RESIDENTIAL SATISFACTION OF LONG-TERM PUBLIC RENTAL HOUSING

By

KIM, Jinhui

THESIS

Submitted to

KDI School of Public Policy and Management

In Partial Fulfillment of the Requirements

For the Degree of

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Committee in charge:

Professor Yoon Cheong CHO, Supervisor

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Abstract

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The objective of this study is to investigate determinants to affect the residential satisfaction of long-term public rental housing. This study developed all fundamental variables using the database of “Residential satisfaction of residents in public rental housing” that the LH carried out a survey of residents in National Rental Housing throughout the country in 2014. And this study categorized determinants to affect residential satisfaction into six major factors such as product physical factor, residential environment factor, operating service factor, repair service factor, economic factor, and personal factor. Using confirmatory factor analysis, two group comparison analysis, and regression analysis, this study analyzed effects of each factor and determinant on overall residential satisfaction.

According to the results of simple regression analyses of five factors except personal factor, economic factor had strongest correlation with residential satisfaction, and product physical factor, operating service factor, residential environment factor and repair service factor followed in order. In terms of specific variables, gender and the number of household members didn’t affect residential satisfaction, and age and household income slightly affected residential satisfaction. And other various variables all influenced residential satisfaction. Especially, maintenance fee and rent level highly affected residential satisfaction compared to other variables relevant to housing design, environment, and service. Factors and independent variables in this study were subjective data except personal factor, so it facilitated

comparisons between determinants.

Also, based on the results of factor analyses and multi-regression analyses, this study found that housing physical features didn't have distinguishable effects on residential satisfaction from environment and neighborhood features, and those variables were highly correlated with each other. And this study found that operating service factor and repair service factor also had strong correlation, and didn't have meaningful differences related to effects on residential satisfaction. Finally this study provides implication for residential satisfaction of long-term public rental housing in Korea. This study suggests that the crucial determinants to affect overall residential satisfaction is the economic factor such as rent level and maintenance fee, and economic factor should be significantly handled to improve residential satisfaction of long-term public rental housing.

Acknowledgment

First of all, I appreciate the Korea Land and Housing Corporation, for which I have been working, giving me the great opportunity to study in the KDI. I was able to write this thesis thanks to the assistance from my corporation. And also I special thank my thesis supervisor, Professor Yooncheong Cho. She led me to the right direction to build academic research. Her guidance and advices allowed me to navigate my research subject in-depth and to develop the elaborate research model. Through her lectures and comments, I could acquire the professional knowledge of satisfaction theories and statistical analysis methods. I also would like to express my gratitude to all my colleagues who helped me to finish this thesis. Information on housing policy and data of residential satisfaction that they shared formed the foundation of this research.

Last but not least, I would like to appreciate my family for their support. Especially I would like to say thank you to Miya who had to live away from me.

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I. Introduction

Experiencing rapid urbanization in 1980s, the Korean government carried out new town developments around Seoul. In order to solve the housing shortage, the Korean government implemented the public housing policy which a lot of public housing for sale and rental housing were supplied to people based on their income levels. Contrary to public housing for sale built for a middle-income class, public rental housing was constructed for a low-income class. According to “Five-year two million housing unit construction plan” of the government in 1988, Permanent Rental Housing was built for the lowest-income people such as beneficiaries of National Basic Livelihood. Afterward the provision of 50-years Public Rental Housing was started, but the amount of supply was not sufficient. The massive supply of public rental housing was resumed in 2002 when “One million of National Rental Housing unit construction plan” was put into practice. National Rental Housing is leased out to low-income people for 30 years. As of Dec.2015, 471 thousand units of National Rental Housing has constructed and settled down as a main type of long-term public rental housing (Adapted from KOSIS (http://kosis.kr/) 2015).

For most people, housing is the largest and important consumption item in their lifetime, and home is the setting where one finds refuge, rest, and satisfaction (Adams 1984). As Lu (1999) described, residential satisfaction is important to not only housing developers and planners but also policy makers, because residential satisfaction is recognized as a vital component of individuals’ general quality of life and low levels of residential satisfaction result in mobility. In the case of Korea, a number of researches for residential satisfaction have been fulfilled along with continuous construction of public rental housing, but the researches haven’t been reflected in the policy (Lee, Shim, and Lee 2012). The previous researches of residential satisfaction mainly focused on correlations between physical factors (housing itself or housing environment) and residential satisfaction, or comparative analyses

between public housing for sale and rental housing, or long-term rental and short-term rental. Moreover, most of previous studies had a limitation to collect data with conducting a survey in limited areas such as a specific city, not a whole country.

Meanwhile, the Korea Land and Housing Corporation (LH) has provided about 75% of long-term rental housing to people as a representative public enterprise which executes land and housing policies on behalf of the Korean government (LH 2015). The LH has carried out residential satisfaction surveys for residents of long-term public rental housing annually in the late 2000s. It is a nationwide survey and consists of questions about housing products, rental services, residential environments, and so on. The survey results haven't been facilitated easily, since only descriptive analyses have been released. Nevertheless, Lee, Shim, and Lee (2012) performed a study on determinants of residential satisfaction for National Rental Housing residents with year 2010's data. But the research also has a limitation since missing out rental service factors.

The objective of this study is to investigate the residential satisfaction of those who live in long-term public rental housing in Korea, especially National rental housing. Through literature reviews and previous studies of determinants for residential satisfaction, the paper classifies determinants of residential satisfaction into five categories such as product physical factor, residential environment factor, operating service factor, repair service factor and economic factor, and establishes a hypothetical model for a relationship between the factors and residential satisfaction. For this analysis, this study facilitates "A residential satisfaction survey of National rental housing residents" which LH carried out in 2014.

Based on the objective of the study, several research questions emerge as follows;

(1) Does product physical factor influence residential satisfaction of long-term public rental housing?

(2) Does residential environment factor influence residential satisfaction of long-term

public rental housing?

(3) Does operating service factor influence residential satisfaction of long-term public rental housing?

(4) Does repair service factor influence residential satisfaction of long-term public rental housing?

(5) Does economic factor influence residential satisfaction of long-term public rental housing?

(6) Does personal factor influence residential satisfaction of long-term public rental housing?

II. Literature Review

2.1 Determinants of Residential Satisfaction

2.1.1 General Studies of Residential Satisfaction

Residential satisfaction is a broad concept, and is associated with multidimensional aspects including physical, social, and neighborhood factors, as well as psychological and socio-demographic characteristics of the residents (Balestra and Sultan 2013). Housing physical and neighborhood factors have been mainly researched among various factors, and Onibokun (1974) noted that the concept of satisfactory housing conditions is related not only to the physical, architectural and engineering components of house, but also to the components of the surrounding environment. Furthermore, Francescato, Weidemann, and Anderson (1987) expanded the concept of determinants to influence residential satisfaction, and they contended that satisfaction depends on three elements which are the design including its space organization, layout and facilities provided, the management practices, and the surrounding social aspects.

In many countries, a lot of researches and assessments for residential satisfaction

have been carried out. The studies built their own variables through previous researches, and most of them set the independent variables including housing (or dwelling) physical factors, neighborhood (or environment) factors and socio-demographic factors, and sometimes service factors were added. In the study with the data of American Housing Survey, Lu (1999) set explanatory variables including housing, neighborhood, and location conditions as well as individual and household attributes and surveyed housing satisfaction and neighborhood satisfaction respectively to find determinants of residential satisfaction. Balestra and Sultan (2013) studied on the link between households' residential satisfaction and a number of variables related to individuals, the households to which they belong, and the characteristics of the dwelling and neighborhood where they live. According to Balestra and Sultan (2013), residential satisfaction in European countries is significantly influenced by four factors: tenure, specific dwelling features, the financial burden of housing costs, and the perceived level of crime in the neighborhood. Meanwhile, housing affordability and neighborhood characteristics (i.e. beauty setting, access to public transports and the feeling of security) have a main effect on residential satisfaction in OECD countries (Balestra and Sultan 2013).

In Korea, many researchers have studied on determinants of residential satisfaction. However, because of difficulties to collect survey data, most of previous studies generally were limited in specific regions or cities. Kim and Lee (2007) analyzed determinants of residential satisfaction by surveying in Gyeonggi province, Korea, and this study classified independent variables to five categories: housing factors, neighborhood factors, accessibility factors (to public transportation and work place), community management factors (e.g. crime, safety and cleanliness), and financial factors (maintenance costs and investment value). According to Kim and Lee (2007), the most influential factors on residential satisfaction in Gyeonggi province were surrounding area's management, housing size, housing facilities, investment value and educational condition in order. Im (2015) conducted the study on the

gap in satisfaction and factors to influence the satisfaction by region with the data of 2013 Social Indicators Survey of Chungnam province, Korea. In the conclusion of the study, Im (2015) described that residential satisfaction is higher in rural areas than in urban areas, and factors related with medical facilities and trust/interchanges among residents have a greater effect on residential satisfaction than factors related with housing, safety, and education.

Previous researches on determinants of residential satisfaction focus on not only overall factors but also particular factors according to their purposes. Kim, Jeong, and Kim (2014) tried to identify the effect of resident's participation such as information exchange on residential satisfaction in Seoul, Korea. For this study, Kim, Jeong, and Kim (2014) conceptually divided resident's participation into three categories: communication, neighborhood harmony, and consideration. Jang and Je (2005) analyzed the relationship between previous housing experience and present residential satisfaction. In terms of independent variables, the study built previous experience factors such as changes of housing size, housing type and ownership as well as housing physical factors and demographic factors (Jang and Je 2005), interestingly the factors were handled as objective attributes, not subjective ones.

2.1.2 Residential Satisfaction of Public Housing

Birks and Southan (1992) argued that tenants of public housing may have little competitive choice and nowhere to take their monies if they are dissatisfied. And the lack of options may lead to reduced expectations and high satisfaction levels when surveyed (Varady and Carrozza, 2000). Lu (1999), in his research, stated that public housing residents were found to be more likely to feel satisfied with their housing than non-public housing residents, though living in public housing was found to yield lower neighborhood satisfaction than living in non-public housing. According to Varady and Carrozza (2000), tenant satisfaction

encompasses four distinct types of satisfaction; (1) satisfaction with the dwelling unit; (2) satisfaction with the services provided, including repair service; (3) satisfaction with the whole package received for the rent paid which includes the dwelling and service; and (4) satisfaction with the neighborhood or area.

