The Study of Mechanism of Mobilization for Mega Disaster – Taiwan Area

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ABSTRACT: Mega disaster refers to a serious event that is over-scaled or compound, which would require extraordinary efforts to management. Therefore, the efficiency of mobilization mechanism would be essential to a nation. The mobilization includes man powers, supplies (equipment), economy and other several categories, to achieve the goal in managing and recovering disaster, each process of mobilizing should be coordinated. As a result, this paper is aiming to locate the effective strategies of disaster management in order to extend the capability in responding mega disasters of government in Taiwan. By reviewing the recently occurred hazard, the Katrina Hurricane and the 311 Earthquake, this paper identifies the main problems of the management of disaster in both countries. In hence, the comparison of the responding timeline between America and Japan is also concluded. With realizing the limitation of the mobilization mechanism, this paper provides the ideal mechanism in mobilizing includes the process and the time line to achieve the purpose of this paper.

KEYWORDS: Mega disaster, Mobilization mechanism.

1. INTRODUCTION

Facing the traumatic change of climate, the whole world should be alerted. Same as Taiwan, from the experiences of the past mega events, a well-development governmental system should be established under a great hazard. Especially now, the whole world is facing not just a single disaster like hurricane; instead, a widespread compound disaster, which might cover more than one region, also, constructed by more than one disaster.

A well-organized disaster responding system should include pre-disaster prevention, disaster response and post-disaster recovery. Therefore, through reviewing the experiences from other countries and Taiwan, this paper is aiming to exam the mobilization mechanism under disaster and the post-disaster recovery of Taiwan; in hence, viewing the system of disaster prevention and management to ensure the disaster-responding efficiency in Taiwan. Overall, this paper is looking for:

A. The organization of mobilization.
B. The process of mobilization.
C. The limitation of mobilization.

With the expectation of providing an overview of the mobilization system in Taiwan, this paper aims to locate the effective strategies of disaster management in order to extend the capability in responding mega disasters of government in Taiwan.

2. DEFINITION

2.1 Mega Disaster

Accordingly, the criteria of emerge disaster includes the number of the death, injured, missing and refugee that relates to the disaster. Also, the number of destroyed, affected households is included. Hence, the time and location of occurrence and the function of the living systems are in counted. Overall, the compound disaster that occurred in Japan

included several components: non-single disaster, the effect of the infrastructures and the mobilization of local governments.

In Noji (1996), the compound disaster refers to "NA-TECHS", which indicates the occurrence of a natural disaster or event that relatively cause second-injured due to the vulnerability of social environment. For example, the earthquake happened in Japan firstly provoked the tsunami, and results the major fire incidents and radiation crisis due to the vulnerable infrastructures. Shih et al. (2002) on the other hand exclude the number of affected human and properties and define the compound disaster as one predictably significant lost, in which would cost all nations' power from governments and non-profit organizations for a long period to be recovered.

Consequently, concludes all approaches, this paper defines the "mega disaster" with several components:

A. **Non-single disaster:** more than one natural disaster that occurred at same region in a short period, which might relatively provoke one and other disaster within the same time.

B. Unpredicted disaster scale: the scale of the disaster is over one region's prediction that results the unadapted and unbearable consequence of the region.

C. Compound disaster: the second impact from the vulnerability of the infrastructures relates to a natural disaster. That is, besides the crash from the disaster itself, the region would suffer another impact from the fragile infrastructures resulted by the disaster.

D. Over-estimated impact: the impact of the disaster is over-estimated, includes the uncountable number of affected people, households and the impact of infrastructures that leads to the dysfunction of the society for a while.

E. A long period and large scale of mobilization: the impact of the disaster requires a wide region of mobilization from all departments, also a long period of time to meet the resilience.

2.2 Mobilization

Generally, the concept of mobilization involves the power of military force. That is, the support from military while the nation facing threaten toward the function or the chaos of wide region. In mobilization, the preparation would be the major stage, which focuses on the early readiness before war or emerge. Two stages should be included; one is the preparation of peacetime, and another is for the wartime. For the peacetime, the preparation requires a long-period of time and thoroughly considered plan to adopt future possible war; on the other hand, the preparation for wartime is the emerge response toward the up-coming war.

