

EAROPH Regional Seminar

in

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Japanese Efforts to Supply Low Cost Housing

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Summary

Japan faced severe shortage of housing in metropolitan areas after World War II and tried to supply affordable housing by public and private. There were three big reasons to have caused such housing shortage. One was the loss of about 2 million houses by the war only on main islands, the second was the baby boom after the war and the third was the big population migration from rural to metropolitan areas.

There were three countermeasures of the governmental policy. They were the governmental loan for individual builders, the standardization of housing unit for public houses and the promotion of land supply by means of land readjustment.

Governmental housing loan organization was established in 1950 and privatized in 2007. During these 57 years, about one third of total housing supply was supported by this system and 19 million applications have been accepted. Standardization of housing unit worked well but also caused the loose family relation because of the separation of living places between children couples and parents. Land readjustment projects supplied about 4,000 km² of housing sites, and this reaches about one third of total urban areas at present.

Number of Households and Housing Units
(Ten Thousand)

Year	No. Households	No. Housing Units
1948	1598	1390
1958	1817	1793
1963	2111	2109
1968	2469	2559
1973	2965	3106
1978	3283	3545

According to the analysis of Professor Shingo Tamaki, Japan was facing the severe housing shortage after World War II. The number of households was 15,980 thousand in **1948** and number of houses in the same year was 13,900 thousand. The **shortage was about 2 million**. Some the other estimation says it was about **4 million** because of the mismatch of demand and supply.

In **1964**, the number of houses **finally overcame** the number of households of about 22 million. About 10 million houses and apartments were supplied until the year of 1964. They were broken down as **1 million each by municipalities, governmental housing loan system, and national and local housing corporations, and another 7 million by private supply.**

The total number of housing units in Japan now is **57.6 million** in **2003**. The half of them are in 3 big metropolitan areas, Tokyo, Nagoya and Osaka. 7.5 million among them, **about 13%, are now vacant**. They also located half by half in metropolitan areas and rural areas. The main reasons would be the population decrease in rural areas and the mismatch for housing demand in metropolitan areas. Mismatch means the transportation inconvenience, no good medical services for aged people, the change of way of thinking in young generation, and etc.

The vacant houses in rural areas are expected to be rented to city people as a second house and those of metropolitan areas should be broken away or rehabilitated. A current Japanese couple produces only 1.3 babies. This means that **one third of Japanese houses and apartments would be vacant in the long future**.

2. The efforts to cut down the housing cost

"The Liaison Council of Public Housing Organizations"

published

" Cost-down Manual for Public Housing" in 1998.

There are 5 factors to cut down the cost of public housing,

such as

- (1) basic plan for housing,
- (2) structure plan,
- (3) detail plan of housing unit,
- (4) utility plan, and
- (5) outside finishing.

(1) Basic plan for housing

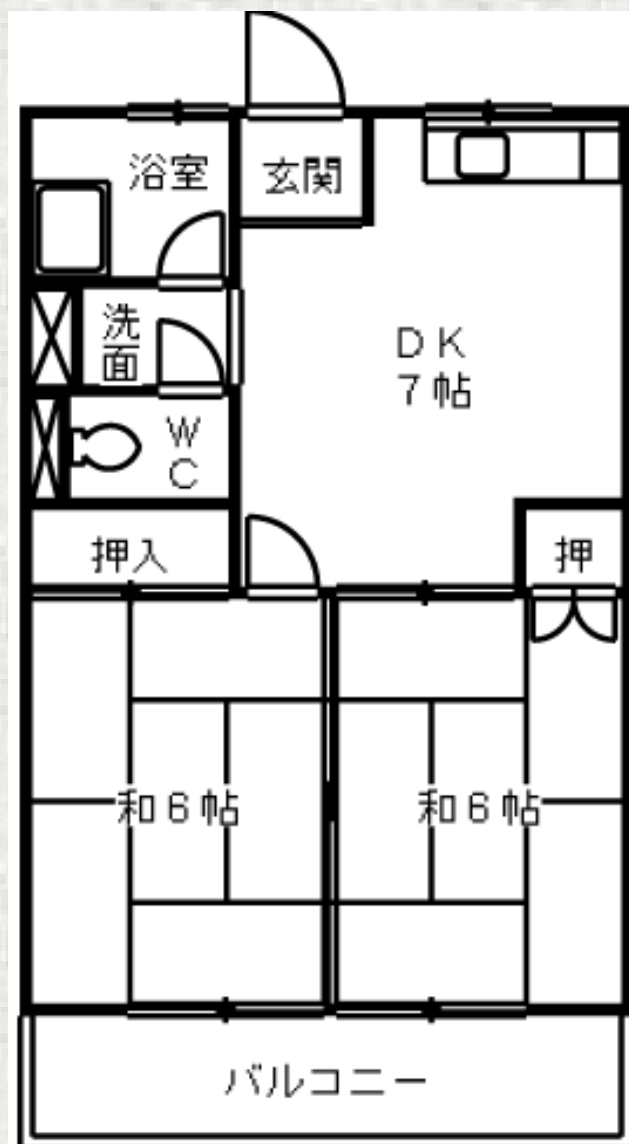
The **estimation of housing demand** by the family size and housing type is important.

