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Strategies of Crisis Management from Contingent Perspective

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Keywords

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STRATEGIES OF CRISIS MANAGEMENT FROM CONTINGENT PERSPECTIVE

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Abstract

The existing literature in crisis management mostly addresses specific measures taken in dealing with a single disaster. However, with chaotic nature of disasters and the uncertainty that surrounds them, the understanding of how to achieve effectiveness in crisis management remains limited. This article investigates that how government apply various capabilities in the crisis management process contingent upon different nature of disasters. By demonstrating the crisis management process from a contingent perspective, the capabilities that government should emphasis on can vary differently according to the nature of disasters. This study develops a framework for crisis management to serve as a guide when government is facing a crisis.

Keywords: Crisis management, Contingency theory, Nature of disasters, Government capabilities.

1 INTRODUCTION

The new millennium has witnessed several devastating natural disasters including earthquakes, floods, wild fires, hurricanes, and tsunamis. The bird flu in June 2002 induced a global pandemic. In 2003, human was further suffered from the swift worldwide contamination by the Severe Acute Respiratory Syndrome (SARS) virus. These disasters involved tremendous threats and damages to human life and property. As such, when the country is facing disaster with high ambiguity, the government's crisis management capabilities become indispensable and significant in saving the country.

Many scholars have conducted conceptual and empirical studies on crisis management (Pearson and Mitroff 1993; Schwartz 1987; Shrivastava 1993). In terms of crisis types, studies have examined the crisis management of earthquakes (Tierney 1997), floods (Tierney et al. 1996), disease (Min 2005), terrorism (Avery 2004), and hurricanes (Hwang and Lichtenthal 2000; Piotrowski 2006; Runyan 2006). Despite a growing body of research, a number of gaps can be identified in the literature. First, much of existing crisis management research only focused on management of one type of crisis (Avery 2004; Tierney 1997). However, facing various types of crisis, government needs different strategies accordingly. With the comparison between distinct types of crisis, a comprehensive crisis management process would be important and beneficial both practically and theoretically. Second, previous discussions on crisis were more in a general perspective (Hale et al. 2006; Henry and Fischer 1999). Little is known on how distinct natures of crises determine different external environment, and consequently result in different organizational strategies to respond. Third, when the country is facing the disaster, the government plays an important role in crisis management. Few studies have looked into the government capability perspective in crisis management. As such, we contend that there is a pressing need for further research in crisis management. The current study not only accounts for how to effectively use available government capabilities to manage crises, but also explains the underlying mechanisms through which distinct capabilities would be utilized. Using two case studies of Singapore government's responses to the SARS and Tsunami, this paper endeavours to advance existing understanding of crisis management. The objectives of our study are threefold: 1) Identify the characteristics of disasters; 2) Explore the government capabilities for crises management; 3) Build an integrated framework to assist governments in responding to different crises.

This study intends to answer two research questions: (1) Contingent upon different disaster natures, how does government apply various capabilities in crisis management? (2) How do IT capabilities support crisis management and enhance crisis management performance? We employ the contingency perspective as a theoretical lens. The contingency theory provides an effective theoretical ground to understand how Singapore government successfully deployed capabilities in response to different crisis situations. Following Pearson et al.'s (1998) study, we propose a three-stage crisis management procedure (i.e. preparation, response, recovery and evaluation) to deal with crises like SARS and tsunami.

2 LITERATURE REVIEW

Disaster has been defined as rapid, instantaneous or profound impact of the environment upon the socio-economic system (Alexander 1993). The distinction between crisis and disaster can be explained by the simple idea that disasters cause crises (Hale et al. 2005; Lagadec 2004). In this study, we attribute crisis management to be the series of activities taken to deal with the disaster.

2.1 Crisis Management

Crisis management is understood as the strategies, processes and measures which are planned and put into force and cope with crisis (Glaesser 2006). To ensure the effectiveness of crisis management, various measures have been tried to divide the crisis management into different stages (Faulkner 2001; Fink 1986; Ritchie 2004). Referring to Ritchie's (2004) three-phase model, a crisis can be mapped on

a time continuum reaching from disaster prevention and planning, to strategic implementation, up to the resolution, evaluation and feedback stage.

The effectiveness of crisis management is evidenced when potential crises are averted (Pearson and Clair 1998). In other words, crisis management must be management plans matured in their overall crisis response capability. This requires crisis management to handle adversity and minimize impact most effectively and facilitating the management process during chaos (Sapriel 2003).

To account all the above concerns, we set up the crisis management process according to Ritchie's study (2004). Each stage is named in one word, (a) Preparation, (b) Response and (c) Recovery. We believe most of the crisis management can be attributed to these three stages. First, before triggering of the disaster, it is of great importance to predict the disaster and prepare for it. Next, the extent and type of damage is assessed, and followed by the tactics formulation and implementation. The last step is to evaluate the effectiveness of the recovery strategies. A feedback loop is used to refine the tactics until the crisis is brought under control.

