

## The Needs of Holistic Approach - Lessons from Hanshin-Awaji Earthquake

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Japan enjoyed many kinds of natural disasters. Floods and land slide due to heavy rain has been the main killers in Japan. Current disaster management system has been established in 1961 following the severe damage caused by the 1959 Ise-Bay Typhoon. Japanese current disaster management system is basically designed to reduce the damage due to floods and land slides. It has been successful in terms of mortality reduction as indicated in the total of mortality between 1945 and 2000. As far as earthquake disaster is concerned, only 17 damaging Earthquakes occurred for this period. Seven earthquakes killed more than 100 people. It was tsunami that killed people in the recent three events in 1960, 1984, and 1993, so tsunami was a prime target for earthquake disaster reduction activities. In other words, it was unprepared for the near field earthquake which occurred in 1995 in Kobe. Thus, this earthquake created a big challenge for disaster community in Japan

On January 17 of 1995, Kobe earthquake occurred in front of us. It resulted in a catastrophic disaster as indicated in these numbers. If you compare these numbers with the US largest earthquake disaster, which is Northridge earthquake, you would realize how severe the damage due to the Kobe earthquake was.

Table Comparing Northridge earthquake with Hanshin-Awaji earthquake

	Northridge	Kobe
Deaths	57	6400+
Homeless	20,000	400,000
Damages Housing Units	30,000	200,000
Total Property Losses	42 Billion USD	150+ Billion USD
Insured Loss	14 Billion USD	10 Billion USD
Damage conditions	-Pockets of severe damage required reconstruction -Moderate damage was widespread but repairable	-Many areas of complete destruction -Widespread severe damage

This unprecedented scale disaster taught us at least two things. First, buildings complied with better building codes could survive this earthquake. So, people realized that structural mitigation really works for reducing disasters. Second, this disaster opened up a new disaster management issue. This issue required for both practitioners and researchers to work hard for a long time should work. In this particular case, it exceeded eight years. Many people in Kobe both in the public and private sectors still feel that they are not fully recovered yet.

In Japan, building codes have been upgraded twice, in 1971 and in 1981. It is common for us to look at building damages in terms of the impact of structural mitigation. This figure shows the result of field survey conducted by AIJ kansai Chapter research team. They focused on the central business district in Kobe city, and they conducted structure by structure examination of damage level of 932 engineered structures. As you can see clearly, newer buildings following upgraded building codes performed better.

This catastrophic disaster also taught us improving mitigation effort should be accompanied by improving preparedness effort. Mitigation effort serves as the basis of disaster reduction. Through Mitigation effort, our society can keep on working with no damage from those mild but frequent hazards. For example, no crisis should be happening by the rain with 10 mm per hour. Any elements of built environment is not able to be perfect. They may not perform well if they are it by the hazard which exceeds their design force. Let me call this as mitigation limit. If the hazard intensity exceeds the mitigation limit, it would create some damage depending on its intensity. This is where preparedness works to minimize the damage and to facilitate recovery.

Thus, disaster management capability can be expressed as the sum of mitigation and preparedness. In case of catastrophic disaster, it would have a very severe damage by definition, it also indicates that we need to have a high level of preparedness for better consequence management.

What the Kobe earthquake revealed for us was the long-term recovery is probably the most difficult disaster management issue because of the amount of work needed as well as its complexity. Psychologically speaking, long-term recovery issue requires for both disaster people and victims a quite different orientation from response and short-term recovery issues. It is well known that human senses respond on a log scale. What this means is that people are very apt to differentiate subtle changes in environment, but they are not good for big changes. For the people experiencing disasters, many distinctive events would occur for them one after another before things get settled, so people would acquire a long list of experiences during response and short-term recovery phase even though it is just several months long. In contrast, during long-term recovery phase, people have to accept a new reality created by disaster and reorganize themselves to adapt for a new environment. This is a time consuming process which might need as long as 10 years.

In case of the Kobe earthquake, the beginning of long-term recovery process was the completion of disaster recovery plan by the end of six months. This is a simplified structure of disaster recovery plan for Kobe city. Plan has three layers, even though every element goes simultaneously. First and most basic element of recovery is restoring damaged infrastructure. This helps both physical recovery and economic recovery. Given the recovery for house and work, people could recover themselves.

In order to facilitate long-term recovery process, Japanese national government has put as more than 80 billion US Dollar within the first year for mainly recovery of infrastructure and public facilities. The damage for infrastructure and public facilities amounts to be about 35% of total damage.

