

# Preferences for High-rise Mixed Use Buildings (HMUBs) for Living Space in Later Life Among Urban Residents

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**Abstract :** The purpose of this research was to find out the preferences in HMUBs for living space in respondents' later life. For this purpose, this research was conducted by social survey research using a questionnaire for those who lived in an urban area around Seoul. The data was collected from November to December, 2005. The results of this research were as follows. Firstly, respondents agreed with living in high rise mixed use buildings in their later life because of convenience. Willingness to move into HMUBs was positive. Concerning preferred physical features, residents preferred living in either lower floors or higher floors because of safety or fine views. Regarding the usage of common space and facilities, they wanted to use them with other generations and preferred 2 bedroom type unit located in a suburban area. Secondly, the preference for living in a HMUB in later life was higher in women respondents than in men. Thirdly, the preference for living in a HMUB in later life was higher in upper floors than lower floors according to property and asset value. As a conclusion, the development of HMUB housing for older people has a bright prospect for urban residents in Korea.

Key Words : High-rise Mixed Use Building (HMUB), Later Life, preference

## I. Introduction

### 1. Background and purpose

High-rise mixed use buildings (HMUBs), which were popularized by the end of the 1990s, emphasize a 'one-stop life'. These are known as the housing type that provides the inhabitants the advantage to use various facilities and services while living in high quality accommodations. Also, the number of such facilities is vastly increasing. According to the results of a study, the average age of the residents of a HMUB was 48, and 47.5% of them were older than 50 (Hong & Chae, 2004). Thus the main users of the HMUB are middle-aged and older.

In comparison to other countries, the ageing population in Korea is increasing extremely rapidly, and by 2018, more than 14% of the population will be older

than 65 (National Statistical Office, 2005). Respondents in the mid-high class, who have their own financial stability, are willing to live without their children in their later lives (You & Hong, 2005). Thus, a supply of senior congregate housing is needed. The HMUB is safe and has massive shared spaces, and the convenience of the 'one-stop life' is highly appreciated. Therefore, a research on the current residents of such housing facilities (You & Hong, 2005) suggests that it is better to provide the senior congregate housing on the lower floors. Thus, the study of middle-aged respondents' housing satisfaction and preferences for the housing, and their opinions on the development of the lower part of the HMUB for senior congregate housing are very meaningful.

This study will focus on the preferences for the HMUB of ordinary apartment residents for their later lives based on the adjusted policy that allows the housing

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proportion of the HMUB to be increased to 90%.

Based on the purpose of the study, satisfaction with current housing and the reasons for dissatisfaction will be studied along with the preferences for the HMUB which provides shared spaces. Subsequently, their opinions on the HMUB for their old age and the preferences for location and space of such facilities will be analyzed as well.

The detailed questions for the study are:

1. What is the satisfaction/dissatisfaction level of the respondents' current residence, and how much do they prefer an HMUB?
2. What is their preference in the HMUB for senior congregate housing?
3. What is their preference for the location, the space of the HMUB, and universal design of senior congregate housing?

## II. Theoretical Background

### 1. Policies and literature related to mixed-use building (MUB)

#### 1) Definition of HMUB

Mixed Use building (MUB) is a type of building derived from mixed use development, which combines both living and commercial space in one building. Such buildings are located in the center or sub-center of the city, where the commercial functions are concentrated. Thus, these are interpreted as mixed use buildings that solve both work and housing problems (Han, 2001). In general, HMUBs are located in the center of the city so they have both the convenience and pleasantness of a hotel. They also have housing, commercial, business, culture, and leisure facilities, which make the 'one-stop life' of the residents possible. Also, depending on the apartment, hotel facilities such as private sports facilities (swim, fitness, golf), party halls, ball rooms, etc may be provided. These are commonly known as mixed use apartments.

Thus, the main function of a HMUB is housing developed for mixed use. Such facilities can be defined as a condominium that serves for the provision of a pleasant living environment through the combination of commerce and other functions (Hong & Chae, 2004).