Besides the arrangement of military, mobilization still depends on the whole nation's power. According to the Ministry of National Defense in Taiwan (2011), the mobilization refers to the use of all nation resources include man power, economy, technology, spirit and others to keep the nation steady while adapting emerge situation, such as war or hazard. It also can be divided into two main parts: administrative mobilization and military mobilization. The general definition of mobilization refers to the process of gathering all nations' resources by the cooperation of each administration session; meanwhile, through the lead and arrange of military to ensure the efficiency of nations' power.

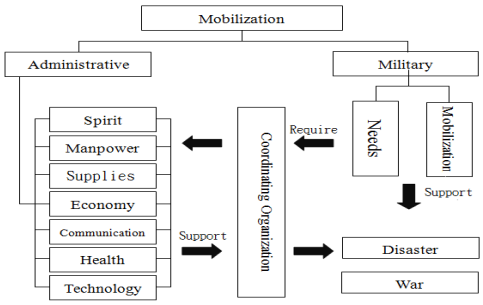

Figure 1. The Process of General Mobilization

From: www.tnfsh.tn.edu.tw/military/webinformation/courses/99course/

Specifically, in disaster prevention and response, the mobilization mainly focuses on the process of gathering the emergency responding sources from each government stage, local responding sector and organization after the declaration of disaster. According to the National Responding Plan (NRP) of Federal Emergency Management Agency (FEMA), mobilization is the inception, integration and operation of every governmental division in responding and supporting an event (Wu et al., 2007). Therefore, in responding disaster, the mobilization requires an overall interaction from government to the responding sectors, through the public to the private.

2.3 Mobilization system in Taiwan

The disaster prevention system in Taiwan is three-level (central government, county/city and country/ local government) process. While disaster, the local government would be the first responding line to the disaster; if the damage of disaster is over the capability of local government, the local government should request further help from higher level (second-level). Basically, the process of mobilization in Taiwan could follow this rule. Like chart 1 show, when one region swept by the disaster, the local government should be the primary responding session; meanwhile, the non-profit organization get involved. Secondary stage is when the local government is no longer be able to respond the damage, the nearest region government should respond to the request of the disaster area to provide assistance. However, if the secondary assistance is still not capable to control the damage, the central government would need to be involved. Moreover, the assistance from military will be attended after the central government is invested, in which, the full process of mobilization system is constructed.

3. REVIEWS

To understand the mobilization process of other countries, this paper reviews two major disasters that occurred in recent years. One is the Katrina hurricane in the United State, 2005 and another is the unprecedented earthquake in Japan, 2011. The following tables will illustrate the details of each disaster and the responding timeline of US government, Japanese government and Taiwan.

In 2005, the hurricane Katrina lashed the southeast of America and caused unprecedented damage of the area. Besides the impact of the hurricane itself, it also led to the dysfunction of electricity and communication system, which cost 300 billion US dollars lost. In total, the US government mobilized over 30,000 manpower and dozens of rescuer teams; also, the warships to assist in responding damage (Table 1).

Table 1. The details of Katrina Hurricane.

Disaster	*Katrina Hurricane*
Location	United State
Time	2005. 08. 23.
Death/ Injured/ Missing	656 deaths.
Refugee	96,178 people.
Other effect	Dysfunction of electricity and

	communication system.
Economy Lost	300 billion US dollars.
Manpower	About 30,000 national guards and 39 medical rescue teams.
Equipment	5 warships.
Foreign aid	Yes.

On the other hand, the unforeseen earthquake and the relatively provoked tsunami devastated the northern east of Japan on March 11th, 2011 (Table 2). The grant damage results more than 10,000 deaths and over 20 trillion lost, also, the crash of oil refinery and the damage of nuclear power plant. The mobilization process continually proceeds since March 11th until August 31th, the total mobilized numbers include: 10 million self-defense forces, 13,906 tons of supplies, 32,985 tons of water and 5,005,484 packs of foods. In order to compare, this paper lists out the first nine days of mobilization process of self-defense forces in Japan.

