

Characteristics of Emergency Response at the Great East Japan Earthquake

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ABSTRACT: The Great East Japan Earthquake disaster brought devastated damage and difficult environment to local governments which had to execute the disaster response based on the Disaster Act. This study gathered facts on the disaster response actions and clarified characteristics for that disaster response in Japan. As a result, many of disaster response issues resulted from the disaster response system of Japan rather than the vast scale of hazards. The characteristics of the disaster was described as the optimal condition for doing disaster response by local governments, the occurrences of problems which experienced in the past disaster, the difficulty of cooperation among several governments and public organizations.

Keywords: disaster response system, the Great East Japan Earthquake, the local government action, complex disaster response

1. INTRODUCTION

The extreme disaster occurred in Japan on March 11, 2011. The strong shaking created by the earthquake spread out widely and the huge tsunami affected damages along the coast areas of the Pacific Ocean. Add to these, the nuclear accident happened in Fukushima Prefecture. The phenomena led to many death, many collapsed building, many sufferers. This complex disaster had never been experienced in Japan and in the world.

Japan had a lot of disaster recovery, so that the method of disaster prevention and the plan, law, organization for disaster response are advanced in compared with other countries. Specially, the technology for disaster prevention and hazard prediction system are the highest level in the world countries. In the case of this disaster, they were just functioned, and the public sectors started disaster response after system's information. But it was pointed out that disaster organizations had many troubles vertically and horizontally at the term of disaster response.

2. The Great East Japan Disaster Response Action

2.1 Disaster characteristics to analyze the disaster response

This shows some basic facts about the Great East Japan Earthquake in order to review how the emergency response system of Japan's administrative government functioned in response to the disaster.

First, it was the Earthquake occurrence time. The earthquake struck at 2:46 PM of March 11 (Friday), a period of time when many government employees (at national and local levels of governments), those responsible for disaster response, were in their offices. Therefore, at local governments and national, human resources for disaster response were available at the maximum level from the beginning. Even though the first problem in disaster response activities in Japan is to be the gathering of necessary staff members, this was not an issue in the case of the Great East Japan Earthquake.

Secondly, it was that national and local governments were successful in obtaining necessary information at the initial stage. Many of the communities that suffered damages experienced strong motions of intensity 6 lower or higher on the Japanese seismic scale. And local governments were informed of the observed seismic intensity level by the Japan Meteorological Agency (JMA). JMA issued a large tsunami warning and communicated it to communities where a large tsunami was anticipated.

Lastly, the tsunami damaged areas were surely most advanced area in Japan for the tsunami disaster countermeasure. Therefore, not only the local governments but also citizens of the area are believed to have been better prepared against tsunami than the local governments and citizens of any other regions. Moreover, it should be noted that the damages to buildings and structures due to seismic activity were not very severe and that there was at least a small time gap between the occurrence of the earthquake and the arrival of tsunami.

2.2 Municipality's response action problems

At the initial response, municipalities that suffered the serious damages were affected by tsunami. Most of the municipal governments in the affected area had anticipated the arrival of tsunami based on the information from JMA's tsunami warning, and had initiated corresponding activities to address the threat of tsunami. Specifically, the municipal governments guided the evacuation of citizens, ordered the closing of floodgates, and opened shelters. Therefore, this tsunami response activities could be

conducted at the level of local governments in an automated action according to the predefined manner. Once initiated by the reporting of the emergency, the process could continue smoothly, only requiring problem-solving activities at the on-field level.

When a tsunami warning is reported, it becomes more urgent for each concerned local government to attend to the distribution of information within its internal organizations than to attend to the exchange of information with the other local governments concerned.

After the tsunami, which was greater than expected, struck many municipalities, causing many deaths and creating many refugees. Means of communication was lost as the communication systems and backup facilities of local governments were physically damaged. At this point, following the occurrence of real damages, municipal governments had to report damages to higher levels of government. At the same time, the municipal governments had to communicate their request for help in regards to life-saving activities and refugee care-taking activities. The lack of a means of communication for the municipal governments at the moment when external support was most needed is identified as a chief cause of the delay in grasping of the breadth of the disaster, which brought difficulties to initial response and emergency relief activities.

In the localities that were severely struck by tsunami, the town halls were destroyed and/or employees of local municipalities were killed by tsunami. The situation was such that it became impossible to conduct emergency response activities according to the predefined procedure. It became necessary to make decisions concerning actions and allocate resources at the field level. Thus, the occurrence of serious damages disabled many municipal governments to conduct emergency response activities “according to the predefined procedure.”