Residential satisfaction in public housing has been frequently researched for searching important factors to increase satisfaction and life quality from the policy maker's point of view. Mohit, Ibrahim, and Rashid (2010) provided an assessment of residential satisfaction of newly designed public low-cost housing dwellers of Kuala Lumpur, Malaysia, with forty-five variables grouped into five components: dwelling unit features, dwelling unit support services, public facilities, social environment and neighborhood facilities. Improving the management of security control, perimeter roads, the cleanliness of garbage house and garbage collection enhanced residential satisfaction in public low-cost housing (Mohit, Ibrahim, and Rashid 2010).

Lim, Han, and Choe (2011) researched factors to affect life quality of tenants in Permanent Rental Housing which provides to the lowest-income group, classifying independent variables into seven categories: residential environment, economic situation, relationship with neighbors, health, cultural and leisure activities, community spirit, and permanent rental housing policy. Lee, Shim, and Lee (2012) studied the determinants of residential satisfaction for National Rental Housing residents with the data which the LH surveyed nationally in 2010. The study classified determinants into five factors: internal structure, quality of the interior material, supporting facilities of complex, local amenities, and housing expenses, and compared the determinants by the categorized region (Lee, Shim, and Lee 2012), however the study didn't deal with factors related to operating or managing services. Kim and Park (2012), in their study on the determinants of residential satisfaction in public rental housing, built the model with seven factors: unit housing factor, housing

environment factor, housing management factor, neighborhood factor, safety factor, psychological satisfaction factor, economic factor, and personal factor. Kim and Park (2012) highlighted not only physical features but also social and psychological features. According to the conclusion of the study, unit housing, economic, housing environment, and management factors highly influenced residential satisfaction in order, and personal factor on the tenants had no correlation with residential satisfaction (Kim and Park 2012).

Meanwhile, it's also active to study comparative analyses between public housing for sale and rental housing, or long-term rental and short-term rental. Kim, Yoo, and Shin (2010) analyzed residential satisfaction depending on public housing types such as public rental housing, sales housing after five years of initial lease, and pre-sales housing, and the study showed that comparing with other groups, residents in public rental housing prefer community-oriented facilities due to eligibility standards such as age and limitation on car ownership. Kwon and Ko (2010) conducted a comparative analysis on residential satisfaction of the public rental housing for lowest-income households, which includes national rental housing and multi-family rental housing. The two types of public rental housing are divided by structural shapes of housing. Specifically national rental housing is a type of apartment, whereas multi-family rental housing is a type of semidetached cottage. According to the study of Kwon and Ko (2010), residents in national rental housing had highest satisfaction in maintenance and management, economic factors had highest satisfaction in multi-family rental housing. Kwon and Kim (2012), in their comparative analysis, showed that residential satisfaction of National Sales Housing was a relatively lower level than one of National Rental Housing, and housing physical factor, community environment factor and housing administrative office work factor had statistically significant impacts on residential satisfaction. Lim, Ji, Yoon, and Lee (2013) analyzed residential conditions of rental housing in the aspect of residential decision factors and housing satisfaction by rental housing types, by

surveying residents in short-term rental housing, middle-term rental housing and Permanent Rental Housing. The study divided residential decision factors into four groups: locations factors, housing factors, outdoor environment factors and socio-economic factors, and the result showed that socio-economic factors had the highest impact on residential satisfaction and residents in Permanent Rental Housing had relatively high satisfaction in park and landscape facilities (Lim, Ji, Yoon, and Lee 2013).

2.2 The Long-term Public Rental Housing System in South Korea

According to Special Act on Public Housing in South Korea (http://www.law.go.kr), public housing means housing that public entities supply with the support of the government subsidy or the National Housing Fund, and it is divided by its purpose into housing for rent and housing for sale. The public entities can construct new housing complexes, purchase existing housing units, or lease existing ones to raise public housing stocks. Enforcement Decree of the Special Act on Public Housing defines types of public rental housing specifically. Based on characteristics such as a rental period and a target group, public rental housing is classified into Permanent Rental Housing, National Rental Housing, Happiness Housing, Deposit-based Rental Housing, Buy-to-rent Housing, and Sub-leasing Deposit-based Rental Housing. And the long-term public rental housing generally means housing, which is leased at least ten consecutive years by public operators.

2.2.1 History of Public Rental Housing in South Korea

In the end of 1980s, the shortage of housing was serious-the ratio of housing supply was around 70%-and housing market was very unstable due to chronic real estate speculation and soaring housing price (Kim, Jin, Choi, Ha, and Choi 2007). In 1989, the new government launched “Five-year two million housing unit construction plan” and planned supplying 250

thousand units of Permanent Rental Housing for the lowest-income group in the name of social welfare (Ministry of Land, Transport and Maritime Affairs (MLTMA) 2008). After constructing 190 thousand units of housing in 1993, the plan has been terminated until resuming the permanent housing construction policy in 2008.

From 1994 to 2000s, 5-year Public Rental Housing had been mainly constructed by private sectors, and 50-year Public Rental Housing was partially supplied to tenants in redeveloped areas for their migration by the development. The 50-year Public Rental Housing was completely finished in 1997 after constructing 100 thousand units (MLTMA 2008). In 1998, government planed the policy of housing provision depending on income brackets, and announced “One million of National Rental Housing unit construction plan”. After 2000s, government additionally has implemented various types of public rental housing such as 10-year Public Rental Housing and purchased Multifamily Rental Housing (Buy-to-rent Housing) based on income bracket (Kim, Jin, Choi, Ha, and Choi 2007).

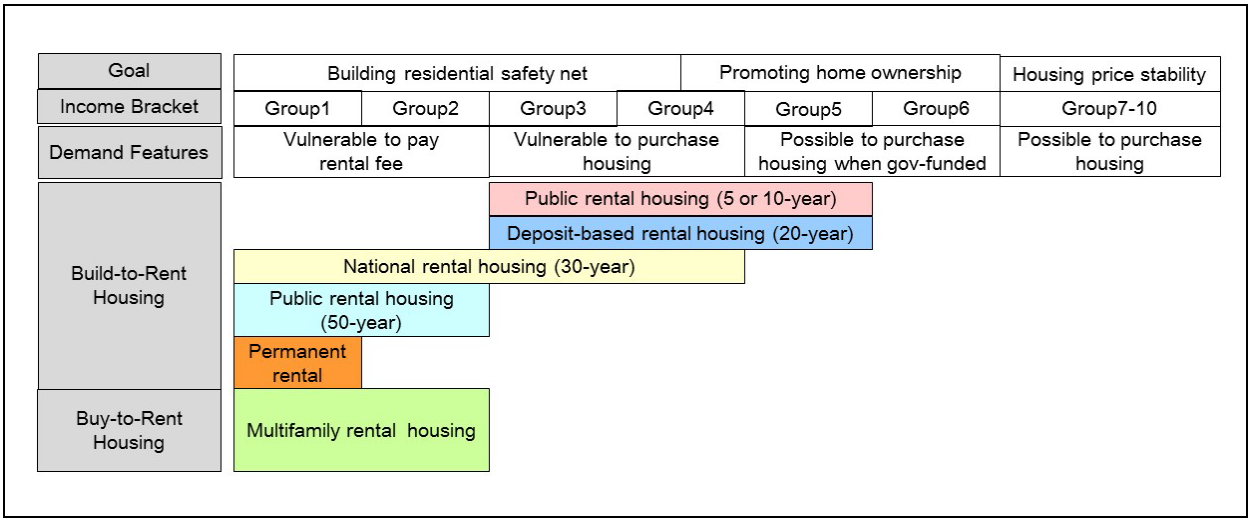
Meanwhile, in 2013the current government started to implement Happiness Housing, which is the public rental housing targeting at young people, especially focusing on college students, the newlyweds and rookies in a career. According to the press release by Ministry of Land, Infrastructure and Transport on Dec. 3rd, 2013, 140 thousand units of Happiness Housing would be provided by public rental business operators from 2013 to 2017.

2.2.2 System of Public Rental Housing in South Korea

After 1998, the Korean government has conducted the public rental housing policy based on income brackets which were divided into 10 groups, as Figure1 shows. Among ten income groups, group1 is characterized as households vulnerable to pay rent and provided with Permanent Rental Housing primarily. In addition, Multifamily Rental Housing, 50-year Public Rental Housing and small units of National Rental Housing are supported for them.The

second income group is also vulnerable to pay rent. They can get public housing services equal to Group1 except Permanent Rental Housing. The rental fee of Permanent Rental Housing is around 30% of market price in surrounding areas and the housing is commonly leased to beneficiaries of National Basic Livelihood, which is a sort of a supplementary benefit. The rental fee of Multifamily Rental Housing also is low at about 30 to 40% of surrounding rental price and tenants in Multifamily Rental Housing can live for 20 years at most. Another type of public rent is sub-leasing housing that rental operators sublease to low-income people after leasing deposit-based housing.

Figure 1. Public Rental Housing Depending on Income Brackets



Source : Adapted from LH's internal data and 2008 Rental Housing Manual

* 50-year Public Rental Housing was partially provided to tenants who needed to migrate from redevelopment areas.

* Happiness Housing is targeting not low-income households but the youth and the newlyweds andit covers up to group 5 in income brackets.

* 2016 Household Income by Decile (1,000 Korean Won (KRW))

Decile	Income before taxes	Income range	* Data on whole households with more than two-members - Average income: 4,373 - Average household members: 2.64 * Three-member households - Median income: 3,579 - 50% of median income: 1,790 * City-Worker households with three members - Average income: 4,817 - 70% of average income: 3,372 - 50% of average income: 2,408
Bottom	1,071	~ 1,532	
2nd	1,992	1,532 ~ 2,327	
3rd	2,662	2,327 ~ 2,938	
4th	3,215	2,938 ~ 3,479	
5th	3,743	3,479 ~ 4,004	
6th	4,264	4,004 ~ 4,556	
7th	4,848	4,556 ~ 5,204	
8th	5,561	5,204 ~ 6,093	
9th	6,625	6,093 ~ 8,181	
Top	9,737	8,181 ~	

Source : KOSIS (Korean Statistical Information Service,http://kosis.kr/)- Household survey data by decile

Income group3 andgroup4 can be provided with National Rental Housing which is constructed by the LH or local governments. The rental fee of National RentalHousing is at 60-80% level of surrounding market price and recipients of the housing can live maximally for 30 years. Now National Rental Housing became a typical type of public rental housing for low-income people. According to Table 1, the stock of National Rental Housing is 471 thousand units as of December 2015, and it accounts for44% of whole public rental housing stock.

