

3-1. Reconstruction of Condominium Buildings damaged by Earthquake and Assistance Measures; the Hanshin-Awaji Earthquake of 1995 in Japan and the 921 Chi-Chi Earthquake of 1999 in Taiwan

Fumitake MENO

Housing Planning Division, Housing Department,
National Institute for Land and Infrastructure Management
e-mail: meno-h92im@nilim.go.jp

Abstract

This study aims to examine characteristics regarding reconstruction of condominium buildings by comparing assistance measures between the Hanshin-Awaji Earthquake of 1995 in Japan, and the 921 Chi-Chi Earthquake of 1999 in Taiwan. The results are shown as follows: (1) deregulation and subsidy for construction cost are the common assistance measure in Japan and Taiwan; (2) Taiwan has more assistance measures for rebuilding and repair than Japan; (3) The short-term loan of the semi-public fund for owners to purchase ownership from the opponent is distinctive in Taiwan.

Keywords: condominium, multi-family building, homeownership, reconstruction, rebuilt, repair, assistance measure, housing policy, earthquake

1. Introduction

The Hanshin-Awaji Earthquake and the 921 Chi-Chi Earthquake hit the city area and they caused the heavy damage to many apartment buildings. Since most of these apartment buildings are condominiums (multi-owned residential buildings) in both Japan and Taiwan, owners should make an agreement about rebuilding or repair of damaged buildings.¹ But the agreement among many unit owners is very difficult because of an expensive cost of construction, a difference of demands for housing, etc. To solve these problems and to realize reconstruction projects of damaged condominiums, some public assistance is needed.

From this point of view, this paper consists of three chapters with different themes. In the first chapter, an outline of damage and ways of reconstruction are described. Second chapter surveys assistance measures for rebuilding and repair of damaged condominiums by public sectors. In the third chapter, the application of assistance measures is examined. Through these three chapters, characteristics and differences of policies for reconstruction of condominiums between Japan and Taiwan are shown.

2. Outline of damage and ways of reconstruction

Numbers of damaged condominium buildings on the Hanshin-Awaji Earthquake are shown in Table 1. There were some surveys by several groups, the target of survey and definition of the damage level are in various ways. However, numbers of buildings are different to each other, it is safe to say that heavy and medium damaged, which can be regarded as building for rebuild, are roughly 170-190 buildings. These buildings are assumed to be approximately 12,500 units, which is about 10% of the whole damaged housing.

Table 1: Numbers of damaged condominium buildings on Hanshin-Awaji Earthquake

1) Survey by Hyogo Prefecture [兵庫県調査] (Dec. 1999)					
	Heavy/Medium Damaged				Total
Total	172	100%			172 100%
Rebuilding [重建]	108	62.8%			108 62.8%
Repair [修繕]	55	32.0%			55 32.0%
Sale of Site [土地処分]	5	2.9%			5 2.9%
Undecided [未定]	4	2.3%			4 2.3%
2) Survey by Committee of Scholars [学会委員会調査] (Dec. 1999)					
	Heavy Damaged	Medium Damaged	Light Damaged	Unknown	Total
Total	122 100%	189 100%	542 100%	9 100%	862 100%
Rebuilding	82 67.2%	23 12.2%	4 0.7%	6 66.7%	115 13.3%
Repair	33 27.0%	163 86.2%	536 98.9%	0 0.0%	732 84.9%
Sale of Site	4 3.3%	0 0.0%	0 0.0%	3 33.3%	7 0.8%
Undecided	3 2.5%	3 1.6%	2 0.4%	0 0.0%	8 0.9%
3) Survey by Real Estate Investigate Company [不動産調査会社調査] (Dec. 1999)					
	Heavy Damaged	Medium Damaged	Light Damaged	Minor Damaged	Total
Total	83 100%	108 100%	353 100%	1988 100%	2532 100%
Rebuilding	64 77.1%	31 28.7%	14 4.0%	6 0.3%	115 4.5%
Repair	12 14.5%	75 69.4%	337 95.5%	1981 99.6%	2405 95.0%
Sale of Site	5 6.0%	1 0.9%	0 0.0%	0 0.0%	6 0.2%
Undecided	2 2.4%	1 0.9%	2 0.6%	1 0.1%	6 0.2%

(buildings)

