

Paper:

Comparison of International and Domestic Methods of Providing Housing After Disasters

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This paper raises issues of housing supply programs after disasters and compares how Japan, Turkey, and Mexico have supplied newly constructed housing after disasters directly through public organizations. The study results indicate that the planning schemes of these three countries differ in terms of their restoration effects on the cities. This paper also discusses problems involved in the public provision of housing in Japan.

Keywords: mass housing restoration, housing supply with public management, housing recovery programs after disasters

1. Backgrounds and Objectives of this Study

Recently, large-scale earthquakes have occurred in heavily populated areas in various countries, such as the Great Hanshin-Awaji Earthquake in Japan (1995), and the earthquakes occurring in Turkey and Taiwan (1999), in India (2001), in Sumatra (2004) and in Sichuan in China (2008). Each of these earthquakes damaged a vast number of buildings, and hundreds of thousands of people lost their homes. The possibilities of heavy damage from disaster will inevitably increase as cities increase in population and housing is built in a disorderly fashion.” In consideration of the increases in urban populations in recent decades, it is unmistakable that the risk of damage in cities is rapidly increasing.

On the other hand, administrative organizations are universally required to support the reconstruction of homes damaged by large-scale disasters to restore the livelihoods of the victims. The roles of the public sector increase as amount of housing to be provided and the necessity for a structured supply of housing for whole cities increases. In other words, the public organizations for city planning are responsible for daily advanced planning while taking safety in consideration, and also for emergency ex post facto planning for the mitigation of the expansion of the damage after disasters. Their roles are ever increasing in consideration of the ever-increasing risk of damage in urban areas.

Housing supply programs after disasters promoted by public organizations broadly fall into two general categories: material compensation for damaged housing and cash allowances as funds for housing supply [1]. A study on housing supply in the areas hit by the Great Hanshin-Awaji Earthquake in 1995 criticizes the single-line type policy centered on material compensation for the provision of temporary housing and then public housing [2]. Another study lauds these material compensations because they support those in lower income brackets [3]. The option of material compensation for the expansion of existing public housing is undoubtedly more realistic and concrete for the public organizations concerned [4]. A double-line type housing restoration policy, which includes both material compensation and cash allowances, has been proposed to solve the above problems [5]. However, no procedure for the cash allowances has been proposed.

This study focuses on policies for the direct supply of housing by public organizations in times of disaster. Past studies have mainly focused on understanding the situations of temporary housing and public housing provided after the Great Hanshin-Awaji Earthquake [6] and on pointing out issues involved in housing reconstruction processes [7-9]. This study analyzes the overseas programs that have physically supplied housing with the Japanese housing supply programs to characterize the Japanese programs and to propose an improvement plan.

2. Issues of Comparisons of Housing Supply Programs After Disasters

Three issues are raised for comparisons of housing supply programs after disasters: housing location characteristics, percentages of housing directly supplied, and intention of the programs. These issues are now discussed in more detail.

2.1. Ratio of Housing Directly Supplied, Cash Allowances or Physical Compensation ?

Housing supply programs after disasters promoted by public organizations broadly fall into two general categories: cash allowances and physical compensation. The former provides funds to promote housing supply efforts

1. This paper is based on “The role of public housing provision in reconstruction programs after disaster,” Association of Urban Housing Sciences, No.43, pp. 150 to 155.

Table 1. Damage caused by the earthquakes.