#### 2) Policies related to MUBs.

Multiuse buildings have been promoted in Korea to solve the transportation problems and the phenomenon of the hollowing out of downtown due to the division of work and living. The city of Seoul supported the construction of MUBs in certain areas, if being renovated, by selecting obligated and recommended areas for MUBs in the Downtown Redevelopment Plan (1994). It also relaxed height restrictions and architectural design standards in order to enhance the investment of private construction companies (Hong & Chae, 2004).

The housing portion of the MUB is 70% to 90% and the remainder is used for sports facilities, officetels, and shared areas. In terms of the law, general apartments followed the Housing Law and the construction of a MUB required the adherence to the building law. However, due to the stabilization policy of the housing market, the construction of a MUB with more than 300 units became the target of the approval of the Housing Law (Housing Law 16).

In terms of the changes in MUB construction policies, in 1967, when the first MUBs in Korea, Saeunsanga and Nakwonsanga, were constructed, there were no certain directions for such buildings. In 1979, the housing construction standards stated that in complex extra facilities such as common areas and commerce areas should be in a separate building. Since the 1990s, when actual MUBs appeared, the increasing floor space index (FSI) facilitates construction. The FSI of ordinary housing areas was 250%. However, in April 1990, it increased to 300%, and in January 1991, it was augmented to 400%. In 1991, the possible areas to construct MUBs expanded from business areas to semi-housing areas. The housing portion was less than 50%, and the number of units was less than 200. However, if

the average area per unit was less than 150 m<sup>2</sup>, then it was given a construction permit. In addition, the policies were changed not to allow lodgings, leisure facilities, theaters, factories, hazardous facilities, but to allow other uses, which complies to the building code. In 1995, the housing portion increased to less than 70% and did not limit the number of units. The sunshine standard of multi-family housing in commercial areas was eliminated in May 1999, which eventually accelerated the construction of skyscrapers. In the Building Code, which was established in April 1998, the housing portion increased even more to 90% from 70% and MUBs with a wide variety of housing combination proportions are now being constructed.

### 3) Literature review on MUBs

MUBs are commonly known as multiuse condominiums. Research on such condominiums usually concentrates on the construction planning and the usage. Research on construction planning includes the planning type classification of MUBs (Oh & Kim, 1982), construction directions based on the multiuse condominiums (Choi, *et al.*, 2005), and space planning to meet the inhabitants' needs (Lee, 2003). This research analyzed the space planning of current multiuse condominiums and investigated the problems to suggest solutions.

In terms of usage, there is research on residents in their post-residency period. Hong and Chae (2004) proved that the satisfaction level increases if services based in the inhabitants' shared areas are provided. This is an advantage not only for the individual inhabitants but also for the overall community. Rhee and Chae (2004) analyzed the consciousness of the local community of inhabitants of the HMUBs and emphasized the need for development of programs to direct and support such common areas. They also studied the perception changes of common areas by comparing the attitudes of the current and prospective inhabitants' management of such areas. You and Hong (2005) showed that current inhabitants preferred HMUBs for their usage and later life residence by interviewing

current inhabitants of HMUBs. In order to study whether HMUBs are suitable for later life or not, Seo and Hong (2005) suggested a few solutions after analyzing the shared and individual areas of HMUBs constructed by two construction companies using the AARP checklist of the United States.

## 2. Senior congregate housing

Senior congregate housing is the type of housing that is designed to provide service to support the independent life of the elderly. These are the detailed characteristics. First, they are constructed in a small size with only 20 to 30 units and the completed type of housing as a kitchen and a bathroom in the individual unit. Even in situations where these are constructed in massive amounts, they should be provided in groups of 20 to 30 units with a shared space and manager. If health and dining services are provided, they should be provided in groups of 10 units. Second, common areas such as the living room and kitchen are utilized and a safe and communal life is promoted by the manager. Third, a system that can connect the management system, which supports alternative emergency systems, within or outside the complex is needed (Hong *et al.*, 2006).

Senior congregate housing is a type of elders' housing that has not yet been introduced in Korea. It is similar to sheltered and retirement housing in the United Kingdom or the congregate housing and independent living housing in the United States. Although the complex size and the service level may be different, assisted living in the U.S. is also one of the elders' housing types.

