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**A Study on Refurbishment of Multi-family Houses in Malaysia
- Housing Developed by Kuala Lumpur City Government in the '80s -**

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A Study on Refurbishment of Multi-family Houses in Malaysia - Housing Developed by Kuala Lumpur City Government in the '80s -

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Abstract: In Asian countries including Malaysia, a lot of new residential areas (; New towns) are developed because of the rapid population increase in urban areas during mass housing era ;60-80's. The designs of the residential buildings provided to New Towns have been influenced by Western design based on modernism, which has different origin from Asian traditional architectures. Residents living in New Towns refurbish their dwellings in daily basis, and these refurbishments represent gaps between their diversified living requirements and the provided standards on which dwelling design is based. In this study, we carried out investigations on refurbishments by residents for multi-family houses in Kuala Lumpur. Our focus is providing the right and eligible procedures and methodologies to configure sustainable New Town houses considering Malaysian cultural aspects.

We extracted three areas from large-scale residential complexes developed during early mass housing era in Kuala Lumpur as investigation targets. Questionnaires were given to the residents, 102 of whom answered them, and 37 of whom agreed photographing insides of the dwellings, sketching their living plans, and hearing their daily lives. 54 among 102 answered they had conducted some refurbishments. Major refurbishments are categorized as follows; installation/removal of walls/dividers, changes on floor/wall surface finishes, expansion to outside, addition of bay windows and window roofs.

In Conclusion,

- Relationship between residents' ways of living and refurbishments is clarified.
- Residents' living activities spread not only inside of dwellings but also to semi-external spaces such

as balconies.

- Various kinds of refurbishments including additions of window roofs and expansions to outside suggest ways how to adjust dwellings to local climate conditions and ways of living.
- The ways of living and refurbishments show their living needs in semi-external spaces with appropriate air circulation.
- The housing design in the future should be based on local climate, environments and cultures.

Keywords: Refurbishment, Malaysia, Kuala Lumpur, Building stock, Urban housing, Sustainability

1. Outline of the research

1-1. Background and purpose of the research

In Asian countries including Malaysia, many new residential areas (“new towns”) are being developed because of the rapid population increase in urban areas during the mass housing era of the '60 to '80s. The designs of the residential buildings provided for new towns have been influenced by Western design based on modernism, which has different origins from traditional Asian architecture. Malaysia is located in the vicinity of the equator, and temperature is 26 - 27 degrees Celsius and it is a hot country throughout the year. In addition, it squalls regularly in wet season. The form of a highly airtight housing with concrete was introduced into there. Residents living in new towns refurbish their dwellings on a daily basis, and these refurbishments represent the gap between their diversified living requirements and the provided standards on which the dwelling design is based. In this study, we investigated refurbishments by residents of multi-family houses in Kuala Lumpur.

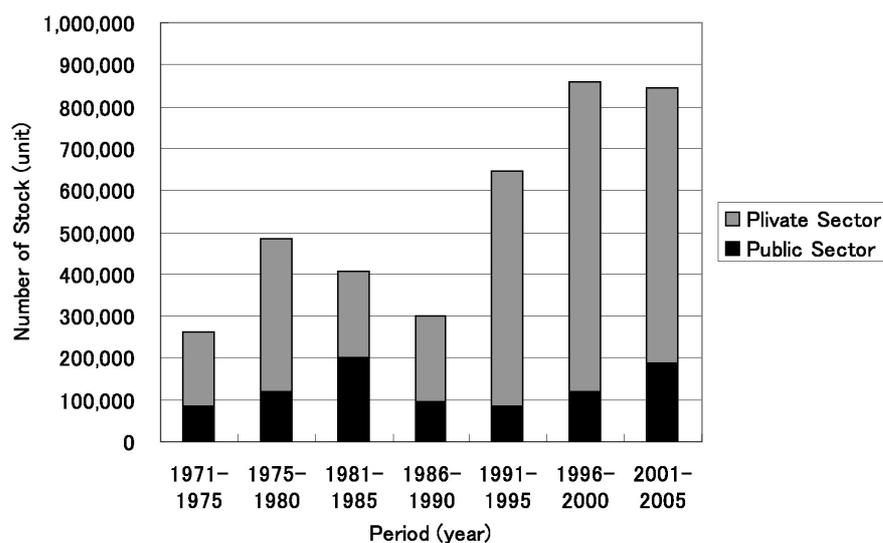
The stock of housing built in the mass housing era are aging sequentially in Malaysia, and will enter into the phase for repair / renovation / remodeling / and reconstruction in the near future.

This means Malaysia will confront the issue which Europe and Japan are facing now, that is how to remodel and revival the old public housing stocks. Our focus is to provide right and appropriate procedures and methodologies to configure sustainable new town houses considering aspects of Malaysian culture.

1-2. Malaysian housing policy and housing stocks

In Malaysia, the Malaysia Plan is composed every five years. The First Malaysia Plan was made on 1965 and it was for the period of 1966-1970. Those plans included the Housing policy. The achievement of the previous five year and the next five year targets of the number of public and private sector housings are shown below. The government compiles the budget of public sector housing for next five years.

Housing stocks by sector, types and years are shown in Figure 1, Table 1 and 2. The public sector stocks were built constantly, and especially large number was built during the period of 1981 to 1985. When we focus on the public low-cost housing, Malaysia has 144000 units of stocks which were built before 1986.



Source: Table 1

Fig.1 Housing stocks by Sector and years. (1971-2005, Malaysia)

Tab. 1 Housing stocks by types and years. (1971-2005, Malaysia)

House Developed types		Number of Stock (unit)						
		1971-1975 *1	1975-1980 *2	1981-1985 *3	1986-1990 *4	1991-1995 *5	1996-2000 *6	2001-2005 *7
Public Sector	Public Low-cost Housing	13,244	26,250	71,310	26,172	10,669	45,583	81,108
	Institutional Quarters & Staff Accommodation	24,240	20,560	25,450	11,284	18,776	12,015	43,620
	Others	48,592	74,700	105,140	59,670	55,097	64,026	54,405
	Sub-Total	86,076	121,510	201,900	97,126	84,542	121,624	188,669
Private Sector	Ordinary Low-cost Housing				4,937	80,678		94,029
	Special Low-cost Housing Programme (SLCHP)	N/A	N/A	19,170	83,940	131,325	724,153	53,607
	Medium-cost Housing			85,630	89,741	240,069		215,267
	High-cost Housing				17,701	99,541		269,320
	Cooperative societies	3,585	4,120	4,570	7,483	11,305	13,703	23,151
	Others	170,149	358,560	94,800	0	0	0	0
	Sub-Total	173,734	362,680	204,170	203,802	562,918	737,856	655,374
Total		259,810	484,190	406,070	300,928	647,460	859,480	844,043

Source: *1 3rd Malaysian Plan, EPU *2 4th Malaysian Plan, EPU *3 5th Malaysian Plan, EPU *4 6th Malaysian Plan, EPU *5 7th Malaysian Plan, EPU *6 8th Malaysian Plan, EPU *7 9th Malaysian Plan, EPU Note: N/A = not available

Tab. 2 Housing stocks by types and years. (1956-1970, West Malaysia except Sabah and Sarawak)

House Developed types	Number of Stock (unit)		
	1956-1960	1961-1965	1966-1970
Public Low-cost Housing	2,983	7,568	22,522

Source: 2nd Malaysian Plan, EPU

Basically, from the year 1956 up to year 1981, standard for low cost houses in Kuala Lumpur was 37m² which consists of 1 bedroom only. After this period, demand on low-cost houses has increased and the design of the houses was upgraded. Therefore, from the year 1982 up until the year 1996, DBKL (Dewan Bandaraya Kuala Lumpur; Kuala Lumpur City Council) increased the number of bedrooms. With 49m², it consists of 2 bedrooms. After this second improvement, DBKL once again increased the level of comfort for Public Low Cost houses in the year of 1997 until 1998 into 52m² but it still consisted of 2 bedrooms. In 1999, DBKL has introduced another housing plan where they have

increased the number of bedrooms to a total of 3. This is because the demand on Public Low Cost has increased especially among the low income group that bears to live in Kuala Lumpur high living standard. The size of the houses also has increased into 60m².

1-3. Districts surveyed and targets of the investigation

The districts surveyed in the investigation are the Wangsa Maju district and neighbouring districts in the capital, Kuala Lumpur. Large-scale multiple dwelling areas were planned in the district surveyed in around 1980. Around 1980 was the period of mass housing in Malaysia. Therefore, our investigations were conducted on numbers of units in 3 to 5 apartment buildings at 3 different housing complexes developed in one of these districts in around 1980. The name of each housing complex and the development categories are as follows.

- Surau Ad Diniyah (Hs) ; Public low cost housing. Mended by DBKL.
- Wangsa Maju Section-1 (Hw1); Public low cost housing. Mended by DBKL and six private management offices.
- Wangsa Maju Section-2 (Hw2); Private sector ordinary low-cost housing. Mended by a private management office.

Three of them are five-story walk-up apartments and RC structure. The Hs type is a rectangular solid, and Hw1 and Hw2 have an open square plan with only three sides (U shaped). (Fig. 2) The room types of the flats are with 2 bedrooms, around 50 m². They are typically low cost housing forms during 1980'.

The contents of the site investigation are as follows.

- Meeting-type questionnaire survey for residents
- Hearing investigation on how to live in the unit
- Hearing investigation of the apartment's management association
- Plan sketch and taking pictures of the unit
- Taking pictures of building exteriors
- Observation and measurement of building arrangement, etc.