After World War II, Japan faced severe shortage of houses and Professor Yasumizu Yoshitake, Architecture Department of the University of Tokyo, and his group **proposed 51C type of public housing in 1951**.

The basic concept was to decompose the spaces of eating and sleeping, and also the spaces of children and parents.

As a result, **two-bedroom type with a dining room** became the typical standard of Japanese public housing. This promoted Japanese new couples to live apart from parents. We called this type of living as “nucleus family”. Until then, it was natural for Japanese people to live all together, grand parents, parents and the new family of the eldest son.

This unit plan method could cut down the housing cost and became the standard type of Japanese dwelling unit for labors.



Hibarigaoka New Town, Built in 1959, Tokyo





Hibarigaoka New Town, Built in 1959, Tokyo

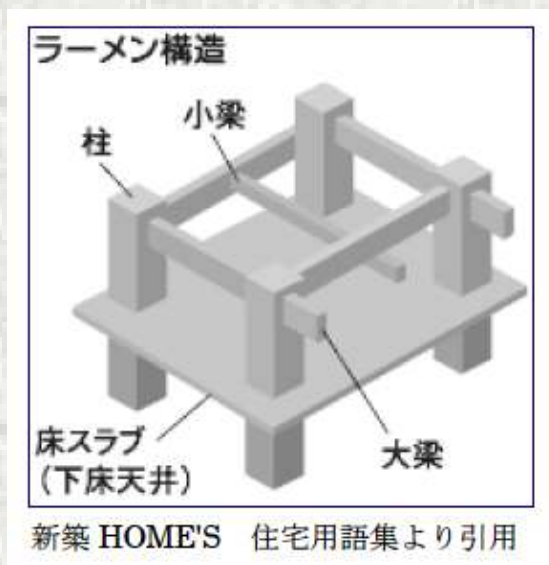


(2) Structure Plan

The basic structure should be selected from RC bent type, RC wall type and RC wall-bent type. **RC wall type is good for up to 5 stories, RC wall-bent type is for 6—14 stories** and RC bent type is for taller structure.

It was found that **RC wall-bent type has the advantage for a mid-tall (6-8 stories) building.**

Pillar and beam are as follows in RC bent type and RC wall type.



RC bent type



RC wall type

Some other method to save the cost would be as follows.

- In case of pile base, tall and RC bent structure can save the **number of base piles** but the upper structure cost may increase.
- **Pit space** for water pipes under the floor may be designed for the minimum space and save the amount of soil disposition by back-filling the saved space.
- **Flat wall** can save the cost not only for construction but also for maintenance. Flying geese (Zig Zag) patten is not recommended.
- The good **balance of cut and bank of soil work** can save the cost.
- **Service facilities** such as elevator, fire hydrant, and etc. should be carefully designed **taking legal regulations into the consideration**.
- The establishment of the **numerous standards for each design** such as floor height 2,700 mm, ceiling height 2,400 mm, beam height 1,900 mm, slab thickness 150 mm, floor height of ground floor GL+400 mm, width of balcony 1,200 mm, width of corridor 1,400 mm, width of main stare cases 1,200 mm, width of sub-stare cases 900 mm, and etc. can save the cost.