2.2 Contingency Theory

Contingency theory contends that there is no one best way of organizing and that an organizational style that is effective in some situations may not be successful in others (Fiedler 1964). In other words, the optimal organization style is contingent upon various internal and external constraints. The contingency perspective originated with the work of Joan Woodward (1958), and it has sought to formulate broad generalizations about the formal structures that are typically associated with or best fit the use of different strategies. The central belief of this perspective is that organizations are open systems that need careful management to satisfy and balance internal needs and to adapt to environmental circumstances. The appropriate form depends on the kind of task or environment one is dealing with. Therefore, different types or species of organizations are needed in different types of environments.

Due to the chaotic nature of disaster, crisis management is extremely complex and full of uncertainty. In crisis management, consequence can vary a lot as one situation is overlooked. In such cases, as to perform well in the crisis management, the government needs to consider both the environmental situations as well as internal conditions. We believe the theoretical lens of contingent theory fits well with the crisis management. When the government is facing a crisis full of change, the contingency theory can provide a clear guidance in crisis management. Being able to consider the contingent factors, the government may perform effectively and efficiently in the crisis management. However, little attention has been paid to the contingent factors in the crisis management. Based on the organizational crisis management model (Pearson and Clair 1998) (Figure 1), this study tries to fill the theoretical gap from the contingent perspective. Contingent upon different factors, necessary government capabilities are indentified to be successful in crisis management.

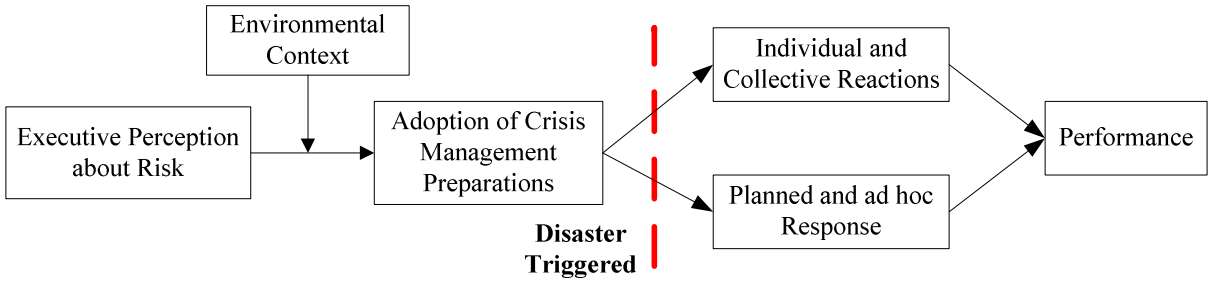

Figure 1. The crisis management process model (Pearson and Clair 1998)

3 RESEARCH METHODOLOGY

An interpretive case study is appropriate for this study. First, the research questions in this study are "how" questions that delve into the underlying process through which government apply various capabilities. Second, the chaotic and uncertain nature of the crisis makes an objective approach to research difficult. It is more appropriate to construct our theoretical arguments from the subjective interpretations of the relevant stakeholders (Klein and Myers 1999).

The cases of SARS and tsunami are particularly appropriate for this study as the two disasters each has its own nature and the government undertook the crisis management differently in the two tasks. The use of two-case study for our research is also advantageous in that we may compare the difference of two cases, which helps to catch more interpretations of the data to build the framework. We interviewed 18 executives from Singapore's Defence Science and Technology Agency (DSTA) between August and November 2003, to find out how capabilities were deployed during the SARS outbreak. In August 2005, we re-entered DSTA for two months to collect further information regarding crisis management to the Asian Tsunami disaster. During this time, we interviewed 15 interviewees that include senior managers and members from the crisis response team from both DSTA and Singapore Armed Forces (SAF). The process of interviews were tape-recorded and transcribed. The interviews were based on topic guides adapted for each interview session. These texts became the main corpus of the data used for subsequent analysis. Secondary data included reading the extensive news coverage of the crisis response efforts in Singapore, press releases from different government agencies, advisories for precautions and articles from multiple newspapers and other Internet publications in Singapore.

4 CASE DESCRIPTION

4.1 Case One: Government Capability and Crisis Management in Combating SARS Crisis

On 1st March 2003, a deadly epidemic was identified as an outbreak of SARS in Singapore when the first case was admitted to Tan Tock Seng Hospital. It ended when the last case of the outbreak was isolated on 30th May 2003. A total of 238 probable SARS cases were diagnosed based on World Health Organization (WHO)'s case surveillance definition. During the SARS crisis, Singapore's e-government systems have been proved crucial and highly rated for their extensive strategic and innovative use of IT in delivering government services.

4.1.1 Identifying the Crisis

In 2002, WHO issued warnings of a spate of mutant viral infections that could rapidly spread around the world. In early 2003, SARS emerged in East Asia and spread globally soon after. The outbreak in Singapore began with regional travellers who fell ill after they returned from Hong Kong and were hospitalized with undiagnosed fever at Singapore General Hospital.

At the initial stage of the outbreak, the leaders of Singapore were faced with the dilemma of whether to assign the Ministry of Health (MOH) solely to tackle the SARS crisis or to treat the outbreak as a national crisis and involve all the government agencies. However, by the end of March 2003, Singapore had more than 80 cases and four fatalities, all arising from just the three initial cases. Meanwhile, more detection of SARS cases and the alerts of potential pneumonia all served as warning signals. The Singapore government recognized the signals as significant threats requiring action.