We received answers from 102 households through the meeting-type questionnaire survey from the target apartment (Table 3). The contents of the questionnaire include ratings of satisfaction with the details of the resident's living environment considerations, basic attributes, remodeling contents of the resident's unit, etc. We sketched plan views and took pictures of 37 household units where consent had been obtained. In addition, we conducted hearing investigations of the locations within the resident's unit where they conducted 9 daily activities such as "sleeping" and "eating" (Table 4).

We deal mainly with the results of the questionnaire survey and analysis of the residents hereafter in Chapter 2 and Chapter 3. In Chapter 4, we discuss in more detail the analysis of the results of the unit sketch, the hearing investigation, exterior investigations, etc.



Fig.2 Surveyed apartments of a housing complex building plan and basic information

Tab. 3 Result of questionnaire survey

	Visited units	Respondents	Self-ownership /Rental	Refurbishment Yes/No	Sketch
Hs	150	33	0/33	23/10	13
Hw1	155	36	18/18	17/19	13
Hw2	200	33	19/14	14/19	11
Total	505	102	37/65	54/48	37

Tab. 4 Nine daily activities

- A). Praying
- B). Sleeping
- C). Relaxing
- D). Desk work
- E). Eating
- F). Cooking
- G). Laundry
- H). Dry clothes
- I). Receiving guests

2. Residents' attributes

2-1. Racial ratio

Malaysia is a multiethnic nation (Malay 65%, Chinese 25%, and Indian 7%). The Bumiputera Policy(*1) gives preferential treatment to the Malays and a small number of native people (generally low-income groups) when moving into apartments.

Figure 3 is the racial ratio of the 3 apartments answering the questionnaire.

On investigation, the racial ratio in the entire residential building could be confirmed from a house management union member of Hs. Malays account for about 90% of the entire apartment, in agreement with the results of our questionnaire. On the other hand, the ratio of Chinese in Hs is higher than in Hw2. It is thought that this is because there is a shopping street nearby and many Chinese works there.

2-2. Ownership pattern and income

The ownership pattern of Hs is rental. The pattern of Hw1 and Hw2 is a mixture of self-ownership and rental, and about half of the residents answered the questionnaire. More residents with RM3,000-5,000 (\$845-1,400) in monthly salary were living in Hw2 compared to the other apartments. But for

the overall questionnaire results, residents earning RM1,000-3,000 (\$280-845) accounted for 54.9% (56 families), which is about the half of those answering the questionnaire. Figure 4 shows the relationship between the ownership pattern, monthly salary, and residence years. As for the average monthly salary, the self-owners are more than the rental. Moreover, it is understood that the residence years of the self-owners are comparatively long.

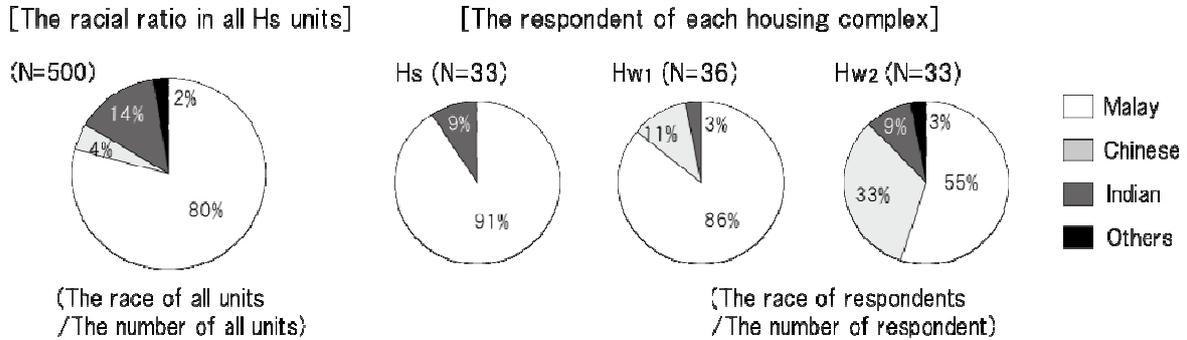


Fig. 3 Racial ratio of each apartment

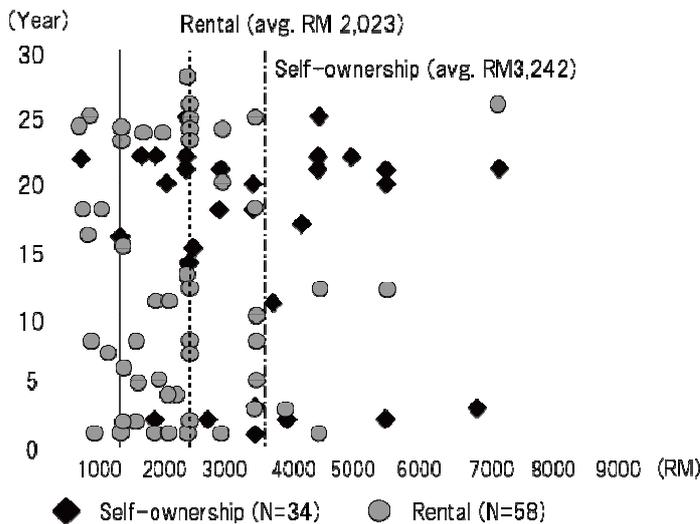


Fig. 4 Relationship between ownership pattern, monthly salary, and residence years

2-3. Family structure and number of people

The family structure and the number of members indicated through the entire questionnaire answers are as follows.

The 2-generation belt was the major family structure accounting for 60.8% (62 families). Then married couples accounted for 10.8% (11 families), and others (student and colleague house share) accounted for 7.8% (8 families). For the number of family members living in the unit, 26.5% (27 families) had 3 members and 18.6% (19 families) each had 2 members or 4 members. In the 2-generation belt, there are mostly 3 to 5 members, and husbands and wives mostly account for the 2-member households.

Moreover, the residence years can be categorized into 2 layers: one is the new resident layer with 5 residence years or less, and the second layer is with 10 to 20 years and more than 20 years.

2-4. Image of the typical resident

Figure 5 shows the relationship between the number of family members, monthly salary, and residence years. Families with 2 to 5 members all tend to have a monthly salary of RM1,000-3,000. In

other words, the monthly salary is constant regardless of the number of family members. In addition, there are many units with 2 to 3 residents whose residence years are 5 years or less, whereas the units with 4 to 5 residents have residence years of 10 years or more.

That is, the polarization of residence years originates in the number of family members. Many of these groups are from the 2-generation belt (or married couples) as shown before. It can be presumed that the number of children increases with the passage of years, and the number of family members increases even if there is no change in the monthly salary. Moreover, the period of residence of students and colleagues sharing as 2 to 3 household members is several years. This is thought to be one reason for the decrease in residence years.

Based on the abovementioned, we extract 3 family types, namely family Types X, Y, and Z. Family Type X is the group with a salary of RM1,000-3,000 / residence years of 10 years or less / 2 to 3 members. Family Y is the group with a salary of RM1,000-3,000 / residence years of 10 years or more / 4 to 5 members. Family Types X and Y comprise the typical residents of the target apartments, and additionally, family Type Z is composed of households other than Types X or Y.

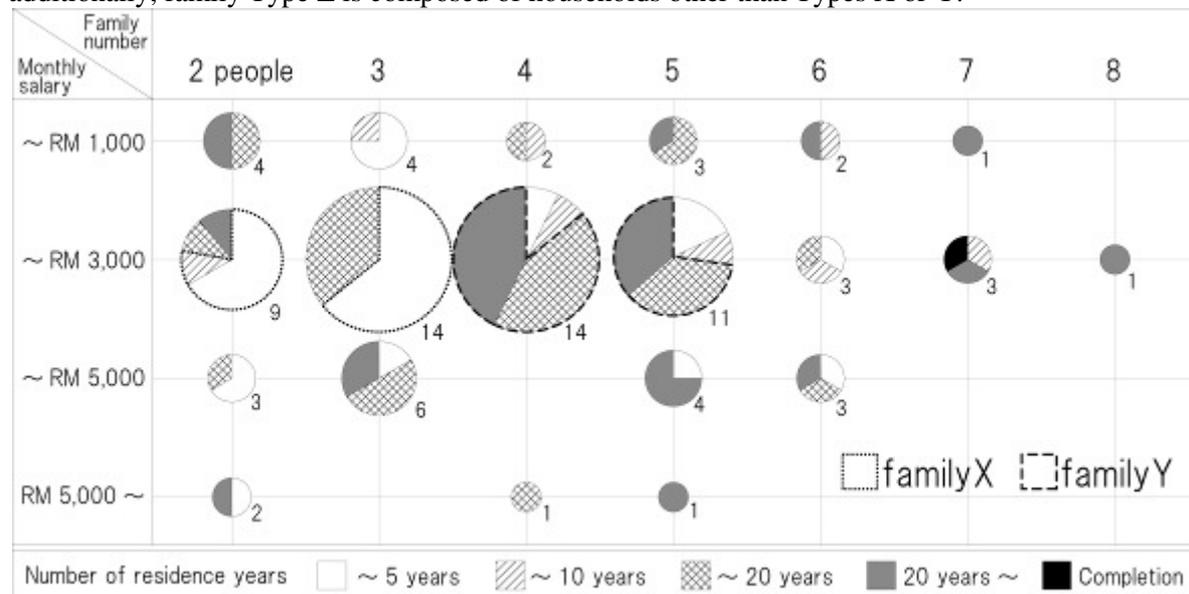


Fig. 5 Relationship between number of household members, monthly salary, and residence years

2-5. Summary of the chapter

In Chapter 2, analysis based on the result of the questionnaire survey clarified the following.