Table 2: Numbers of damaged condominium buildings on the 921 Chi-Chi Earthquake

1) Survey by Government [住宅及社区處調査] (Jan. 2003)				
	Heavy Damaged	Medium Damaged	Total	
Total	178 100%	151 100%	329	100%
Rebuilding [重建]	146 82.0%	4 2.6%	150	45.6%
Repair [修繕]	0 0.0%	134 88.7%	134	40.7%
Moving to New Site [新社区開発]	5 2.8%	0 0.0%	5	1.5%
Undecided [未定]	27 15.2%	13 8.6%	40	12.2%
2) Survey by Government [住宅及社区處調査] (Sep. 2003)				
	Heavy Damaged	Medium Damaged	Total	
Total	172 100%	144 100%	316	100%
Rebuilding	153 89.0%	0 0.0%	153	48.4%
Repair	0 0.0%	142 98.6%	142	44.9%
Moving to New Site	5 2.9%	0 0.0%	5	1.6%
Undecided	14 8.1%	2 1.4%	16	5.1%

(buildings)

Turning now to the ways of reconstruction, about 50-60% of heavy and medium damaged condominiums are intended to rebuild by owners. Repair is done about 30-40% of these buildings. 5-7 buildings (about 3%) are planned to sell a site and break up common ownership. Though five years passed after the earthquake, there are 4-8 buildings (about 2%) which owners can not decide the way of reconstruction.

Data of survey 2)&3) on table 1 shows that approximately 70% of heavy damaged buildings are intended to rebuild and the percentage of buildings which is planed to rebuild is fewer on the medium damaged. It follows from these data that damage levels of buildings correlate with the rate of rebuilding, but it must be noted that some light and minor damaged buildings which will be able to repair are planned to rebuild.

Numbers of damaged condominium buildings on the 921 Chi-Chi Earthquake are shown in Table 2. Damage to housing is announced by Department of Housing and Community Revitalization, The 921 Earthquake Post-Disaster Recover Commission. Numbers of buildings are varied as time passes because judgments of damage level are still modified. From the recent data, heavy damaged condominiums which are necessary to scrap and rebuild are 172 buildings / 11578 units, medium damaged condominiums, which

repair cost is more than a half of rebuild cost, are 144 buildings / 17607 units. The Number of heavy damaged buildings is the same as the number of heavy and medium damaged one in the Hanshin-Awaji Earthquake, the number of heavy and medium damaged is twice as large as that in Hanshin-Awaji. These units of heavy and medium damaged buildings are assumed to be approximately 35% of the whole damaged housing. From these numbers one can say that damage to condominium in the 921 Chi-Chi Earthquake is larger than that in the Hanshin-Awaji Earthquake.

Concerning ways of reconstruction, over 80% of heavy damaged condominiums are planned to rebuild and there is no building to repair. Almost all of medium damaged condominiums are intended to repair. Owners of 5 heavy damaged buildings (about 3%) opt to reconstruct houses at new sites instead of rebuilding at the same site. The reason why they move to a new site is that they are probably afraid of living in a same place where a former building was collapsed and some people died. There are 14 heavy damaged buildings and 2 medium damaged buildings which owners can not decide the way of reconstruction although four years passed after earthquake. Especially the percentage of undecided buildings in heavy damaged ones is 8%, this ratio is higher than that in the Hanshin-Awaji Earthquake (2% of heavy damaged buildings).

3. Assistance measures for rebuilding and repair by public sectors

Main assistance measures for rebuilding and repair are shown in table 3 & 4. In these tables, listed measures are especially for condominiums, not for detached houses and rented apartment housing.² Assistance measures may be divided into 6 categories: 1) Law provided rule for reconstruction; 2) Deregulation of building regulation; 3) Subsidy for reconstruction cost; 4) Loan and interest subsidy; 5) Participation in reconstruction project by public sector; 6) Support for planning and consensus.

3-1. Measures for rebuilding in the Hanshin-Awaji Earthquake, Japan

Assistance measures for rebuilding in the case of the Hanshin-Awaji Earthquake are shown in the left side of table 3. In a category of Law, special purpose law about rebuilding of completely collapsed condominium is enacted. This law provides procedures of rebuilding in the unsettled situation.

In a category of Deregulation, Comprehensive Design System is specially modified for earthquake restoration. A degree of deregulation is extended and some conditions to apply this system are easing in comparison with the ordinary system. Added to this, building regulations are applied flexibly.

Category of Subsidy for rebuilding cost includes some types of subsidy handled with different sector. Subsidy system for building improvement projects is a national system at ordinary time. This system is expanded for earthquake restoration, conditions to apply is deregulated and subsidy rate for planning cost and construction cost of common facilities is increased 2/3 to 4/5. Subsidy for Activities of rebuilding damaged condominiums is established by the local government and subsidy for the joint housing project is established by the Hanshin-Awaji Earthquake Disaster Restoration Fund. These two subsidies are applied for small buildings which subsidy system for building improvement project is not able to be applied.

In Category of loan and interest subsidy, there are many types such as loan from governmental housing loan corporation and interest subsidy for this loan. These measures are mostly for ordinary housing, owners of damaged condominiums also can use them. Special measure for rebuilding of condominium is a similar system established by the Earthquake Disaster Restoration Fund.