2.3 Local Government`s response action problems

Prefectural level of government has been a main responsible for the disaster response in the Disaster Relief Act. . Following the earthquake occurrence information, emergency response headquarters were set up at many of the municipalities of Iwate, Miyagi and Fukushima Prefectures, and the governments of these prefectures also converted to emergency organizations. The setting up of such emergency organizations was done automatically according to a predefined procedure.

However, as many municipalities suffered enormous damages due to tsunami, the amount of information that required handling by the prefectural governments increased sharply. While still unable to grasp the overview of damages caused by quakes, it became urgent for these organizations to give emergency support to the municipalities that were struck by tsunami. To make the situation worse, many means of communication were severed at this time, making it even more difficult to grasp the prefecture-wide overview of the situation. The disaster response resources held by the prefectural governments are not sufficient enough in quantity to be able to support responses to a great catastrophe. The main activity of prefectural governments, therefore, is to negotiate with the national government the procurement of resources and to discuss with municipal governments the allocation of resources. When a rough overview of damages caused by tsunami was known, it became clear that it was not possible to deal with the situation according to predefined procedure. However, no new system immediately existed to replace the predefined procedure. For example, it is necessary for a organizational system that enables decision-making about the priorities of actions to be taken, the allocation of resources and the necessary modifications to the lines of command even in the absence of an overview of the situation.

It should be noted that not all of the means of communication with municipal governments were lost. It was still possible to exchange information using dedicated communication lines for emergency use, for example. It has been reported a confusion or a lack of coordination in information exchange at this point due to discrepancy between the damage-related information required by the prefectural governments for the grasping of overview and the information required by the municipal governments for issuing requests for help occurred, which obscured communication. The information of the first category was required for conducting response activities “according to the predefined procedure,” while the information of the second category was required for “case by case” situation recognition. With limited availability of information, a gap in the awareness of the situation continued to exist between the field personnel and the logistic support personnel. Furthermore, it has been found problematic that the organizations in charge of logistic support did not have a mechanism that enabled them to convert to a procedure that could address an unanticipated situation.

2.3 National response action problems

This disaster response was the first case that Japan national government had an emergency disaster headquarter organization in accordance with the law after the Second World War. As to the dispatch of resources to the areas affected by the earthquake and tsunami, the national government immediately proceeded to mobilize the prearranged forces (medical teams, fire-fighting teams, police teams and self-defense forces). Each team of experts with an independent function has a unified line of commands that controls both field operations and logistic operations while conducting emergency response activities. In comparison, the national government`s emergency response headquarters, which also was charged with the task of grasping an overview of damages to large areas of the country, reportedly faced difficulties in sorting out information due to problems in the procedure to bring together information from different ministries. The ministries that have their own teams of technical experts for emergency response were under the major responsibility to conduct emergency response activities in the area of their responsibility, and therefore, collected necessary information on their own. The other ministries, which waited instructions from the emergency response headquarters, collected information according to the predefined procedure and transferred the collected information to

the emergency response headquarters. In this way, there arose differences among the ministries in the manner they collected information, which causes difficulties for the emergency response headquarters to put together information from different ministries.

The situation was further complicated with the issue of nuclear disaster response, which is congruently coordinated by the national government. In Japan, disaster responses to nuclear emergencies and to natural disasters are governed by entirely different sets of laws. Therefore, when a natural disaster is coupled with a nuclear accident, responses to the situation involve great complications. Even though this investigation will not discuss numerous issues in this area, I need to mention that, in this area of nuclear disaster response, hardly anything occurred according to the predefined procedure. As examples of the greatest identified weaknesses, there was almost a total lack of coordination concerning the distribution of risk information to municipal governments and also concerning the evacuation of citizens.

2.4 Discussion points for disaster response system

The following is the list of issues with Japan's disaster response systems that were brought to light during the Great East Japan Earthquake:

1. The predefined procedure generally assumed the provision of support after receiving a request for support. This mechanism, however, requires the handling of great amount of information.
2. Actions based on unified decisions are made difficult due to the presence of decision makers at multiple levels (at municipal, prefectural and national levels of government).
3. There is a lack of a system to support the coordinated actions of multiple governmental/administrative organizations in response to disaster.
4. There are weaknesses in the systems for making decisions regarding the allocation of resources.
5. There is a lack of method, procedure and capability for bringing changes in organizations in order to confront situations beyond those anticipated.
6. There is a shortage, within the concerned organizations, of human resources, including decision makers, capable of disaster response.