- Residents with a monthly salary of RM1,000-3,000 accounted for 54.9%.
- Compared to leasing residents, self-owning residents have a higher average monthly salary and longer residence years.
- Two to five household members comprise the majority, and as for family structure, 60.8% belong to the 2-generation belt.
- The group (Family X) with a "salary of RM1,000-3,000 / residence years of 10 years or less / 2 to 3 members" and the group (Family Y) with a "salary of RM1,000-3,000 / residence years of 10 years or more / 4 to 5 members" have been extracted as typical resident images.

3. Unit refurbishment and residents' consideration

3-1. Classification of refurbishment items

Fifty-four households, half of the 102 households answering the questionnaire, answered that they had remodeled their units somehow. We investigated the presence of 18 remodeling items that had

been identified by a previous investigation conducted last year, by questioning the residents about the detailed contents of their remodeling (Figure 6 and Figure 7).

From previous researches up to now, we have classified the remodeling items confirmed by a housing complex survey*2 in several countries such as Japan, the United States, and Europe. In this chapter, we show the difference in remodeling items between Malaysia and other countries by using the classification table. In Document 1), the level of remodeling was classified in the range of "Remodeling performance level (R level)" and the "Decision-making person level (D level)." We distributed the remodeling items to this R-D matrix. Table 5 shows an example of a classified remodeling case in a developed country that has been surveyed and categorized into the R-D matrix.

On the other hand, Table 6 shows the remodeling items confirmed by this investigation (Malaysia) embedded into the same R-D matrix in Table 5. (The *italics* show cases where both the developed country and Malaysia agree, and the *underlined italics* indicate the case of Malaysia only).

In the developed country, remodeling related to the outside wall and common parts such as "repainting of the wall" and "extension to the outside" is classified as D2 (house manager level). However, it is often done only by the resident's will in the surveyed apartments in Malaysia though this remodeling is related to the common parts of the apartment complex. Therefore, it is not possible to simply classify these remodeling items into D1 (resident level) and D2 (house manager level). We added D1.5 as a new D-level indicator, and classified the cases seen in the main investigation. D1.5 corresponds to "remodeling concerning the outside wall and common parts around my unit," and is decided only by the resident's will. Moreover, the main features seen in the main investigation include "installation of a bow window," "installation of eaves," etc. among the remodeling items classified as D1.5.

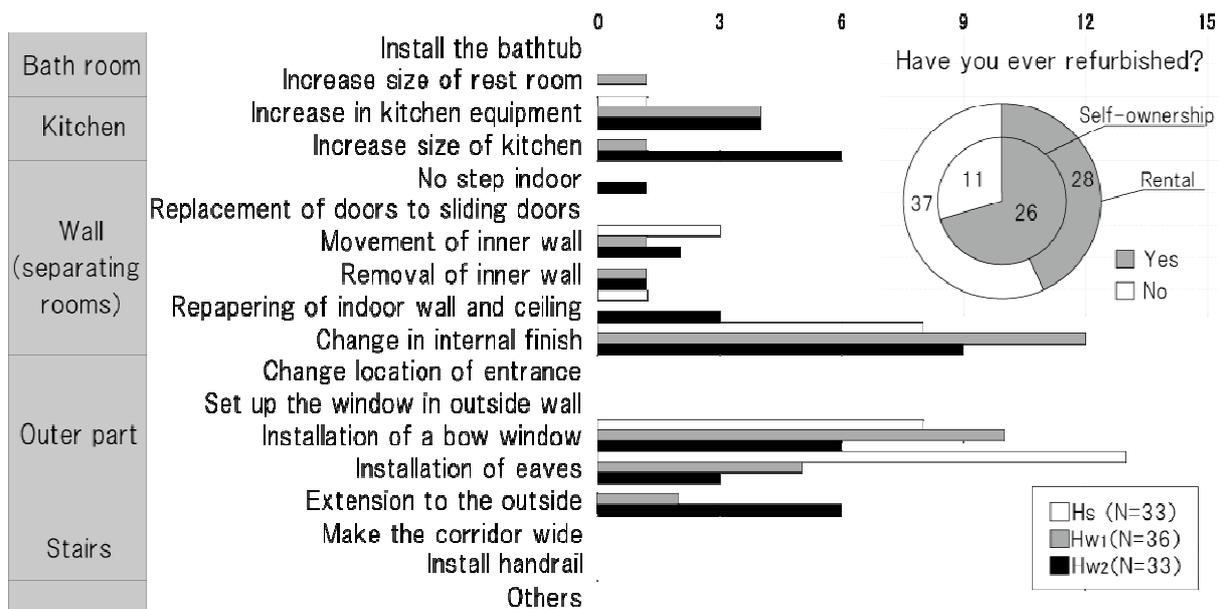


Fig. 6 Result of the questionnaire on detailed remodeling items



Fig. 7 Remodeling cases by item

Tab. 4 Classification into the R-D matrix of remodeling items seen in a developed country

Decision-maker level	Part position	Rehabilitation performance level		
		R1:Repair	R2:Improvement	R3:Large scale renovation
D1 Resident level	Bath room	Change the ventilator Repair the bath Repair the handrail Replace the tile Change the Faucet Change the lavatories	Installation of new ventilator Change to the large bathtub Install the handrail Install the shower Install the hot water tank	Install the bath room
	Kitchen	Change the range hood Change the gas ring Change the sink	Install the boiler Increase in kitchen equipment Increase size of kitchen area	
	Wall (separating rooms)	Repair the indoor wall	Change in internal finish	Removal and movement of inner wall
D2 Decision-marker level	Stairs	Repair the handrail Repaint the stairwall Repair the bulletin board Repair the waterproofing on the	Install handrail (for children/for elders) Install the planter Install the bulletin board Do waterproofing on stairs	Set up the new stair Set up the window in stairwall
	Elevator	Repair the elevator	Improvement of elevator	Set up the new elevator
	Roof/Roof top	Repair the roof/roof top Repair the waterproofing	Change the roof Do waterproofing on roof Install the heat insulating materials	Extend the top floor the new use of roof for play ground

Tab. 5 Position of remodeling items in Malaysia in Table 4

Decision-maker level	Part position	Rehabilitation performance level		
		R1:Repair	R2:Improvement	R3:Large scale renovation
D1 Resident level	Bath room	Change the ventilator Repair the bath Repair the handrail <i>Replace the tile</i> Change the Faucet <i>Change the lavatories</i>	Installation of new ventilator Change to the large bathtub Install the handrail Install the shower Install the hot water tank	Install the bath room
	Kitchen	Change the range hood Change the gas ring Change the sink	Install the boiler <i>Increase in kitchen equipment</i> <i>Increase size of kitchen area</i>	
	Inner wall (separating rooms)	<i>Repair the indoor wall</i>	<i>Change in internal finish</i> <i>No step indoor (barrier free)</i> <i>Replacement of doors to sliding doors</i> <i>Install the lattice doors.</i>	<i>Removal and movement of inner wall</i>
D1.5	Outer wall of the unit	<i>Repainting of the wall.</i>	<i>Install the tile on the common corridor</i> <i>Installation of eaves</i>	<i>Extension to the outside</i> <i>Set up the window in outside wall</i> <i>Change location of entrance</i> <i>Installation of a bow window</i>
D2 Decision-marker level	Stairs	Repair the handrail Repaint the stairwall Repair the bulletin board Repair the waterproofing on the floor	<i>Install handrail (for barrier-free)</i> <i>Install the slope (for barrier-free)</i> Install the planter Install the bulletin board Do waterproofing on stairs	Set up the new stair Set up the window in stairwall
	Elevator	Repair the elevator	Improvement of elevator	Set up the new elevator
	Roof/Roof top	Repair the roof/roof top Repair the waterproofing	Change the roof Do waterproofing on roof Install the heat insulating materials	Extend the top floor the new use of roof for play ground

* The regular font shows the case of a developed country, the italics show the case of both Malaysia and developed countries, and the underlined italics show the case of Malaysia only.

3-2. Elements related to the remodeling items

We focus on the top 6 remodeling items adopted in this investigation among the abovementioned 18 remodeling items (6 of which being kitchen expansion, removal and movement of inner wall, change in internal finish, extension to the outside, installation of a bow window, installation of eaves). Figure 8 shows the relationship between the resident images shown in Paragraphs 2 to 4 and the 6 remodeling items. We can say that there is little remodeling done by Family X, whereas remodeling is actively done by Family Y. That is, units with many family members and long residence years tend to remodel. This tendency is especially strong in "installation of eaves and bow windows" and "change in the wall finish." Next, unit remodeling is overwhelmingly done in the self-ownership units when the relationship between the remodeling item and the ownership pattern is seen (Figure 8). "Extension to the outside" and "increase in kitchen equipment" are hardly done in the rented units. Looking at the relationship between remodeling items and monthly salary, "extension to the outside" and "increase in kitchen equipment" are conducted in units with an income of RM3,000 or more.

