executive summary of the situations that the risk assessment was more accurate and the response was well planned and executed.

Losing trust toward the ineffective decision making and leadership of the central government, Bangkok Metropolitan Authority (BMA), decided to solely analyze risk and implement flood operation within jurisdiction. Such decision reflects a poor collaboration and unity of command. Under Disaster Prevention and Mitigation Act and Flood Operation Plan, BMA is directly under FROC. Therefore, choices to redirect and alternatives to manage flood have to be mutual but one direction. BMA cannot operate without considering the effects to neighboring area. When the conflict appears to the public, logical decision seems unreasonable. Setting political conflict and partisan aside, disaster, by character, has no jurisdiction.

Trust, either among disaster response agencies or between public agencies and the public, is a significant component of collaboration. Being professional helps create and regain credibility among all parties. FROC failed in term of communication not only with local authorities but also to the people. In disaster management, media liaison is not for anyone or any team to become. This position is designated and reserved for a professional person trained to deal with media and reporters as well as translate the situation for public preparation and response.

When communication is bad, conflict usually occurs. Ironically, disaster management theory has said "Disaster is a diplomatic policy". The government underestimated the power of mass in conflict. The decision to announce the area "to be flooded" and "to be less flooded" or "not allowed being flooded" creates the perception of inequality and "double standard". Adding with the political conflict from FROC and BMA, all that should make sense are suddenly insensible. Communicating, negotiating, and explaining during disaster usually is much harder than making all happen before hand.

Choices were made by the government to areas to be flooded although such decision is to assure the effectiveness of flood management. In correspondent to such decision, the government is accountable for the consequences. Household are flooded unequally which results in unequal damage. The redemption paid by the government should also be varying by the level of damage. Thai government first immediately decided to pay flat rate as a redemption which mistakenly assumed efficiency and equality of payment. The wrong assumption led to the legal case of the people versus government due to an inappropriate flood management requesting redemption to the actual damage cost.

III. Has the disaster management moved from Non-Adaptive to Emergent-Adaptive?

Coping with disaster requires "structural and non-structural" solutions. Those who are in favor of non-structural one usually are multidisciplinary-social scientists. The Art and Science of Disaster management is a complex system in itself. Multiple agencies are operating multiple tasks to satisfy multiple stakeholders with multiple conditions. Thus, the efficiency of disaster management depends upon the ability to adapt to a complicate situation and respond to more difficult problems. Complex Adaptive System (CAS) can be used for productive ends in order to help managers and policy makers harness complexity in rapidly changing and hard-to-predict environments like disasters.

Capacity to adapt is a combination of crucial components in emergency operation. These components include the three dimensions of technical infrastructure, organizational flexibility, and cultural openness. Technical infrastructure refers to the existence of a sufficient level of information and communication exchange regarding risks and operations to enable communities and their emergency response agencies to function effectively. Organizational flexibility is the extent to which emergency personnel are able to reduce complexity in the environment through functional

differentiation of tasks among participating organizations and reintegration of sets of related tasks under the basic function of disaster response. Cultural openness is willingness to accept changes, improve performance, correct mistakes, learn new methods of work, and solve conflicts, is a crucial component in developing an adaptive organization and communities. Cultural openness needs to be rooted in every level of stakeholders as a high value and new norm. Common understanding will help guide the agencies to operate and coordinate in a clear and effective direction.

With low awareness of tsunami risk and lack of understanding in such states of emergency, Thai national and provincial governments have many difficulties in working together to provide assistance to damaged communities. Lack of experience in crisis management leads agencies to misinterpret severe risk and creates an unorganized and inadequate response. This study assesses the flood crisis management and massive accident emergency plan of Bangkok as well as response to the tsunami in southern Thailand. It seeks to identify the patterns of self-organization and adaptation in complex systems in emergency operation. These two approaches explain and clarify the adaptive capacity of organizations to benefit participating agencies and affected communities. Lessons and experiences shared among agencies foster organizational flexibility to adapt to changes and deal with complexity.

Under the state of emergency, the governor, by constitution, automatically becomes the head of the emergency operation center of the province. The governor commands the emergency operations and coordinates with all the participating agencies in the area. A single provincial system was not capable to manage and respond to either the situation or to coordinate the assistance from neighboring agencies from the other six provinces since all six provinces shared the same damaged coastline. This limitation signaled to the national government the need to send their rescue and mitigation team into the area. More equipment, more manpower, and more medical personnel and resources poured unorganized into the affected areas like the second wave of water. This lack of organization delayed the rescue and recovery process. The low level of local participation in organizing response and recovery operations led to misinterpretation of needs for disaster assistance and dissatisfaction with the recovery process. The disorganized state of response operations distrust among the survivors and between the agencies and communities they were seeking to assist. Lack of valid information impacted the development of trust between citizens and governmental agencies.