## III. Research Method and General Characteristics of the Respondents

### 1. Research method and procedure

The study conducted a social survey research on

middle-aged respondents living in Seoul using a questionnaire. The data was collected from November to December 2005 and it was analyzed using the SPSS Windows program. The survey questions were the general characteristics of the respondent, satisfaction/dissatisfaction levels on current housing, housing preference if moving, preference for HMUB, willingness to move into a HMUB if senior congregate housing was provided, preferred location, attitude on shared space, desired usage of universal design, and willingness to pay extra costs, etc.

## 2. General characteristics of the respondents

The respondents consisted of 39.7% males and 60.3% females with an average age of 50. More than 62.6% had an education level of university undergraduate. The average income was 5,360,000 won, which is approximately 3,000,000 won greater than the average income of urban households in 2005. The expected average income after retirement was 3,140,000 won. The average asset was 0.82 billion won. Families with only one child

<Table 1> General characteristics of the respondents

Characteristics	Category	Number of respondents (%)	Characteristics	Category	Number of respondents (%)	
Gender	Male	157(39.7)	Occupation	Housewife, Retired, Unemployed	136(35.4)	
	Female	238(60.3)		Simple job, Technician, Agriculture/Fishery	8(2.1)	
	Total	395(100.0)		Sales, Service, Office worker	119(31.0)	
Age (Average 50)	40s	242(61.3)		Semi-professional, Professional	113(29.4)	
	50s	132(27.1)		Officer, Manager	8(2.1)	
	60s	21(11.6)		Total	384(100.0)	
	Total	395(100.0)		Location	Seoul	230(69.7)
Education	Middle school	12(3.1)			Metropolitan	100(30.3)
	High school	136(34.4)			Total	330(100.0)
	College	247(62.6)			Religion	Very religious
	Total	395(100.0)	Generally religious	105(26.6)		
Asset (Average 816,110,000 won)	Less than 200,000,000	42(11.0)	Generally not religious	76(19.2)		
	200,000,000-500,000,000	118(30.8)	Never religious	128(32.4)		
	500,000,000-1,000,000,000	98(25.6)	Total	395(100.0)		
	More than 1,000,000,000	125(32.6)	Expected Monthly Income in Later life (Average 3,140,000 won)	Less than 1,000,000 won	53(14.2)	
	Total	383(100.0)		1,010,000-2,000,000 won	129(34.5)	
Monthly Income (Average 5,360,000 won)	Less than 3,000,000 won	45(11.5)		2,010,000-3,000,000 won	99(26.5)	
	3,000,000-5,000,000 won	148(37.8)		More than 3,010,000 won	93(24.9)	
	5,000,000-7,000,000 won	153(39.0)		Total	374(100.0)	
	More than 7,000,000 won	46(11.7)				
	Total	392(100.0)				

<Table 2> Family characteristics of the respondents

Characteristics	Category	Number of respondents (%)	Characteristics	Category	Number of respondents (%)
Spouse	Live together	368(93.)	Children	Live together	312(81.9)
	Do not live together	24(6.1)		Do not live together	69(18.1)
	Total	392(100.0)		Total	381(100.0)
Number of children	1	224.(71.6)	Growth level of children	Pre-school	6(1.6)
	2	85(27.2)		Elementary school	23(6.1)
	3	4(1.3)		Middle/High school	133(35.1)
	Total	313(100.0)		Graduate school	168(44.3)
Average	Son	1.3		Professional	49(12.9)
	Daughter	1.4		Total	379(100.0)