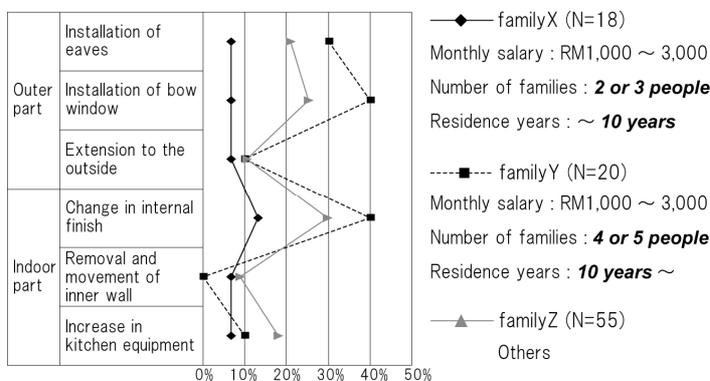


Fig.8 Remodeling items and resident image

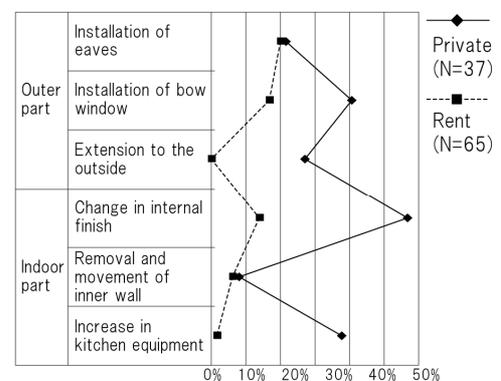


Fig. 9 Remodeling items and ownership pattern

3-3. Remodeling rules and residents' awareness

Table 6 is the result of the hearing investigation on the Remodeling rules at each management office.

In case of the ownership, for the outer wall, the lattice doors, bow windows and the eaves are allowed to be changed by the residents. The extension is also allowed by the management if the owners follow a certain procedure by the local authorities. On the other hand, residents are not allowed to do any changes inside and outside the rental units. However, it is allowed to increase the kitchen equipment with the manager's permission.

During the questionnaire survey, we confirmed whether the 54 remodeled households acknowledged the necessity of permission to be granted when remodeling. Moreover, we confirmed whether they actually asked for permission (36 households answered).

A total of 17.6% (Hs:5 and Hw2:1) answered "Necessary" to the question "Do you think that the house manager's permission is necessary for remodeling?" The other 82.4% answered, "Unnecessary" or "Do not know." Next, we asked "Did you actually ask for permission upon remodeling?" A total of 16.2% (Hs:3 and Hw2:3) answered "Permission asked and granted," and the remaining 83.8% answered "Permission not asked."

Tab. 6 Remodeling rules of the apartments

Mending items		Hs	Hw1		Hw2		
		Rental	Rental	Ownership	Ownership		
Each building Common part	Common passage, stairs	Mending of handrail	B	B	B	B	
		Mending of stairway	B	B	B	B	
		Repainting of common part wall	A	A	B	B	
		Waterproof finish of common part floor	B	B	B	B	
		Mending of illuminator	A	A	A	A	
		Mending of bulletin board and mailbox	B	B	B	B	
		Installation of slope	B	B	B	B	
		Mending of eaves	B	B	B	B	
		Outer wall	Mending of the outer wall	A	A	B	B
	Repainting or Cleaning of the outer wall		A	A	B	B	
	Roof	Mending of rooftop	A	A	B	B	
		Waterproof finish of rooftop	A	A	B	B	
	Equipment	Mending of plumbing	A	A	B	B	
		Installation of TV antenna	C	C	D	D	
		Installation of fire fighting equipment	A	A	A	A	
	Structure	Mending of structural building frame	A	A	A	A	
	Each unit	Bath room	Replace the tile	D	D	C	C
			Change the lavatories	D	D	C	C
Kitchen		Increase in kitchen equipment	C	C	C	C	
		Increase size of kitchen area	D	D	C	C	
Inner wall (separating rooms)		Repair the inner wall	A	A	C	C	
		Movement of inner wall	D	D	D	D	
		Removal of inner wall	D	D	D	D	
		No step indoor (for barrier free)	D	D	C	C	
		Change in internal finish	C	C	C	C	
Outer wall		Install the lattice doors	D	D	C	C	
		Install the bow window	D	D	C	C	
		Install the eaves	D	D	C	C	
		Extension to the outside	D	D	C	C	
		Set up the window in outside wall	D	D	C	C	
		Install the tile on the common corridor	D	D	D	D	

A. Mending that is done according to the regular mending plan.

B. Mending that is done irregularly.

C. Mending that is done by resident obtaining the manager's permission.

D. Mending that is done by resident without permission of manager or in illegally.

3-4. Summary of the chapter

In Chapter 3, we classified the remodeling items seen in the site investigation. Moreover, we analyzed the relationship between resident attributes and unit remodeling, and the following was clarified.

- Many confirmed unit remodeling cases cannot be simply classified into the R-D matrix based on the developed country concept.

- The residence years and the number of family members strongly influences whether unit remodeling is undertaken.
- In particular, the influence of the ownership pattern and the income on "extension to the outside" and "increase in kitchen equipment" is large.
- In remodeling rule, Extension to the outside and setting up the window in outside wall are both possible, if the residents get permission. But there were some residents who did the repair without permission.

4. Residents' living activity locations from the unit sketch

In the following section, we analyze residents' living activity locations and the remodeling of the units, based on a unit sketch of 37 households in total obtained from each apartment of the housing complex. Moreover, from the facade photograph of the target building, we investigate remodelings related to the outside walls.

4-1. Comparison of each unit plan

Figure 10 shows a comparison among the original unit plans of each apartment of the housing complex. The floor space of each of the 3 apartments is around 50 m². The basic composition is 2 rooms, the living space, a kitchen space, a rest room, and balconies connected with a door. When the Hs plan is compared with the Hw1·Hw2 plan, the Hs plan is shaped so that the balcony is directly attached to the kitchen space. The private room on the balcony side is broadened as a result. However, the rest room is located outdoors instead. On the other hand, the Hw1·Hw2 plan is shaped so that the balcony abuts the private room. The living space is large though the private room is small. The kitchen equipment of the 3 apartments at the time of moving in was a simple sink alone, and the floor finish was not done. Moreover, there were no bathing facilities, only a toilet. However, the rest room space is a little longer and narrower. It seems that this is to have a small bath space.

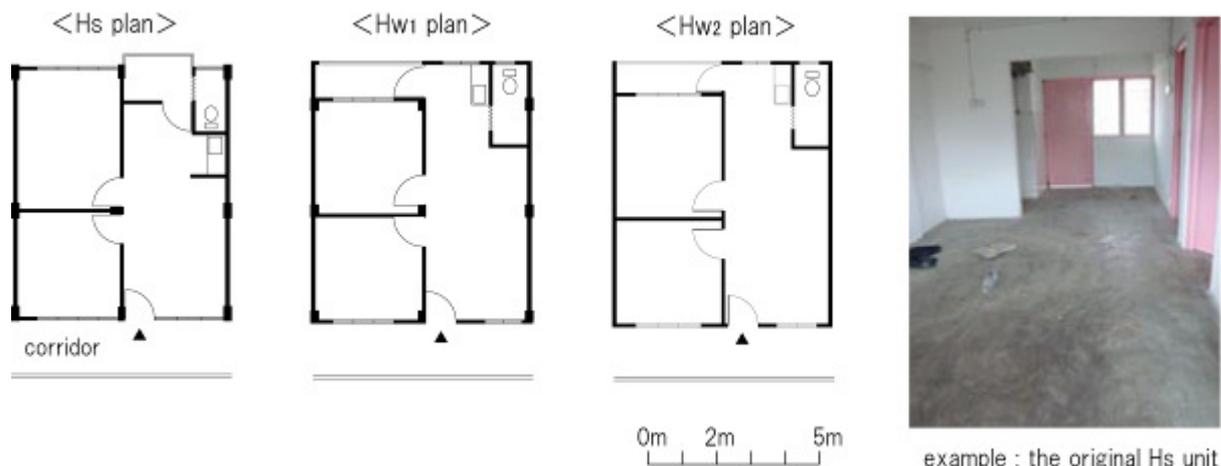


Fig. 10 Comparison of original plans

4-2. Analysis of how a room is used

Figure 11 shows the division of the area into "common room," "room 1," "room 2," "area surrounding the kitchen," "balcony," and "exterior," for each unit plan. However, because cases of extension to the outside were seen, an "extension part" area has been added to Hw1 and Hw2. (The Hs area division group is called the Hs type, and the Hw1 and Hw2 area division groups, which happen to be the same, are called the Hw type.)

Figure 12 shows the areas of the Hs type and the Hw type in which the abovementioned 9 living activities (A to I) are conducted. This information was gathered through the visit / hearing investigation of the residents. Let us look at the Hs type first. For "A. praying" and "B. sleeping" residents use the private room of room 1 and room 2, and use the common room for "C. relaxing" and "I. receiving guests." "D. desk work" is done in the common room and room 2. On the other hand, 60% or more do "F. cooking" on the balcony. As a result, tables are placed in the kitchen space and 30% of "E. eating" is done in the area surrounding the kitchen. Moreover, about 80% do their "G. laundry" on the balcony. That is, the tendency to do water [ri] work such as laundry altogether on the balcony side and use the area surrounding the kitchen widely can be observed in the investigation results from the Hs type.

Now, let us look at the Hw type. The private room is used for "A. praying" and "B. sleeping," and the common room is mainly used for "C. relaxing" and "I. receiving guests." This is similar to the Hs type. On the other hand, "E. eating" is mostly done in the common room, not in the area surrounding the kitchen. This is not observed in the Hs type. As for water work, the tendency for "F. cooking" and "G. laundry" to be done on the balcony was strong in the Hs type. However, such work is mainly done in the area surrounding the kitchen in the Hw type. Moreover, the extension part is used for various purposes, including as a place for "C. relaxing" besides water work and for "E. eating."