	Earthquake in Mexico	Earthquakes in Turkey		(Reference), the Great Hanshin-Awaji Earthquake
		Kocaeli Earthquake	Bolu Earthquake	
Date and time of earthquake	1985.9.19 AM7:17	1999.8.19 AM3:02	1999.11.12 PM4:17	1995.1.17 AM5:46
Magnitude of earthquake	M8.1	M7.4	M7.2	M7.3
Approximate number of deaths	9,500	17,000		6 400
Approximate number of homes damaged	95,000	96,000		100,000
Approximate number of households affected	180,000	100,000		190,000
Major affected cities	Mexico City, others	Gölcük, Düzce, Sakarya		Kobe, Ashiya, Nishinomiya, Kita-awa, others
Population of the affected areas	About 1.5 million	About 2.6 million		About 3.6 million

by the victims themselves, and the latter constructs housing and provides it to victims preferentially. In general, the former is promoted on the premise that the market mechanisms work, whereas the latter is frequently adopted when necessary stocks are in short supply and public support is needed. The former can be thought of as the market-economy type whereas the latter can be thought of as the planned-economy type, but both greatly affect the housing markets of the afflicted areas. The number of recipients of support is roughly estimated and the number of units to be supplied is determined based on the support schemes and the ratio of residences to be directly supplied.

2.2. Housing Location Characteristics: On-the-Spot Supply or Relocation Supply ?

One of the issues involved in the public supply programs is where the housing is to be constructed: in the afflicted areas or in other areas [10]. Relocation of the residences of victims frequently causes social problems, depending on the methods of selecting the residents.

2.3. Intention of the Programs: Protection of Assets or Protection of the Weak ?

Public housing supply programs intend to support the protection of assets (promotion of self-help construction) or the protection of the socially weak. The former compensates for significantly damaged housing assets with public funds, whereas the latter mainly protects the victims from losing their homes and livelihoods, and therefore suffering hardships. The former is basically for housing owners and the latter is mainly for renters, with renters suffering more hardships than owners.

3. Comparative Analysis

This section compares housing supply programs adopted by Mexico and Turkey, which were hit by earthquakes in 1985 and 1999, respectively, with those adopted by Japan in support of the victims of the Great Hanshin-Awaji Earthquake. Each of the afflicted areas has a population exceeding 1 million, lost around 100,000 homes,

and provided around 50,000 housing units through public funds. The Mexico and Turkey earthquake relief efforts share common features with those after the Great Hanshin-Awaji Earthquake in many aspects, e.g., the extents of the damage to urban areas and the large scales of the aid and housing provided. This study investigates processes for setting up housing supply programs as well as the details and backgrounds of the programs, based on information collected so far. The author visited Mexico in September, 1999 and March, 2001, and Turkey in November, 1999² and August, 2000, and August, 2002³ for on-the-spot surveys to collect information and interview the persons concerned [11]. This study reviews the direct housing supply programs adopted for the 3 afflicted areas to extract their similarities and differences.

4. Backgrounds of Housing Environment in the Afflicted Areas

This paper outlines the housing environment in Mexico as of 1985 and those of Turkey as of 1999, based on the existing documents [12-15]. Both countries have the common problems of chronic housing shortages and expanded slum areas around cities as a result of rapid population increases and population concentrations in urban areas. Moreover, these countries have taken similar public policy stances on a large scale through enactments, e.g., legalization of slums. Mexico's national housing corporation, in particular, has constructed condominium apartments for laborers and subdivided them at low prices, thus gaining experience in housing supply by a public organization.

Let us now review the features of afflicted area. The Mexico earthquake hit the central areas of the capital, Mexico City, which has historically had old houses along its streets; many buildings are 2- to 3-story tenements built at least 100 years ago. They are rented accommodations

2. The author visited the afflicted areas together with the secondary investigation team members (team head: Prof. Hidehiko Sazanami), dispatched by the Architectural Institute of Japan.
3. The author visited the afflicted areas together with the investigation team (team head: Prof. Itsuki Nakabayashi) for "Comparative Study on Urban Reconstruction Process after Earthquakes among Turkey, Taiwan and Japan".

mainly for those with low income. The units are close to the city centers and convenient for job hunting. However, they offer insufficient living space and facilities, and they tend to degenerate into slum tenements. The reconstruction of the central areas is a major problem for the government, in addition to having to reconstruct such areas due to the expansion of slums.

