博士論文

Factors of Population Aging in Metropolitan New Towns

Developed during the Rapid Growth Era

- Focused on Bundang New Town in Seoul Metropolitan Area, Korea-

(高度成長期に開発された大都市圏ニュータウンの

人口高齢化の実態と要因

- ソウル大都市圏における盆唐ニュータウンの集合住宅団地を事例に-)

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ABSTRACT

This thesis aims to find factors affecting the population aging in metropolitan new towns developed during the rapid growth era. Further, this thesis examined the population aging process of these new towns and prospected the resident aging pattern in the era of population aging and decline.

To better understand the process of population aging in metropolitan new towns developed during the rapid growth era located in metropolitan areas, this thesis firstly examined physical characteristics (e.g., background and process of new town development, housing supply and land use plan) of these new towns, and then investigate the demographic change characteristics of these new town residents from the initial stage of new town development to the present in case of Japan and Korea. Bearing in mind the previous points, this thesis sought to address the following three key research questions:

- What kinds of characteristics are there in metropolitan new towns developed during the rapid growth era?
- How do these characteristics of metropolitan new towns affect population structure and movement pattern of new town residents in the era of population aging and decline?
- Would Korea's metropolitan new towns do experience the same process of population aging as Japan's ones? If not so, which factors have an important bearing on the pattern or degree of the population aging in metropolitan new towns in Korea?

This thesis operationally defined the objective of new town as the large-scale housing complexes in the suburbs of metropolitan areas by the package supply system with master plan of public sector in order to cope with housing shortage and stabilize the real estate market during the rapid growth era. And so, this thesis named these new towns 'metropolitan new towns developed during the rapid growth era'. Examining the growth process of metropolitan new towns developed during the rapid growth era in Tokyo and Seoul metropolitan area since the initial occupancy of new towns, this thesis set a temporal scope for analysis from 1971 to 2010 in case of Japan and from 1991 to 2010 in case of Korea.

Among the new towns constructed to sort out housing shortage of Tokyo and Seoul metropolitan area in the rapid growth era (i.e., from 1960s to 1970s in case of Japan, from 1980s to 1990s in case of Korea), Tama New Town in Japan and the first generation new towns in Seoul metropolitan area, Korea (i.e., Bundang, Ilsan, Pyeongchon, Sanbon and Jungdong New Town) were chosen as the spatial scope for analyzing the statistical data and literature review.

Apart from this, only some apartment complexes in Bundang New Town was set for target areas to do an interview and survey for catching the demographical characteristics of new town residents which cannot be analyzed using the statistical data and literature review.

Chapter 2 and Chapter 4 examined the characteristics of metropolitan new towns in Japan and Korea in terms of 'background of new town development', 'transition of new town development policy'. The last section of each chapter pointed out issues of metropolitan new towns in the era of population aging and decline.

Korean metropolitan new towns planned during the rapid growth era have similar characteristics with Japanese ones as follows: 1) construction under the leadership of the central government, 2) a massive migration of homogeneous people and households at the same time by a massive uniform housing supply method, and 3) urban infrastructure and facilities supplied by the inflexible master plan based on the Clarence A. Perry's neighborhood unit theory. Moreover, Korean metropolitan new towns are confronted with such as following issues in the era of population aging and decline: 1) vulnerability of population structure, 2) probability of the collapse in real estate values (bubble burst), 3) decrepit housing complex and infrastructure, 4) massive supply of housing units and residential sites within Seoul metropolitan area (e.g., readjustment of Green Belt area), and 5) reduction of housing demand in Seoul metropolitan area (e.g., public agency relocation from the capital region).

In particular, the third section of Chapter 4 analyzed the demographic characteristics (i.e., the change of population structure, movement pattern, residential characteristics and socioeconomic

characteristics of residents) focused on the first generation new towns in Seoul metropolitan area using the population and housing census data for the last 20 years.

As for the ratio of population aged 65 and over and its growing trend, the possibilities of urban emptiness and deterioration of vitality caused by the age profile imbalance are relatively low in current condition of these five new towns just judging from only the statistics. However, the total population of four new towns among the first generation new towns except Jungdong New Town started to decrease in 2010. In addition, population migration in these first generation new towns has been stabilized gradually. In physical point of view, it is too early to promote the remodeling or reconstruction projects of apartment buildings or complexes through the method to demolish whole structure and build it again even though some apartment buildings of the first generation new towns in SMA have factors related with the structural safety concerns the construction process and the central government reduced the minimum requirement period of implementing the housing reconstruction project as an institutional measure to stimulate the country's real estate market.

