

Strengthening foundations of civil engineering role in Japan's disaster preparations

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Abstract

Civil engineering officers of local governments in Japan construct and maintain public facilities. In the event of disasters, these officers initiate the restoration of facilities, including damage to land or damage caused by landslides. In recent years, agreements among local governments have increased the opportunities to dispatch civil engineering workers from other local governments to disaster-stricken areas.

Background

In 2011, a few days after the Great East Japan Earthquake, I was dispatched to the Tohoku region to investigate the damage. The civil engineering staff of the local governments differ from the employees of private construction companies as they need to respond to disaster events. Local construction companies prepare disaster response agreements in advance and collaborate with local governments that manage public facilities. However, I faced a difficult problem as I worked in disaster response as an employee of a local government.

According to the National Institute for Environmental Studies (2017), 'In Japan, where there are many typhoons and earthquakes, the topographical and meteorological conditions make it prone to landslide disasters'. It should be noted

that Japan is an earthquake-prone area. Therefore, disaster response is crucial for the civil engineering staff of local governments. However, no literature has been found that studies the problems experienced by civil engineers in municipalities who were in charge of disaster agreements and disaster drills. Therefore, the reconsideration and reconstruction of current disaster response methods to respond to the disasters efficiently and effectively is urgently needed.

Role of civil servants in disasters

The role played by civil servants in Japan during disasters is stipulated in the Disaster Response Basic Law (Government of Japan 2012). The law was enacted in 1959 following the Isewan Typhoon. Table 1 shows the roles of the national and local governments as set out in the Basic Act on Disaster Response. Civil servants must respond appropriately to serve residents after a disaster and can be broadly classified into their level of service, being national civil servants and civil servants in local governments. The civil servants in local governments are closely related to the residents of their area. Evacuation orders are provided to guide residents to avoid dangerous places. They are based on civil engineering technologies, such as estimating how such facilities may be damaged in a disaster. Therefore, the civil engineers in local governments responsible for issuing evacuation orders, which is their primary responsibility in disaster response, bear a great burden during disaster events.

Table 1: Roles of the national and local governments in the Disaster Response Basic Act.

	Establishment of disaster headquarters	Disaster prevention plan	Disaster response	
			Evacuation order	First aid
Country	Yes	Yes (obligation)	No	Yes (obligation)
Local governments	Yes	Yes (obligation)	Yes	Yes (obligation)

Topographic features of major cities in Japan and disaster response

In 12 of Japan’s 21 major cities, the total area designated by each municipality as ‘areas where building restrictions are imposed to prevent landslides associated with land development due to several unlevelled cliffs’ accounts for a 2-digit percentage of the total area (Ministry of Land, Infrastructure, Transport and Tourism 2022). In Japan’s major cities, many residential areas are built on cliffs, which could result in landslides during earthquakes and typhoons. If roads are blocked by landslides caused by collapsed cliffs, the obligation to clear the road becomes a problem. The earth and sand from the collapse must be removed, but it is difficult to remove earth and sand immediately during a disaster. However, unless the earth and sand are removed, the roads used by nearby residents cannot be opened. There are cases where local governments have managed to clear such debris. However, local governments must balance their decision for each disaster site because they use resident taxes to remove earth and sand from privately owned land. The removal of debris is conducted over several days, during which time the roads remain closed. This can lead to a decline in public services.

Preparations that occur before a disaster event

Preparations that must occur before a disaster are disaster drills in which local governments, residents and related parties review disaster response and disaster agreements. Local governments and private companies must promise to cooperate in disaster response.

Disaster drills

Disaster drills are held regularly in all 21 of Japan’s major cities. The main keyword for disaster prevention drills is ‘residents’ and the content of drills mainly relates to how to evacuate residents and conduct firefighting activities.

A survey related to disaster prevention was conducted (Tokuyomo 2022), which states that:

...in the United States, Hawaii, and New Zealand, where large earthquakes and tsunamis have occurred in the past, evacuation drills are customary. Emphasis is placed on first aid training. There is a strong tendency to learn how to give first-aid to injured people in the event of a fire. In recent years, there is a well-known disaster drill called ‘Shakeout.’ This is a disaster drill that is said to have originated in the United States and is a coined word that

literally translates to ‘blow away an earthquake.’ It has undergone a transformation into a unique format called ‘Shakeout’ and is currently being reimported to Japan.

There are several studies on community participatory disaster management in countries, including New Zealand, the United States and European countries (Bajek *et al.* 2008; Barra *et al.* 2010; Chou and Wu 2014; Çoban and Gökteş 2022; Li *et al.* 2022; Malla, Dahal and Hasegawa 2020; Mönter and Otto 2018; Novak, Lozos and Spear 2019; Tierney, Bevc and Kuligowski 2006; Zavar and Nelan 2020). All these studies are mainly disaster prevention studies related to training for residents. Disaster drills in Japan and in other countries focus on evacuation and firefighting activities.

As per OYO Corporation (2023):

As a result of conducting a questionnaire survey of victims of the Great East Japan Earthquake, it was found that it is important to revitalise disaster prevention drills in local governments in order to maintain awareness of disaster prevention.

Disaster agreements

K City has concluded over 200 disaster agreements, including 20 in the construction sector. Table 2 shows 2 types of cooperation agreements (City of Kawasaki 2023).

In general, contracts are not required for grant aid, but contract procedures are required for paid cooperation. In addition, for the disaster agreement of K City’s port authority, contract procedures were established for the event of a disaster 10 years after the conclusion of the first disaster agreement.

Yamashita (2015) states:

In 2014, we conducted a survey on disaster agreements with business operators in 1,741 local governments nationwide. 22.4% have experience of cooperating with business operators based on [omitted]. The method of construction for disaster response was decided quickly, but there were discussions concerning what kind of contract procedure would be good, and it took a certain amount of time to begin construction for disaster response. For the person in charge of the local government to understand the person in charge of the contracting party, it is necessary to regularly communicate with the person in charge of the contracting party. It is necessary to keep in regular contact... [omitted]... Departments and staff other than the disaster prevention department should actually understand the contents of the agreement.

Table 2: Types of disaster agreements and implementation details.

Types of disaster agreements	Implementation details
Free cooperation	No payment to private companies for disaster work.
Paid cooperation	Payment to private companies for disaster work.

Views

There are new views that can assist in an effective and appropriate response in the event of a disaster:

1. It is important to identify contract procedures in the disaster agreement. It then is possible to rapidly begin disaster relief efforts.
2. It is important to revitalise disaster drills by implementing new drills such as emergency disaster recovery construction contract procedures. Considering several natural disaster types, training will be provided on restoration and contract work pertaining to disaster recovery. Disaster prevention drills can be revitalised by making changes to the disaster prevention drills of each year. By changing the contents of disaster prevention drills each year rather than fixing it, it is possible to prevent one from getting stuck in a rut.

This report is the result of the author's own ideas and does not represent any positions taken by the local government for which he works.

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