<Table 3> Housing characteristics of the respondents

Characteristics	Category	Number of respondents (%)	Characteristics	Category	Number of respondents (%)
Structure Type	Single-family housing	78(19.8)	Floor	1	69(17.7)
	Apartment	252(64.1)		2-5	150(38.6)
	Villa, Row-house	51(13.0)		Higher than 6	170(43.7)
	Multi-household	12(3.1)		Total	389(100.0)
	Total	395(100.0)		Satisfaction Level	Very satisfied
Size	Average 38.4 Pyung	Satisfied	175(44.4)		
Type of Ownership	Own	345(87.8)	So so		153(38.8)
	Rent	45(11.5)	Dissatisfied		34(8.6)
	Offspring's ownership	3 (.8)	Very dissatisfied		4(1.0)
	Total	393(100.0)	Total	394(100.0)	
Housing Expenses (Summer) Average 380,000	Less than 200,000	159(40.9)	Housing Expenses (Winter) Average 530,000	Less than 20,000	60(15.5)
	210,000-300,000	110(28.3)		210,000-300,000	102(26.3)
	310,000-40,0000	45(11.6)		310,000-40,0000	80(20.6)
	More than 410,000	75(19.3)		More than 410,000	146(37.6)
	Total	389(100.0)		Total	388(100.0)
Plan to Move	Yes	264(67.0)	Preferred Housing Type	Shared Space + HMUB	118(31.6)
	No	130(33.0)		Huge Apartment Complex	115(30.8)
	Total	394(100.0)		General single-family housing	24(6.4)
Willingness to Purchase HMUB	Very high	19(4.8)		Community center + Single-family housing complex	17(4.6)
	High	133(33.8)		Cooperative management + Single-family housing complex	16(4.3)
	Average	147(37.3)		Suburban housing	73(19.6)
	Low	65(16.5)		Villa	8(2.1)
	Very Low	30(7.6)		Others	2(.5)
	Total	394(100.0)		Total	373(100.0)

were 71.6%, currently attending middle/high school and living together were 35.1%, and currently attending universities were 44.3%. Families living in apartments were 64.1%, where 87.8% of them were owned by him/

herself or his/her spouse. Respondents who were planning to move were 67% and 75.9% had an 'average' willingness level to purchase the HMUB. There were 43.7% who lived in stories higher than the 6<sup>th</sup> floor.

## IV. Results Interpretation and Discussion

### 1. Satisfaction with current housing and housing preferences when moving

Current housing satisfaction with ‘more than average’ was 90.3% and ‘dissatisfaction’ was only 9.6%. The reasons for such satisfaction were divided into 3 categories such as the physical characteristics (reasonable private areas and individual space based on the family size), the housing environment (convenience of facilities, transportation, outdoor view, air ventilation, surrounding environment, silence and pleasantness), and the psychological satisfaction (own property, relaxation, memories) etc. The reasons for dissatisfaction were the physical properties (the depreciation of the building, size, inadequate facilities) and the inconvenient housing environment (noise from the transportation system, inadequate parking space).

The reasons to move were to move to a larger size and to have a better environment for their children (education, separation from family, independence, school problems). In addition, they also wanted a better housing environment (atmosphere, transportation, convenience), had financial reasons (ownership, asset accumulation), and the depreciation of the housing.

The preferred housing type if moving was a HMUB with 31.6%. The reasons were the convenient life and housing management that improves their lives through preparation for later life, usage of various shared spaces, and services.

Respondents, who preferred large apartment complexes, were 30.7%. The reasons were due to the convenience of life and the easiness of management. The third preference was suburban housing with 19.6%. The reason was because they can foster a healthier life in a quiet and clean area where they can prepare for their old lives. Such results show that the current respondents prefer multi-family housing over single-family housing due to its convenience.

### 2. Opinions on development of HMUBs for senior congregate housing

67.1% agreed to the development of HMUBs into senior congregate housing. More females preferred this than males and among these respondents, 83.1% claimed that they were willing to move. In relation to the independent variables, respondents were willing to move if female (62.2%), with a high school education (60.3%), and had assets with more than 5 billion won. In such cases, if HMUBs are developed to become senior congregate housing, there will definitely be high demand for such construction.