Furthermore, government provides 5-years or 10-years Public Rental Housing and Deposit-based Rental Housing to income group2 to group5, and the housing's rental fee is about 80% of surrounding market price. These income groups are not the lowest income brackets, but still vulnerable to purchase housing. 5-year or 10-year Public Rental Housing is converted into housing for sale with a low price after the designated rental period, thus government can give low-income people better opportunities to purchase housing cheaply.

Table 1. Characteristics and Stock of Public Rental Housing (As of Dec. 2015)

Types/Operators	Start (year)	Rental Period (year)	Target Group	Sum of Units	Operators		
					LH	Local Govern -ments	Private Sectors
			69,484	1,082,937 (100%)	739,632 (68%)	210,561 (20%)	132,744 (12%)
Permanent Rental Housing	1989	Perm. (50)	Beneficiary of National Basic Livelihood[a]	195,699 (18%)	144,227	51,472	0
50-year Public Rental Housing[b]	1993	50	Very low income group (Group1-2)	108,140 (10%)	28,356	79,784	0
5-year Public Rental Housing	1993	5	Low or middle income group (Group3-5)	71,899 (7%)	4,128	4,511	63,260
National Rental Housing	1998	30	Low income group (Group1-4)	471,110 (44%)	441,525	29,585	0
10-year Public Rental Housing	2003	10	Low or middle income group (Group3-5)	127,605 (12%)	54,220	3,901	69,484
Multifamily Rental Housing	2004	20	Very low income group (Group1-2)	82,298 (8%)	66,132	16,166	0

Deposit-based Rental Housing	2007	20	Low or middle income group (Group3-5)	25,339 (2%)	1,004	24,335	0
Happiness Housing	2013	6 (youth) 20 (other)	The youth (below income Group5)	847 (0.1%)	40	807	0

Source : Adapted from LH's internal data and related statutes,
and KOSIS (http://kosis.kr/)- Rental housing stock (2015)

* Data exclude Rental Housing for Employees (21,881), Sub-leasing Deposit-based Rental Housing (142,070),Private Rental Housing (680,224), and large-size units (over 85m^2) of public rental housing (10,573)

a. The lowest-income group who are granted public assistance, National Basic Livelihood.

b. New construction of 50-year Public Rental Housing policy was terminated in 1997.

c. Residents in Deposit-based Rental Housing don't actually pay monthly rent but pay a deposit of 80%-level.

d. Rent of Happiness Housing is imposed differently depending on the recipient's income.

III. Theoretical Background

3.1 Consumer Satisfaction

3.1.1 Definitions of Consumer Satisfaction

Consumer satisfaction has been researched significantly in the domain of business marketing, and many diverse definitions of consumer satisfaction have developed. Though the lack of explicit definitions of consumer satisfaction would result in problems on developing valid measures and interpreting empirical results (Giese and Cote 2000), it's hard to find a formal consensus for the concept of satisfaction. Oliver (1997) offered a formal definition of consumer satisfaction based on his theoretical and empirical research. According to Oliver(1997), satisfaction is the consumer's fulfillment response, and it is a judgment that a product or service feature, or the product or service itself, provided (or is providing) a pleasurable level of consumption-related fulfillment, including levels of under- or overfulfillment.

Yi (1990) classified the previous definitions for consumer satisfaction into two types according to emphasizing consumer satisfaction either as an outcome or as a process. Yi (1990) describes that some definitions focus on an outcome resulting from the consumption experience. According to Westbrook and Reilly(1983),consumer satisfaction is defined as an emotional response to the experiences provided by, associated with particular products or

services purchased, retail outlets, or even molar patterns of behavior such as shopping and buyer behavior, as well as the overall market place. On the other hand, Tse and Wilton (1988) stated that consumer satisfaction is the consumer's response to the evaluation of the perceived discrepancy between prior expectations and the actual performance of the product. This is considered as the concept which underlines an evaluative process.

3.1.2 Methods of Measuring Consumer Satisfaction

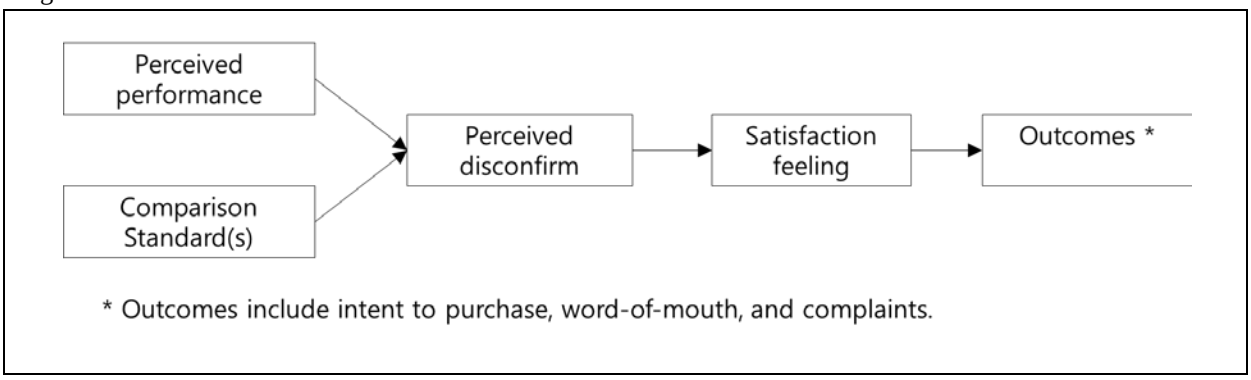
Consumer satisfaction has been measured by direct or indirect methods. Direct survey methods are the most widely used way to measure consumer satisfaction. They make it possible to investigate consumer response unequivocally, but they include problems such as selection bias, interviewer bias, and non-responses bias to influence the validity of the survey data. Indirect methods used to carry by collecting and analyzing data on consumer complaints and repeat purchases which are closely related with satisfaction. But indirect methods are ambiguous and unclear for measuring satisfaction, since repeat purchasescan be affected by other factors such as promotions and brand loyalty. Yi (1990) addressed that the two types of methods have different advantages and can be applied depending on the purpose of the study. For example, direct survey methods might be suitable for the research of satisfactionprocesses, and on the other hand, indirect methods might be effective means for monitoring product satisfaction and public policies.

3.1.3 Theories of Consumer Satisfaction

Yi (1990) described that expectation (or some other comparison standards) and confirmation/disconfirmation has consistently been found to be important variables to affect evaluation of product performance. Expectation influences perceptions of product performance. Consumers perceive several different levels of performance, though the

objective performance has actually one level. Therefore, confirmation and disconfirmation appear by the disparity between expectations and performances and it affects consumer satisfaction. Hom (2000) accounted for the traditional macro-model of customer satisfaction based on an analysis of the past research for customer satisfaction. As Figure 2 shows, customers perceive disconfirmation between perceived performance and comparison standards (or expectation) and the disconfirmation influences satisfaction feeling.

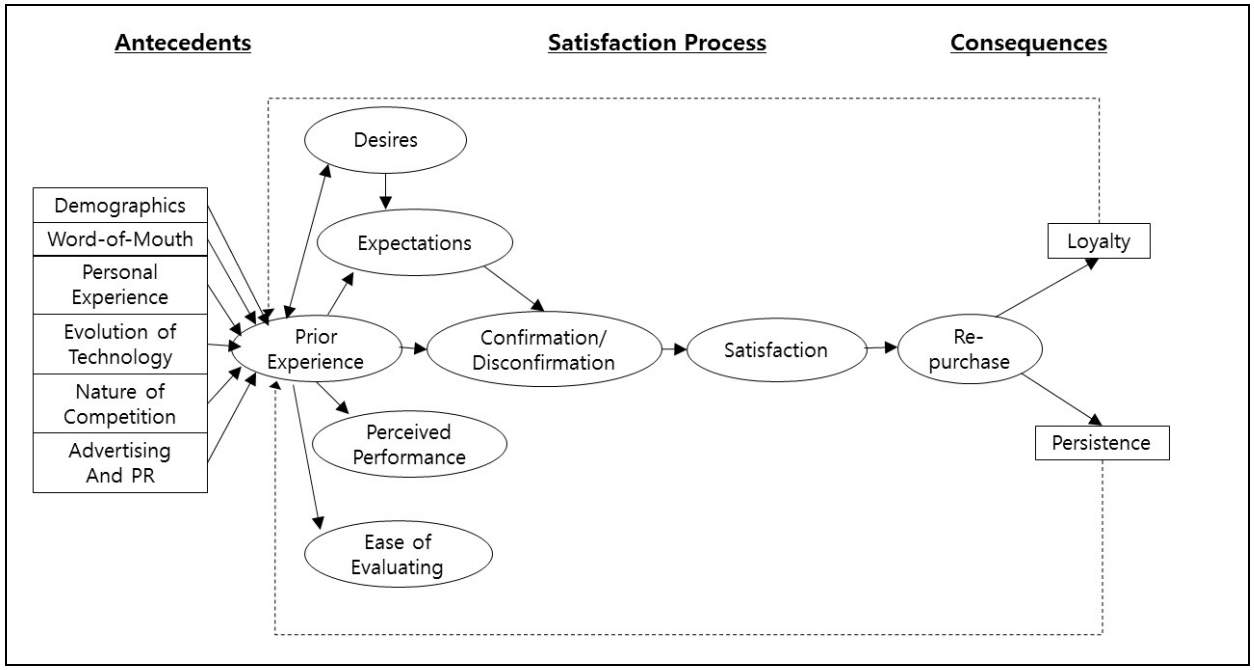
Figure 2. Traditional Macro-Model of Customer Satisfaction



Source : Hom (2000)

Oliver (1980) established a process to describe how satisfaction is produced in the expectation-disconfirmation framework. According to Oliver (1980), prior to purchase, consumers make expectations of the product or service and consumers perceive the product quality through consumption. Oliver (1980) described that the perceived quality either positively confirms expectations or negatively disconfirms them. Figure 3 shows Oliver's models. In this model, expectation and confirmation (or disconfirmation) is foundations for satisfaction.