3. KNOWLEDGE FOR DISASTER SYSTEM

Japan has the excellent tsunami and earthquake shaking prediction system, so that response actions are determined by these information. This system is more functionally for rapid response at the small simple disaster, but it makes a confusion at the mega-scale complex disaster. Too quickly systematic response action plan leads to lose

4. CONCLUSIONS

Through the disaster response experience, it was revealed that Japan's disaster response system has serious problems for mega-disasters. It can make possible to act at the initial term for local and small, mono-disasters. But it is impossible to do at the time to need all organizational response only by expanding the plan and action manual. It is necessary to build a principle and strategy for the emergency response. While there are many problems to be dealt with, at the first, we need start considering a response and recovery plan with effective organizations that is designed to address a mega-scale disaster.

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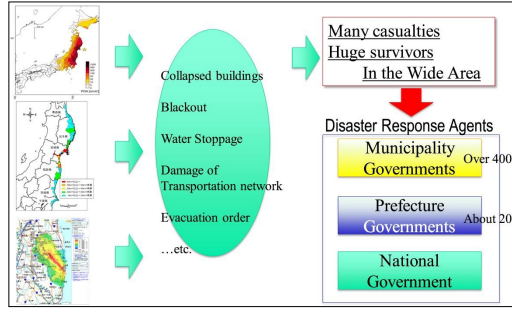


Fig.1 Action for the Disaster response in Japan



2. Disaster characteristics to analyze the disaster response

Figure.2 shows some basic facts about the Great East Japan Earthquake in order to review how the emergency response system of Japan's administrative government functioned in response to the disaster.

- Date and time of occurrence
 - No need to gather HR
- Site of Tsunami occurrence
 - Success of the initial warning of Tsunami
- Region hit by Tsunami Disaster
 - Advanced preparedness capability
- Shaking damage
 - Less of buildings with serious damage by shaking

Suitable correspondence condition for disaster response

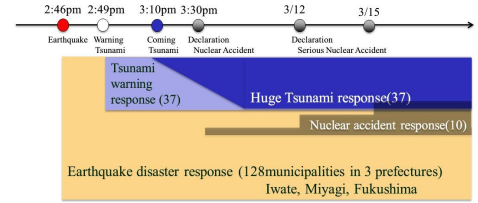


Fig.3 TimeLine of Disaster Response of municipalities

3. Disaster Response of municipalities, local governments

Municipality's response action problems

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Fig.2 The Situation of the disaster for administrators

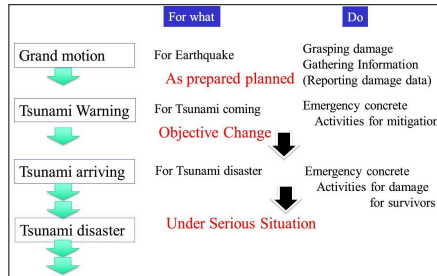


Fig.4 Municipality Response activity for Tsunami

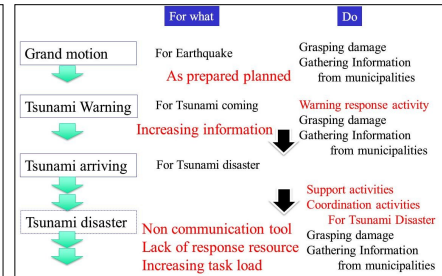


Fig.5 Prefecture Response activity for Tsunami

- **Wide spread Shaking damage**
 - Caused massive-blackout in the spread area
 - Lack of the information network function
 - Caused thousands of pointing damages for road and railway in the East Japan
 - Stop of the wide-area transportation network system
 - **Complexity: Triple disasters**
 - Earthquake shaking - Tsunami - Nuclear accident
 - Stacking of response activities to work according to regulations and laws
 - Causing complete confusion in administrative organizations
 - **Beyond the scale of the assumption**
 - The Tsunami exceeded the primary estimated level at many points.
 - Unavailability of the response plan and manual prepared on ahead for all level of administrators
- Japanese Disaster response system is vulnerable to an unexpected situation.

Fig.6 Factors of Emergency Response Difficulty

4 Discussion points for disaster response system

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