Chapter 3 and Chapter 5 examined the evolution of two typical metropolitan new towns in terms of the 'background and process of new town developments', the 'housing unit type and supply method', and the 'demographic changes' focused on Tama New Town and Bundang New Town, which are two typical metropolitan new towns in Tokyo and Seoul metropolitan areas. Chapter 3 examined the case of Tama New Town in Japan that had experienced population aging problems, and Chapter 5 analyzed the characteristics of Bundang New Town in Korea. The latter part of Chapter 5 compared the demographic change characteristics in Bundang New Town with that of Tama New Town.

According to the comparison of the supplied housing unit type and housing supply method in both new towns, the population aging process like Tama New Town may not occur in Bundang New Town, Korea in current situation. However, the demographic structural vulnerability caused by the impeded migration has been also increased in some communities of Bundang New Town since the mid-2000s. This impeded migration is mainly related with living condition, housing unit size and

diversity of housing unit type within own complex according to the household survey. Looking at the community level of these new towns, however, it has been found that some communities or housing complexes have the vulnerable population structure in the ear of population aging and decline depending on their own residential characteristics, living environment or characteristics of residents.

Chapter 6 conducted a household interview survey to analyze the population aging-related characteristics of Bundang New Town, a typical metropolitan new town in SMA, Korea. The interview survey was conducted at two specific neighborhood units that consisted in some apartment complexes in 'Yatap 2-dong' (Block A) where population structure has been more vulnerable to population aging since 2005, and 'Sunae 1-dong' (Block B) where the ratio of household with school age children has been maintained unlike Yatap 2-dong.

This chapter conducted Pearson's chi-squared test as well as identified primary survey results by variables and factors of questionnaire. The purpose of conducting Pearson's chi-squared test is to measure whether respondents of each target area (Block A and Block B) have different attributes in terms of each factor. In addition to Pearson's chi-squared test, correlation analysis using the Pearson correlation coefficient for each factor also conducted to examine the tendency of the direction and strength of the linear relationship between the two variables.

One of the causes of the difference in population structure between two blocks is that migration of household, especially with school age children has occurred more frequently in Block B (Sunae 1-dong) than Block A (Yatap 2-dong). Furthermore, Block B's relatively high proportion of the small-sized housing units eases the migration of household triggered by the specific events in the life course such as a change in marital status or job, the birth of a child, entering or attending upper school. According to the result of asking the resident's opinion on the cause of population aging, most of respondents thought that 'education condition for children' was the most important cause of differences between population cohorts of two communities. Besides, transportation and shopping conditions were also considered as causes of differences in population cohorts between two blocks.

This chapter also examined the respondents' characteristics related with population aging, and then analyzed correlation between factors on the demographic characteristics of household (i.e., 'age of householder', 'number of householder members', and 'household composition'). According to the correlation analysis, it is also very likely that one-generation households consist of only the elderly as well as a small-sized household has an older householder than a large-sized household.

Chapter 7 analyzed the factors affecting the aging trend of residents in Bundang New Town, Seoul metropolitan area, Korea based on the results of interview survey. To find the affecting factors on the population aging, this chapter analyzed the correlations between population aging-related factors (i.e., age of householder, number of household members, and household composition) and three categories of affecting factors; 1) population movement characteristics (i.e., migration, commuting, and duration of residence in current house), 2) residential characteristics (i.e., home ownership, housing unit size), and 3) living environment (i.e., satisfaction in current residential environment, and reason to select a complex) in Bundang New Town, Korea.

It is fact that duration of residence and proportion of household to hope to live in current house continuously have been increased in Bundang New Town gradually. According to the survey result, most (86.5%) households hoped to live in current house continuously and their most frequent reason was the 'convenience of urban facilities'. Meanwhile, the proportion of households unable to leave Bundang New Town due to constraint conditions in spite of hoping to leave immediately was the highest in the largest housing unit type of Block A of Yatap 2-dong with vulnerable population structure, and that reason was related to the real estate market condition.