Figure 3. A Model of Consumer Satisfaction



Source : Oliver (1980)

The discrepancy between expectation and performance (or outcome) has been an essential point of satisfaction researches. A number of satisfaction theories have attempted to explain the relationship between perceived disconfirmation (or confirmation) and dissatisfaction (or satisfaction) (Clinton and Wellington 2013). The assimilation-contrast theory maintains that there are latitudes of acceptance and rejection in one's perceptions (Sherif and Hovland 1961). According to Yi (1990), if the disparity between expectation and performance is small enough to fall into the consumers' latitude of acceptance, one will tend to assimilate the product rating toward one's expectations. Meanwhile, if the discrepancy between expectations and performance is so large as to fall into the zone of rejection, then a contrast effect occurs and the consumer magnifies the perceived disparity (Anderson 1973).

Another theory of satisfaction is dissonance theory. As originally described by Festinger, dissonance is a psychologically uncomfortable tension state (Festinger 1957). The theory states the dissonant or inconsistent states may exist and are a source of psychological tension to the person perceiving them. This tension will lead to efforts to reduce dissonance and restore consistency. Mechanisms to reduce dissonance include changes in behavior or

attitudes, or selective distortion of perceptions (Festinger 1957).The existence of dissonance should produce pressures for its reduction, which could be accomplished by adjusting the perceived disparity between expectation and reward (Cardozo 1965).Cardozo (1965) studied when customers expend little effort to obtain a product, those who receive a product less valuable than they expected will rate that product lower than will those who expected to receive, and do receive, the same product.

3.2 Residential Satisfaction

3.2.1 Conceptual Approaches of Residential Satisfaction

According to Weidemann and Anderson (1985), the research relating to residential satisfaction may be grouped into two different categories. The first is studies of residential satisfaction as a criterion of evaluation of residential quality, and another is a research into residential mobility as a predictor of behavior of residents. Adriaanse (2007) also stated two approaches for residential satisfaction. According to his research, some of the previous studies consider residential satisfaction as a predictor of behavior such as moving house or home improvement, and this approach assumes that any incongruence between the set of needs and aspirations and the current residential status can be alleviated either by moving or making adjustments to the current unit or location. Another approach which Adriaanse (2007) explains uses residential satisfaction as a criterion of residential quality. To determine the degree that a person is satisfied with one's residential environment, researchers investigate factors which influence the satisfaction levels such as length of residence, tenure status, the physical characteristics of house and neighborhood, social bonds, and the socio-demographic characteristics of residents (Galster and Hesser 1981).

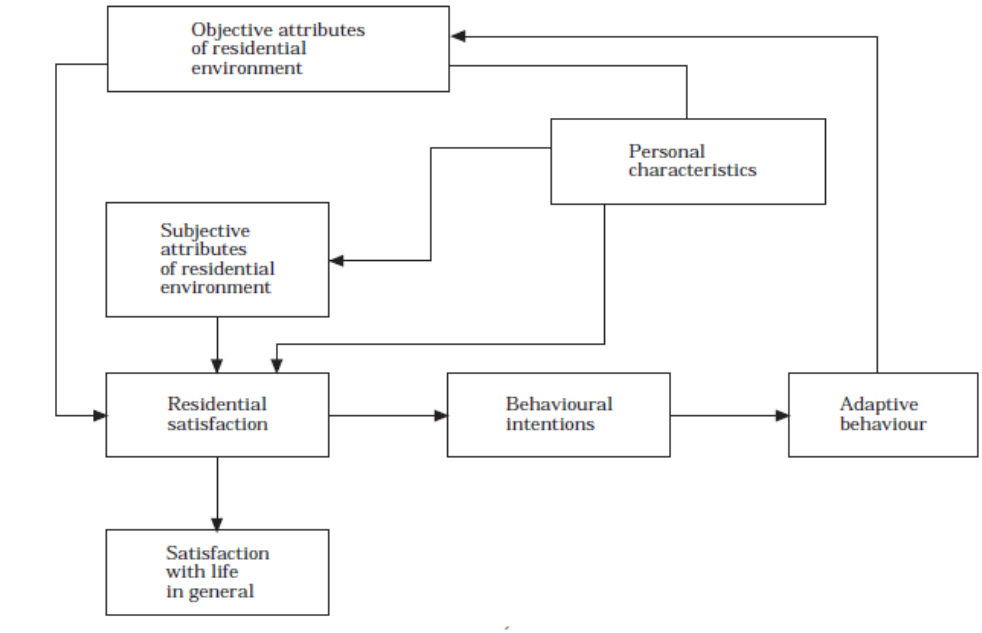
As residential satisfaction has been researched in a variety of academic fields from marketing to urban planning, its definitions also are diverse, but most of the definitions have

the behavioral approach in common. Mesch and Manor (1998) define satisfaction as the evaluation by respondents of features of the physical and social environment. Canter and Rees (1982) define residential satisfaction as a reflection of the degree to which the inhabitants feel their housing is helping them reach their goals. Galster (1987) explains that residential satisfaction represents the difference between households' actual and desired/aspired housing and neighborhood situation. In addition, Francescato, Weidemann, and Anderson (1989) developed a more comprehensive approach to residential satisfaction. They noted that the construct of residential satisfaction can be conceived as a complex, multidimensional, global appraisal combining cognitive, affective, and cognitive facets, thus fulfilling the criteria for defining it as an "attitude". Thus the researchers have paid attention to subjective responses such as expectations and attitudes of residents.

3.2.2 Models of Residential Satisfaction

Amerigo (1997) provided a conceptual framework in which to examine the way the individual interacts with his/her residential environment. As Figure 4 shows, Amerigo (1997) describes that the objective attributes of the residential environment, once they have been evaluated by the individual, become subjective, giving rise to a certain degree of satisfaction. Thus the subjective attributes are influenced by what are termed "personal characteristics" in the Figure 4 (Amerigo 1997). Balestra and Sultan (2013) also state the importance of combining objective indicators related to housing and neighborhood where people live with households' subjective evaluations of residential attributes. According to Balestra and Sultan (2013), objective measures refer to the presence or lack of attributes, while subjective measures refer to the perceptions, feelings and attitudes towards the attributes of housing and neighborhood.

Figure 4. A Conceptual Model of Residential Satisfaction

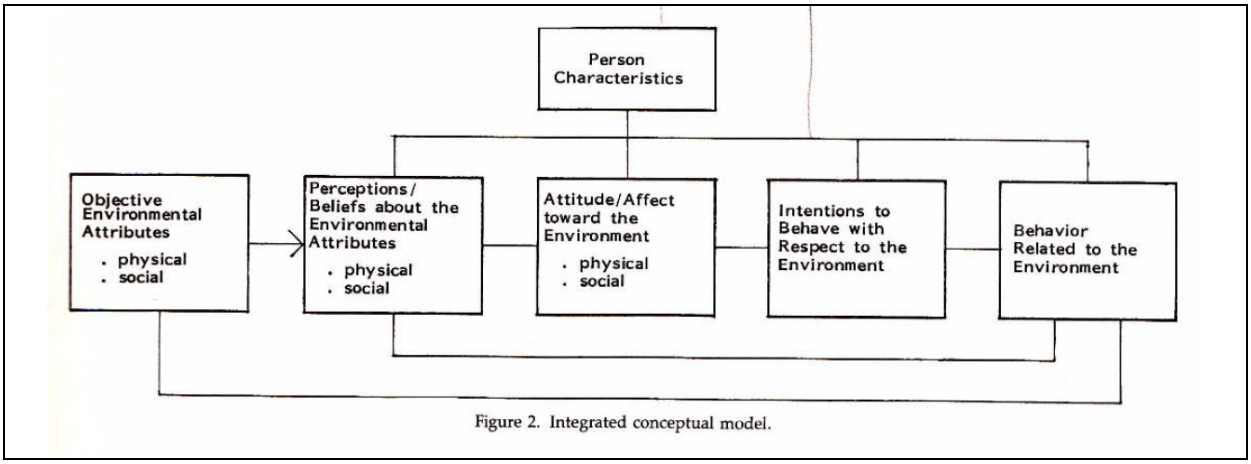


A systemic model of residential satisfaction. From Amerigo (1990, 1992*a*).

Source : Amerigo and Aragonest (1997)

Weidemann and Anderson (1985) presented diverse conceptual models of residential satisfaction. Among them, a basic conceptual model is similar to the conceptual model which shows in Figure 5. This framework explicitly recognizes the physical environment, by indicating that objective attributes of particular environment have an influence upon a person's satisfaction through the person's perceptions and assessments of those environmental attributes (Weidemann and Anderson 1985). Comparing with the basic model with directly causal linkages between different components, Weidemann and Anderson (1985) suggested an integrated conceptual model which is more complex and reciprocal than previous ones. As Figure 5 shows, any variable can influence any other variable, therefore, the integrated model has lines (rather than arrows) linking the various components (Weidemann and Anderson 1985).

Figure 5. An Integrated Conceptual Model of Residential Satisfaction



Source : Weidemann and Anderson (1985)

IV. Hypotheses Development

4.1 Effects of Factors on Satisfaction

Previous researches hypothesized about factors and determinants to affect residential satisfaction according to their research objectives and targets. The studies concerning general residential satisfaction dealt with housing (or dwelling) physical attributes, environment (or neighborhood) attributes, social attributes, and demographic attributes. When the range for investigation was narrowed down to public housing or rental housing, variables relevant to operatingand maintenance services were added to determinants. This study aims to investigate determinants to influence residential satisfaction in National Rental Housing, a typical type of long-term public rental housing in Korea. Based on literature reviews and previous studies, this paper creates six factors for residential satisfaction including product physical factor, residential environment factor, operating service factor, repair service factor, economic factor, and personal factor.