A dramatic change in geography and unstable structures make disaster areas more difficult for agencies to access efficiently and coordinate actions with other participating agencies simultaneously without effective communication facilities. The unexpected failure of communication and electrical systems worsens the situation since the agencies could not communicate and update the information. The information and communication facilities are crucial to managing states of emergency. A typical communication and information system can fail due to the lack of power or the black-out of electricity. Emergency response agencies need sufficient information in order to make more informed decisions, and such information sharing and decision making need to be supported by an efficient communication system.

Kamolvej(2006), in her dissertation, proves statistically that the sociotechnical component has a positive relation to the organizational performance and readiness to cope with disaster. From her analysis, Thailand's tsunami response management is a non-adaptive system due to the lack of almost all sociotechnical components. In addition, she also points out that, among the three, organizational flexibility has far more effect to the system capacity than the other two. Extracting from her analysis, the level of each variable in sociotechnical components is shown in table 3.

It is not a surprise that tsunami 2004 response operation is a non-adaptive system because Thais are unaware of a tsunami threats and its impact to the coastline area. That leaves the community and local authority vulnerable and too much exposure to the attack. Among the sociotechnical components, Thailand tsunami case study shows that the lowest level of capacity and ability to perform is technical infrastructure. Since Thai government underestimates the threat, the prevention-mitigation-preparedness measures are not in place. The response agencies do not have not only appropriate equipment but also accurate and familiar codes of conduct to perform. Organizational flexibility ranks second to the technical infrastructure, lack of preparedness leads to less practices and revisions on national emergency law, relevant laws and special regulations, and coherent design for integrated operational plans. Coping with unfamiliar threat like tsunami is difficult by its own regardless the lack of experience and effectively collaborative network of tasks lead to confusion and unorganized operations. Interestingly, cultural openness is divided into two different scales, high value of humanitarian and commitment to help, and the personal value of accepting own mistake and seek for advise and better solution. Thai safety culture is far less professional due to the unawareness of disaster risk, lack of knowledge and understanding of disaster management and safety practices, and the education training to build a mindset of disaster resilience.

Table 3: Level of Sociotechnical components of tsunami response system

ORGANIZATIONAL FLEXIBILITY	TECHNICAL INFRASTRUCTURE	CULTURAL OPENNESS
Unclear and not familiar responsibility translating from national emergency laws	Unaware and lack of understanding on risk assessment and risk management	High level of shared value of humanitarian assistance
Unfamiliar and less practice on the deploying the special emergency regulations	Lack of understanding on the use of building codes and assure that the safety code is performed	Medium to high level of commitment to goal of protecting life, however, there are still some opportunists taking valuable assets from the victims

ORGANIZATIONAL FLEXIBILITY	TECHNICAL INFRASTRUCTURE	CULTURAL OPENNESS
There is an emergency response plan but not a clear emergency integrated response plans	Structural inspection to tsunami risk is rare.	Low level of willingness to share information needed, acceptance of new information, openness to new methods, willingness to review actions taken, willingness to correct mistakes, willingness to accept responsibility, solve conflicts and less knowledge where to locate continual search for relevant and accurate info
Lack of exercise and coherent plans to execute emergency commands and coordination, emergency inter-organization for communities, emergency inter-organization for agencies, multi-ways of info exchange between agencies, and multi-ways of info exchange across sectors	There are less preparation for alternative communication, alternative electrical facilities, special emergency operation and equipment, identification of major facilities, alternative rescue or emergency response, self-technical manual procedure, and other technical support	
There are no number of trained professional managers and personnel or reserved personnel for tsunami response operations		Although Thais are willing to assist and help the poor, the concept of service public systematically for mutual interest seems to be undermined by the unorganized and subjective actions.