4.1.2 Utilizing Various IT Capabilities: Tracing the Spread of SARS Virus

For the responding process to be successful, it required the participation and coordination of large, internationally reputed organizations, such as WHO, and inter-government agencies such as MOH, Defence Science and Technological Agency (DSTA) and Singapore Regional Coordination Centre

(SRCC). The Singapore government quickly established a well organized structure of these agencies and their coordinating SARS initiatives. Subsequently, Singapore government expedited the response progress and formulated revised IT strategies to response.

Singapore's uses of IT in the SARS outbreak were varied and widespread, and used a number of different technologies. The MOH requested the help of DSTA to set up an operations centre to support large-scale contact tracing and data management at the operations centre. To identify and isolate the suspect cases of SARS as early as possible, on 24th March 2003, the Singapore government began to detect SARS cases. Several IT applications were used to control the spread of SARS virus, such as Microsoft VisioTM, a diagramming program used to document and organize complex processes; Radio Frequency Identification tags (RFID) for tracing contacts; a Thermal Fever Scanner systems, used to screen travellers at checkpoints. MOH and hospitals used the government's e-mail systems to exchange data. NEA used spreadsheets to maintain lists of infected patients, and their potential contacts. One officer of DSTA commented about the method used during this stage:

"This list we used to record infected patients and contacts is useful. However, it did not always contain up-to-date information, so it needed to be manually updated – a time-consuming effort."

Therefore, as the operations centre's job escalated, DSTA took an active role in proposing and developing an information system to manage the data exchange across agencies.

4.1.3 Developing a Case Management System: Managing the Crisis Data

DSTA began its case management system (CMS) work by forming a project team of specialists in networking technologies, database administration, system development, and testing. Within two weeks, DSTA had developed a CMS to support the contact tracing and data management activities at the operations centre. The CMS gave the government the means to monitor the status of SARS across the nation, and it had accurate updates from the CMS's data, including quarantine numbers and their status. Using the information on the daily CMS report, the Minister for Health briefed the nation at daily press conferences. The report also went to hospitals and other agencies.

On May 30th 2003, Singapore was removed from WHO's list of SARS-affected countries. After managing the SARS crisis, the Singapore government realized some disasters, like SARS, are unpredictable and may re-occur. To better prepare public sector agencies and its people to be ready for future crises, the Singapore government launched a training course "crisis preparation & management" in the civil service college and a training institute for public sector employees. The Singapore government also formed crisis management groups in 84 constituencies to handle future emergencies. The chronology of events for combating SARS is shown in Table 1.

1st Mar	The index patient was admitted to Tan Tock Seng Hospital.
6th Mar	The Ministry of Health was informed by Tan Tock Seng Hospital that two patients had developed atypical infectious pneumonia after travelling to Hong Kong.
22nd Mar	MOH-TTSH declared as the central isolation hospital, other checkups stopped.
24th Mar	The Singapore government began to detect SARS cases by contact tracing of people who were either related to SARS patients or had possibly come in contact with these patients.
27th Mar	The Singapore government announced the measure of closing public schools for two days.
3rd Apr	ICA-Incoming Cruise Vessels and health advisory cards are given in affected areas.
11th Apr	DSTA-First Infrared Fever Sensing System jointly with ST Electronics installed at Changi airport.
17th Apr	MOF/MTI-$230 million SARS relief package implemented.
25th Apr	NEA-Clean up of markets/Food Centres, fever checks of all hawkers and food handlers.
26th Apr	Regional health ministers declared commitment and determination in combating SARS.
30th May	Singapore was removed from WHO's list of SARS-affected countries.

Table 1. Chronology of events for SARS crisis

4.2 Case Two: Singapore's IT Capability Development during Asian Tsunami Crisis

On 26th December 2004, Earthquake erupted under the Indian Ocean and triggered the tsunami. The tsunami devastated 13 countries' coastlines, leaving more than 280,000 people dead and millions homeless. Soon after the disaster, the international community responded quickly with crisis relief operations for the nations affected. Due to its proximity to a number of tsunami-hit countries, the Singapore government set up a crisis management task force, called Singapore Regional Coordination Centre (SRCC). Its responsibilities included the development of a strategy to coordinate the crisis relief activities. SRCC used IT infrastructure to interconnect IT resources and developed a crisis management system to coordinate the distribution of aid supplies.

4.2.1 Identifying the crisis

On 1st January 2005, the government organized a meeting with several public sector agencies to discuss the setting up of a Singapore SRCC. It includes senior Singapore Armed Forces officers and key decision makers from other public sector agencies such as the DSTA (see Case One for information about DSTA). One manager who attended the meeting commented on the topics discussed during the meeting:

"From the earlier SARS experience, the Singapore government was fully aware of the important role played by IT in crisis situations. It therefore decided that the development of IT to enhance SRCC's coordination of crisis relief activities was a priority."