The change on the household size was more seriously occurred in a small-sized housing unit due to such as a separation of generation. Moreover, the size of household with a long duration of residence is much more likely to be dwindled even in a large-sized housing unit which can accommodate growing the size of household if there is no influx of households which need more residential space for the growing children in these trends such as downsizing of household, population aging and decline.

In addition, this chapter found some characteristics on the evolution of Bundang New Town in terms of population movement instead of the respondent characteristics related with population aging. First, as most of the urban facilities have been equipped according to their original master plan and self-containment commercials, degree of satisfaction for living environment is getting higher gradually. Second, it is generally thought that residents, especially retired elderly people place a high value on the satisfaction of living environment condition rather than housing price or occupation in such a situation that real estimate market has been stabilized and preference for good residential condition is regarded as an important factor.

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Chapter 1   Introduction

1.1   Research background

New Towns are the result of powerful application of a national policy expressed by governmental decisions. New Towns have been created on the basis of an agreed policy on the purpose, role, location, and the physical characteristics of new settlements. Implementation measures, funds, and management procedures are all crucial elements of their progress (Kafkoula, 2009). For that reason, it seems necessary to examine the adopted new town concept and the national urban and housing policies in the planning stage to understand the characteristics of new towns in each country exactly.

Japan and Korea are the one of the nations to overcome the damage of war and achieve the rapid economic growth. Japan gained a foothold of rapid economic growth as a supply base during the Korean War (1950-1953) and Korea by entering the Vietnam War (1965-1973). During the Japanese post-war economic miracle, however, a rapid influx of population into metropolitan area (e.g., Tokyo, Osaka) led land price to skyrocket, the shortage of housing supply volume and rapid urban sprawl on the cheaper outskirts of the city.

To solve these problems, the Japanese Government has planned and constructed many new towns (e.g., Tama, Chiba, Kohoku, etc.) in the outskirt of metropolitan areas since 1960s. In 1963, national government enacted a new legislation named 'The New Residential Town Development Law' 新住宅市街地開発法 in order to promorte the development of a large-scale satellite new town. By the year of 2009, the number of the large-scale new towns (more than 300ha) has been built, reaching 39 places all over the country. However, some socio-economic phenomena (e.g., low-growing population and aging, collapse in real estate market, etc.) made these new towns 'cold spot'. In the end, Prime Minister Junichiro Koizumi announced the end of new town construction by public sector in 2002.

At the end of the 1980s, the Korean Government planned to construct five new towns (i.e., Bundang, Pyeongchon, Sanbon, Jungdong and Ilsan) in Seoul Metropolitan Area (*hereafter*, SMA) in

a distance of 20 to 25km, one-hour commuting distance from Seoul. These new towns were planned to solve the housing shortage and stabilize the real estate market. The construction of the new towns was immediately completed within 5 to 6 years by the special act, 'Residential Land Development Promotion Act' 宅地開発促進法 which simplified the construction process.

About twenty years have passed since the completion of these first generation new towns and they became 'hot spot' in SMA. Most of the urban facilities have been equipped according to their original master plan and self-supporting commercials and communities have been organized within these 'mature' new towns. Even though these first generation new towns had their own merits on good residential and educational environment and geographical location in SMA, their merits have been de-escalated due to the decrepit houses and infrastructures and the Seoul inner city regeneration policies that supplied residential lands.

It is a well-known fact that population aging and decline have been causing social and spatial problems in Japan and Korea. Metropolitan new towns built in order to solve the housing shortage of the metropolitan area in the era of high economic growth have the characteristics that the somewhat same class of people migrated largely in a short time into planned housing unit types by a mater plan. These metropolitan new towns are more susceptible to the status of population aging than the unmediated urban areas where population migration has happened gradually over a long period especially in the circumstance of a low birth rate and population decline. It has actually arisen in the apartment complexes developed in the initial stage of Tama New Town, Japan.

Against this background, it is crucial to examine the status of metropolitan new towns developed during the rapid growth era in the era of population aging and decline. For exactly diagnosing the phenomenon and potential of population aging in these metropolitan new towns, we must first understand their characteristics and then find factors affecting the population aging in metropolitan new towns.