On the other hand, the afflicted areas in Turkey were central cities in outlying provinces, e.g., Adapazarı and Golcuk [16, 17]. Major cities in Turkey have constructed a number of medium- to high-rise condominiums to cope with increases in population, and many of the buildings damaged in the afflicted areas were 5- to 6-story buildings, relatively new ones. Most of them were privately owned, unlike the damaged buildings in Mexico, and they functioned as general housing for middle-income households. The afflicted areas in Turkey had problems resulting from rapidly increasing population, but these problems were different from those resulting from increased illegal housing in peripheral areas.

The Great Hanshin-Awaji Earthquake had features in common with the Mexican and Turkish earthquakes in the areas where the damaged housing units were concentrated. The damage to low-rent, wooden housing units in densely populated areas and features of the victims in Japan are more similar to those in Mexico than to those in Turkey, whereas the damages to condominiums in Japan were more similar to those in Turkey. Overall, the situation in Japan is more similar to that in Mexico from the point of view of the structures and scale of the damage.

5. Features of the Great Hanshin-Awaji Earthquake Compared with Those of the Earthquake in Mexico and Turkey

This section reviews procedures for supplying housing with public managements after disasters. These procedures are based on the issues discussed in the international comparison, which was based on published reports, including ones issued by public organizations [19, 20]. This section also discusses the backgrounds and conditions which enabled the supply of housing after the three earthquakes, and it clarifies the features of the procedures after Great Hanshin-Awaji Earthquake.

5.1. Percentage of Housing Units Directly Supplied in the Housing Construction Support Activities

In the aftermath of the Mexico City earthquake, a total of about 93,500 housing units were made available within the public support framework, of which about 48,800 units, or about 50% of the total, were directly constructed within two years after the earthquake. The housing supply program was called the program for low-income citizens (Renovacion Habitacional Popular, RHP). The program was not on a rent basis but on a subdivision basis, including the land. The housing could be acquired using

long-term, low-interest loans, which could be paid back in monthly installments amounting to about 20% of the average minimum wage. Thus, the program gave sufficient consideration to low-income households.

After the earthquake in Turkey, on the other hand, the housing constructed directly with the public funds within about four years after the earthquake accounted for about 37% of the total. The housing units constructed were supplied in the subdivision manner, as was the case in Mexico. The housing could be acquired with long-term (20 years), no-interest loans. Thus, the victims purchased the housing constructed with public funds for which special loan systems had been established. These systems are very different from those for the Great Hanshin-Awaji Earthquake victims in Japan, where rented accommodations built with public funds prevailed. Location Characteristics of the Housing Supplied.

After the Mexico City earthquake, the government purchased about 3,000 districts where the victims had lived in rented accommodations, and it constructed small-scale condominiums there and subdivided them. Thus, the housing was constructed with public funds in the areas where the victims had lived before the earthquake.

After the earthquake in Turkey, on the other hand, a total of 29 large-scale housing complexes were mainly constructed in the vast public lands extending into the suburban areas, each complex being 10 to 15 km away from the central portions of the afflicted areas. One complex had 1,500 housing units on average, shopping centers, and public service centers, e.g., elementary schools and nurseries. The housing in these complexes was supplied in a subdivision manner, as was the case in Mexico, where the victims purchased the housing in areas where they hoped to live.

What happened after the Great Hanshin-Awaji Earthquake is somewhat similar to what happened after the earthquake in Mexico in that rented condominiums were constructed by the private sector in the vicinity of the afflicted areas, and it is similar to what happened in Turkey in that large-scale public housing complexes, each having several hundred units, were constructed in suburban and oceanfront areas, scattered in and around the afflicted areas because of a large number of units required.