At the meeting, Paya Lebar Airbase was selected as the site to establish the regional coordination centre. The decision of IT deployment involves establishing an IT infrastructure to store and disseminate information. DSTA was assigned the task of developing the IT infrastructure and applications. DSTA is selected because of its experience in developing IT in combating SARS during 2003 and also the expertise gained from its technological collaboration with other organizations.

4.2.2 Developing an IT Infrastructure: A Technological Platform to Interconnect IT Resources

On 5th January 2005, the IT infrastructure team began setting up SRCC's networks and servers in the Paya Lebar Airbase and managed to complete the installation within 24 hours. On 8th January, directory and protocol services problems were resolved. The SRCC IT infrastructure included internet, electronic mail, directory name service, other directory services and dynamic host configuration protocol. Ancillary services included telephony, video conferencing, streaming media, wireless connections and high performance computing. The IT infrastructure allowed storage, dissemination and exchange of information, and it also provided network resilience and backup servers.

4.2.3 Developing a Crisis Management System: Coordinating the Distribution of Aid Supplies

During the response process, one sever problem was that the distribution of aid supplies was once stagnated because of damage of transportation equipment. Besides, since the IT infrastructure and communication equipment was damaged in Sri Lanka and Indonesia, it is difficult for Singapore government to arrange the distribution activities. Therefore, a major IT application adopted by SRCC was a web-based crisis management system, which was able to monitor the availability and demand for aid supplies and assess how supplies could best be distributed. The crisis management system was developed within two days and could also track the deployment of relief personnel in tsunami-hit countries. The Applications and System Development team leader commented on the system design and development processes:

"We gathered information from our main users: Singapore Armed Forces' work procedures, which helped us to identify the features to be incorporated within crisis management system"

In the end, SRCC had handled close to 2000 tons of aid supplies. After the crisis situation had stabilized, the Singapore government embarked on a series of reconstruction projects (e.g. Meulaboh

General Hospital in Indonesia) and preventative measures (e.g. Tsunami Warning System) for potential tsunami disasters in future. The chronology of events for Asian tsunami crisis is shown in Table 2.

26th Dec	Earthquake erupted and triggered the tsunami which devastated several countries' coastlines, leaving millions homeless.
1st Jan	Singapore government organized a meeting with several public sector agencies to discuss the setting up of a SRCC. It also decided that the development of IT to enhance coordination was a priority.
5th Jan	The IT infrastructure team began setting up SRCC's networks and servers in the Paya Lebar Airbase.
7th Jan	IT infrastructure was set up and began to deploy client image.
8th Jan	Active directory, domain name server and dynamic host configuration protocol services were established at Paya Lebar Airbase.
11th Jan	Approximately 20 non-governmental organizations began their operations in the SRCC.
Early Feb	The support for SRCC continued. The relief activities began to be wound down, with many non-governmental organizations leaving SRCC.

Table 2. Chronology of events for Asian tsunami crisis

5 CASE ANALYSIS

The two cases illustrate the process of crisis management in which the government dealt with two different kinds of disasters. It is immediately evident that each disaster has its distinct natures (Table 3). Therefore, we narrowed our research boundary to focus on contingent upon the different nature of disaster. We employ the contingency theory to explore the process of crisis management to distinct crisis cases according to their nature. The findings can be generalized to other crisis cases owning the similar nature with SARS and Tsunami.

Nature of Crises		**Tsunami**	**SARS**
Predictable Degree		Moderate-High	Low
Extent of Damage	**Intensity**	Large	Small
	Duration	Short	Long
	Scope	Small	Large
Risk of Environment		Low-Moderate	High
Controllable Degree (after disaster triggered)		High	Low
Knowledge about Crisis		Many	Few
Frequency		Moderate-High	Low

Table 3. Nature of crisis

Evidence from the two case studies reveals that the government applies different strategies and conducts various activities in each crisis management process contingent upon the nature of crisis. We framed the Singapore government's crisis management process of SARS and Tsunami in the following two figures (Figure 2 and Figure 3).

The two cases suggest that the nature of each disaster determines the degree of uncertainty in the operating environment and the degree of complexity in the operating mission. Different government capabilities were successfully applied contingent upon the nature of crisis. Crisis management commences with pre-crisis planning, activates to respond to the crises as it unfolds and is implemented to recover from the crisis. Adapted from Pearson et al. (1998)'s crisis management framework, and employed the temporal breaking strategy, we compartmentalized the process of two crisis both to three stages: preparation, response, and recovery.