1.2   Research questions

This thesis aims to find factors affecting the population aging in metropolitan new towns developed during the rapid growth era. Further, this thesis will examine the population aging process of these new towns and prospect the resident aging pattern in the era of population aging and decline.

To better understand the process of population aging in metropolitan new towns developed during the rapid growth era located in metropolitan areas, this thesis will firstly examine physical characteristics (e.g., background and process of new town development, housing supply and land use plan) of these new towns, and then investigate the demographic change characteristics of these new town residents from the initial stage of new town development to the present in case of Japan and Korea.

Bearing in mind the previous points, this thesis seeks to address the following three key research questions:

- What kinds of characteristics are there in metropolitan new towns developed during the rapid growth era?
- How do these characteristics of metropolitan new towns affect population structure and movement pattern of new town residents in the era of population aging and decline?
- Would Korea's metropolitan new towns do experience the same process of population aging as Japan's ones? If not so, which factors have an important bearing on the pattern or degree of the population aging in metropolitan new towns in Korea?

1.3   Scope of the thesis

1.3.1   Operational definition of the 'Metropolitan new towns developed during the rapid growth era'

Generally, a 'new town' is a specific type of a planned community or planned city, which was commonly constructed in a previously undeveloped area with a master plan. However, it is very

difficult to define a new town as one concept because new towns have been planned and constructed to serve a variety of specific functions in the world.

Golany (1978) categorized modern new urban settlements in terms of their economic base and varying levels of economic self-containment. According to his categorization, a 'new town' is a type of new urban settlements which has all the characteristics, such as the public or unified land ownership (semipublic), the confined green belt, the combination of urban and country, the intersecting green often space, the defined and compact area, a limited population size, the balanced community, neighborhood units, a sound economic base, proximate places of work and residences, the local provision of infrastructure, the sustenance of industrial decentralization, a public as main enterpriser and the strong planning control (See Figure 1-1).

Figure 1-1. Characteristics of new urban settlements

CHARACTERISTIC	NEW TOWN	NEW COMMUNITY	NEW CITY	COMPANY TOWN	DEVELOPMENT TOWN	REGIONAL GROWTH CENTER	FREESTANDING COMMUNITY	ACCELERATED GROWTH CENTER	HORIZONTAL CITY	VERTICAL CITY	SATELLITE TOWN	METRO TOWN	LAND SUBDIVISION	PLANNED UNIT DEVELOPMENT	NEW TOWN INTOWN	NEW TOWN IN-CITY
1. PUBLIC OR UNIFIED LAND OWNERSHIP (SEMIPUBLIC)	●	—	◐	—	●	◐	—	—	—	◐	—	◐	—	—	◐	●
2. CONFINED GREEN BELT	●	●	●	●	●	●	●	●	◐	●	—	●	—	◐	—	●
3. COMBINE TOWN AND COUNTRY	●	●	●	●	●	●	●	◐	◐	●	◐	◐	—	◐	—	●
4. INTERSECTING GREEN OPEN SPACE	●	◐	●	●	●	●	●	◐	—	—	—	—	◐	◐	—	●
5. DEFINED AND COMPACT AREA	●	—	●	●	●	●	◐	◐	—	●	—	◐	—	◐	—	●
6. LIMITED POPULATION SIZE	●	—	—	—	●	◐	—	—	—	●	—	◐	—	◐	—	●
7. BALANCED COMMUNITY	●	◐	●	—	●	◐	●	●	●	●	—	●	—	◐	◐	●
8. NEIGHBORHOOD UNITS	●	●	●	—	●	●	●	◐	◐	●	◐	◐	◐	◐	●	●
9. SOUND ECONOMIC BASE	●	◐	●	—	●	●	●	●	●	●	—	◐	—	—	—	●
10. PROXIMATE PLACES OF WORK AND RESIDENCES	●	—	●	●	●	●	●	●	—	●	—	◐	—	—	—	●
11. LOCAL PROVISION OF INFRASTRUCTURE	●	◐	●	◐	●	●	●	●	◐	●	◐	●	—	◐	◐	●
12. SUPPORT INDUSTRIAL DECENTRALIZATION	●	◐	●	◐	●	●	●	◐	◐	●	—	●	—	—	◐	●
13. PUBLIC AS MAIN ENTERPRISER	●	—	—	—	●	●	—	—	—	◐	—	—	—	—	◐	●
14. STRONG PLANNING CONTROL	●	◐	●	—	●	●	◐	◐	—	●	◐	●	●	●	●	●

KEY — NOT APPLICABLE
◐ APPLICABLE IN PART
● APPLICABLE

Source: Golany, 1978.