Continued

- Finishing of outside wall should be standard type such as **exposed concrete** in order to save the cost. But, sometimes it may be needed to **decorate to make better urban landscape**.
- **Roof** design should take account of the **life-time cost** including the maintenance cost.
- In case of row house, the dividing wall between next door works for both sides and contributes to save number of walls. Therefore, **the row house type would be recommended** if possible.

(3) Detail plan for each housing unit

In the planning of each housing unit, followings are the ideas to save the cost.

- Introduction of **standard flat plan and the unit facilities for interior design,**
- Save the space for corridor by the **good circulation planning,** and
- Foreign products are sometimes less expensive.

(4) Utility plan

Followings are the ideas to save the cost.

- To **centralize the water related facilities** in order to save the length of water pipes, and
- To **utilize the unit products** as much as possible.

(5) Outside finishing

Followings are the ideas to save the cost.

- To avoid the expensive pavement,
- The necessary parking space for cars and bicycles should be carefully estimated,
- To save the length of inside road by the good circulation planning, and
- To consider the utilization of recycled materials.

Table 1 Cost comparison among 7 construction methods
 Small town in Tokyo Suburban Area (10,000 Yen/m²)
 About 100 \$US/m²

Construction method	Low Cost	Standard	High Grade
Wooden traditional	14 -15	17 -18	18 -20
Wooden prefabrication	15 -16	18 -19	19 -21
Wooden Two by four	17	18 -20	20-22
Steel prefabrication	17 -19	20 -22	22 -24
Steel beam	18 -20	21 -23	23 -25
Concrete prefabrication	19 -20	22 -24	24 -26
Reinforced concrete	20 -21	23 -25	25 -28

(1) Construction cost includes electricity, water system, gas supply, solar water warm up system, and miscellaneous.

(2) The cost was calculated by dividing the total construction expense by the total constructed floor space of selected projects.

According to this data, it can be said that the cost difference between Tokyo metropolitan area and Hokkaido rural area is only 10% and the **difference among the grades** is much larger than that and reaches to **20 - 25 %**.

The difference among **construction methods** is also large enough and reaches to **40 - 50 %**. But this may be influenced by various conditions such as **so much wood resources in Japan and so little in Mongolia**.

Table 2 Land price of residential areas (Rough number, \100=\$1US)

Area	Thousand yen / m ² About Ten US Dollars /m ²
Tokyo downtown Minato Ward	2,000
Tokyo suburbs Setagaya Ward	600
Tokyo suburbs Ohmiya area	250
Osaka downtown Chuo Ward	550
Osaka suburbs Takatsuki area	190
Sapporo downtown Chuo Ward	60 -210
Hokkaido small town Akabira City	10
Fukuoka downtown Chuo Ward	130 -540
Kyushu small town Kobayashi City	20

The principle of land readjustment is the same as land pooling in India. Landowners can establish a legal project union under the Land Readjustment Law.

They replace their each land based on the public approved replacement plan and construct the public facilities such as road, green parks, water supply, and etc. The project union is exempted from all of the administration commissions and taxation as far as the income meets the project cost.

The union can pool the land for public facilities and money resource. Usually the total land for public facilities would be 20 - 30 % of total land and necessary money resource land is calculated by the project cost and the selling price of money resource land. Usually it would be 30 - 40 %.

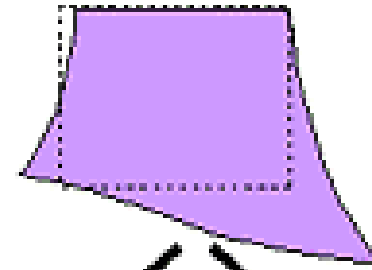
This means that the landowners will pool the 50 - 70 % of their land but the land price would rise up to several times after the project.