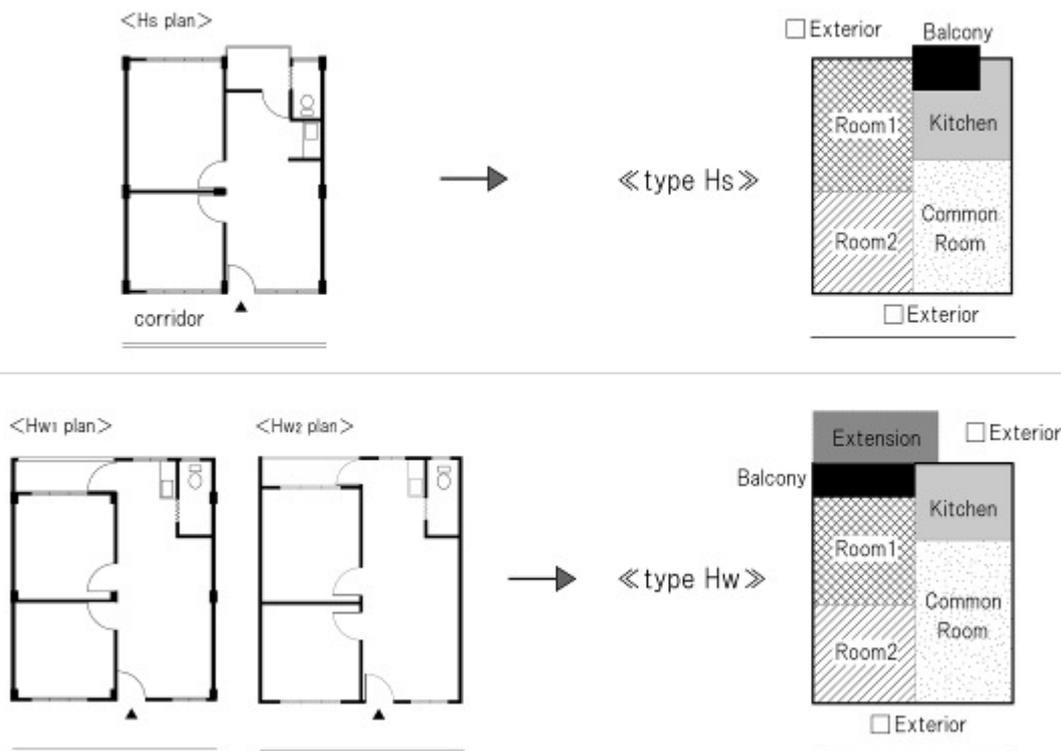


Fig. 11 Area division of each plan

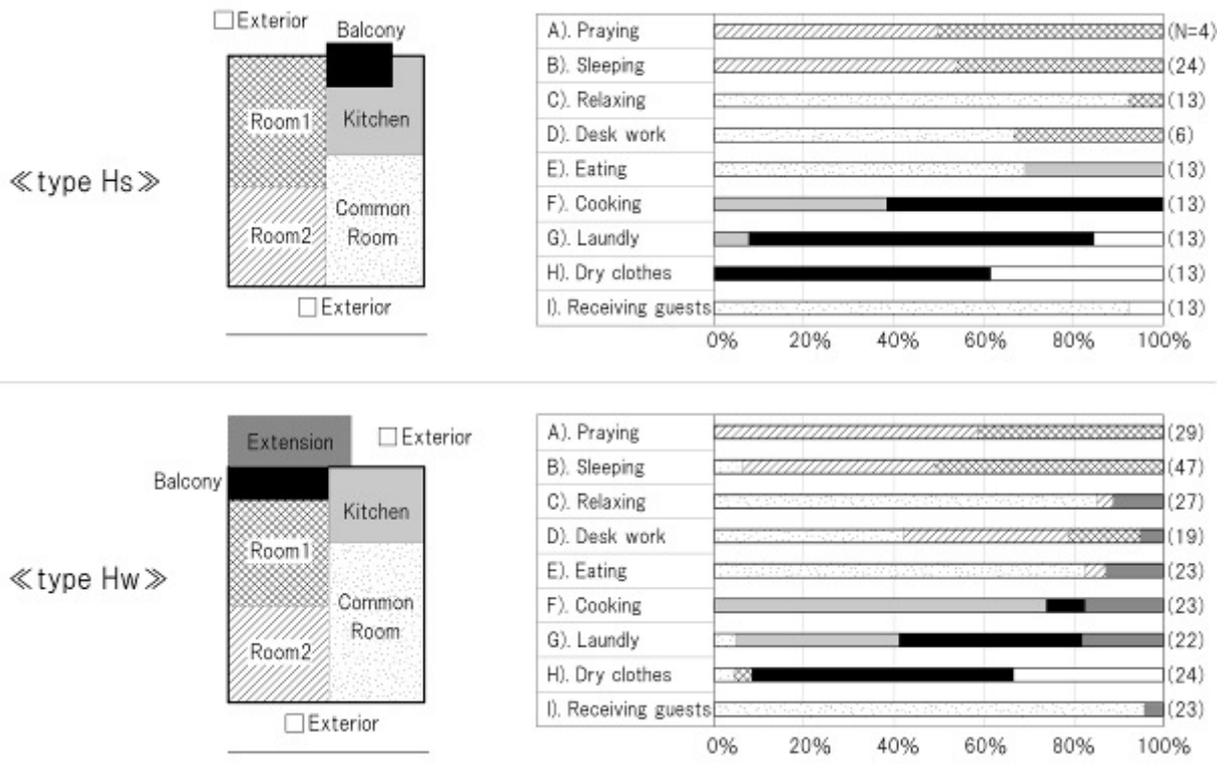


Fig. 12 Relationship between plan type and living activities

4-3. Analysis of life style

Among the 9 life operation items, "B. sleeping" included sleeping in bed as well as sleeping on the floor using a mattress, etc. The use of chairs and directly sitting on the floor for "E. eating" and "C. relaxing" were seen. If the chair type and the floor type ratio of the 37 sketched households of B, C, and E are seen (Figure 13), "B. sleeping" with bed + mattress was almost half the number of bed only, and there were 3 units where the residents only slept on the floor. There are many chairs + floor seats for "C. relaxing," and take "E. eating." Only 4 cases of floor seats only were seen. There was only one unit using floor seats only [*shoune*] for both "E. eating" and "C. relaxing." There was no other unit using floor seats for multiple living activities.

Figure 14 shows the relationship between number of family members with the chair type and the floor type ratio and the residence years regarding 3 items, namely "B. sleeping," "C. relaxing," and "E. eating." As for "B. sleeping," when the residence years and the number of family members increase, it is understood that units with beds only tend to shift to bed + floor [*shoune*]. There seems to be no correspondence between the increase in the number of family members using beds alone. However, there is a possibility for the 3 cases to shift from sleeping on the floor to sleeping in a bed in the future since their residence years are only 1 or 2 years. Use of floor seats increases for "C. relaxing" and for "E. eating" as the residence years and numbers of family members increase. Moreover, it was only the Malays who conducted living activities on the floor. Householders of the unit that use floor seats for "E. eating" and "C. relaxing" were all more than fifty years old.

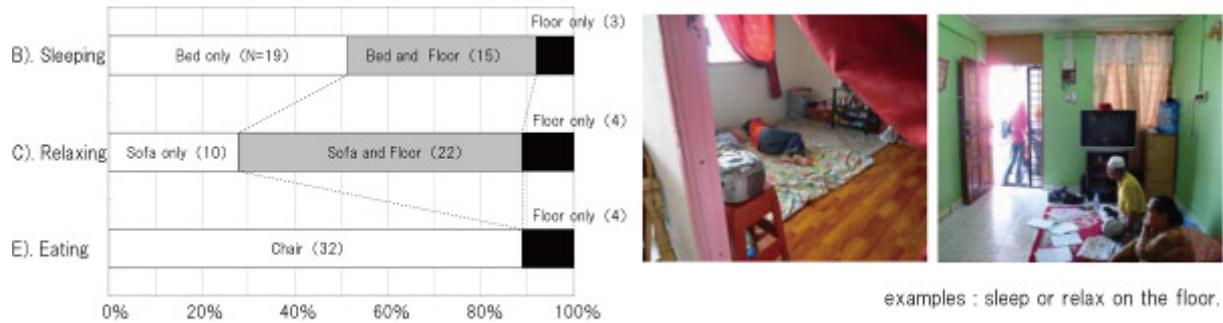


Fig.13 Chair seat and floor seat ratio for living activities

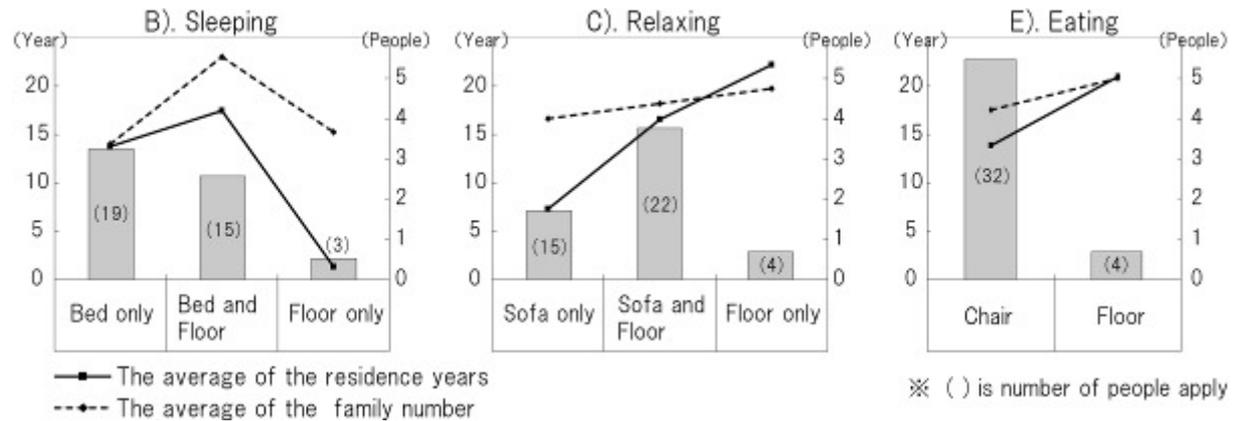


Fig.14 Relationship among floor seats, chair seats, residence years, and number of family members

4-4. Summary of the chapter

In Chapter 4, we analyzed the realities of the way of living based on 37 unit household sketches obtained from the visit investigation, and the following was clarified.