<Table 4> Opinions on development of HMUBs into senior congregate housing  
(Number of respondents (%))

		Opinion on renovation of senior congregate housing			Total	χ <sup>2</sup>
		Good	Don't know	Bad		
Gender	Male	94(59.9)	52(33.1)	11(7.0)	157(100.0)	6.15*
	Female	171(71.8)	55(23.1)	12(5.0)	238(100.0)	
	Total	265(67.1)	107(27.1)	23(5.8)	395(100.0)	
Willingness to Move	Yes	187(83.1)	37(16.4)	1(4)	225(100.0)	139.02***
	Don't know	63(57.8)	42(38.5)	4(3.7)	109(100.0)	
	No	15(22.7)	28(42.4)	23(34.8)	66(100.0)	
	Total	265(66.3)	107(26.8)	28(7.0)	400(100.0)	

1) \* p < .05 \*\*\* p < .001

<Table 5> Willingness to move into senior congregate housing  
(Number of respondents (%))

		Willingness to move			Total	$\chi^2$
		Good	Don't know	Bad		
Gender	Male	77(49.0)	47(29.9)	33(21.0)	157(100.0)	8.63*
	Female	148(62.2)	62(26.1)	28(11.8)	238(100.0)	
	Total	225(57.0)	109(27.6)	61(15.4)	395(100.0)	
Live with Spouse	Yes	212(57.6)	104(28.3)	52(14.1)	368(100.0)	6.76*
	No	12(50.0)	4(16.7)	8(33.3)	24(100.0)	
	Total	224(57.1)	108(27.6)	60(15.3)	392(100.0)	
Plan to Move	Yes	166(62.9)	60(22.7)	38(14.4)	264(100.0)	12.77**
	No	58(44.6)	49(37.7)	23(17.7)	130(100.0)	
	Total	224(56.9)	109(27.7)	61(15.5)	394(100.0)	
Education	Middle school	6(50.0)	5(41.7)	1(8.3)	12(100.0)	15.63**
	High school	82(60.3)	45(33.1)	9(6.6)	136(100.0)	
	College	137(55.5)	59(23.9)	51(20.6)	247(100.0)	
	Total	225(57.0)	109(27.6)	61(15.4)	395(100.0)	
Asset (won)	Less than 200,000,000	19(45.2)	12(28.6)	11(26.2)	42(100.0)	15.71*
	200,000,000-500,000,000	57(48.3)	42(35.6)	19(16.1)	118(100.0)	
	500,000,000-1,000,000,000	60(61.2)	21(21.4)	17(17.3)	98(100.0)	
	More than 1,000,000,000	83(66.4)	30(24.0)	12(9.6)	125(100.0)	
	Total	219(57.2)	105(27.4)	59(15.4)	383(100.0)	

1) \* p < .05 \*\* p < .01

### 3. Preferences for HMUB for senior congregate housing

#### 1) Opinions on locations and ownership

If the HMUB was developed into senior congregate housing, the urban areas had the highest preference of 62.8%, but only 9.6% wanted the city area. The preferred ownership types were lease (40.5%) > ownership (32.9%) > and membership (26.6%). In relation to the independent variable, if respondents had a higher monthly income, and expected later life income and assets more wanted ownership. If the financial level was low, the respondents wanted membership opportunities, and if the financial level was below average, they wanted lease opportunities.

The reason for wanting ownership was due to the psychological comfort of having his/her own property and the asset value. If they wanted to lease, it was due to the financial burden and the low investment value. If they wanted membership, it was due to the easiness to manage and to transfer or purchase.

In general, HMUBs are higher than 30 stories. The preferred floors were, first floor (44.1%), 2nd-5th (20.6%), 6th-10th (27.7%), so that respondents prefer lower floors. The reasons were they provide residents with a secure feeling and will be easier to access when they get older. This shows that the lower floors with easy accessibility are more suitable to develop into senior congregate housing.

#### 2) Opinions on shared and private spaces

After studying the opinions on the division of shared and private spaces in senior congregate housing, 57.7% said the entrance must be shared with general residents and 42.3% said that there should be a separate entrance.

If they had to make a choice due to financial problems, 25.2% wanted to increase shared space, 41.0% wanted to increase individual space, and 32.3% said that despite such problems, both areas are large enough.