Table 2. The details of 311 Earthquake.

Disaster	*311 Earthquake*
Location	Japan
Time	2011. 03. 11.
Death/ Injured/ Missing	15,828 deaths, 3,754 missing and 5,942 injured.
Refugee	About 14,000 people.
Other effect	Level 5 Radiation crisis.
Economy Lost	15～25 trillion Yen (Japanese dollars).
Manpower	10 million self-defense forces
Supplies	13,906 tons of supplies, 32,985 tons of water and 5,005,484 pack of foods.
Equipment	Over 500 aircrafts and 53 warships.
Foreign aid	Yes.

Overall, as Table 3 demonstrates, it can be seem that the path of US government in responding Katrina was lagged behind. For both countries, several problems that related to the mobilization mechanism are pointed out (Chu and Chang, 2009; Yang, 2010; Kang and Xiang, 2011):

A. The reduction to FEMA's capability in responding hazard.

After FEMA has been merged into the Department of Defense (DoD) in 2003, it leads to two main concerns.

a. As the DoD put more focus on the defense of national security, the budget for FEMA was sharply curtailed.
b. The cause of FEMA's relegation to secondary status.

B. Incomplete evacuation plan.

The evacuation plan in New Orleans was incomplete, which resulted the evacuators had to stay in the unprepared place without enough needed supplies.

C. The lack of coordination in responding and managing disaster.

The New Orleans city had made a late declaration, which delayed the response from high-level government resulted a period of dark time of the city.

D. **The communication gap between divisions**.

a. Central government vs. local government – the unclear communication system between each level of government decreased the efficiency of managing disaster.
b. Local government vs. citizens – the lack of communication between local government and citizens would cause the

satisfaction of citizens.

E. The difficulties of delivering supplies.

a. The complex delivery system – the supplies delivery systems in Japan are well organized but complex. The government would firstly request for the needed supplies from other divisions and private organizations, the goods would deliver to the county supplies depots; afterward, those goods would attribute to each country and finally deliver to the disaster area under the arrange of countries. This complex delivery system once blocked the supply system, fortunately, the application of logistic released part of the predicament later.

b. The undeliverable disaster area – due to the mega disaster, a large scale of land transportation was destroyed, which disrupted the operation of the delivery systems.

F. Poor information transmission.

The dysfunction of electricity system would lead to the unclear information transmission, which could mislead the central government in decision-making. However, in recent years, the development of wireless Internet and mobile communication provide another way to collect and broadcast the information.

G. The treatment to minority groups.

From the experience of Japan, most of the death and injured were elders or physically disabled, same as in the US, during Katrina, the US government has been criticized for being ignorance to the African-Americans in New Orleans. In which allows us to consider the treatment of those minorities.

Table 3. The comparison of Katrina Hurricane and 311 Earthquake.

	(US)	*(Japan)*
Event	Katrina Hurricane	311 Earthquake
1	2005. 8. 26. ■ The Governor of Louisiana declared the emergency exists of Louisiana and started to operate the military force to assisting disaster. ■ Meanwhile, the declaration of Mississippi; also, the operation of military force.	2011. 3. 11. ■ The official residence responding session established. ■ The requesting for sending self-defense forces to assist disaster area. ■ The emergency responding session established. ■ The Tokyo fire department sent rescue teams. ■ The declaration of Radiation crisis. ■ Operating great quantity of self-defense forces, police, firefighter and medical