In addition, building damage, mainly damage for private houses, amounted to be about 60% of total damage. So, it is impossible for such government money cover the entire recovery process. We need to mobilize private resources. As of year 2003, which is the 9th year of recovery, here is the current state-of-affairs. Infrastructure was restored in two years. It is probably the fastest restoration ever done as many of you have been surprised. Next focus was the houses. In five years, more than 140,000 houses or living units were supplied by a variety of means: governments at various levels provided rental apartments, private developer also did so, and victims themselves invested a lot for reconstructing their house. There are a total of 11 major redevelopment projects, some of the were completed and the rests are approaching to end this year. These are successes.

In contrast, economic recovery and personal and family recovery are still underway. People may not have a clear vision how they could end them successfully. It is mainly because we are not well prepared to incorporate these aspects into recovery plan. As a matter of fact, recovery plan was equivalent with physical recovery plan. Before the Kobe earthquake, there was no recovery plan which set economic recovery as well as personal and family recovery as its goals.

The followings are the lessons from Physical recovery:

- Wise Land Use Planning

  - Moratorium for First Two Months

  - Quick Debris Removal

  - Recycle Debris by Differentiation

- Quick Restoration of Infrastructure as the basis of All Recovery Activities

  - Construction of Safe Buildings

Enforce Building Codes Strictly  
Based on Lessons from 1923 Kanto Earthquake and Post WWII Reconstruction  
Specific Numerical Targets were Established  
In the First Five Years, Physical Recovery was Completed

Let me turn to Personal and Family recovery. Before the Kobe earthquake, it was assumed that personal and family recovery would be achieved by supplying ample amount of public spending to the impacted area for physical recovery. After the Kobe earthquake, it became one of the explicit goals to be achieved in recovery plan.

However, nobody was confident enough to define what is personal and family recovery. In other words, we were not sure about what the desired end state looks like by which we can say they are recovered, and what kinds of programs should be implemented for recovery. In reality, it turned out to be almost like social welfare programs for low-income and/or senior citizens.

In order to define the meaning of personal and family recovery, we worked with victims through a series of workshop to help them figuring out the meaning of personal and family recovery. Through workshops, people revealed that there might be at least seven element for successful recovery: They are 1) Securing Housing issue, 2) Maintaining existing social network and/or creating new one in case of forced relocations, 3) Having proper land use plan and/or town-scape regulations, 4) Improving disaster mitigation level, 5) Maintaining good physical and mental health, 6) Securing enough income and work, 7) Having a good relationship with local government. Only after these seven elements become acceptable for victims, they may think they are recovered.

Based on the definition of personal and family recovery introduced now, we have been conducting a series of random sampled survey for those residents in the most severely impacted area since 1999. Since then, we are having survey every two years, so 1999 data, 2001 data, and 2003 data were obtained, and 2005 data will also be collected. This figure shows that psychological recovery level of victims may change depending on their life stage and the severity of housing damage.

As for the economic recovery, it was not really incorporated into recovery plan, mainly because nobody can control economy. In other words, programs for both physical recovery and personal and family recovery have been implemented without any reference to economic recovery. For example, Kobe harbor was rebuilt with a higher seismic standard with lots of money, even though the business never returned. We have been monitoring economic recovery using social statistics provided by Kobe city on a monthly basis. It was found that three major patterns exist for recovery: 1) increasing activities after the earthquake such as building construction, 2) reducing sharply for a while but returning back to previous level such as grocery consumption, 3) reducing sharply for a while and never returning to previous level. The typical example for the third pattern is export and import at Kobe Harbor as shown in next slide. Based on these findings, we are now thinking that economic recovery should be placed as the top priority goal for recovery. Physical recovery should be regarded as a tool for upgrading social infrastructure for the implementation of expected economic development. By this way, we could turn disaster as a chance for future sustainable development. Personal and family recovery should be realized as a result of economic recovery. In order to do so, participatory process would be an indispensable element of recovery planning process.

As a conclusion, I could sum up the Hanshin-Awaji earthquake as follows:

- Importance of Having a Pre-recovery Plan
  - It could be a chance for improvement
  - What we would like your life to be
  - Future Vision : Smart Growth
- Pre-recovery Plan must be a Holistic Plan
  - Not Just Zoning
  - Sustainable Economic Development
  - Improving Quality of Life
  - Physical Recovery as a tool
- Planning Process Should be Participatory
  - Capacity Building
  - Don't Rush/Take Time