Then the landowners can easily enjoy the development benefit by selling their replaced land after the project.

整理前



Aさんの整理前の宅地



換地 減歩

(Aさんの整理後の宅地)



整理後



公共減歩
(道路や公園等の用地となる)

保留地減歩
(売却して事業費の一部に充てる)

Principle of Land Readjustment

Japan could have succeeded to supply affordable housing sites all over the country.

The total land area supplied by these projects is about 4,000 km² and this is about one third of all urban areas (densely inhabited district) in Japan.

These projects also contributed to **confirm the ownership border by the precise surveying** through the projects.

5. Eco heating system in residential areas

In accordance with the worldwide effort to cut down the exhaustions of CO₂, Japan is trying to introduce as many as ideas to cut down the exhaustions of CO₂.

Japan established "The Promotion Act of Clean Heat Supply" in 1972 and more than 80 companies 150 districts have been approved by the Ministry of Economy, Trade and Industry. This is the same system as the electric supply company and it is easy to establish the heat supply company attached to waste treatment centers, hot springs, power stations, coal washers, volcanic areas and so on.

It is possible to cut down the exhaustions of CO₂ by introducing such centralized heat supply system with the qualified advanced technology.

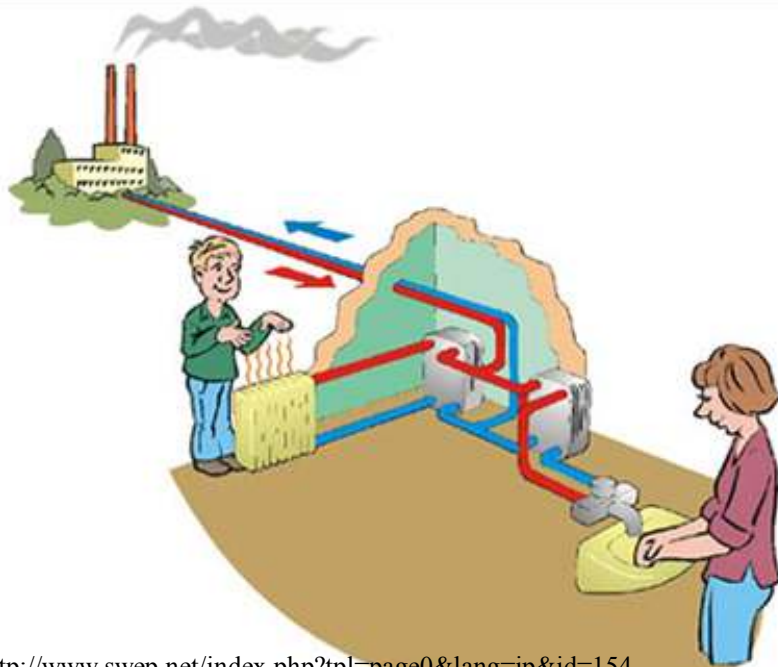
It is also important to decrease the consumption of energy in each house. Therefore, roof planting, wall greening, solar panel or water warm up system on the roof, heat insulated wall, floor and ceiling, are getting popular in these days.

These ideas contribute not only to realize low carbon emission cities but also to improve the urban landscape and to strengthen cities against natural disasters.

Eco House

1. Utilize as much as natural resources
2. Avoid to use harmful materials
3. Maximum use of natural energy, sunshine/rainfall/etc.
4. Harmony with the regional tradition & resources
5. Save the facilities

Now, Ger house may be the best!



<http://www.swep.net/index.php?tpl=page0&lang=jp&id=154>



6. Conclusion

This study concluded that the ideas for affordable housing would be as follows:

- (1) To establish good plans for housing based on the reasonable demand estimation,
- (2) To supply affordable housing sites by means of land adjustment or some other methods,
- (3) To select the reasonable building structure and design,
- (4) To establish design standards to cut down the construction cost,
- (5) To choose the suitable construction method, and
- (6) To introduce some good heating systems.

Thank you very much for your kind attention.

See you again!