Table 3: Main Assistance Measures Especially for Rebuilding of Condominiums

1995 Hanshin-Awaji Great Earthquake, Japan	Category	1999 Taiwan 921 Chi-chi Earthquake
Law on Special Measures for Rebuilding Damaged Condominiums [被災区分所有建物再建特別措置法] - Enactment of clause means that collapsed building can be rebuilt by mutual consent with 80% of owners. - Enactment of clause means that owners must deal with the legal procedure to rebuilding within one year.	Law [法制度]	921 Earthquake Reconstruction Act [九二一震災復興暫行條例] - Enactment of clause means that damaged building can be rebuilt or repaired by mutual consent with 50% of owners. - Enactment of clause means that if owners can not rebuild building after demolished ultimately, government will acquire ownerships and make compensation for these rights.
Earthquake Restoration Comprehensive Design System [震災復興型総合設計制度] - Deregulation of floor area ratio within the same as former building. - Reduction of minimum size of applicable building in comparison with the ordinary system.	Deregulation [建築規制緩和]	Addition to Building Bulk [容積奨励] - Addition of extra bulk within the limits of 0.3 times as many as determined bulk by the building regulation in the case of urban regeneration project. - Deregulation of height restriction.
Flexible Apply of Building Regulation [建築制限弾力の運用] - Deregulation of height restriction and shadow restriction.		
Demolition by Public Expense [被災建物公費解体]		Subsidy for Removal Cost of Basement [補助震損集合住宅地下層拆除]
Expansion of Subsidy System for Building Improvement Projects [優良建築物等整備事業拡充] - Reduction of minimum size of applicable building in comparison with the ordinary system. - Deregulation of some conditions to apply this system.	Subsidy for Rebuilding Cost [建設資金補助助成]	Subsidy for Sewage Treatment Facilities [建築物汚水処理施設補助] Subsidy for Planning Cost [都市更新規劃及作業費用補助] - To Subsidize whole costs of planning in the case of urban regeneration project.
Subsidy for Activities of Rebuilding on Damaged Condominiums [被災集合住宅建替等支援事業] - Subsidy for costs of planning and agreement among owners and neighborhood.		Support Program for Rebuilding of Damaged Condominiums (921 Earthquake Reconstruction Fund) [協助受災集合住宅更新重建方案(九二一震災重建基金會)] - Subsidy for activities of owners' association in the case of urban regeneration project. - Subsidy for planning cost to planners who cooperate with owners' association.
Subsidy for Joint Housing Project (Earthquake Disaster Restoration Fund) [小規模共同建替等事業補助(阪神淡路大震災復興基金)] - To Subsidize 2/3 of costs for planning and construction of common facilities.		
Interest Subsidy for Rebuilding of Damaged Condominiums (Fund) [被災集合住宅建替支援利子補給(復興基金)] - Interest subsidy for a rebuilding loan from the government housing loan corporation.	Loan and Interest Subsidy [融資・利子補給]	Interest Subsidy for Purchase of Ownership [受讓公寓大廈區分所有權人產權貸款之利息補貼] - Interest subsidy for a loan to purchase ownership of owner who doesn't join the rebuilding project. Loan for Structural Improvement Projects [集合住宅採都市更新鋼骨構造重建融資] - Loan to owners when they use a steel frame on rebuilt building for earthquake-proof in the case of urban regeneration project. Guaranty for Housing Reconstruction Loans from Central Bank (921 Fund) [提撥專款辦理震災災民重建家園信用保證業務計畫(基金會)] - Guaranty on reconstruction loan from central bank in the case of urban regeneration "Crossing the Threshold" Program (921Fund) [臨門方案(基金會)] - Short-Term Loan without interest for owners who don't have a security in the case of urban regeneration project. (Item No.3) - Short-Term Loan to owners who cannot pay an expense of rebuilding temporarily in the case of urban regeneration project. (Item No.4)
Support Project for Rebuilding of Damaged Condominiums (Local Housing Supply Corporation) [被災集合住宅再建支援事業(県住宅供給公社)] - Participation of the Local Housing Supply Corporation in rebuilding projects. - Purchase of ownerships of owners who don't join the rebuilding project and sell rebuilt new houses in a market. - Purchase of all ownerships of site and rebuilding with fixed-term land lease.	Participation of Public Sector [公的団体事業関与]	"Crossing the Threshold" Program (921Fund) [臨門方案(基金會)] - Short-Term Loan from the 921 fund to owners' association for purchase ownership of owner who doesn't join the rebuilding in the case of urban regeneration project. (Item No.1,2) - Rebuilt new houses will be sold in a market, and ownerships of unsold houses are transferred to the 921 fund in the end.
Subsidy for Rebuilding Projects using Fixed-Term Land Lease (Fund) [定期借地権建替支援制度(復興基金)] - Subsidy for planning cost and land rent in rebuilding projects with fixed-term land lease by Local Housing Supply Corporation.		"Touchdown" Program (921Fund) [達陣方案(基金會)] -not enforcement - Exchange of ownership of unsold houses possessed by the 921 fund for ownership of residents who cannot rebuild their buildings.
Support Program for Community Development [復興社區營造支援事業] - Dispatch of advisers for support of planning and agreement and subsidy for advice fees by the Earthquake Disaster Restoration Fund.	Support for Planning and Consensus [計画策定,合意形成支援]	Support System for Rebuilding [協助提供震損集合住宅重建諮詢] - Organization of architect groups and dispatch to each condominium for support.