And this study establishes five factors except the personal factor as subjective values, not objective ones. Specifically, variables to construct some factors can be measured objective values such as a size of housing, a number of rooms, a distance of amenity facilities from

housing and service processing days. But in this study, all variables of five factors excluding personal characteristics are measured as a satisfaction degree which residents feel about individual variables of factors. It reflects the conceptual models of residential satisfaction that objective attributes change to subjective ones by personal characteristics and the subjective perception of housing performances influences resident's satisfaction (Amerigo and Aragonest 1997, Weidemann and Anderson 1985).

The six factors to affect residential satisfaction are classified into design and planning, services, economic matter and personal attributes. First, product physical factor means resident's satisfaction with housing product itself. Variables to construct the product physical factor consist of housing unit plan, exterior plan, interior material or facility, exterior material or facility, and housing unit construction quality. And the five variables are comprised of detailed variables respectively. Specifically the housing unit plan is explained by a unit size and the number of rooms, and the second variable of exterior plan covers parking lot, green space and residents' community space. The variable of interior material or facility includes satisfaction with wallpaper, flooring, kitchen, door, closet, bath and toilet, lighting, communication equipment, interior finishing material. The detailed variables of exterior material or facility are elevator, playground, rest area, ground, exterior material, and pavement. And the final variable, housing unit construction quality, represents satisfaction with construction quality of interior wall and floor, waterproof, door and furniture, bathroom, electrical installation, heating facility and insulation, exterior space, entrance and balcony, and plumbing.

The second factor on residential satisfaction is residential environment factor, which means resident's satisfaction with inside and outside environments of housing complex. It is organized with three variables which are community environment, internal environment, and neighborhood. Firstly the community environment describes living environment of the area

around the housing complex, and it includes eight variables such as green space, natural environment, public transportation use, amenities, education, cleanliness, proximity to cultural facilities or park, and proximity to social welfare facilities. The variable of internal environment means satisfaction with inside environment of housing, which is related to ventilation and lighting, heating, sound proofing, and water supply and drainage.

The third factor is operating service factor involved in leasing office's work processing. To be specific, it consists of five variables such as rapid work processing, courteous attitude, detailed explanation for a resident's inquiry, listening to resident's opinions, and impartial work processing. The five variables construct the operating service factor, and also they are measured as a level of perceived performance that residents experience in the process of housing operating service.

The fourth factor is repair service factor. It is measured by resident's satisfaction with maintenance service performance and repair construction. This factor includes three variables. And the three variables are punctuality in keeping appointment, courteous attitude, and repair work quality such as waste disposal and flawless finishing.

The fifth is economic factor, which means financial burdens that residents feel while living in the public rental housing. It is classified into two variables, and they are a rent level compared to market prices of surrounding areas and a level of maintenance fees. This factor also represents resident's satisfaction, not an objective indicator such as a rent to income ratio.

The final factor is personal factor that is a demographic factor. It shows resident's personal characteristics such as gender, age, household income, and the number of household members. This is the only factor constructed by objective data. Following Table 2 shows all factors and variables to influence residential satisfaction.

Table 2. Hypothesized Factors and Variables to Affect Residential Satisfaction

Factors	Variables (Detailed Variables)
Product Physical Factor (1)	(a) Housing unit plan (Unit size, Number of rooms), (b) Exterior plan(Parking lot, Green space, Residents' community space), (c) Interior material or facility(Wallpaper, Flooring, Kitchen, Door, Closet, Bath and toilet, Lighting, Communication equipment, Interior finishing material), (d) Exterior material or facility(Elevator, Playground, Rest area, Ground, Exterior material, Pavement), (e) Housing unit construction quality(Interior wall and floor, Waterproof, Door and furniture, Bathroom, Electrical installation, Heating facility and insulation, Exterior space, Entrance and balcony, Plumbing)
Residential Environment Factor (2)	(a) Community environment(Green space, Natural environment, Public transportation use, Amenities, Education, Cleanliness, Proximity to cultural facilities or park, Proximity to social welfare facilities), (b) Internal environment(Ventilation and lighting, Heating, Sound proofing, Water supply and drainage), (c) Neighborhood(Noise, Privacy protection, Graffiti and vandalism)
Operating Service Factor (3)	(a) Rapid work processing, (b) Courteous attitude, (c) Detailed explanation for a resident's inquiry, (d) Listening to resident's opinions, (e) Impartial work processing
Repair Service Factor (4)	(a) Punctuality in keeping appointment, (b) Courteous attitude, (c) Repair work quality(Waste disposal, Flawless finishing)
Economic Factor (5)	(a) Rent level compared to market prices of surrounding areas, (b) Maintenance fee
Personal Factor (6)	(a) Gender, (b) Age, (c) Household income, (d) Number of household members

4.2 Building Hypothesis Model

This study examines the effects of factors and variables on residential satisfaction of long-term public rental housing. So, residential satisfaction that residents feel synthetically while living in long-term public rental housing is a dependent variable. And six factors and variables to construct each factor become independent variables respectively. They are established by reducing dimension of detailed and basic variables with confirmatory factor

analysis. This study hypothesizes that each factor affects overall residential satisfaction as follows.

H1. Product physical factor affects residential satisfaction of long-term public rental housing.

H2. Residential environment factor affects residential satisfaction of long-term public rental housing.

H3. Operating service factor affects residential satisfaction of long-term public rental housing.

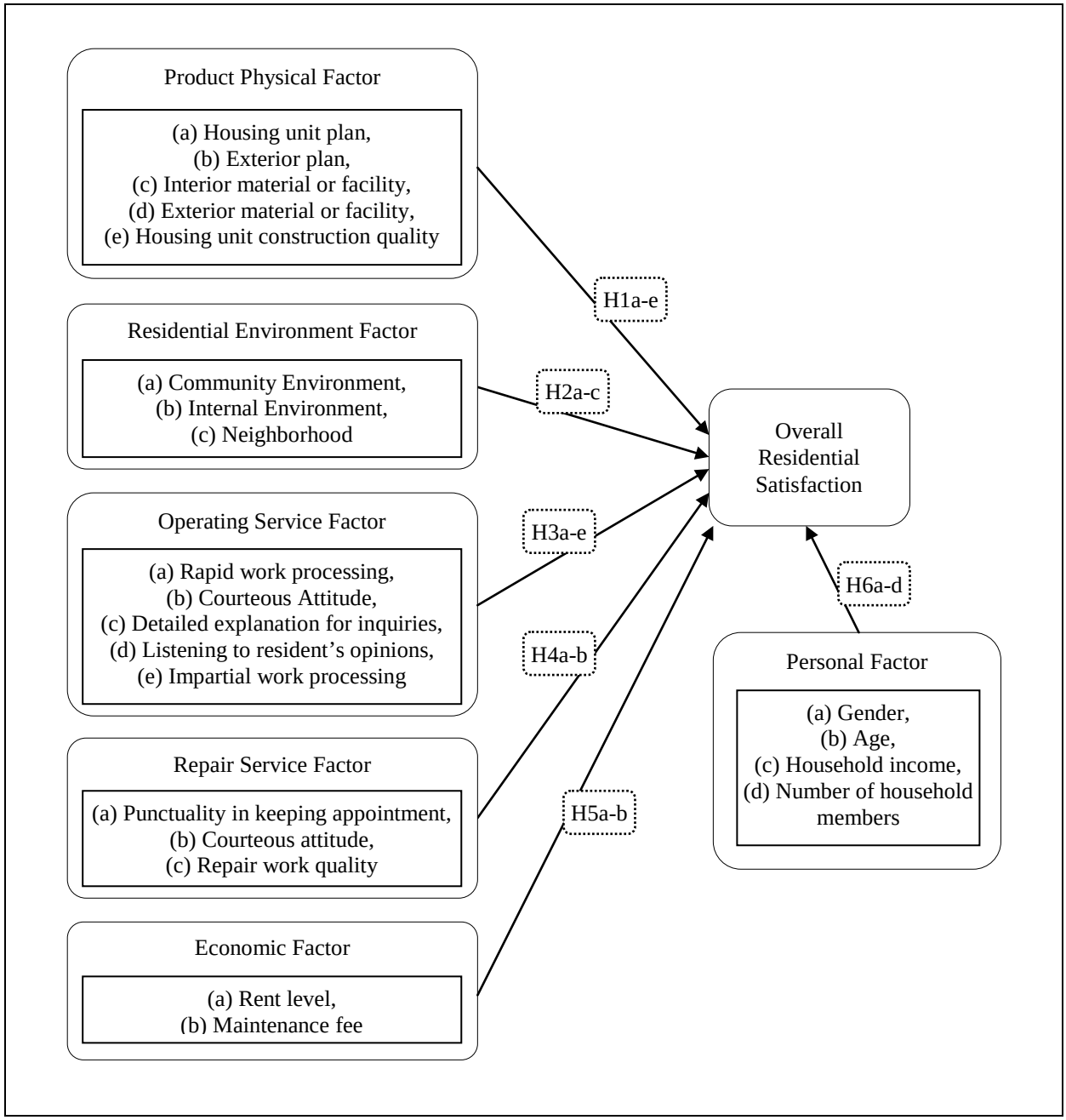
H4. Repair service factor affects residential satisfaction of long-term public rental housing.

H5. Economic factor affects residential satisfaction of long-term public rental housing.

H6. Personal factor affects residential satisfaction of long-term public rental housing.

Also, this study hypothesizes that each individual variable to construct six factors affects overall residential satisfaction of long-term public rental housing. The hypothetical model of residential satisfaction for this study is displayed as following Figure 6.

Figure 6. Hypothetical Model of Residential Satisfaction



V. Methodology

5.1 Data collection

The LH every year conducts a survey of residents in public rental housing newly supplied to figure out their residential satisfaction. The LH creates detailed survey items, and tries to find out each satisfaction with those items as well as overall residential satisfaction.

Based on the result of the survey, the LH comes up with proper measures to improve services and product qualities of public rental housing. And the results also are used as fundamental data to support the government's policy decision related to public rental housing. So, this study utilizes the database of "Residential satisfaction of residents in public rental housing" that the LH carried out a survey of residents in National Rental Housing throughout the country in 2014.