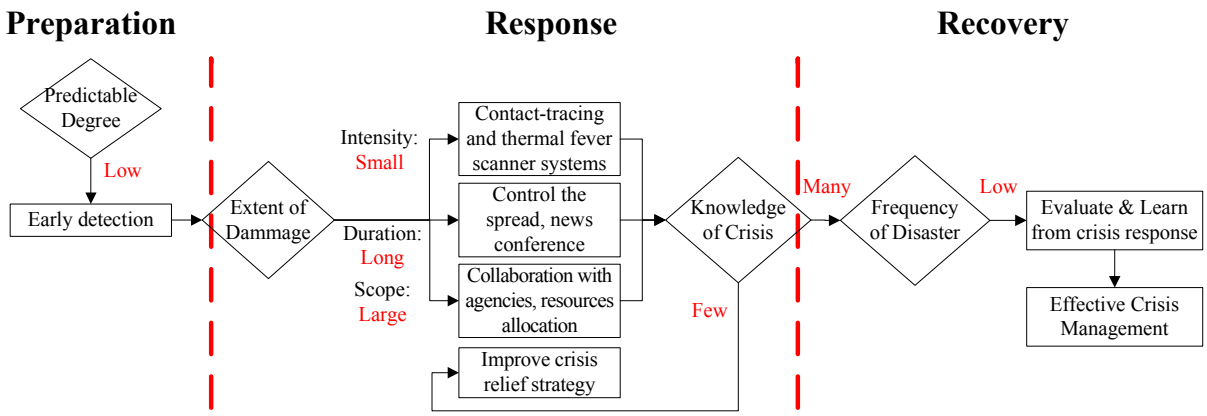

Figure 2. Descriptive Framework of SARS

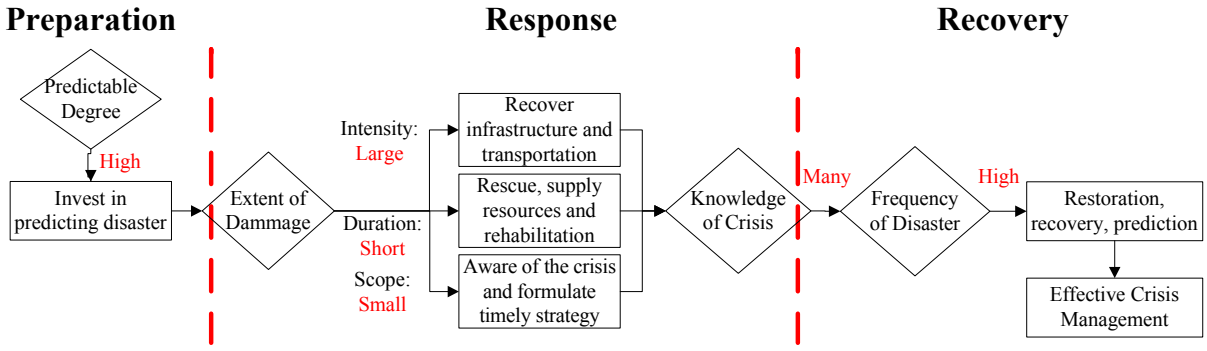

Figure 3. Descriptive framework of Tsunami

5.1 Stage 1: Preparation

In the preparation stage, measures can be taken to minimize the possible loss from the crisis in case of the happening of a disaster. Two forms of preparation can be taken, preparation of the response designed to prevent the disaster and preparation for ad-hoc disaster (Craddock 2006). The later one occurs when a disaster cannot be prevented or it is too late to prevent the disaster. Preparation can also be made through raising the alertness, and sustained through education, frequent drills, training and inspection. All these are based on the awareness that efforts and investment are to serve effectively to the reduction of losses at the moment of a catastrophe (Balamir 2002).

5.1.1 Predictable degree

The predictable degree of disaster is considered as the nature of disaster involved in the preparation stage. Many disasters happen in all of a sudden that people do not have enough time to cope with it. While the occurrence of natural events is largely beyond human control, the consequences are not. Investment in protective infrastructure, early warning and response systems has been shown to have a dramatic effect in saving lives and property in natural disasters. In such cases, whether a disaster is predictable is of great significance for the government to get fully prepared.

For those disasters that can be predicted to a certain degree, the prediction capability of the government plays an important role in crisis management. For prediction capability, it is the determination of what disaster is going to occur, and when it is going to occur, is the key to minimizing the effects of a disaster. Once the disaster has been accurately predicted, prevention and preparation responses can be formulated and implemented (Craddock 2006). A lesson from the 1987

floods is that a comprehensive early-warning system could have reduced, to a great extent, the loss experienced in 1988 (Rahman 1996). In the tsunami case, the investment of prediction equipment and natural disaster research helps the government to prevent crisis or conduct the pre-planning.

On the contrary, for those disasters are not easy to predict, the detection capability of the government should be highlighted in the preparation stage. The capability to recognize signals, which is based on attentiveness in assessing and detecting the risks associated with unexpected and potentially widespread threats (Quarantelli 1988). This is crucial in influencing the speed of responding to a crisis. It reflects the ability of an organization's alertness in looking out for possible danger. The SARS case demonstrated the Singapore government's detection capability of paying attention to SARS crisis and treating it as a severe national crisis:

During the SARS crisis, the early warnings of a pneumonia outbreak by WHO, the detection of SARS cases in Guangzhou and Hong Kong, and the alerts provided by TTSH of patients potentially developing pneumonia all served as warning signals.

Early detection of SARS provided time to control and prevent it transmitting to a larger area. Only by first time detection, will the government be able to take follow-up measures to reduce the possible loss from the crisis. Based on the above analysis of the predictable degree of crisis, there will be two subsequent conditions. If the disaster is successfully predicted, the government can arrange the emergency evacuation before the disaster comes. However, if not predicted, the government shall turn into the response stage.