Table 4: Main Assistance Measures Especially for Repair of Condominiums

1995 Hanshin-Awaji Great Earthquake, Japan	Category	1999 Taiwan 921 Chi-chi Earthquake
	Subsidy for Repair Cost [修繕資金補助助成]	Subsidy for Repair of Common Facilities [補助震損集合住宅公共設施修復補強] - Subsidy for repair cost of common facilities. (from government: 49%, from committee of community: 30%) Subsidy for Support of Experts [協助提供震損集合住宅修復補強] - Subsidy for fees of expert who support planning and agreement. Support Program for Repair of Damaged Condominiums (921 Fund) [補助受災集合住宅辦理修繕補強方案(基金會)] - Subsidy for repair cost of common facilities. (21%) - Subsidy for fees of architects who deal with repair plan. Support Program for Making a Repair Plan (921 Fund) [協助受災集合住宅擬定修繕補強計畫書方案(921基金會)] - Subsidy for negotiation activities by owners' association. - Subsidy for cost of making repair plan by architects.
Interest Subsidy for Repair of Common Facilities [被災集合住宅共用部分補修支援利子補給制度(復興基金)] - Interest Subsidy for repair cost of common facilities with loan from the government housing loan corporation.	Interest Subsidy [利子補給]	
	Support for Planning and Consensus [計画策定,合意形成支援]	Establishment of Organization to Solve Disputes [成立爭議處理組織] - Establishment of organization to evaluate safety of buildings and to solve disputes about buildings. Commission to Check Qualities of Repair Works [委託辦理營建管理技術服務] - Commission of checking qualities of repair to organization of experts.

Category of Participation of public sector is operated by Local Housing Supply Corporation. This organization participates in rebuilding project actively, purchases ownerships from owners who oppose rebuilding and don't join project. In some projects they purchase all ownerships, build a new building with fixed-term land lease, and sell back rights for living to owners. The Earthquake Disaster Restoration Fund supports these projects by subsidy for planning cost and land rent.

In the category of support for planning and consensus, the local and municipal government send advisers to help activities of owners. Fees for advisers are subsidized by the Earthquake Disaster Restoration Fund.

3-2. Measures for rebuilding in the 921 Chi-Chi Earthquake, Taiwan

Assistance measures for rebuilding in the case of the 921 Chi-Chi Earthquake are shown in the right side of table 3. In a category of Law, law of specified duration is enacted. It includes all sorts of provisions about earthquake reconstruction and it provides some rules about reconstruction such as required ratio of approved owners to rebuild or repair (over 50% of the whole owners). There is a provision about a task of the government when some condominiums are impossible to rebuild.

Category of Deregulation is similar to the way of Hanshin-Awaji Earthquake. Extra building bulk is added to rebuilding of condominium in the case of urban regeneration project. The urban regeneration project is a national system for renewal of urban areas and the government recommends it for rebuilding of damaged condominiums.

Category of Subsidy for rebuilding cost consists of two types: first is applied to every condominium for removal or construction of common facilities; second is applied to rebuilding in the urban regeneration for planning and consensus cost. The latter subsidies are done by the government and the 921 Earthquake Reconstruction Fund. This Fund is a semi-public foundation based on contributions from citizens and fund supports reconstruction from earthquake disaster with a different standpoint from the government.

In category of loan and interest subsidy is also provided by the government and the 921 Fund. Low interest loans from central bank are available for all people whose houses are damaged, the 921 Fund guarantees these loans in the case of owners who rebuild condominiums with the urban regeneration. Interest subsidy from the government is supplied to people who use administering loan for purchasing ownership of non-participate owners, in order to support consensus building among unit owners. The government also provides special loan for earthquake-proof, using a steel frame. The 921 Fund makes a unique system named "Crossing the Threshold" program that means "support in the last stage". In this program, the 921 Fund loans the rebuilding payment for owners who don't have much money or can not borrow it from a bank because of lack of security. This program is a short-term loan only for the urban regeneration project.