The survey about "Residential satisfaction of residents in public rental housing" was conducted from Nov. 11th to Dec. 20th in 2014. Trained interviewers collected data by visiting individual home which was selected all over the country with the quota sampling method. A total of 1000 respondents completed the survey. The survey developed questionnaire items to construct variables and determinants described on Table 2 above. And it also applied a seven-point Likert scale where 1 = strongly dissatisfaction and 7 = strongly satisfaction.

This study applied confirmatory factor analyses to check the validity of six factors and nine variables set by detailed variables. This study applied principal components analyses as the extraction method and Varimax rotation methods with Kaiser Normalization. This study conducted two group comparison analyses such as oneway ANOVA test and t-test. And this study also applied regression analyses. The results of regression analyses provide the impacts of major 6 factors and 22 variables on the dependent variable that is overall residential satisfaction.

5.2 Reliability Analysis

This study measured Cronbach's alpha for multi-item scales for each of the factors. Cronbach's alpha values were 0.97 for product physical factor, 0.92 for residential environment factor, 0.96 for operating service factor, and 0.94 for repair service factor.

Finally Cronbach's alpha value for economic factor was 0.94. Considering Cronbach's alpha values for factors (Table 2), all variables and factors are strongly acceptable for data analysis.

Table 3. Reliability Analysis of Factors to Affect Residential Satisfaction

Factors	Variables	n	Cronbach's Alpha
Product Physical Factor	Housing unit plan, Exterior plan, Interior material or facility, Exterior material or facility, Housing unit construction quality	29	0.97
Residential Environment Factor	Community environment, Internal environment, Neighborhood	15	0.92
Operating Service Factor	Rapid work processing, Courteous Attitude, Detailed explanation for inquiries, Listening to resident's opinions	5	0.96
Repair Service Factor	Punctuality in keeping appointment, Courteous attitude, Repair work quality	4	0.94
Economic Factor	Gender, Age, Household income, Number of Household members	2	0.94

VI. Data Analysis

6.1 Descriptive Analysis

Of the one thousand respondents, 68.2% were female and 31.8% were male, 1.9% were under 30 years old, 14.3% were 30-39 years old, 13.6% were 40-49 years old, 14.1%were in their 50s, and 56.1% were 60 years or older. In terms of the number of household members, 28.2% of respondents lived alone, 31.9% lived with one family member, 17.3% lived with two family members, 13.6% lived with three family members, and 9.0% lived with more than 4 members. In regard of income, 56.2% had monthly household incomes of less than 1.5 million KRW, 11.1% had monthly incomes between 1.5 million KRW and 2.0 million KRW, 15.2% had monthly incomes between 2.0 million KRW and 2.5 million KRW, 4.0% had monthly incomes between 2.5 million KRW and 3.0 million KRW, and 5.4% had monthly incomes above 3.0 million KRW. And 8.1% didn't respond the survey questions relevant to household income. Table 4 shows demographic attributes of whole one thousand

respondents.

Table 4. Demographic Attributes of Respondents

Attributes		Frequency	Percent	Mean of RS
Gender	Male	318	31.8%	5.06
	Female	682	68.2%	4.99
Age	under 30	19	1.9%	4.84
	30 – 39	143	14.3%	5.05
	40– 49	136	13.6%	5.46
	50– 59	141	14.1%	5.07
	Over60	561	56.1%	4.88
Household income	No response	81	8.1%	4.30
	under 1.5 m KRW	562	56.2%	4.98
	1.5–2 m KRW	111	11.1%	5.41
	2–2.5 m KRW	152	15.2%	5.10
	2.5–3 m KRW	40	4.0%	5.33
	over 3 m KRW	54	5.4%	5.09
Number of household members	1	282	28.2%	5.06
	2	319	31.9%	4.87
	3	173	17.3%	4.92
	4	136	13.6%	5.18
	5 or more	90	9.0%	4.88

* m KRW = million Korean Won
* RS = Residential Satisfaction

The mean of overall residential satisfaction was 5.01 out of 7 points and standard deviation (sd) was 1.48. In addition, the mean of respondent's ages was 60.64 (sd. 17.18), the mean of household monthly incomes was 1,211thousand KRW (sd. 882.4), and the average number of household members was 2.48 (sd. 1.39). Following Table 5 shows descriptive results.

Table 5. Description of a Dependent Variable and Personal factors

Variables	Mean	sd	n
A dependent variable Residential satisfaction	5.01	1.48	1000
Personal factors Age	60.46	17.48	1000

Household monthly income (k KRW)	1,211	882	919
Number of household members	2.48	1.39	1000

6.2 Hypotheses Testing

6.2.1 Factor Analysis

This study hypothesized 18 variables, and categorized them into five factors excluding personal factor. 5 variables to construct operating service factor, 2variablesto construct repair service factor, and another2variables to construct economic factor were independent variables in themselves. But the remaining 9 variables were explained by detailed variables respectively. To be specific, five variables for product physical factor, three for residential environment factor, and the variable of repair work quality to build repair service factor had detailed variables individually.

This study applied confirmatory factor analysis to reduce dimension of variables and to check the validity of the nine variables developed by each detailed variable. And this study also applied principal components analyses as the extraction method, and Kaiser-Meyer-Olkin (KMO) and Bartlett's Test to check the sampling adequacy. The results of factors analyses showed the distinct reduced variables with Eigen values greater than 1.00 as following Table 6. Specifically, 10 valid variables were extracted from 46 detailed variables. Eight hypothesized variables were verified valid ones, which are housing unit plan, exterior plan, interior material or facility, exterior material or facility, housing unit construction quality, internal environment, neighborhood, and repair work quality. Although two variables such as housing unit plan and repair work quality had the low KMO value (0.500), this study accepted the results to reduce the number of variables. Two variables such as amenity and green environment were newly extracted from eight detailed variables that constructed community environment. The amenity was developed by five detailed variables such as amenities, education, public transportation use, proximity to social welfare facilities, and proximity to

cultural facilities and parks. The green environment variable was constructed by three detailed variables such as green space, natural environment, and cleanliness. The newly-added independent variables were applied to the hypothetical model of residential satisfaction

Table 6. Valid Determinants Extracted from Detailed Variables

Hypothesized Variables	Detailed Variables	n	Verified Variables	KMO
(1-a) Housing unit plan	Unit size, Number of rooms	2	(1-a) Housing unit plan	0.500***
(1-b) Exterior plan	Parking lot, Green space, Residents' community space	3	(1-b) Exterior plan	0.734***
(1-c) Interior material or facility	Wallpaper, Flooring, Kitchen, Door, Closet, Bath and toilet, Communication equipment, Interior finishing material, Lighting	9	(1-c) Interior material or facility	0.959***
(1-d) Exterior material or facility	Elevator, Playground, Rest area, Ground, Exterior material, Pavement	6	(1-d) Exterior material or Facility	0.896***
(1-e) Housing unit construction quality	Interior wall and floor, Waterproof, Door and furniture, Bathroom, Electrical installation, Heating facility and insulation, Exterior space, Plumbing, Entrance and balcony	9	(1-e) Housing unit construction quality	0.956***
(2-a) Community environment	Amenities, Public transportation use, Proximity to social welfare Facilities, Education, Proximity to cultural facilities or park,	5	(2-a1) Amenity	0.863***
	Green space, Natural environment, Cleanliness	3	(2-a2) Green environment	
(2-b) Internal environment	Ventilation and lighting, Heating, Sound proofing, Water supply and drainage	4	(2-b) Internal environment	0.774***
(2-c) Neighborhood	Noise, Privacy protection, Graffiti and vandalism	3	(2-c) Neighborhood	0.753***
(4-c) Repair work quality	Waste disposal, Flawless finishing	2	(4-c) Repair work quality	0.500***

*** Significant at 0.01 level

This study hypothesized eighteen variables to construct the five major factors. As the results of factor analyses of each individual variable developed by detailed variables, nineteen valid variables emerged. This study conducted factor analysis of the whole nineteen valid variables again to check the validity of the five factors, using principal components analyses

as the extraction method and Varimax rotation methods with Kaiser Normalization. As the KMO value was 0.948 (sig. 0.000), the data was highly adequate. Table 7 summarizes the results of factor analyses.

The results of factor analyses show that three components were extracted from nineteen variables. Five variables of product physical factor and three variables of residential environment factor were categorized as the component 1, three variables of repair service factor and five variables of operating were categorized as the component 2, and two variables of economic factor and the amenity variable of residential environment factor were categorized as the component 3. The results are interpreted that the component 1 represents satisfaction factor relevant to design and environment, the component 2 represents service satisfaction, and the component 3 represents economic satisfaction.

Contrary to the five hypothesized factors, the results of factor analyses extracted three components by merging product physical factor and residential environment factor, and by combining operating service factor and repair service factor. Nevertheless, this study didn't remove the initial hypothesized five factors. This is because the initial five factors were regarded to be more suitable than the three extracted components to serve the objective of this study that is to investigate the effects of subdivided factors and variables on residential satisfaction.

And another difference between the initial hypothesized factors and the results of factor analyses is the variable relevant to amenity. The amenity variable was initially categorized as one of the variables to construct residential environment factor. But according to the result of factor analysis, the amenity variable was checked more tied to the component 3 that is economic satisfaction factor. The reason can be interpreted that attributes such as convenience of amenities and public transportation use, proximity to social welfare centers, education environment, and so on are related to living costs. So the amenity variable was

changed into one of variables to construct economic factor, and the hypothetical model of residential satisfaction was also modified.

Finally, this study conducted a factor analysis of variables related to personal attributes such as gender, age, household monthly income, and the number of household members. According to the result of the factor analysis, one component was extracted. But because the extraction sums of squared cumulative variance of the factor were 53.869%, this study determined to reject the extracted personal factor score. Thus only four variables of personal attributes were used to test the effects on residential satisfaction.