5.2 Stage 2: Response

The second stage is the operational crisis situation which is determined by a highly complex set of interactions. As time goes on, the crisis may become worse because of the triggering of other crises. Therefore, quick effective measures taken by the government is indispensible. The response and strategy of government as well as the action of stakeholders involved (e.g., rescuers, victims) all have strong influence on the crisis's further development. Also, clear communication and well-delegated responsibility strongly influence the outcome of the crisis. The aim of this stage is to prevent an escalation of the situation (Smith 1990).

5.2.1 Extent of damage

According to the nature of the disasters, the extent of damage varies across the disasters. In this study, we categorize the extent of damage into three levels, intensity, duration, and scope. First, for intensity, we define it as the extent to which the human and material resources are damaged by the disaster. Second, for duration, we refer it as the time length of the occurrence of the disaster, which means how long the disaster will last from triggering of the event to the disaster stops damaging. Finally, for scope, we define it as the extent of the possible area that can be affected by the disaster.

5.2.2 Extent of damage - Intensity

For disasters like tsunami, the intensity of damage is quite intensive as hundreds and thousands of people can be dead and simultaneously all the infrastructures are broken down. In the tsunami case, after the cities were hit by the disaster, the transportation system was broken down and the communication facilities and electronic power were destroyed. For those disasters with large intensity, the infrastructure recovery capability of the government is quite important in that the government will be able to take first actions to reset-up the infrastructure to begin the follow up rescue tasks. The government needs to take immediate actions to help the affected areas to recover infrastructure, communication facilities, and transportation, which extensively determines the efficiency of crisis relief applications.

However, for some disasters like SARS, the intensity of damage is small at commencement of response activities. People are affected by the disease while the entire infrastructure is still operating

well. In this situation, the government do not need to put much effort in infrastructure recovery. Rather, they need to focus more on the implementation of IT facilitating capability. The IT facilitating capability enables the government to develop or invent new equipment which can be used in helping the fight against the crisis. With the help of new IT equipment, the government will be better facilitated to further undertake the mission in crisis management. Meanwhile, the data of the contacts are well under control so that the government can monitor the development of the disease. The Singapore government did a fantastic job with applying IT facilitates in the SARS case. It was mentioned by several workers engaged in the crisis management activities:

"The development of the e-government infrastructure over the years entitles the government ability to deploy IT Resources with a very short time. DSTA built contract-tracing and Thermal Fever Scanner systems (SARS) and aid- tracking systems (Tsunami), which provided the information needed to respond."

"Within two weeks, DSTA had developed an information system to support the large-scale contact tracing and data management activities at the operations centre. Microsoft VisioTM, a diagramming program used to document and organize complex processes; RFID for tracing contacts; a CMS was proposed to manage data exchange across agencies."

5.2.3 Extent of Damage - Duration

As for the duration of the disaster, some disasters come quite fast, like tsunami that may end within two hours while some disasters may last for a long period of time, like SARS which may continue for one year. Based on the duration of the disaster, we further attribute disasters with short duration and with long duration.

For those disasters with short duration, the emergency phase is quite short which means the government have very limited time to negotiate on the strategy to use in the rescue mission. In the tsunami case, the victims in the affected area are dying and they need to be rescued as soon as possible. Every minute elapsed could cause more death and victims are in short of resources making them survival. Past evidence shows the first action taken by the government will alleviate the horror of the people in danger. Meanwhile, the uncertainty of the environment is quite small. Consequently, the operating mission is less complicated. In this circumstance, the strategy execution capability should be pointed out to ensure the government being able to carry out the strategy in the first occasion. By focusing on the execution capability, the government avoids wasting time on formulating a perfect plan suitable for any uncertainties and emergencies, instead, it is in urgent need for them to find an effective strategy and put it into action right after the disaster happens.

Nevertheless, when the duration of the disaster is long, like SARS, the time is not that urgent and no large casualty happens at the same time in the disaster. However, the uncertainty of the environment could be quite high. Consequently, the operating mission becomes more complicated. As recalled by some of the interviewees:

"As the time goes on after the outbreak of SARS pandemic, people become fear and panic. Timely and quality information dissemination is crucial for managing negative reactions."

In this situation, the government strategy needs to include not only conducting crisis relief activities, but also managing other related issues such as public relations. Therefore, they need to emphasis on the effectiveness of the strategy they use, which means the government should formulate, evaluate and choose the best strategy to apply in the crisis management. In the SARS case, the government set up SRCC at first and engaged in developing a strategy to coordinate the crisis relief activities. We refer this capability as strategy formulation capability, the ability to formulate a best strategy based on the existing knowledge and resources.

5.2.4 Extent of Damage-Scope

For some disasters, the affected area will be spread out because of the traffic flow or the immigration of people. While for some disasters, the affected area is rather stable that the disaster will only happen

in the specific area. Therefore, we refer tsunami as disaster with identifiable scope and SARS as with unidentifiable scope.