5.2. Intentions of Housing Supply Programs

In the aftermath of the Mexico City earthquake, the supply of housing constructed with public funds was for low-income citizens who lived in rented housing before the earthquake. They now own the housing provided. In Turkey, on the other hand, the victims who had the right to purchase housing constructed with public funds were limited to those who had owned their housing before the earthquake, and those who had lived in rented housing had no such rights [22, 23]. In other words, the way the situation was handled in Mexico had an aspect of support for low-income households in recovering their housing, whereas the situation in Turkey had a noted aspect of compensation for the lost assets of those who had owned

Table 2. Comparison of housing built with public funds after earthquakes in three countries (comparison of housing supply programs shown in the parentheses).

	Earthquake in Mexico (RHP)	Earthquake in Turkey (Restored housing)	The Great Hanshin-Awaji Earthquake (Publicly owned restored housing)
Number of housing units provided with public funds	48,800	43,053	41,963
Number of housing units constructed with public funds*	93,000	115,000	75,684
Ratio of the above number to the total number of units supplied by the housing supply program	50%	37%	55%
Housing supply method	Subdivision	Subdivision	Rental
Construction period after the earthquake	About 2 years	About 4 years	About 5 years
Number of housing districts	About 3,000 districts (sections)	29 districts	About 350 districts
Average number of housing units per district	About 15	About 1,500	About 120
Square area of one residence	About 40 m ²	About 90 to 100 m ²	About 40 to 90 m ²
Location of housing	Afflicted areas	Large-scale housing complexes in suburban areas	Suburban areas and oceanfront area
Cited literature	[11, 12, 19, 20, 24]	[16, 17, 18, 21]	[4]

*Housing constructed with financial support for self-help housing construction (mainly relaxed interest rates) is excluded because of the different nature of the direct support adopted in Mexico and Turkey.

their own housing before disaster struck. These cases differ greatly in terms of the objectives and characteristics of providing housing constructed with public funds.

The situation after the Great Hanshin-Awaji Earthquake apparently differs from that after the earthquakes in Mexico City and Turkey in that the housing provided was public, rented units. It may somehow be similar to the case in Mexico City in that the victims who got the public housing mainly belonged to lower income brackets and had mainly lived in private, low-rent, wooden housing, although there were big differences in the support mechanisms. The Japanese victims got subdivided condominiums, as did the victims in Turkey to a certain degree, but the supply programs failed to work efficiently in Japan.

Thus, the direct provision of housing with public funds in these cases can be characterized as follows.

In Mexico, they adopted a procedure for providing a number of housing units corresponding to that of displaced households. The victims who lived in rented accommodations benefited from greatly relaxed loan repayment conditions in purchasing housing in areas where they hoped to live. In Turkey, they adopted a procedure for providing by subdivision a number of housing units, the number of which also corresponds to the number of damaged units, and the loan repayment conditions were relaxed as they were in Mexico. The housing supply rate was accelerated by using public funds to construct housing temporarily in short supply. In Japan, they adopted a procedure for constructing rental accommodations in areas within or outside of the afflicted areas for the victims who lived in low-rent accommodations before the earthquake. The rents they paid were similar.

5.3. Relation Between Housing Supply and City Restoration

Restoration efforts after the Mexico City earthquake supported the lower-income citizens by restoring housing with public funds and, at the same time, removing poor housing in the city center (urban renewal). Low-income

households were provided with housing in the city center, resulting in the suppression of population increases in these areas. Mexico has improved the housing management functions of the public organizations concerned (Koshiyama et al, 2000 [11]). These programs provide systems in which the victims who lived in rented accommodations before the earthquake participate in the construction of their own housing with their own funds; the systems can thus be appreciated as ones promoted from the viewpoint of the victims [24].

After the earthquake in Turkey, a large amount of housing was built with public funds in suburban areas while restricting the height of the buildings constructed or reconstructed in the afflicted areas. The programs suppressed the construction of high-rise buildings in these areas in consideration of ground fragility and the structural strength of normal buildings, thereby reducing the threat of similar damages in the future. It can be considered that these programs were adopted to improve earthquake resistance of the cities. The measures adopted in Turkey can be understood as being intended to suppress the disorderly increase of fragile condominiums in the city center, and, at the same time, to improve population distribution.