Day	*Responding Process*	*Responding Process*

	specialties in rescuing mission. ■ Total number of mobilized aircrafts: 25	
2	2005. 8. 27. ■ President Bush declared Louisiana and Mississippi States of Emergency.	2011. 3. 12. ■ Total number of mobilized self-defense force: 20,000 people. ■ Total number of mobilized aircrafts: 190. ■ Total number of mobilized warships: 45. ■ Total number of other supplies: 1,500 towels and 1,200 cans.
3	2005. 8. 28. ■ The preparation of disaster-relief supplies by FEMA in Georgia and Texas. ■ The evacuation caused people stocked in the gas stop. ■ About 10,000 people refuge in the superdome.	2011. 3. 13. ■ Total number of mobilized self-defense force: 50,000 people. ■ Total number of other supplies: 50,000 pack of food.
4	2005. 8. 29. ■ Evacuated about 80% citizens, and about 37,091 refugees in total. ■ Solders and FEMA were in an armed state.	2011. 3. 14. ■ Total number of mobilized self-defense force: 66,000 people. ■ Total number of mobilized aircrafts: 96 helicopters and 7 aircrafts. ■ Total number of mobilized warships: 58 warships. ■ Total number of other supplies: dry batteries, water（140L + 170 L ）, foods, preserved foods and other supplies.
5	2005. 8. 30. ■ The Pentagon announced sending 5 warships to the disaster area.	2011. 3. 15. ■ Total number of mobilized self-defense force: 70,000

		people. ■ Total number of mobilized aircrafts: 176 helicopters and 319 aircrafts. ■ Total number of mobilized warships: 59 warships.
6	2005. 8. 31. ■ The relocation of New Orleans city. ■ Mobilized 1,400 police from disaster rescue to public security control. ■ FEMA sent 39 medical rescue teams to the disaster area.	2011. 3. 16. ■ Total number of mobilized self-defense force: 76,000 people. ■ Total number of mobilized aircrafts: 194 helicopters and 322 aircrafts. ■ Total number of mobilized warships: 58 warships. ■ Total number of other supplies: over 200,000 packs of food, water.
7	2005. 9. 1.	2011. 3. 17. ■ Total number of mobilized self-defense force: 76,000 people. ■ Total number of mobilized aircrafts: 202 helicopters and 321 aircrafts. ■ Total number of mobilized warships: 57 warships.
8	2005. 9. 2 ■ About 6,500 national guards first entered Alabama. ■ 20,000 national guards entered Louisiana and Mississippi..	2011. 3. 18. ■ Total number of mobilized self-defense force: 76,000 people. ■ Total number of mobilized aircrafts: 203 helicopters and 324 aircrafts. ■ Total number of mobilized warships: 59 warships. ■ Total number of other supplies: 650 kg towels and other supplies, water (3t), foods and

		fuels.
9	2005. 9. 3. ■ Dispatched 10,000 national guards to disaster area. ■ 96,178 total refugees	2011. 3. 19. ■ Total number of mobilized self-defense force: 106,000 people. ■ Total number of mobilized aircrafts: 209 helicopters and 321 aircrafts. ■ Total number of mobilized warships: 57 warships. ■ Total number of other supplies: 600 kg ingredients and other supplies.

From: National Science and Technology Center of Disaster Reduction. (2005 & 2011).; Cabinet office, government of Japan (2011).

4. RESULT

Fortunately, Taiwan did not encounter any mega disaster until now; considering the global warming and relative disaster, it is necessary to be well prepared. From the past experience, the performance of responding time and the capability in disaster responding were acceptable. However, the opportunity of facing major disaster should be considered. Based on the experiences from other countries and Taiwan, several issues are listed:

A. The ambiguity of the authority in each government level.

a. The disaster prevention and management mechanism in Taiwan is basically following the system of Japan. However, the three-level governance might meet the obstacle due to the poor function of local government (third-level).

b. The unclear distinction between responsibility and accountability of central government and local government that confused the chain of command.

B. Inefficient communication between divisions.

During disaster, it requires the horizontal and vertical communication between departments in order to ensure the smooth of the responding; however, from the reality, the poor communication between each division has delayed the responding time for cooperating.

C. The failure of information transmission.

From the experience, the information transmission system was not successfully operate, which led to the failure of providing supplies. For instance, the supplies from central government were unusable that would eventually heaped up, which could waste more man power to collect.

D. The lack of a unify disaster management plan.

The experience shows that due to the lack of unify plan, the incoordination between central and local government delayed the mobilizing process for extra communications.