Source: adapted from analysis of Kamolvej, 2012

After tsunami, lots of efforts have been made toward organization flexibility and technical infrastructure while much less has been done to build a strong resilient culture to the communities and nation. Education and capacity building program have been spread out to assure that the communities at risks and nation learn of tsunami threat and its consequences. End-to-end tsunami early warning system has been activated in tsunami risk prone area and expands to multi-hazard early warning system. International and regional collaborative network on tsunami practices have exchanged knowledge and lesson learned to concert a concept of resilient communities. The revision and redesign of Disaster Act in 2007 contributes to the clearer and more flexible structure of authorized disaster agencies, incident commanding and multi-agency coordination, and emergency operational plans. All agencies have been trained of multi-hazard risks countermeasure and disaster management profession. In addition, scholars have conducted both lesson learned and applied researches to improve how to be resilient to tsunami risk. Unfortunately, only survivors and affected communities keep the momentum and continue to learn and improve. Tsunami lessons are concluded toward the movement of building the

knowledge and infrastructure, believing that people are aware of tsunami risk and well prepared to respond and be resilient. Once tsunami is known and the system is established, the nation turns its attention back to other public issues seen as prior to disaster risks which are rare.

Until 2011 did another large scale of disaster hit Thailand again. Flood situation in 2011 was beyond expectation and experience. The excessive amount of water exceeds all capacity the water sheds, dikes, and reservoirs could retain. It does not have to take an engineer or scientist to see that the threat is tremendous and Thai agencies are confused and underestimating the amount, direction, and effects of this flood. The 2011 flood management is evaluated and indicated as emergent adaptive system, details shown in table 4. The level of deployment of technical infrastructure, surprisingly, is low due to the inability to assess and manage flood incident although flood occurs frequently in Thailand.

As mentioned in the previous section that lessons learned from tsunami draws the attention to the Thai government and relevant agencies to review and revise laws, regulations, policies, plans, and operations to be more coherent. The changes are to create more organization flexibility and how national-provincial-local authorities and involving agencies coordinate systematically. However, the political conflict at the national level finds its way to intervene the decision making process how to manage the situation. In the end, through a thorough research, the analysis still could not pinpoint that the overall performance would be more effective and efficient if the government activated the flood disaster operation center by the Disaster Act rather than the Administrative Act.

To the cultural openness, although the Thai agencies have learned to work together and explore new solution, political conflict also leads to less acceptance to collaborative network of operations. Sense of security and safety culture of Thais strangely affect the efficiency of the disaster management such as underestimated risk perception, intolerance to false alarm, no discipline to the social order, etc. Evacuation centers outside of Bangkok were not used at full capacity due to the fact that the evacuees prefer to stay at immediate temporary shelters closer to home which also located in a risk prone area. On one hand, this is a reflection of low level of cultural openness. One the other hand, it also illustrates the lack of communication and coordination between agencies and communities on the detail of “how to” in a process of evacuation and afterward.

Table 3: Level of Sociotechnical components of tsunami response system

ORGANIZATIONAL FLEXIBILITY	TECHNICAL INFRASTRUCTURE	CULTURAL OPENNESS
The decision to set up the emergency operation center using the Administrative Act instead of national emergency law, Disaster Act, results in unclear of direction and structure of authority to conduct the operation.	The underestimation of flood disaster undermines the risk assessment and analysis to design an appropriate countermeasure. Political intervention delays and obstructs the decision making process on risks.	Thais have been known to be kind and helpful, even before tsunami event in 2004. Afterward, people shared value of humanitarian assistance to get together collectively to help in many ways

ORGANIZATIONAL FLEXIBILITY	TECHNICAL INFRASTRUCTURE	CULTURAL OPENNESS
Questions have been raised by scholars to the special emergency regulations indicating the authority of incident commander over the regular administrative order, and the utilization of provincial emergency budget. Should not governor and mayor have authority to utilize budget to the hazard mitigation and disaster preparedness.	The response agencies are not familiar using building codes to conduct disaster management. The structures outside and outbound of Bangkok are better fit to flood than in Bangkok. However, factories and community around factories did not prompt to flood risk.	Thais have commitment to goal of protecting life. However, flood in 2011 was not life threatening comparing to tsunami in 2004. This suddenly hinders the recognition and realization of how to function in disaster and how to stay safe and not burden to the agencies.
Thailand has emergency integrated response plans from national level to provincial level, however, local authority practices their operations using experiences and subjective believe or style.	There are several period of structural inspection to factory and roads but not by the building block of a huge flood coming to Bangkok. Thus the structural inspection is in vain.	Each agency is operating using its own data and information, although available, less willingness to share information together with political conflict leads to fragment of information.
Thai agencies have unequally and independently learned, trained, and exercised the Incident Command System and Multi-Agency Coordination concept as mechanisms for emergency commands and coordination which they deployed ineffectively.	The government utilizes national television to broadcast the situation and update the situation, which helps communicate more to the public as alternative communication. However, media liaison is not very professional	The conflicts between politician leads to conflict of organizations and authorized key agencies to deny new information.
Thailand has never comprehensively understand the important of written operational plan and standard operating procedures of emergency inter-organization for communities and emergency inter-organization for agencies, and exercise the plan together frequently to build coherent operation and trust among agencies and communities at large.	Shelters and evacuation centers are set as major facilities. Local authorities, electrical generating authority of Thailand, and universities coordinate to assist in providing alternate electricity equipment and facilities. However, some facilities are in the risk prone, some are overcrowded, while some are underused.	Public opens to new methods to survive and self-help while agencies operate strictly under their own judgment, methods, and perception to conflict.