Such opinions were very different depending on the ownership status. If respondents wanted ownership, they

<Table 6> Opinions on ownership of senior congregate housing

(Number of respondents (%))

		Ownership			Total	$\chi^2$
		Own	Rent	Membership		
Occupation	Housewife, Retired, Unemployed	39(28.7)	57(41.9)	40(29.4)	136(100.0)	17.30*
	Simple job, Technician, Agriculture/Fishery	4(50.0)	3(37.5)	1(12.5)	8(100.0)	
	Sales, Service, Office worker	27(22.7)	57(47.9)	35(29.4)	119(100.0)	
	Semi-professional, Professional	51(45.1)	39(34.5)	23(20.4)	113(100.0)	
	Officer, Manager	4(50.0)	2(25.0)	2(25.0)	8(100.0)	
	Total	125(32.6)	158(41.0)	101(26.3)	384(100.0)	
Monthly Income	Less than 3,000,000won	7(15.6)	24(53.3)	14(31.1)	45(100.0)	25.04***
	3,000,000-5,000,000won	42(28.4)	67(45.3)	39(26.4)	148(100.0)	
	5,000,000-7,000,000won	52(34.0)	59(38.6)	42(27.5)	153(100.0)	
	More than 7,000,000won	28(60.9)	9(19.6)	9(19.6)	46(100.0)	
	Total	129(32.9)	159(40.6)	104(26.5)	392(100.0)	
Expected Income after Retirement	Less than 1,000,000won	11(20.8)	23(43.4)	19(35.8)	53(100.0)	22.46**
	1,010,000-2,000,000won	30(23.3)	61(47.3)	38(29.5)	129(100.0)	
	2,010,000-3,000,000won	35(35.4)	42(42.4)	22(22.2)	99(100.0)	
	More than 3,010,000won	45(48.4)	24(25.8)	24(25.8)	93(100.0)	
	Total	121(32.4)	150(40.1)	103(27.5)	374(100.0)	
Asset (won)	Less than 200,000,000	8(19.0)	20(47.6)	14(33.3)	42(100.0)	22.53***
	200,000,000-500,000,000	27(22.9)	57(48.3)	34(28.8)	118(100.0)	
	500,000,000-1,000,000,000	31(31.6)	45(45.9)	22(22.4)	98(100.0)	
	More than 1,000,000,000	58(46.4)	35(28.0)	32(25.6)	125(100.0)	
	Total	124(32.4)	157(41.0)	102(26.6)	383(100.0)	

1) \* p < .05 \*\* p < .01 \*\*\* p < .001

<Table 7> Opinions on the division of shared and private areas

Category	Number of respondents (%)
Shared area and individual area must be large enough despite financial issues	127(32.3)
Rather have a larger individual area due to financial issues	161(41.0)
Rather have a larger shared area due to financial issues	99(25.2)
Others	6(1.5)
Total	393(100.0)

<Table 8> Opinions on the usage of shared and private areas

(Number of respondents (%))

		Usage of shared and private areas			Total	$\chi^2$
		Both should be large	Larger private area	Larger shared area		
Ownership	Ownership	58(45.3)	48(37.5)	22(17.2)	128(100.0)	16.32**
	Lease	42(26.8)	65(41.4)	50(31.8)	157(100.0)	
	Membership	27(26.5)	48(47.1)	27(26.5)	102(100.0)	
	Total	127(32.8)	161(41.6)	99(25.6)	387(100.0)	

1) \*\* p < .01



wanted both shared and individual spaces to be large. If they wanted a lease, they wanted the shared space to be large. If they wanted the membership, they preferred a larger shared space.

Depending on the investment cost, the division of shared and private spaces must be determined carefully.

**3) Opinions on the usage of shared spaces**

If a portion of the HMUB was to be renovated into senior congregate housing, do the respondents want a separate shared space for later life or use the previous shared space? This was studied using the usage of shared spaces. As a result, 43.8% answered that it is better to use with other residents because they want to interact with respondents from different generations. With the same reply but with a reason to reduce the cost, 25.7% replied so and 8.9% said that they preferred to share the space regardless of reason. On the other hand, only 20.4% of the total respondents said that they did not want to share the area regardless of reason. Thus, it

seems possible to use the existing shared spaces of HMUBs. Also, this may become a space plan to prevent the isolation of elders, but the possibility of keeping a portion of elders’ private area should be considered regarding the other units’ preferences.