Category of Participation of public sector is taken by the 921 Fund. "Crossing the Threshold" program includes more items, which the 921 Fund are concerned in ownership of not-participate owners. Owners' association purchases ownership of the no-participant with loan from the 921 Fund and association sales rebuilt new houses based on the purchased ownership. When houses are sold, the association returns loan with income. But when houses remain unsold, ownership of unsold house is transferred to the 921 Fund. According to this process, this program connotes that the 921 Fund purchases ownership and participates in rebuilding project as an owner. The 921 Fund plans further support measure named "Touchdown" program, which is the exchange of the houses they possessed for the ownership of residents who cannot rebuild their

buildings.

For the purpose of support for planning and consensus, the government organizes architect groups and it sends them to each condominium.

3-3. Measures for repair

Assistance measures for repair are shown in table 4. In the case of the Hanshin-Awaji Earthquake, subsidy for repair cost is not available. Interest subsidy for repair of common facilities is the only measure especially for condominiums.

Comparing with this, measures in the 921 Chi-Chi Earthquake are sufficient. Subsidies for repair of common facilities are provided by the government, committee of community and the 921 Fund. Owing to these subsidies from three sectors, repair cost of common facilities is fully satisfied. Subsidy and support for planning and consensus are also available. Government establishes an organization to evaluate safety of building and commission system for checking qualities of repair for the purpose of reducing disputes.

3-4. The System of Assistance Measures

To sum up major measures for rebuilding of condominium, systems of assistance in the Hanshin-Awaji Earthquake and the 921 Chi-Chi Earthquake are described in figure 1 & 2. These figures show assistance measures, organizations that execute measures, and objects of measures.

Figure 1 illustrates the system of assistance in the Hanshin-Awaji Earthquake, Japan. Objects of measures are divided into three kinds: a building itself and space to build; group of owners typically named owners' association; each individual owner. Law is supported all kinds of object by adjustment of procedure to rebuild.

For Building, deregulation of the building regulation is applied for the purpose of rebuilding the same scale buildings as former ones. For owners' association, there are three types of assistance by different organizations. The central and local government give subsidy for the construction of common facilities and cost of planning through the subsidy system for the building improvement project. The Local Housing Supply Corporation participates in rebuilding project and it coordinates plans and agreement among owners. Earthquake Disaster Restoration Fund supports them with subsidy for the planning cost such as consulting fee to advice. For owners, the Government Housing Loan Corporation loans for a reconstruction with low interest (this loan is not especially for condominium) and Earthquake Disaster Restoration Fund gives an interest subsidy on this loan. If some owners oppose a rebuilding plan and don't participate in that project, Local Housing Supply Corporation purchases their ownership and it participates in the project as an owner.

It follows from this system that organizations build up a closer connection to each other and they deal with the measures not to overlap.

Figure 2 describes the system of assistance in the 921 Chi-Chi Earthquake, Taiwan. Objects of measures are the same as the system of the Hanshin-Awaji. Law in Taiwan named the 921 Earthquake Reconstruction Act provides almost all measures for reconstruction, therefore it includes not only adjustment of procedure but also provision of deregulation, subsidy, and interest subsidy, etc.

For Building, deregulation such as an extra building bulk is applied only in the case of the urban regeneration project. For the owners' association, there are two types of assistance: one is for all

condominiums; the other is only for the urban regeneration project. The former is subsidy for construction of common facilities and cost of planning and support to coordinate the project by organized architect groups. They are supplied by the central and local government. The latter is the loan for using a steel frame from the central bank and subsidy for planning by the 921 Fund. The 921 Fund also provides loan for the purchase of ownership, this have an effect on individual owners. For them, the 921 Fund guarantees the loan, which is the central bank loans with low interest, in the case of the urban regeneration and the central government gives interest subsidy for the loan to purchase the proprietary right of owners who don't participate in rebuilding. The 921 Fund has original loans for owners who don't have enough securities in the case of the urban regeneration.

From this system in Taiwan, one may say that the basic structure is similar to that in Japan. But there are 2 unique points in the system in Taiwan compared with that in Japan. They are as follows: the existence of the 921 Fund as the semi-public fund; concentration of assistance in the case of the urban regeneration. On the first point, since the 921 Fund is more separated from the government than the Earthquake Disaster Restoration Fund in Japan, the 921 Fund can provide unique and required assistance from the original viewpoint. With this characteristic of the 921 Fund, two different assistance systems - by the government and by the 921 Fund - are coexisted in Taiwan. On the second point, it may be that the government should concentrate assistance measures on the urban regeneration in order to standardize the way of rebuilding and to get a good result in a short period.