ORGANIZATIONAL FLEXIBILITY	TECHNICAL INFRASTRUCTURE	CULTURAL OPENNESS
There are a few numbers of multi-ways of information exchange between agencies due to lack of interoperability and willingness to share. However, there are multi-ways of information exchange across sectors including social network, hot-line, facsimiles, and NGO's network.	Insufficient special emergency operation and equipment to respond to the large scale of affected area and population.	Agencies play along political conflict more than focusing on their willingness to review actions taken, willingness to correct mistakes, willingness to accept responsibility, solve conflicts, willingness to service public. And continual search for relevant, accurate info
	There are numbers of volunteers as alternative rescue or emergency response such as NGOs, private organizations, and university personnel.	
There are trained professional managers on duty and trained reserved personnel on recall. However, the number of agencies is lower than the number of affected households.	There are a few numbers of self-technical manual procedure and other technical support	

Source: Adapted from Kamolvej, 2012

If we are naive to only explain the improvement from 2004 tsunami non-adaptive system to 2011 emergent-adaptive system, Thailand disaster management would have been mistakenly evaluated to make a progress. On the contrary, 2011 flood management is degraded because flood management used to be assessed and evaluated to be identified as operational-adaptive system (Kamolvej, 2009). Many developments and improvement have been made since the big flood 1995 including the kink dikes along the edge of Bangkok. Infrastructures is built and in place as prevention and mitigation measures, while the flood SCADA system at the Bangkok Flood Control Center and tide gauges are installed. Capacity to assess risk and manage flood is built and enhanced by trainings and exercises. Thais are also getting used to cope with flood resiliently. Unfortunately, flood in 2011 was rare and exceed the knowledge and experience to cope with. Moreover, conflict plays very strong role intervening the decision that should be made on only accurate and informative technical assessment and design.

Evaluating Thailand disaster management using sociotechnical components indicates certain development of the more adaptive capacity to disaster risks. However, there are many shortfalls presence to the ineffectiveness of flood response operation. Political conflict, poor risk assessment and analysis, and less awareness of familiar risk are the reasons the management of flood response operation fails.

IV. Ways forward…

It has been ten years for Thailand after the Indian Ocean Tsunami attack in 2004 that a lot of efforts have been put into the improvement and development of disaster management. To the structural approach, many prevention and mitigation structures and measures are constructed and established. To the non-structural solution, clearer and more integrated laws, policy, regulations, and operational plans are designed and activated. Trained personnel and professional exercises of multi-hazard management are conducted. Thais have learned and experienced more frequently of smaller scale of disaster. Big flood in 2011 overturns how ready and resilient to disaster Thais believe they are.

This article believes it is not that Thailand has lack of sociotechnical component, On the contrary, Thailand have produced, developed, established, revised, and redesigned many components to assure effective disaster management system. Managing disaster in Thailand needs 1) less number of politicians in the decision making process so that the decision based on the analysis of data and technical information not political bargains, 2) to improve the disaster related database and information system to help decision makers make more accurate and informative decisions, 3) the development of local incidence response plan and disaster management tasks' standard operating procedures (SOP) so that local authorities are well equipped with mechanisms to be deployed systematically, 4) to justify and certify operational plans and standard operating procedures as official code of conduct which helps disaster personnel to focus on their operations rather than the political order, and 5) capacity building in disaster risk reduction for all level of disaster personnel and communities because mutual and coherent understanding leads to better risk assessment, risk countermeasure design, collaborative network of response and relief, and resilience culture. Thailand can start by signifying the local incident response plan and SOPs to be developed by the locals. Only this way can Thailand strengthen the heart of disaster management with how all stakeholders learn and understand the concept of "living resiliently with disaster".

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