Clapp (1971) listed in the most distinguishing characteristics of new towns as follows. First, they are always planned and constructed for some pre-established purposes or objectives and these objectives determine the major planning characteristics, such as size, location and composition of land uses. Second, new towns are developed by some sponsorship, such as government, private enterprise, or a combination of both. The third fundamental characteristic is that a new town is managed by single ownership or control over net town land, at least during the development process. Lastly, the new town master plan is usually established before the building process is actually begun; whereas the master plans for existing communities are often prepared after much of the community has already undergone development.

Although we sometimes describe new towns with different terms, such as "new communities," "planned communities," "satellite towns," "new cities," "greenbelt towns," and "garden cites," these alternative names of new towns also have a connotation of the large-scale planned developments.

This thesis operationally defines the research target of new town as the large-scale housing complexes in the suburbs of metropolitan areas by the package supply system with a master plan of public sector in order to cope with housing shortage and stabilize the real estate market during the rapid growth era. And so, this thesis names these new towns 'metropolitan new towns developed during the rapid growth era'.

Figure 1-2. Operational definition of 'metropolitan new towns developed during the rapid growth era'
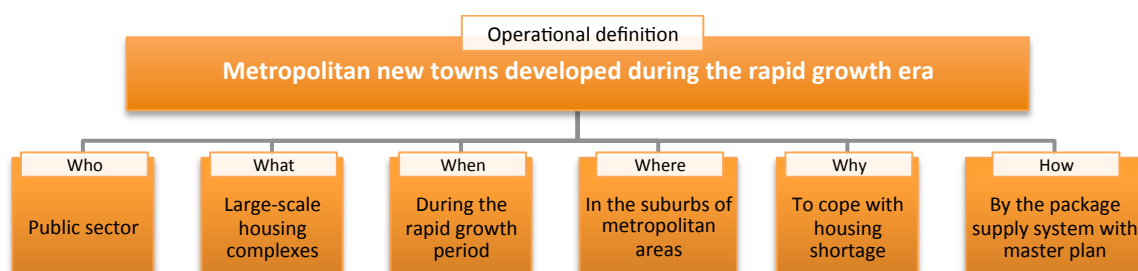
1.3.2 Spatial and temporal scope

Examining the growth process of metropolitan new towns developed during the rapid growth era in Tokyo and Seoul metropolitan area since the initial occupancy of new towns, this thesis set a temporal scope for analysis from 1971 to 2010 in case of Japan and from 1991 to 2010 in case of Korea.

Among the new towns constructed to sort out housing shortage of Tokyo and Seoul metropolitan area in the rapid growth era (i.e., from 1960s to 1970s in case of Japan, from 1980s to 1990s in case of Korea), Tama New Town in Japan and the first generation new towns in Seoul metropolitan area, Korea (i.e., Bundang, Ilsan, Pyeongchon, Sanbon and Jungdong New Town) were chosen as the spatial scope for analyzing the statistical data and literature review.

Apart from this, only some apartment complexes in Bundang New Town was set for target areas to do an interview and survey for catching the demographic characteristics of new town residents which cannot be analyzed by the statistical data and literature review.

1.4 Structure of the thesis

As an introduction to this thesis, Chapter 1 demonstrated the overall background of the research topic, research questions, scope of the thesis and methodology. The remaining parts are organized in six chapters of three parts as followings.

The following four chapters (Part I and Part II) provide a theoretical basis for designing interview survey and selecting analysis factors of population aging in metropolitan new town residents.