Table 7. Component Matrix of Residential Satisfaction Determinants

Hypothesized Factors	Variables	Component		
		1	2	3
(1) Product Physical Factor	(d) Exterior material or facility	0.777		
	(b) Exterior plan	0.768		
	(c) Interior material or facility	0.768		
	(e) Housing unit construction quality	0.740		
	(a) Housing unit plan	0.726		
(2) Residential Environment Factor	(a2) Greenenvironment	0.730		
	(b) Internal Environment	0.710		
	(c) Neighborhood	0.711		
(4) Repair Service Factor	(b) Courteous attitude		0.828	
	(a) Punctuality in keeping appointment		0.821	
	(c) Repair work quality		0.766	
(3) Operating Service Factor	(e) Impartial work processing		0.737	
	(c) Detailed explanation for inquiries		0.728	
	(b) Courteous Attitude		0.720	
	(d) Listening to resident’s opinions		0.712	
	(a) Rapid work processing		0.699	
(5) Economic Factor	(a) Rent level			0.890
	(b) Maintenance fee			0.884
(2) Residential Environment Factor	(a1) Amenity			0.545

6.2.2 Comparison Analysis

In terms of variables related to personal factor, this study hypothesized that gender affects residential satisfaction of long-term public rental housing (H6a). The gender data is collected as a nominal scale with two groups of male and female. So, this study applied two-group comparison analyses such as oneway ANOVA and independent sample's t-test to test the hypothesis (H6a). According to oneway ANOVA, the mean of residential satisfaction between two groups was statistically equal (F-value: 0.593, Sig.: 0.442, Table 8). And t-test also showed the mean was equal (Sig.: 0.442, Table 10). In conclusion, it rejected the alternative hypothesis (H6a) that the difference of gender affects residential satisfaction of long-term public rental housing.

Table 8. Oneway ANOVA Test of Gender

	Sum of Squares	df	Mean Square	F	Sig.
Between groups	1.304	1	1.304	0.593	0.442
Within groups	2196.596	998	2.201		
Total	2197.900	998			

Table 9. Independent Sample's T-Test of Gender

		T	df	Sig.(2-tailed)
Residential Satisfaction	Equal variances assumed	0.770	998	0.442
	Equal variances not assumed	0.767	613.649	0.443

6.2.3 Simple Regression Analysis

Simple regression analysis was used to test the various hypotheses that each factor and variable affects residential satisfaction of long-term public rental housing respectively. Table 10 provides the results of simple regression analyses for the effects of five factors and twenty-two variables, except the personal factor and the gender variable, on overall residential satisfaction individually. Overall, the results of simple regression analyses of each factor and variable had very low adjusted R square values except the economic factor and variables. This

is because of the characteristic of simple regression analysis to analyze one independent variable and another dependent variable. According to the results of simple regression analyses, five factors and twenty-one variables, except the variable of the number of household members, respectively affect overall residential satisfaction with significant level at 0.01.

First, product physical factor affected overall residential satisfaction (H1) with coefficient B (B) of 0.676 (adj R^2: 0.207, standardized coefficient *Beta* (*Beta*): 0.456, Significance (Sig.): 0.000). So, the hypothesis 1 was accepted. And also five variables under product physical factor were tested by simple regression analyses individually. Housing unit plan was checked to affect residential satisfaction (adj R^2: 0.082, B: 0.428, *Beta*: 0.289, Sig.: 0.000), exterior plan affected residential satisfaction (adj R^2: 0.148, B: 0.572, *Beta*: 0.385, Sig.: 0.000), interior material or facility affected residential satisfaction (adj R^2: 0.170 B: 0.611, *Beta*: 0.412, Sig.: 0.000), exterior material or facility affected residential satisfaction (adj R^2: 0.193, B: 0.653, *Beta*: 0.440, Sig.: 0.000), and housing unit construction quality also affected residential satisfaction (adj R^2: 0.188, B: 0.644, *Beta*: 0.434, Sig.: 0.000). Based on the results, the hypothesis 1a to 1e were all accepted. And the variable of exterior material or facility was checked to affect residential satisfaction most strongly among five variables under product physical factor.

Second, residential environment factor was checked to affect residential satisfaction (H2) (adj R^2: 0.190, B: 0.647, *Beta*: 0.437, Sig.: 0.000), so the hypothesis 2 was accepted. According to the results of simple regression analyses of three variables, green environment affected residential satisfaction (adj R^2: 0.120, B: 0.515, *Beta*: 0.347, Sig.: 0.000), internal environment affected residential satisfaction (adj R^2: 0.175, B: 0.622, *Beta*: 0.419, Sig.: 0.000), and finally neighborhood also affected residential satisfaction (adj R^2: 0.150, B: 0.577, *Beta*: 0.389, Sig.: 0.000). So the hypothesis 2a to 2c were all accepted.

Third, operating service factor was appeared to affect residential satisfaction (H3) (adj R^2: 0.204, B: 0.672, *Beta*: 0.453, Sig.: 0.000), so the hypothesis 3 was accepted. Based on the results of simple regression analyses of five variables to construct the operating service factor, rapid work processing affected residential satisfaction (adj R^2: 0.164, B: 0.486, *Beta*: 0.406, Sig.: 0.000), courteous attitude affected residential satisfaction (adj R^2: 0.187, B: 0.554, *Beta*: 0.433, Sig.: 0.000), detailed explanation for inquiries affected residential satisfaction (adj R^2: 0.186, B: 0.571, *Beta*: 0.432, Sig.: 0.000), and listening to resident's opinions affected residential satisfaction (adj R^2: 0.168, B: 0.508, *Beta*: 0.411, Sig.: 0.000). And finally impartial work processing also affected residential satisfaction (adj R^2: 0.176, B: 0.537, *Beta*: 0.421, Sig.: 0.000). So the hypothesis3a to 3e were all accepted.

Fourth, repair service factor was found to affect residential satisfaction (H4) (adj R^2: 0.181, B: 0.645, *Beta*: 0.426, Sig.: 0.000), so the hypothesis 4 was accepted. According to the results of simple regression analyses of each variable under repair service factor, punctuality in keeping appointment affected residential satisfaction (adj R^2: 0.137, B: 0.387, *Beta*: 0.372, Sig.: 0.000), courteous attitude affected residential satisfaction (adj R^2: 0.165, B: 0.457, *Beta*: 0.407, Sig.: 0.000), and repair work quality also affected residential satisfaction (adj R^2: 0.166, B: 0.619, *Beta*: 0.409, Sig.: 0.000). So the hypothesis 4a to 4c were all accepted.

Fifth, economic factor influenced residential satisfaction most strongly among five factors (adj R^2: 0.613, B: 0162, *Beta*: 0.783, Sig.: 0.000, and definitely the hypothesis 5 was accepted. The level of adj R2 (0.613) represented strong correlation between economic factor and residential satisfaction. In terms of three variables under economic factor, rent level affected residential satisfaction (adj R^2: 0.582, B: 0.718, *Beta*: 0.763, Sig.: 0.000), maintenance fee affected residential satisfaction (adj R^2: 0.622, B: 0.745, *Beta*: 0.789, Sig.: 0.000), and amenity affected residential satisfaction (adj R^2: 0.087, B: 0.439, *Beta*: 0.296, Sig.: 0.000). So the hypothesis 5a to 5c were all accepted.

Finally, three variables related to personal factor were tested by simple regression analyses. Age affected negatively the residential satisfaction (adj R^2: 0.009, B: -0.009 *Beta*: -0.101, Sig.: 0.001) and household income affected residential satisfaction (adj R^2: 0.006, B: 0.001, *Beta*: 0.085, Sig.: 0.010). The hypothesis 6b to 6c were accepted, but the effects were very slight. And the number of household members didn't affect residential satisfaction (adj R^2: 0.001, B: 0.047, *Beta*: 0.044, Sig.: 0.161), so the hypothesis 6d was rejected.

Table 10. Simple Regression Analyses of Each Variable (Coefficients)

Variables	adj R^2	B	*Beta*	Sig.
(H1) Product Physical Factor	**0.207**	**0.676**	**0.456**	**0.000**
(H1a) Housing unit plan	0.082	0.428	0.289	0.000
(H1b) Exterior plan	0.148	0.572	0.385	0.000
(H1c) Interior material or facility	0.170	0.611	0.412	0.000
(H1d) Exterior material or facility	0.193	0.653	0.440	0.000
(H1e) Housing unit construction quality	0.188	0.644	0.434	0.000
(H2) Residential Environment Factor	**0.190**	**0.647**	**0.437**	**0.000**
(H2a) Green Environment	0.120	0.515	0.347	0.000
(H2b) Internal Environment	0.175	0.622	0.419	0.000
(H2c) Neighborhood	0.150	0.577	0.389	0.000
(H3) Operating Service Factor	**0.204**	**0.672**	**0.453**	**0.000**
(H3a) Rapid work processing	0.164	0.486	0.406	0.000
(H3b) Courteous Attitude	0.187	0.554	0.433	0.000
(H3c) Detailed explanation for inquiries	0.186	0.571	0.432	0.000
(H3d) Listening to resident's opinions	0.168	0.508	0.411	0.000
(H3e) Impartial work processing	0.176	0.537	0.421	0.000
(H4) Repair Service Factor	**0.181**	**0.645**	**0.426**	**0.000**
(H4a) Punctuality in keeping appointment	0.137	0.387	0.372	0.000
(H4b) Courteous attitude	0.165	0.457	0.407	0.000
(H4c) Repair work quality	0.166	0.619	0.409	0.000
(H5) Economic Factor	**0.613**	**1.162**	**0.783**	**0.000**
(H5a) Rent level	0.582	0.718	0.763	0.000
(H5b) Maintenance fee	0.622	0.745	0.789	0.000
(H5c) Amenity	0.087	0.439	0.296	0.000
(H6) Personal Factor	-	-	-	-
(H6b) Age	0.009	-0.009	-0.101	0.001

(H6c) Household income	0.006	0.001	0.085	0.010
(H6d) Number of Household members	0.001	0.047	0.044	0.161

6.3 Multi-Regression Analysis

This study applied multi-regression analysis for the effects of five factors on residential satisfaction. The independent variables were product physical factor, residential environment factor, operating service factor, repair service factor and economic factor. According to the result of multi-regression analysis, repair service factor and economic factor were selected to compose a correlation model with 99% of significant level and adjusted R^2 0.633. And the rest of factors such as product physical factor, residential environment factor, and operating service factor were excluded due to the collinearity. Table 11 shows the result of the multi-regression analysis. Economic factor's standardized coefficient *Beta* was 0.719, and much higher than operating service factor's *Beta* (0.100). The economic factor overwhelmingly influenced residential satisfaction. Based on the result, this study could provide the following equation which describes the correlation of factors and residential satisfaction:

$$y = 5.004 + 1.082x1 + 0.152x2$$

(y: residential satisfaction,

x1: economic factor,

x2: repair service factor).