When disaster only happens in certain area and the scope of the affected is stable or limited, the government may put all their effort into these areas to fight against the disaster. In the tsunami case, the government had a clear idea of the scope of the affected area and acted as a leading role in the crisis management. Thus, the leading capability of the government proves to be dominant when the scope of the disaster is identifiable. The government should lead the organizational agencies to cooperate to undertake the missions in crisis management. It is important to immediately dispatch the senior management to the crisis scene because the involvement of senior management adds weight to the significance of a crisis response operation (Augustine 1995). The government's swift and decisive leadership role in promoting a strong response to the Tsunami disaster was catalytic in improving the unity and cohesion at various levels of the crisis relief operation.

When the scope of the disaster is not easy to be identified, the affected area may spread out randomly because of the traffic flow. Therefore, the government need to communicate with other government to control the spread out of the disasters. Communication allows more information to be shared and the government in those areas that has not been affected yet can take measures to prevent the disaster. In the SARS case, the government collaborated with other government together to fight against the SARS to prevent the further spreading of this disease.

"Various government agencies led different initiatives to contain the spread of SARS. Flat structure is built so that information could be coordinated through one body and quickly spread to others. Working with foreign agencies, such as WHO, helped Singapore get informed about the nature of SARS."

We attribute this ability of the government as the communication and collaboration capability. The communication and collaboration among governments can put the disaster within control, so that the disaster will not cause more losses.

5.2.5 Knowledge about crisis

Knowledge can be gained from past crisis management experience in coping with certain disasters. We may also encounter some disasters which we do not have adequate knowledge about them. For those disasters we have certain knowledge, like tsunami, the government can decisively stick to the strategy they applied from the beginning of the crisis management. Nevertheless, for those that we do not have adequate knowledge, the government shall update their knowledge during the process of crisis management. Expertise gained from brain storming can be utilized to form new knowledge. The government may further formulate the strategy in dealing with the disaster.

"For the first few days, the patients were treated in an open ward with no infection precautions because the highly infectious nature of the illness was not yet known."

In the SARS case, Singapore managed to keep itself updated about the latest development of the crisis, i.e. the nature and symptoms of SARS. Another good example is the SARS Channel set up in May 2003 to provide SARS-related information and updates. This capability enables the government to improve crisis response. In this case, a loop should be circled back to the strategy formulation if the existing is not adequate and new knowledge can be formed so as to better support finding new strategy.

5.3 Stage 3: Recovery

Once the disaster is over, the affected areas need to return to the normality. The government shall take actions to recover the destroyed land and relief the victims. It is beneficial for the government to learn from the whole crisis management process to avoid future crisis. This is symbolized by the feedback loop in our crisis management framework.

5.3.1 Frequency

According to the number of occurrences of the disasters, we may categorize the disaster as high frequency and low frequency. Disasters happen once a year or even several times within a single year are referred as disasters with high frequency, while those disasters happen only once in several years are referred as low frequent disasters. The frequency of the crisis determines which aspects the government effort should put on in its different post-crisis period.

For high frequency disaster, the government needs to focus on rebuilding the area been destroyed. Residence and public sectors need to be set up and victims ought to be inhabited. Thus, the restoration capability is critical in the recovery stage to turn the ruined area back into a piece of beautiful land.

Instead, if the disaster rarely happens, the government shall try their best to learn from the experience in the crisis management process. Long-term strategy can be formed to prepare for the possible crisis in future. In the SARS case, the CMS was designed both to cater to the immediate needs of managing the SARS outbreak and also to provide a long-term solution for similar crises in future. In this study, we refer this capability as the learning capability of the government.

By considering the contingent factors during the crisis management, the dominant capabilities of the government in each stage are highlighted. According to the above discussion, our prescriptive framework of crisis management is shown in the following figure (Figure 4).