Chapter 2 examines characteristics of Japanese metropolitan new towns developed during the rapid growth era based on the literature reviews of the precedent studies. The first two sections of Chapter 2 introduce the background of new town development and then describes the transition of the new town development policy by dividing into five period. The last two sections of this chapter

examines characteristics of Japanese metropolitan new towns developed during the rapid growth era and points out the major issues of Japanese metropolitan new towns according to the arrival of the era of population aging and decline. More specifically, Chapter 3 examines the objective and process of new town developments, the housing unit type and supply method, and the demographic changes of Tama New Town residents in Japan that had experienced population aging problems. In particular, the third section of this chapter focuses on the population structure by age, ratio of population aged 65 and over, and migration based on the literature reviews and population census data.

Chapter 4 examines characteristics of metropolitan new towns developed during the rapid growth era in Seoul metropolitan areas, Korea based on the literature reviews of the precedent studies and official statistic data. The first two sections of this chapter introduce the background of new town development and then describes the transition of the new town development policy by dividing into three periods. The third section analyzes the demographic characteristics (i.e., the change of population structure, movement pattern, residential characteristics and socioeconomic characteristics of residents) of the first generation new towns in Seoul metropolitan area using the population and housing census data for the last 20 years. The last section of Chapter 4 points out issues of the first generation new towns in Seoul metropolitan area and then prospect status of these new towns in the era of population aging and decline. And more particularly, Chapter 5 analyzes the objective and process of the developments, housing unit type and housing supply method, and the demographic changes by age and migration of Bundang New Town in Korea. The latter part of Chapter 5 compares the demographic change characteristics in Bundang New Town, Korea with that of Tama New Town in Japan.

The last part (Chapter 6 and 7) conducts empirical analysis on Bundang New Town residents in Korea.

Chapter 6 analyzes the population aging-related characteristics of Bundang New Town residents using the interview survey. The first half of this chapter selects the target areas and designs the questionnaires according to the previous results. The latter half part analyzes the characteristics of respondent households by target area and population aging-related characteristics of respondents

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using the interview survey results. The Chapter 7 analyzes the correlations between 1) population movement characteristics (i.e., migration, commuting, duration of residence in current house), 2) residential characteristics (i.e., home ownership, housing unit size), 3) living environment (i.e., satisfaction in current residential environment, reason to select a complex), and population aging in order to find out affecting factors on the population aging trend in Bundang New Town, Korea.

Finally, Chapter 8 concluded this dissertation with major findings in previous chapters and sugguested policy implications for population aging in metropolitan new towns. Further, the last part of this chapter described limitations of this study and recommendations for future studies.

Figure 1-3. Structure of the thesis

Chpater1. **Introduction**
Research Background and Questions/ Scope of the Thesis/ Methodology

Part I

Chapter2. **Characteristics** of Metropolitan **New Towns** in **Japan**			
2.1 **Background** of New Town Development	2.2 **Transition** of the New Town Development **Policy**	2.3 **Characteristics** of Japanese Suburban New Towns	2.4 **Issues** in the **Era of Population Aging and Decline**

Chapter3. **Evolution of Tama New Town** in Tokyo Metropolitan Area, **Japan**		
3.1 **Objective and Process** of New Town Development	3.2 **Housing** Unit Type and Supply Method	3.3 **Demographic** Changes

Archival Analysis [in Case of Japan]

Part II

Chapter4. **Characteristics** of Metropolitan **New Towns** in **Seoul** Metropolitan Areas, **Korea**			
4.1 **Background** of New Town Development	4.2 **Transition** of the New Town Development **Policy**	4.3 **Demographic Changes** of the first Generation New Towns	4.4 **Issues** in the **Era of Population Aging and Decline**

Chapter5. **Evolution of Bundang** New Town, Seoul Metropolitan Area, **Korea**	
5.1 **Objective and Process** of New Town Development	5.4 **Comparison With Tama** New Town in terms of Evolution
5.2 **Housing** Unit Type and Supply Method	
5.3 **Demographic** Change and Prospects	

Archival Analysis [in Case of Korea]

Part III

Chapter6. **Empirical Analysis on Population Aging-Related Characteristics** of Bundang New Town Residents		
6.1 **Outline** of Survey (Target area, Questionnaire, etc.)	6.2 **Characteristics** of Household **by Target area**	6.3 Population Aging-Related **Characteristics of respondents** *(Defendant variable)*

Chapter7. **Analysis of Affecting Factors** on the **Population Aging** Trend in Bundang New Town		
7.1 **Population Movement Characteristics** *(Independent variables 1)*	7.2 **Residential Characteristics** *(Independent variables 2)*	7.3 **Living Environment** *(Independent variables 3)*