Mexico and Turkey employ public housing supply programs to solve the problems of cities, e.g., those related to disaster prevention and those resulting from population concentration. In other words, these programs for supplying a large amount of housing with the public funds are intended to improve the overall disaster prevention capabilities of the cities.

By contrast, Japan seems to lack systems for solving the basic problems of cities, including those related to disaster prevention, although it clears off rented, wooden housing from the urban areas.

5.4. Backgrounds of the Programs

The overall economic environments are behind the housing supply programs in the aftermath of the Mexico City and Turkey earthquakes. The damage done by

the earthquake had serious effects on the national economy of each country, increasing the inflation rate to about 80% in Mexico and about 70% in Turkey. The long-term, low-interest loan systems have greatly relaxed the victims' terms for obtaining housing. Because of the negative impact on their economies, both countries got loans from the World Bank in order to provide housing through public organizations.

Moreover, they have shared the common feature of strong administrative managements for implementing the programs. Mexico established a temporary organization by presidential order for handling housing supply and restoration problems in a cross-cutting manner across the ministries. The organization has implemented land purchases and the subdivision of housing for the renters, both of which are almost impossible under normal conditions. On the other hand, Turkey also established a special organization under the president to handle problems stemming from the earthquake, and it enacted laws related to housing restoration after disasters, under which housing has been provided. The laws limit the right to receive public funds for housing reconstruction to those who owned their housing before disaster struck, and they stipulate the terms for support to victims as well as the government's power to purchase land for housing complexes.

It is pointed out that Japan "coped with the disaster of the Great Hanshin-Awaji Earthquake by moderately changing or revising established systems after announcing that they were taking temporary measures [1]." Japan seems to lack the will to carry out urban renewal when compared to Mexico, which established a special administrative organization, or Turkey, which strengthened administrative power and legitimized the support framework for housing restoration, including the limitations of private rights.

6. Conclusion

This study discusses any deeper features of and problems involved in the programs for the restoration of the areas hit by the Great Hanshin-Awaji Earthquake by the comparative analysis of those adopted by Mexico and Turkey. The ways in which reconstruction after these earthquakes was handled share a common feature in that the public organizations constructed housing and promptly offered it to households that would have had difficulty in restoring their homes under normal procedures. On the other hand, it is possible to adopt tactics of supplying housing with public funds in the restoration processes to solve problems which cities encounter before disasters and, at the same time, to improve disaster prevention or damage reduction capabilities. These two latter objectives were efficiently included in Mexico and Turkey but not in Japan.

Issues related to housing restoration have been discussed in Japan since the Great Hanshin-Awaji Earthquake, and the lessons learned from how Mexico and Turkey dealt with the earthquakes may provide useful

suggestions for the programs in the future. The housing was provided with public funds after the Great Hanshin-Awaji Earthquake within the framework of existing systems for "public housing." These systems cannot efficiently solve problems related to fragility, problems which cities have encountered as the basic causes of damage in afflicted areas. Moreover, the study on restoration program efficacy verification points out problems related to the aging of the residents in public housing, maintenance of the communities, and expanded administrative costs, and it also points out the necessity of a drastic rethinking of the public housing programs [7]. In other words, the restoration programs that provide public housing within the existing framework no longer work efficiently.

Large disasters which may directly hit large cities, e.g., those caused by the Nankai and Tonankai earthquakes, are imminent in Japan.

It is necessary to rethink housing restoration programs required for coping with disasters while taking into consideration the lessons learned in the past, both within and without the country, and to discuss the procedures the programs use in providing housing.

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- "Problems in Housing Restoration after the 1995 Great Hanshin-Awaji Earthquake," Journal of Disaster Research, Vol.2, No.5, pp. 335-348, Oct. 2007.

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