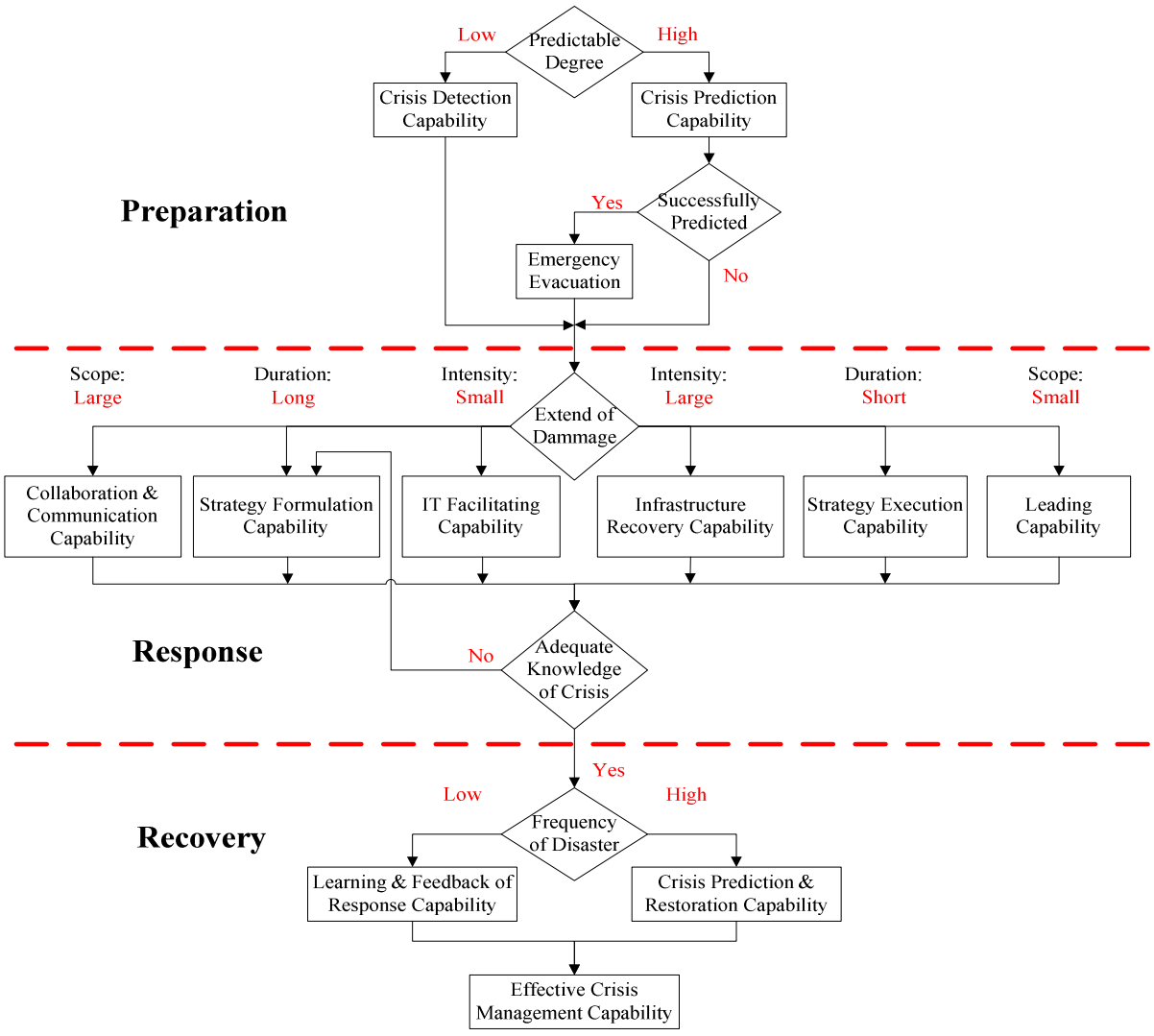

Figure 4. Prescriptive Framework of Crisis Management

6 CONCLUSION

6.1 Limitations and Future Research

A criticism commonly directed at case study research is the problem of generalizability (Walsham 2006). Although it must be readily acknowledged that statistical generalization is impossible from a single case study, generalization may take the form of theories, specific implications (Walsham 1995; Walsham 2006). In our study, we try to generalize the factors from our cases which can be applied to any disaster in the crisis management. This makes our findings not constrained to specific types of disasters. Nevertheless, future study can be directed at statistically validating the propositions of this study, so that the boundary conditions of the proposed model can be better defined.

A second limitation is that despite our efforts to be as inclusive as possible, we acknowledge that it is impossible to exhaustively describe all the possible ways through which various capabilities can enhance the performance of the crisis management within a single study. While we are bounded by feasibility concerns and the limits of the data collected, future research can certainly investigate other possible capabilities in which crisis management can be enhanced. One might begin by looking at other types of disaster so that more data from crisis management can be accessed. Possible capabilities may be control capability, public relation capability, or resource management capability.

The future research should address trends and triggering events leading to the crises, and the crisis management actions and policies regarding the extent and depth of crisis pre-planning, management, reporting, communication, knowledge sharing and organizational learning.

6.2 Theoretical and Practical Implications

By addressing the research questions set forth at the beginning of this paper, this study has made a number of important theoretical contributions. First, by illustrating the nature of disasters, and demonstrating how to apply government capabilities according to the nature of the disasters, this article underscores the importance of contingent factors in natural disasters in crisis management. The majority of existing natural crisis management research has emphasized the process and the measures taken in the crisis management and neglected the contingent factors of the natural disasters. In reiterating the importance of contingent factors of natural disasters, this article urges for a thorough consideration of strategies in future crisis management, and suggest the need to look beyond monolithic set of conditions and formulate a flexible framework facilitating crisis management.

Second, little research has been conducted on a comprehensive level of crisis management addressing capabilities. The past researches we found, all of them are focusing on the specific measures taken by the government rather at the capability level. By abstracting the actions being done into a capability level, our framework will be of more value in dealing with various kinds of natural disasters. In doing so, the framework enables the government to gain experience beyond past experience and prepare for future possible crisis management.

In terms of practical implications, the utility of the paper lies in the indications it provides for governments. None of the crisis management books can be used as bible when the government is facing a disaster. This underscores the central premise of this paper that to achieve effectiveness in a crisis management, is not dependent on how mighty the government is, but rather the approach to apply and emphasis on the specific capability contingent upon the nature of the disaster. By recognizing the nature of the disaster and focusing on the particular capabilities, it is hoped that if the proposed capabilities are effective according to the nature of the disaster, the framework developed in this article can be used as a roadmap to help governments to be more purposeful and confident in the process of crisis management.

** We wish all the best for the Japanese Government to lead the country through the crisis after the massive earthquake on Mar 11, 2011.*

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