- In the Hs type plan, there was a tendency to bring water (*ri*) work together on the balcony side, and to use the area surrounding the kitchen widely.
- In the Hw type plan, cases where the extension part is used as a place for "relaxing" and "eating" was seen.
- About 10% of the units conducted a floor-type life such as "sleeping," "relaxing," and "eating" on the floor.
- For both "relaxing" and "eating," families with a larger number of members and longer residence years tend to select floor seats rather than chairs.

5. Analysis concerning unit remodeling

5-1. Remodeling and building composition related to the outside wall

We take up "installation of eaves," "installation of a bow window," and "extension to the outside" as the main 3 remodeling items related to the outside wall among the 6 remodeling items. We analyzed at what rate the 3 remodeling items related to the outside wall had been applied to each wall in the building, based on the photographs of the exteriors. (Investigation was conducted on each targeted apartment of 3 residential buildings of a housing complex.) Figure 15 shows the ratio of the number of houses actually remodeled to the number of houses on each floor of the unit, for the 3 remodeling items. Let us call the passage side "Side A," the balcony side, "Side B," and other side of the unit, "Side C," and we classify which side is remodeled for each applicable unit.

Installation of eaves

Eaves are installed at a rate of 60% or more on each floor in Hs. However, installation is not done for Side A (passage side). This is because the hallway is a substitute for eaves. It is installed up to the fourth floor in Hw1 and Hw2 at a rate of 80% to 100%, and it is installed in nearly every place with an opening. It is thought that there is less installation on the fifth floor because the roof of the residence building works as eaves. It seems that eaves are positively used in order meet unique conditions such as strong sunshine and squalls.

Installation of a bow window

Bow windows are defined as a metallic hedge set up on balconies and openings. Bow windows are also used as a shelf where tableware and laundry are put to dry. Installation of a bow window is conducted at a rate of 50% on the first floor in Hs though the total is less than the installation of eaves. Bow windows are installed on Side A (passage side) in Hw2 though a difference according to the floor number is not seen in Hw1 and Hw2.

Extension to the outside

Extension to the outside is not done in Hs. Large-scale remodeling such as extension is not readily done in the rented units, as shown in Chapter 3, and extension is not therefore seen in Hs, which are all rented units. However, there is a strong tendency to try to make use of the room more widely as can be read from the large number of cases of installation of a bow window in Hs. Side B of the ground floor of Hw1·Hw2 is easy to extend. However, it was seen in Hw2 that Side A of the upper floor (passage side) has been extended. These are cases seen only in the upper-floor corner rooms of Hw2.

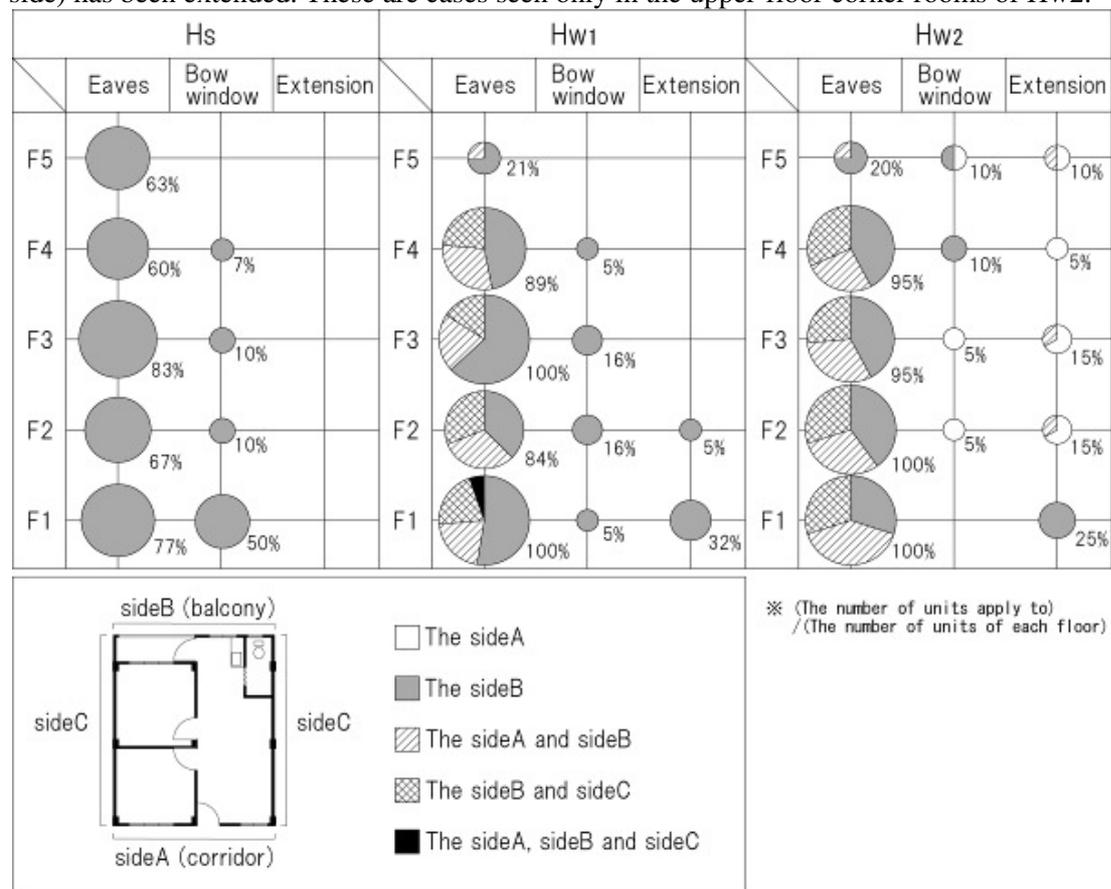


Fig. 15 Remodeling and building composition

5-2. About extension to the outside

Extension to the outside can be classified into 4 kinds (the balcony side of the first floor, the balcony side of the upper floor, the passage side of the first floor, and the passage side of the upper floor) according to the feature.

First-floor balcony side

As for extension of the first-floor balcony side, there are many variations in the extension area and the design. There are those that are completely made as an extension of their original indoor space and others that are those with half-indoor extension and half-outdoor style. For extension of the indoor style, the room is extended from the balcony part, and the extension is made using concrete blocks, cement, etc. and firmly [tsukukketairu] set, as with the wall. There was a case where the space extended half outdoors also with extended eaves, though the space may feel cramped (Figure 16-[Ⓐ]). On the other hand, the half-outdoor form creates the area by making the concrete blocks and the hedge a spandrel wall and placing floor tiling, and the upper part of the spandrel wall improves permeability using a metal lattice, a window shade, a vinyl sheet, etc. (Figure 17). A sink stove and a counter are set up to be used mainly as a place for cooking, and when the area is large, a table and sofa might be placed. Moreover, because permeability is high, the half-outdoor part is also used as a place for drying laundry.

First-floor passage side

This to make the enclosure in the hall part with a spandrel wall and a handrail with a concrete block, to place tiles etc. on the floor, and makes the area surrounding the entrance its own area (Figure 16-[Ⓑ]). There was a case in the upper hall where eaves have been added in addition to the extension even though the hallway acts as a roof. A desk, chair, and sofa are set up and it is used as a place for "relaxing" and "receiving guests." During the visit investigation, residents were chatting to each other in the extension part of a unit.

Upper-floor balcony side

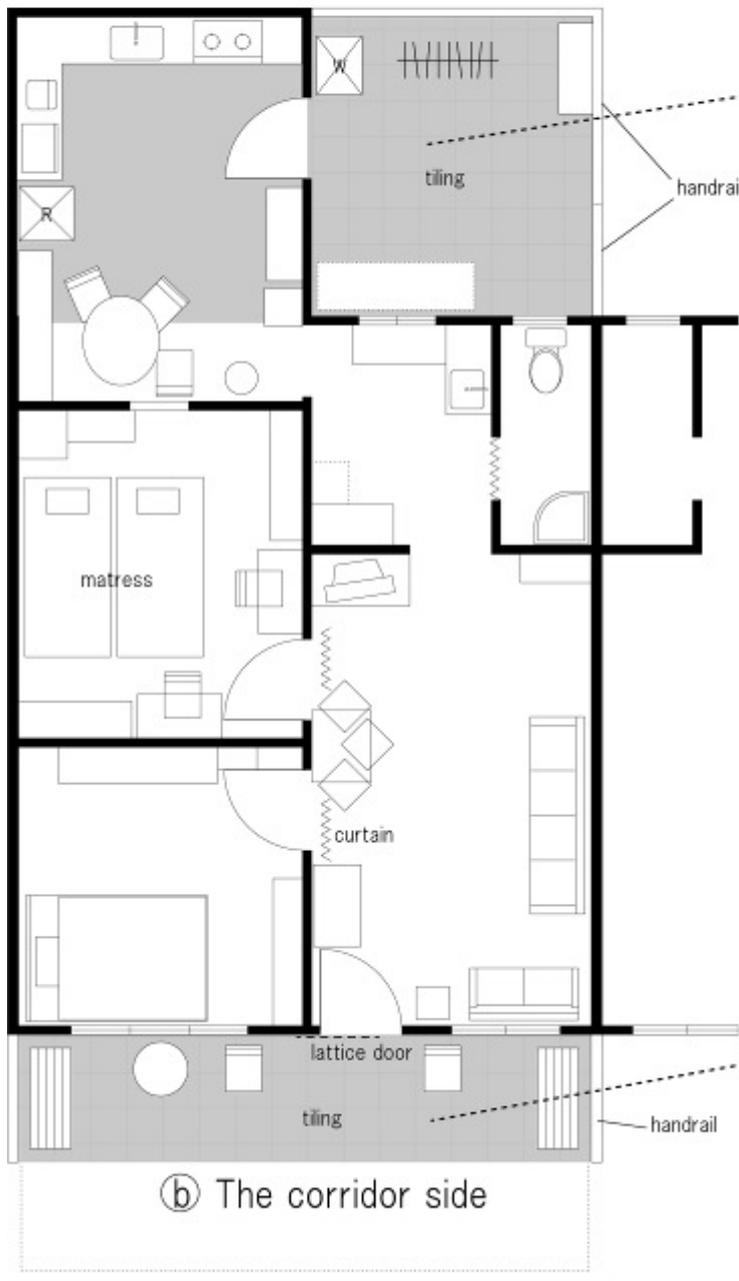
The balcony was enlarged to expand the indoor area (Figure 18-[Ⓐ]). Since the extended part would project into the air, the extension area is small and it tends to be a closed space. A stove and washing machine are set up and used for cooking and water [ri] work in the extended space. It is also used as a place for drying laundry.