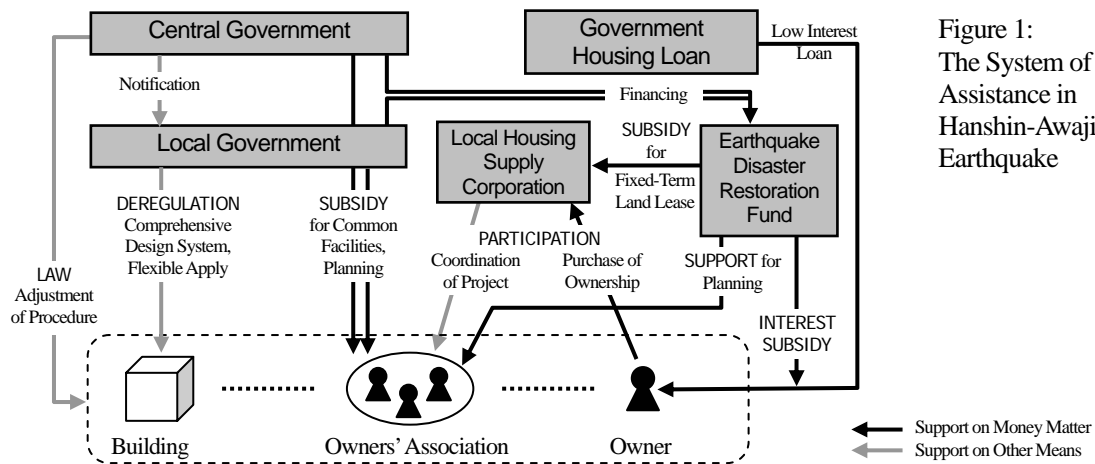


Figure 1:
The System of Assistance in Hanshin-Awaji Earthquake

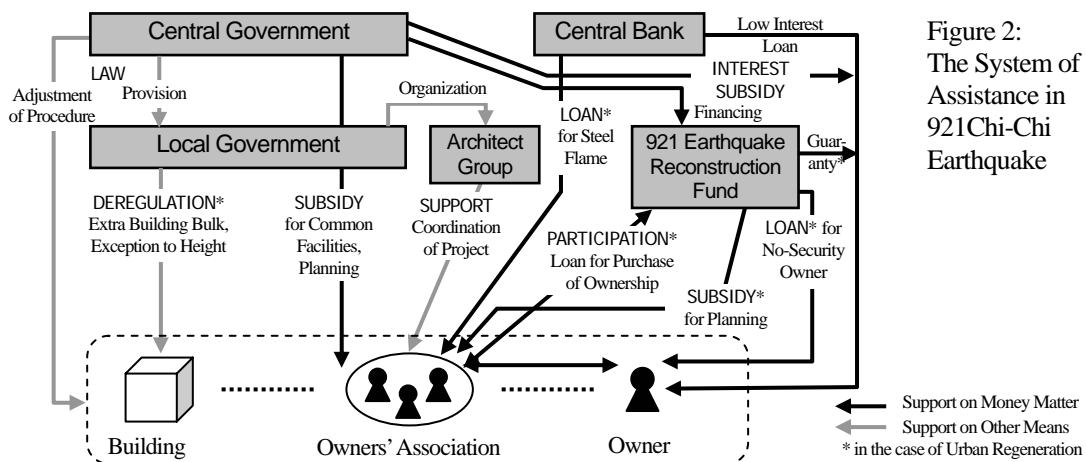


Figure 2:
The System of Assistance in 921Chi-Chi Earthquake

4. Application of assistance measures and Execution

The actual situation of application of these assistance measures in the Hanshin-Awaji Earthquake is shown in table 5. Deregulation on the Earthquake Restoration Comprehensive Design System is applied in 52 buildings / 4137 units. These are approximately 50 % of rebuilt buildings/units. The system is applied for most of them within 2 years after the earthquake.

Subsidy System for Building Improvement Projects is widely used, roughly 90% of rebuilding. Characteristics of this system are the applications for almost all the rebuildings and the quick applications (the system is applied for over 80 % of the rebuildings within two years after the earthquake). The total amount of subsidy is estimated approximately 34 billion yen (1 yen = 0.01 US\$ in July, 2004) and it is equal to 368 million yen per building, 5 million yen per unit.

Interest Subsidy for Rebuilding of Damaged Condominiums is also high (about 85%) and this measure is provided in late years because loans are applied after new buildings are constructed. Amount of the interest subsidy until 1999 is approximately 1.1 billion yen.

Support Project for Rebuilding of Damaged Condominiums by the Local Housing Supply Corporation is applied for 37% of buildings and 50% of units. It follows from the changes of numbers that this corporation participates rebuilding projects in early time. Just two (1.9%) of the Buildings use the fixed-term land lease, all the ownership being once purchased by this corporation.