Table 11. Multi-Regression Analysis of Five Factors (Coefficients)

Variables	B	*Beta*	*t*-value	Sig.
(Constant)	**5.004**		**154.997**	**0.000**
(H1) Product Physical Factor	0.006	0.004	0.085	0.932
(H2) Residential Environment Factor	0.047	0.032	0.767	0.443
(H3) Operating Service Factor	0.037	0.026	0.651	0.515
(H4) Repair Service Factor	**0.152**	**0.100**	**3.025**	**0.003**

(H5) Economic Factor	**1.082**	**0.719**	**29.730**	**0.000**

Note : Adjusted R square 0.633

To find out determinants to affect residential satisfaction, this study also conducted multi-regression analysis of twenty-one variables, which had correlations with residential satisfaction in simple regression analyses. Table 12 provides the results of multi-regression analysis. Rent level, maintenance fee, and age were selected to compose a correlation model with 99% of significant level and adjusted R^2 0.656. If significance sets at 95% of level, internal environment, courteous attitude when repair service, and household income are added for a correlation model. And remaining fifteen variables were excluded by the collinearity diagnostics, for example all five variables under product physical factors, green environment and neighborhood under residential environment factor, all five variables under operating service factor, punctuality in keeping appointment and repair work quality under repair service factor, amenity under economic factor. Based on the result with the significant level of 95%, this study could provide the following equation which describes the correlation of variables and residential satisfaction:

$$y = 1.294 + 0.421x1 + 0.280x2 + 0.134x3 + 0.127x4 - 0.007x5 - 0.001x6$$

(y: residential satisfaction,

x1: rent level,

x2: maintenance fee,

x3: internal environment,

x4: courteous attitude while repair service,

x5: age,

x6: household income)

Table 12. Multi-Regression Analysis of Variables (Coefficients)

Variables	B	*Beta*	*t*-value	Sig.
(Constant)	1.294		3.010	0.003
(H1) Product Physical Factor				
(H1a) Housing unit plan	-0.006	-0.004	-0.151	0.880
(H1b) Exterior plan	0.077	0.053	1.461	0.145
(H1c) Interior material or facility	-0.025	-0.017	-0.376	0.707
(H1d) Exterior material or facility	0.076	0.051	1.131	0.258
(H1e) Housing unit construction quality	-0.106	-0.073	-1.386	0.166
(H2) Residential Environment Factor				
(H2a) Green Environment	-0.076	-0.052	-1.408	0.160
(H2b) Internal Environment	**0.134**	**0.092**	**2.408**	**0.016**
(H2c) Neighborhood	-0.046	-0.031	-0.908	0.364
(H3) Operating Service Factor				
(H3a) Rapid work processing	-0.047	-0.040	-0.879	0.380
(H3b) Courteous Attitude	0.093	0.072	1.475	0.141
(H3c) Detailed explanation for inquiries	-0.011	-0.008	-0.146	0.884
(H3d) Listening to resident's opinions	-0.032	-0.026	-0.492	0.623
(H3e) Impartial work processing	0.034	0.027	0.494	0.622
(H4) Repair Service Factor				
(H4a) Punctuality in keeping appointment	0.000	0.000	-0.008	0.994
(H4b) Courteous attitude	**0.127**	**0.111**	**2.384**	**0.017**
(H4c) Repair work quality	0.048	0.032	0.760	0.447
(H5) Economic Factor				
(H5a) Rent level	**0.280**	**0.299**	**6.541**	**0.000**
(H5b) Maintenance fee	**0.421**	**0.447**	**9.578**	**0.000**
(H5c) Amenity	-0.005	-0.004	-0.148	0.882
(H6) Personal Factor				
(H6b) Age	**-0.007**	**-0.079**	**-2.730**	**0.006**
(H6c) Household income	**-0.001**	**-0.059**	**-2.108**	**0.035**

Note : Adjusted R square 0.656

VII. Conclusion

This study's objective was to investigate determinants to affect the residential satisfaction of long-term public rental housing, especially focused on National rental housing that is a typical type of public rental housing in Korea and is supplied to low-income

households for 30 years. This study categorized determinants to affect residential satisfaction into six major factors such as product physical factor, residential environment factor, operating service factor, repair service factor, economic factor, and personal factor. And this study hypothesized effects of each factor and determinant on overall residential satisfaction. This study developed all fundamental variables by utilizing the database of “Residential satisfaction of residents in public rental housing” that the LH carried out a survey of residents in National Rental Housing throughout the country in 2014. This study applied confirmatory factor analyses to check the validity of six and also conducted two group comparison analyses such as oneway ANOVA test and t-test, and regression analyses.

First of all, according to the results of simple regression analyses of five factors, economic factor (*Beta* 0.783), product physical factor (*Beta* 0.456), operating service factor (*Beta* 0.453), residential environment factor (*Beta* 0.437), repair service factor (*Beta* 0.426) affected residential satisfaction respectively. So, economic factor overwhelmingly influenced residential satisfaction with very high coefficient. And regarding effects of variables, all variables except gender and the number of household members had effects on residential satisfaction. Among various variables, rent level (*Beta* 0.763) and maintenance fee (*Beta* 0.789) strongly affected residential satisfaction compared to other variables. Regarding the effects of variables on residential satisfaction, the most interesting point is that the variable of housing unit plan (*Beta* 0.289) related to unit size and the number of room had the lowest effect among nineteen variables except personal factor. Rather interior (*Beta* 0.412) and exterior (*Beta* 0.440) materials and construction quality (*Beta* 0.434) of housing unit had much higher effects on residential satisfaction. And internal environment variable (*Beta* 0.419) related to housing performance such as lighting, heating, water proofing, and so on also had higher coefficient than housing unit plan variable. Besides, all service-related variables had higher coefficient (*Beta* 0.372-0.433) than housing unit plan variable. In terms of variables to

construct personal factor, gender didn't affect residential satisfaction, given the result of ANOVA and t-test. Also the number of household members didn't affect residential satisfaction, according to the result of simple regression analysis. On the other hand, age (*Beta* -0.101) and household income (*Beta* 0.085) affected residential satisfaction, even if they had a low level of coefficients.

Second, in terms of variables grouping, eighteen variables were categorized into three components based on the results of factor analyses, contrary to the hypothesized five factors. Specifically, product physical factor and residential environment factor were merged into component 1 associated with design and environment. Also operating service factor and repair service factor were combined into component 2 indicating service. And the results of multi-regression provided that only one design-related variable (internal environment) and one service-related variable (courteous attitude while repair service) were selected for a correlation model. Given the results of factor analyses and multi-regression analyses, this study found that housing physical features didn't have distinguishable effects on residential satisfaction from environment and neighborhood features, and those variables were highly correlated with each other. And also, this study found that operating service factor and repair service factor had strong correlation, and didn't have meaningful differences related to effects on residential satisfaction.

According to the results of factor analyses, the amenity variable correlated with not community environment factor but economic factor. The amenity variable represented resident's satisfaction of amenities, public transportation use, proximity to social welfare facilities, education environment, and proximity to cultural facilities and parks. It was explained that amenity features were related to living costs rather than satisfaction of natural environment.

Finally, the result of multi-regression analyses showed the correlation models of

residential satisfaction and its determinants. According to the result of multi-regression analysis of five factors except personal factor, economic factor (B 1.082, *Beta* 0.719) and repair service factor (B 0.152, *Beta* 0.100) were selected as determinants to affect residential satisfaction (Sig. 0.001 level). And given the result of multi-regression analysis of twenty-one variables except gender and the number of household members, maintenance fee (B 0.421, *Beta* 0.447), rent level (B 0.280, *Beta* 0.299), internal environment (B 0.134, *Beta* 0.092), repair service attitude (B 0.127, *Beta* 0.0.111), age (B -0.007, *Beta* -0.079), and household income (B -0.001, *Beta* -0.059) were selected as determinants to affect residential satisfaction (Sig. 0.05 level). The coefficients of economic factor and its variables were much higher than other factors and variables, and it is no different from the result of simple regression analyses.

This study provides implication for residential satisfaction of long-term public rental housing in Korea. This study provides that the crucial determinants to affect overall residential satisfaction is the economic factor such as rent level and maintenance fee. Especially, because this study applied factors and independent variables as subjective data, it facilitated comparisons between determinants. The results of this study is different from previous researches that the most influential determinants were unit housing factor in long-term public rental housing (Kim and Park 2012) or maintenance and management factor in National Rental Housing (Kwon and Ko 2010). The different results are explained by differences of survey time, range of survey areas, survey target, and so on.

This study also offers policy and managerial implication for improving residential satisfaction of long-term public rental housing. First, policy makers and administrators should put top priority on economic factor such as rent level and maintenance fee among various considerations, if they want to improve residents' satisfaction in long-term public rental housing, especially National Rental Housing. The mean of respondents' household monthly incomes was only 1,211 thousand KRW, which is just a little higher than income of bottom

group (1,071 thousand KRW) among income decile. Considering the fact that National Rental Housing targets income group 1 to group 4 (income 3,215 thousand KRW), the actual resident's average income level was very low. It supports that the resident's satisfaction is surely sensitive to changes of living costs like rent level and maintenance fee. Therefore, lessening the burden of living costs from residents should be handled above all. Second, under the limited resources, policy administrators should focus on improving housing materials and construction quality rather than planning larger size of housing unit or additional rooms and community spaces. Also, to raise operating and repair service quality by improving attitude and manner of employees can be selected as a way to increase residential satisfaction with low costs.

This study has a few limitations. First, the survey target was limited in one type of long-term public rental housing that is National Rental Housing. Future studies should consider including all types of public rental housing as a survey target. Second, all independent variables except personal attributes were applied as subjective data, not objective one. Though several variables such as housing physical factor had objective data, this study applied satisfaction values of all determinants based on the conceptual model of Amerigo and Aragonest (1997) and Weidemann and Anderson (1985). Future studies might investigate effects of the objective attributes of each variable on overall residential satisfaction.

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