Upper-floor passage side

This is a case (Figure 18-[Ⓑ]) seen only in the corner room on the upper floor. It is to use the hall area as if it belongs to the unit owner, just like the passage side of the first floor. However, they enclose the area surrounding the entrance by using not a spandrel wall, etc. but a metal lattice, and tiles are placed on the floor. The added metal lattice is shaped like a bow window and is used as a shelf. A sofa, etc. is placed and it is used as a space for relaxation. Plants were put on a part of the bow window shape, and the area surrounding the entrance was decorated.

Hw2 B2-107	Ownership-Private	Monthly income	RM 4,000
	Family members	Malay-5 people	
	Main earner (25)	Sales adviser	
	Father (58)	Pension	
Mother (56)	Pension		
Sister (18)	Sales adviser		
Sister (13)	Student		

Ⓐ The balcony side

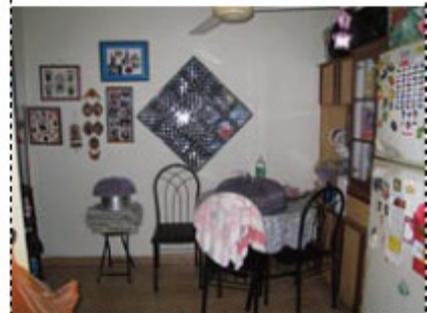


Ⓑ The corridor side

※ extension

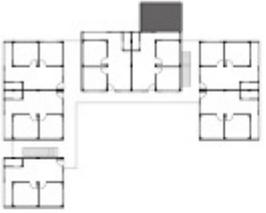
Fig. 16 First-floor balcony-side/passage-side extension case

Ⓐ The balcony side



Ⓑ The corridor side



Hw1 F6-105	Ownership-Private	Monthly income	RM 1,200
	Family members	Malay-4 people	
	Main earner (21)	Driver	
	Father (56)	Pension	
	Mother (54)		
	Sister (15)	Student	

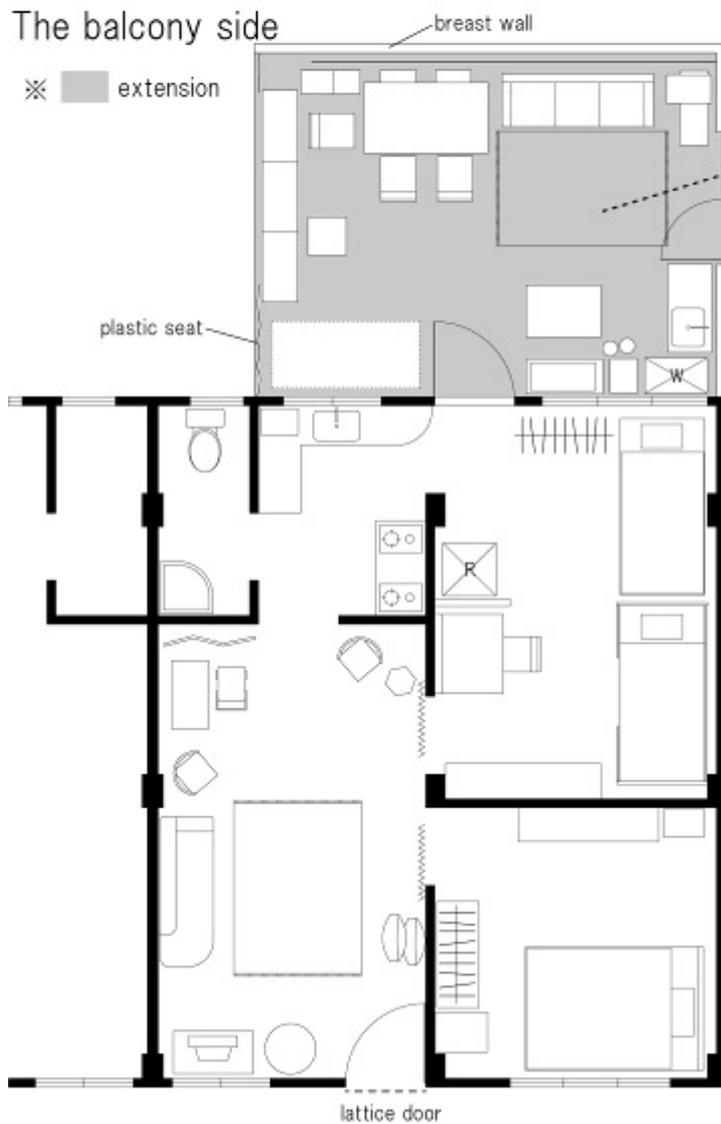


Fig. 17 Example 2 of extending the first-floor balcony side

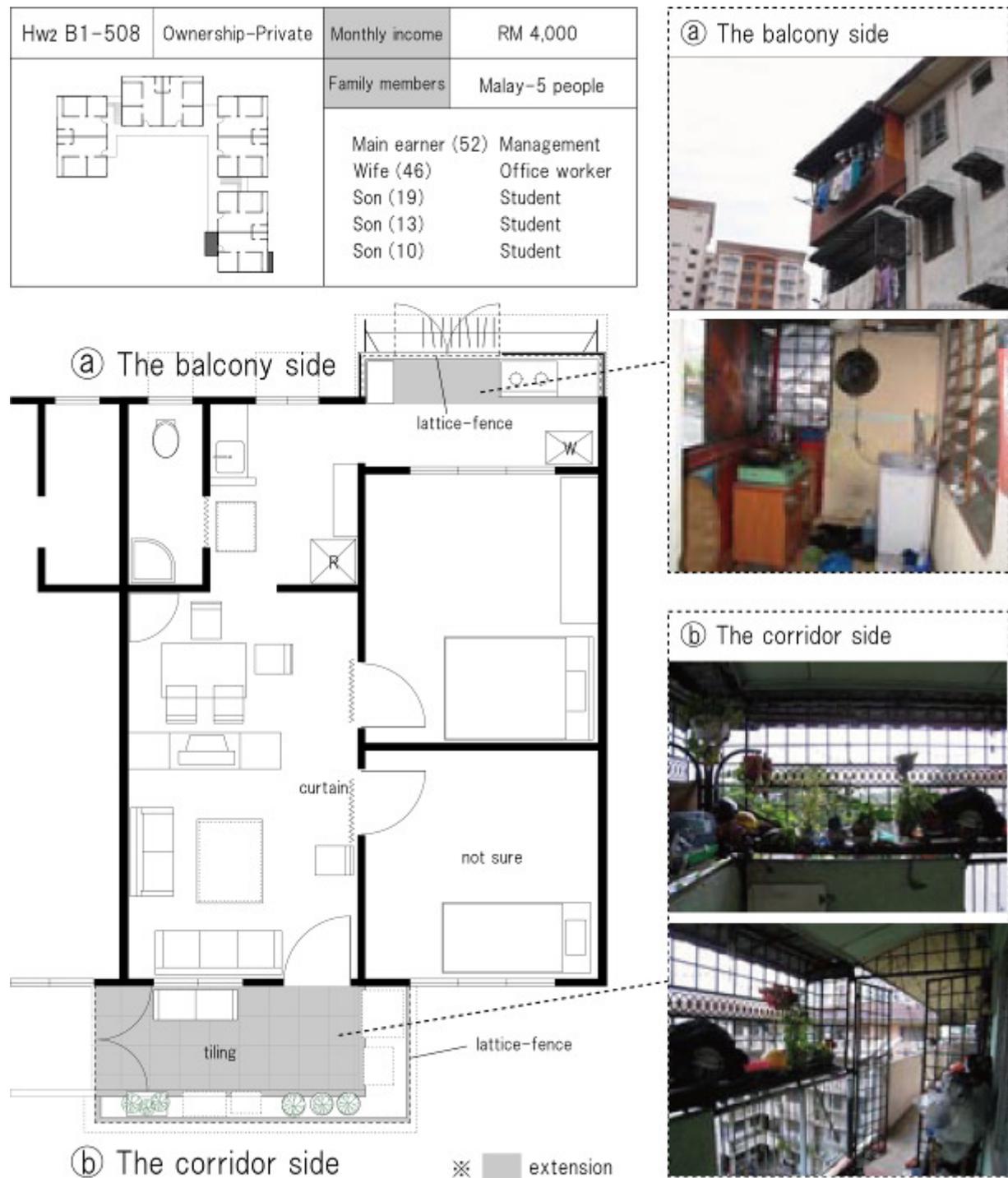


Fig. 18 Upper-floor balcony-side/passage-side extension case

5-3. About remodeling around the kitchen

Only a simple naked sink is set up when the residents move in to the unit, and the residents need to install gas stoves and other kitchen equipment by themselves. The side of the naked sink was used for enclosure storage by adding concrete blocks, etc., and counters were attached next to the sink (henceforth, sink remodeling). It is thought that "the partition wall increased / removed" shown in Chapter 3 is seen mainly on the boundary of the area surrounding the kitchen and the common room, and is performed in relation to remodeling the kitchen equipment.