The actual application situation of those assistance measures in the 921 Chi-Chi Earthquake is shown in table 6. The Urban Regeneration Project which deals with many measures is applied for 40 buildings (57%

Table 5: Application of Assistance Measures in the Hanshin-Awaji Earthquake, Japan

Category	Assistance Measure	Result	Ratio of Application	Changes				
				1995	1996	1997	1998	1999
Deregulation	Earthquake Restoration Comprehensive Design System	52 bldgs	48.1%	6	35	5	6	
		4137 units	55.7%	-	-	-	-	-
Subsidy for Rebuilding Cost	Subsidy System for Building Improvement Projects	93 bldgs	86.1%	70	17	5	0	1
		6586 units	88.7%	4607	1653	273	0	53
	Subsidy for Activities of Rebuilding on Damaged Condominiums	17 bldgs	15.7%	16	1	0	0	0
Interest Subsidy	Interest Subsidy for Rebuilding of Damaged Condominiums	6287 person	84.7%	0	17	296	2226	3748
Participation of Public Sector	Support Project for Rebuilding of Damaged Condominiums	40 bldgs	37.0%	23	11	6	0	0
		3707 units	50.0%	1871	1152	684	0	0
	Subsidy for Rebuilding Project using Fixed-Term Land Lease	2 bldgs	1.9%	1	1	0	0	0
		108 units	1.5%	59	49	0	0	0

Note: Ratio of Application means percentage of measure applied buildings/units to rebuilt buildings/units (108 bldgs, 7421 units)

Table 6: Application of Assistance Measures in the 921 Chi-Chi Earthquake, Taiwan

Category	Assistance Measure	Result	Ratio of Application	Changes				
				1999	2000	2001	2002	2003
Deregulation, Subsidy, etc.	Urban Regeneration Project (Addition to Building Bulk, Subsidy for Planning Cost, etc.)	98 bldgs	57.0%	0	9	55	23	11
		8768 units	75.7%	0	1080	5573	1111	1004
Subsidy for Rebuilding Cost	Support Program for Rebuilding of Damaged Condominiums	87 bldgs	50.6%	-	-	-	-	-
		8300 units	71.7%	-	-	-	-	-
Loan and Interest Subsidy	Crossing the Threshold Program	Item No.3: Loan without interest for no-security owners	67 bldgs	39.0%	-	-	-	-
		Item No.4: Loan for owners who cannot pay temporary expense	2597 units	22.4%	-	-	-	-
		Item No.4: Loan for owners who cannot pay temporary expense	67 bldgs	39.0%	-	-	-	-
Participation of Public Sector	Item No1,2: Loan for owners' Association to purchase ownership	2521 units	21.8%	-	-	-	-	
		57 bldgs	33.1%	-	-	-	-	
		728 units	6.3%	-	-	-	-	

Note: Ratio of Application means percentage of measure applied buildings/units to heavy-damaged buildings/units (172 bldgs, 11578 units)

of heavy-damaged) and 8768 units (about 76%). These numbers are counted for the established associations, following the necessary procedure of the urban regeneration, therefore all of these are not always applied assistance such as the addition to building bulk and subsidy for the planning cost, etc. Most of the owners' associations are established after 2000, two years later from the earthquake.

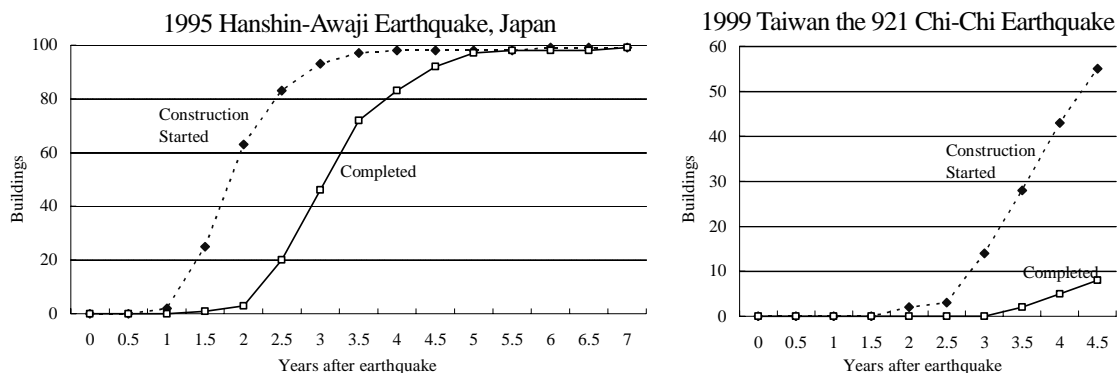
Support Program for Rebuilding of Damaged Condominiums by the 921 Fund is applied for about 50% of heavy-damaged buildings. This program is applied only for the case of the urban regeneration and a ratio of this program applied buildings is approximately 89% of the urban regeneration applied buildings. On this program, the 921 Fund subsidizes about 8 million NT\$ (1 NT\$ = 0.03 US\$ in July, 2004) for activities of the owners' association and about 70 million NT\$ for planning fees of the architects.