**4) Opinions on the universal design**

The evaluation results using the AARP(American Association of Retired Persons) check list for the current HMUBs show that there are a few problems in having them as elders’ housing (Seo & Hong, 2005). If two construction companies were involved, the shared spaces still used the cylindrical door knobs, marble was used for the floor material, the signage system was inefficient for elders, certain areas had relatively high doorsills, bathrooms did not have handles, and shower chairs were not installed.

This study questions the need for the universal design and the willingness to pay extra amounts. Using the Likert-type scale, which used 5 points for ‘extremely

<Table 9> Opinions on the usage of shared spaces

Category	Number of respondents (%)
Always use with other inhabitants	80(20.4)
Never use with other inhabitants	35(8.9)
Use with other inhabitants to reduce financial burden	101(25.7)
Use with other inhabitants to interact with different generations	172(43.8)
Others	5(1.3)
Total	393(100.0)

<Table 10> Need for universal design and willingness to pay extra

Category	Average	Willing to pay extra (%)
Emergency Alarm	4.37	307(81.2)
Non-slip floor	4.35	302(79.9)
Light switches appropriately placed	4.25	267(70.6)
Air-conditioning/heat system that can be controlled from each room or with a remote control	4.16	267(70.6)
Safety handles for hallways and bathrooms	4.10	270(71.4)
Easily passable door width for wheelchairs	3.99	272(64.0)
Height adjustable kitchen cabinet/sink/toilet	3.93	247(65.3)
Knee space under the kitchen cabinet	3.79	204(54.0)
User adjustable bathroom equipment	3.69	207(54.8)
Bath tub with a door	3.49	163(43.1)

needed', the most needed feature was the emergency alarm (4.37). Other options were a non-slip floor (4.35), light switches appropriately placed (4.25), air-conditioning/heating system that can be controlled from each room or with a remote control (4.16), safety handles for hallways and bathrooms (4.10), easily passable door width for wheelchairs (3.99), height adjustable kitchen cabinet/sink/toilet (3.93), knee space under the kitchen cabinet (3.79), user adjustable bathroom equipment (3.69), and bathtub with a door (3.49). Thus, the need for universal design was extremely high from 3.49 to 4.37. If HMUBs were to be renovated into senior congregate housing, universal design must be taken into consideration.

If the HMUB was constructed using the universal design, the willingness to pay extra amounts depended greatly on the installing features. Respondents were greatly willing to pay for these features: emergency alarm (81.2%), non-slip floor (79.9%), light switches appropriately placed (70.6%), air-conditioning/heating system that can be controlled from each room or with a remote control (70.6%), safety handles for hallways and bathrooms (71.4%), easily passable door width for wheelchairs (64.0%), or height adjustable kitchen cabinet/sink/toilet (54.0%). However, for certain features, respondents' willingness to pay was relatively lower: knee space under the kitchen cabinet (54.0%), user adjustable bathroom equipment (54.8%), or bathtub with a door (43.1%).

## V. Summary and Conclusion

First, if the housing part of the HMUB was developed into senior congregate housing, respondents were willing to move in and were positive about the renovation. Thus, it seems there should be some demand for senior congregate housing. Also, if developed, they preferred the lower floors due to safety and easy accessibility. When dividing common and the private areas, they did not have certain preferences on the size of

shared space or common space. The responses greatly differed depending on ownership type. Therefore, regulations are needed for purchase methods depending on whether it is an ownership, lease, or membership. Most of the respondents preferred to use the shared spaces with inhabitants from different generations. However, the preferences of general residents must be studied as well.

Secondly, the need for universal design for construction standards was very high. The respondents were also willing to pay the average extra amount.

In conclusion, the current respondents were relatively satisfied with their current residence. However, they were willing to purchase HMUBs and to relocate. Thus, for a certain duration, the consumption of these HMUBs will remain constant and the development of certain areas into senior congregate housing also welcomed.

The development of HMUBs into senior congregate housing studied in this research can be considered by the suppliers as a possibility to solve space or indifference problems.

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