E. The suitability of military force in managing disaster.

From the past experience from other countries and Taiwan, the military force plays an

essential role in managing disaster. However, it should be considered that national defense should be the main function of militaries. Therefore, the process of involving disaster management might disperse the power of military force (Chang, 2009).

F. The incomplete supplies mobilizing systems.

Unlike Japan, the supplies mobilizing system in Taiwan is not as organized. The shortage of depots confused the donators and the suppliers, which spread out the energy of resources. Besides, the delivery system is another issue in mobilizing supplies. That is, how to deliver the supplies under the dysfunction of transportation situation.

G. The poor management of volunteers.

During disaster, all volunteers would crow into the disaster area, which could disrupt the order of the scene. Moreover, it might lead some extra cost of resources in arranging those volunteers.

5. CONCLUSION

The mobilization mechnism plays an important role in disaster management and prevention. From reviewing literature and collecting the data of recent disasters, this paper points out several problems of moblization system in Taiwan. Above all, this paper provides some suggestions for improving the mobilization mechism in Taiwan.

First of all, the time of responding is essential. From the experience of Katrina hurricane, it is clear that the response to the disaster should be timely to avioding further damage. As a result, this paper provides a timeline to clarify the suitable disaster manging (Figure 2). As the figure shows, considering about the capability of Taiwan, the assumption that the supply of the supplies could achieve 100% 3 days after the disaster by our own can be made; however, after the fourth day, the supply system would start to drop down, in which, it is necessary to import the forigen aid to support.

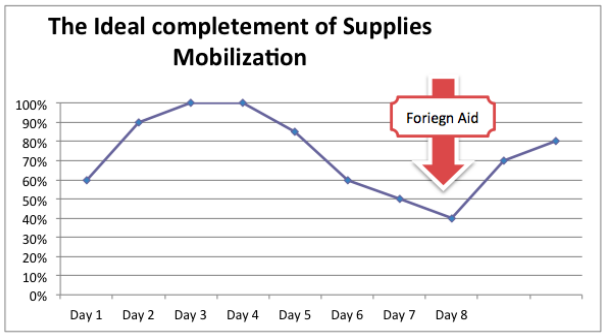

Figure2. The ideal completement of supplies mobilization.

Also, to ensure the capability of the mobilization mechnism, this paper indicates an ideal mechnism in operating mobilization during disaster. As the figure indicates, the mobilization inculdes two main parts: supplies and equipments. While the disaster occurs, due to the unclear situation, the local government of the affected area would primary need be prepared for providing the ugently needed supplies (include foods and water). If the impact is higher than the region's bearability, the region could apply for the assistance from nearest county by rules. Meanwhile, the operation of non-profit organization get involved to support the affected area. Besides, the military usually stored certain amount of supplies; hence, the wider space for reserving goods and refugees, the use of military force would be critically helpful.

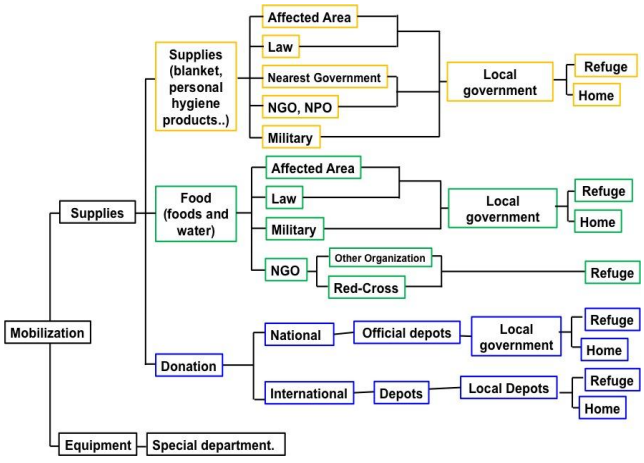

Figure 3. The ideal mobilization process.

The full mobilization requires the operation of all divisions from government to non-profit organization. As a result, this paper expects to improve the mobilization mechanism in Taiwan by following the ideal process of mobilization.

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