Number of applications of the "Crossing the Threshold" Program provided by the 921 Fund is announced. Item No.3, which means the loan without interest for owners who don't have enough security, is applied for 2597 units on 67 buildings. Item No.4, which is the loan for owners who cannot pay temporary expense, is applied for 67 units on 67 buildings. These two items have the tendency to be used at the same time and these are used for about 20% of the heavy damaged units, for about 29% of the urban regeneration applied units. Item No.1&2, which mean the short-term loan for the owners' association to purchase the ownership of not-participate owners, is applied for 57 buildings and 728 units (about 6% of the heavy damaged units). Applications of this program are still in progress, therefore, applied buildings and units will increase in the future.

Rebuilding Projects of damaged condominiums are executed with the application of these assistances. The number of buildings, construction being started and completed, is shown in Figure 3. The Left graph describes a situation of Hanshin-Awaji Earthquake in 1995. In this graph, 99 buildings which are ascertained the time are counted and they are equal to 92% of buildings planned to rebuild. Most of rebuilding projects are completed within five years after the earthquake. Constructions for rebuilding are mostly started in about two years after the earthquake and they are mostly completed in about three and a half years after the earthquake. The earliest is completed in one and a half years, and the latest is started six years after the earthquake and completed seven years after the earthquake.

The graph in the right side describes a situation of the 921 Chi-Chi Earthquake in 1999. In this graph, 87 buildings, which use the Support Program for Rebuilding of Damaged Condominiums by the 921 Fund, are counted and they are equal to 57% of buildings planned to rebuild. Since this support program is applied for

Figure 3: Execution of Rebuilding Project of Condominiums



the case of the urban regeneration, the regular rebuilding projects managed without the urban regeneration are not included. Regular rebuilding is done for 55 building / 1101 units and 34 buildings are completed before Sep. 2003. Return to the graph, the construction started projects are 55 buildings (63% of the whole) before four and a half years after the earthquake, the completed projects are only 8 buildings (9%). Constructions for rebuilding are mostly started in about four or five years after the earthquake and this timing is later than that of the Hanshin-Awaji. The earliest is started in one year and eight months after the earthquake, completed in three and a half years after the earthquake.

Although there are abundant and powerful assistance measures in Taiwan, progress of rebuilding in Taiwan is slower than that in Japan. The reason for this is likely that there are many vacant houses in Taiwan and it is easy for residents of the damaged condominium to get a new house in the neighborhood of their region. Rich owners tend to move to new houses and they will have no interest in rebuilding and this makes agreement among owners difficult.

5. Conclusion

The results mentioned through chapter 2 to chapter 4 lead to the conclusion as follows:

- (1) Deregulation and subsidy for the construction cost are common assistance measures, and the basic structure is similar in Japan and Taiwan, the case of the Hanshin-Awaji Earthquake and that of the 921 Chi-Chi Earthquake.
- (2) There is the extensive system of measures for rebuilding in Taiwan, compared with that in Japan, and there are more assistance measures for repair in Taiwan than in Japan.
- (3) Unique loan program, such as the short-term loan for owners to purchase ownership from the opponent by using the 921 Fund as the semi-public fund, and the concentration of assistance in the case of the urban regeneration are distinctive in Taiwan.
- (4) Although there are extensive systems and powerful assistance measures in Taiwan, progress of rebuilding in Taiwan is slower than that in Japan.

Acknowledgement

This research was supported by the Japan Society for the Promotion of Science (JSPS) for Grants-in-Aid for Scientific Research under Grant No.13372007, Scientific Research (A) "A Comparative Study on Disaster Management and Reconstruction Strategy among Earthquake Disasters of Hanshin (Japan), Kocaeli (Turkey) and Chi-Chi (Taiwan)".

I also researched about same problems in the Kocaeli Earthquake because it is supposed that most of apartment buildings in Turkey are condominiums, same as Japan and Taiwan. But I cannot find any assistance measures especially for rebuilding or repair for condominiums and I cannot find any condominium buildings which are rebuilt during the past three years. I will continue to research about reconstruction of condominiums in Turkey.

Notes

1 In this paper, the word "Reconstruction" is used in the broad sense, including both "Rebuilding" and "Repair".

2 It must be noted that there are many assistance measures for reconstruction of ordinary housing which is equally applied to condominiums.