The various positions of the sink and the stove are categorized into types based on the unit sketch, and Figure 19 shows the categorized types and the unit plan. (Hw1·Hw2 was collectively assumed to be the Hw type.) There are many Type Bs in the Hs type, and this is because of the tendency for residents to cook on the balcony. Moreover, there were 2 cases each of Type B and D where dining tables were placed in the area surrounding the kitchen. These are types where the stove is set up on the balcony. However, cases of sink remodeling were hardly seen in the Hs type. It is thought that the reason for this is that the original sink was enclosed by a wall, and it was not easy to remodel the area surrounding the sink (or it was not necessary to remodel it). On the other hand, many Type A sink remodelings were seen in the Hw type. Moreover, there were 4 cases in which cooking in the extension part in the Hw type was observed.

The sink and stove seem to be placed away from each other, but during the visit investigation, it was observed that "food ingredients were prepared sitting on the floor around the kitchen, and then prepared ingredients were cooked on the stove on the balcony." We could say that this sense of distance is part of their culture. However, as there is typically no ventilation installed in the units investigated this time, setting up the stove on the balcony may have been unavoidable.

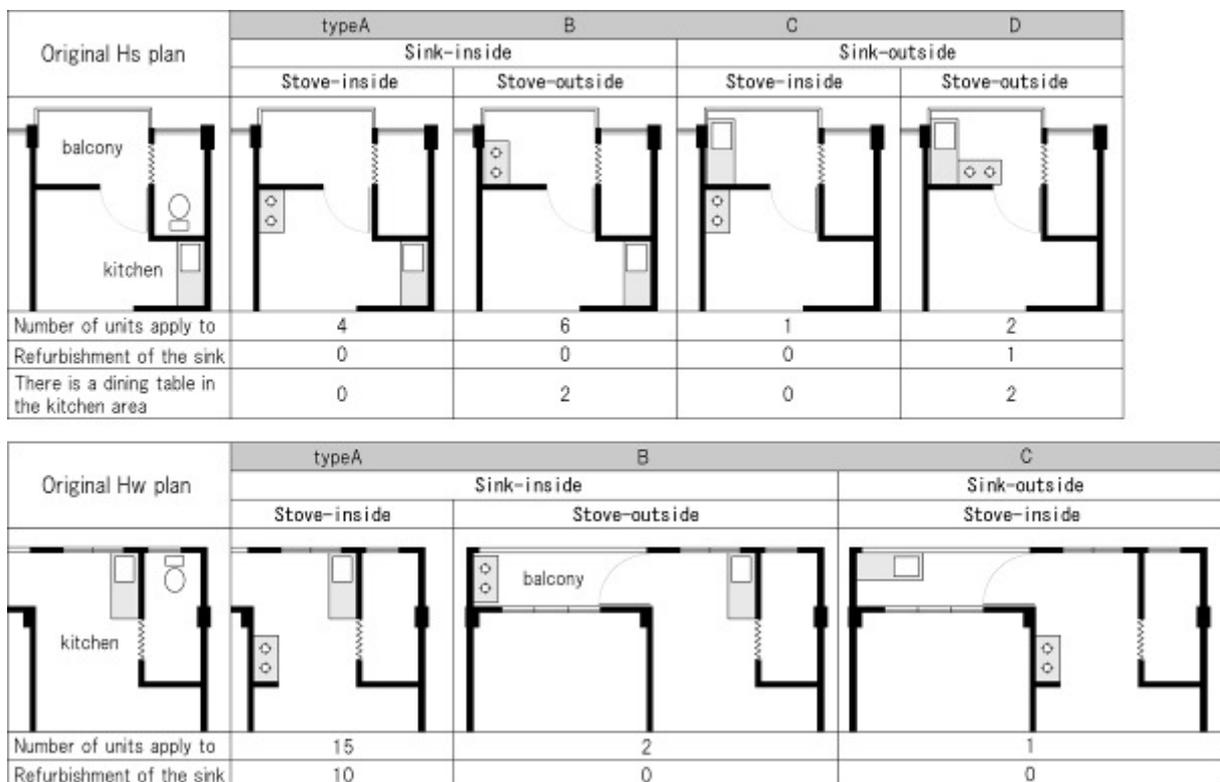


Fig. 19 Classification of sink stove arrangements

5-4. Summary of the chapter

In Chapter 5, we analyzed actual remodeling cases, and the following was clarified.

- Eaves were installed at a high rate of 80% in Hw1·Hw2 and 60% on each floor of Hs.
- Bow windows were especially installed on the first-floor balcony side of Hs.
- Extension to the outside was seen in Hw1·Hw2, and they were classified into 4 kinds (the balcony side of the first floor, the passage side of the first floor, the balcony side of the upper floor, and the passage side of the upper floor).
- For the use of the kitchen area, many stoves were placed on the balcony where cooking took place, and cases of large separation between the sink and the stove were also seen.

6. Conclusion

This investigation analyzed the realities of unit remodeling in a public management housing complex in Malaysia and how the residents live in such accommodation, by conducting a local questionnaire survey and also based on a sketch of the units.

In Chapter 2 and Chapter 3, we extracted the residents' attributes and a typical resident image emerged, based on the results of the questionnaire, and the relationship with unit remodeling could be seen. In Chapter 4 and Chapter 5, we looked at the residents' living activities and details of remodelings based on the unit sketch and exterior investigations.

In Chapter 3, we classified the remodeling items seen in the main investigation. The residents' awareness of remodeling rules and that of the manager side were found to be different, and the residents were positively active in remodeling even the common parts of their apartments, as explained in Paragraph 3-3.

The living activities of the residents, as mentioned in Chapter 4, showed very a strong connection with the outside. We can say that "installation of a bow window," "installation of a metal lattice gate," extended parts, etc. are Malaysia-original concepts among the remodelings seen in Chapter 5.

If a future housing complex is to be planned, then housing style should be in a form where all residents understand each other, and a mechanism to incorporate remodeling into common areas may be necessary. Moreover, it is necessary to incorporate this flexibly into the plan in order to suit the local climate and cultural conditions, instead of just introducing plans from developed countries.

Explanatory notes

Bumiputera Policy: The Bumiputera Policy has aimed to give various privileges to the Malay people to narrow the economic discrepancy between the Malay and the Chinese people and to improve economic standing. Bumiputra gives preferential treatment to the Malays in education, employment, and housing in addition to prior allocation of stock.

Reference

Journal Articles:

Shin MURAKAMI & Norie KAWANO(2005). Study on the consensus building mechanism for renovation of multi-family dwellings. Proceedings of the 2005 World Sustainable Building Conference in Tokyo,11-14,3144-3151

Shin MURAKAMI & Norie KAWANO(2002). A Study on Residents' Agreement Consciousness for Renovation of Multi-family Dwellings. Summaries of technical papers of annual meeting, Transactions of Architectural institute of Japan, 1177-1178

Shin MURAKAMI & Eiichi TOBE(2002). Approaches and Challenges to Rehabilitation of Japanese Public Multi-family Dwellings. Proceedings of CIB W104 Symposium, 129-139

Shin MURAKAMI & Eiichi TOBE(2003). Approaches and Challenges to Rehabilitation of Japanese Public Multi-family Dwellings. Open House International 28 (2), 47-54

Shin MURAKAMI & Norie KAWANO(2005). Study on the Methodology of Investigation, Diagnosis and Decision Making for Renovation of Multi-family-dwellings Focusing on Urban and Architectural Laws and Acts and Technology. Journal of Sugiyama Jogakuen University

Norie KAWANO, Shin MURAKAMI & Yukie MAEDA(2008). Study on renovation of housing stocks in South Korea, Malaysia and Singapore: renovation methodologies of new towns in Asia on the basis of peculiar cultures (part 2). Journal of Sugiyama Jogakuen University. Natural sciences, 44-52

Yushi UTAKA & Ho Chin Siong, (1994). A study of multi-ethnic and mix dwelling residential area in Malaysia. : The case study of Johor Bahur metropolitan area. Summaries of technical papers of Annual Meeting Architectural Institute of Japan, 685-686

Yushi UTAKA & Mamoru TOUHIGUCHI, (1996). ETHNICITY AND SPACIAL USING IN STANDARDIZED ESTATE'S HOUSE, MULTI-ETHNIC SOCIETY : Part 1 A study of mixed-ethnic living and housing in Malaysia. Transactions of Architectural institute of Japan,489, 89-96

Yushi UTAKA & Yuki OKAMOTO, (2000). TRANSPLANTATION OF THE URBAN PLANNING SYSTEMS TO COLONIAL CITY : Case of repeal to control of rent act, 1966 (ACT 363) and changing the urban settlement in Malaysian cities. Transactions of Architectural institute of Japan, 529, 211-216