Empirical Analysis (Survey) [in Case of Korea]

Chpater8. **Conclusion**
Major Findings and Contributions/ Policy Implications/ Limitation and Further Study

1.5   Methodology and approach

1.5.1   Literature reviews on analyzing demographic characteristics and aging factor of metropolitan new town residents in Korea

The past migration patterns affect current urban patterns strongly and those urban patterns have created quite different population structures in different parts of the country (Sorensen, 2006). It means that migration patterns impact greatly on population structures. In this context, this thesis assumes that one of the crucial factors affected population aging is the low migration rate of new town residents based on the Japan's experience (Kato, 2011; Kimura and Takiguchi, 2006; Kitanami and Kishii, 2003; Miyazawa, 2006; Tama University, 2009; Ueno and Matsumoto, 2011, etc).

In Korea, population aging of metropolitan new town residents also has not begun in earnest yet. For this reason, aging of metropolitan new town residents has not been dealt with a serious social problem unitl recently. Hence, there are also few statistics and precedent studies on the aging of new town residents,[1] whereas there are greate deals of studies that have examined characteristics of households, migration purposes, and housing unit types of new towns residents and analyzed the determinants of migration from the initial stage of new town development to the present time.

Therefore, this literature reviews focus upon 'what kinds of factors have been used to analyze demographic characteristics' rather than 'which factors play a key role in affecting demographic characteristics'. In this connection, this thesis describes factors used to analyze determinants of migration and major results in some typical studies as follows.

First, followings are the typical studies on the 'determinants of migration' and the 'population structure and characteristics of household' of new towns residents, which show the real condition of population aging in metropolitan new towns.

Lee, D. K. (2000) researched factors affecting population migration through a survey of Ansan and Bundang divided into macro and micro aspects; examined differences between Ansan, the

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[1] Though some studies on the life pattern of the elderly live in metropolitan new towns exists in Korea, this thesis did not deal with these subject matter beause they are unrelated to research questions of this thesis.

industrial metropolitan new town, and Bundang, the housing metropolitan new town. He concluded that the people migrated actively were as follows. Their ages were 30 to 40, occupations were tech workers, sales and service, housing unit sizes were small, housing tenure types were rental, duration of residence was shorter, and migration purposes were job opportunity and income increase.

Lee, W. (2000) inverstigated the determinents of migration in Gyeonggi Province. In this study, two types of migrtations are examined. First, the determinants of net migration in Gyeoggi Province for 1980 to 1985, 1985 to 1990, and 1990 to 1995 analyzed. Second, the determinants of interurban migration in Gyeonggi Province for 1995 and 1997 were also investigated. Foru factors (e.g., economic factor, gravity factor, policy factor, and amenity factor) were considered as potential attributes of migtraion based on the precedent studies. Specially, from the four factors, the specific variables of the migration model in this study were defined (e.g., income and number of employees as the economic factor, tax revenue, educational condition, housing supply growth as the policy factor, amenity index as the amenity factor, and distance and population size as the gravity factor, etc.) This study showed that 1) in the net migration, the increasing rates of housing and the proportion of people in cities were most influential variables. 2) In interurban migration, the distance between cities and the proportion of people in both origin and destination are the most important determinants. In 2001, Lee, W. also examined the determinants of migration and the differences of residential satisfaction between previous residence and current residence by the resident registration data and household survey in the whole area of Gyeonggi Province. This study used three factors; general factor, moving-out and commuting factor, and characteristics and reasons of migtraion. The general factors consist of household characteristics (e.g., number of household members and age of householder), population structure by sex, age and school age, socioeconomic characteristics (e.g., income, occupation, and education level) and residential characteristics (e.g., housing unit size and type, home ownership). The moving-out and commuting factors consist of moving-out area and commuting characteristics (e.g., commuting area, distance, time and mode). And the characteristics and reasons of migtraion consist of migration characteristics (e.g., number of migtations, average duration of residence), change of migration determinant, and change of residential satisfaction). In 2007, she analyzed the change of

population migration in the metropolitan area and Gyeonggi-do and migration factors between the capital and non-capital region, and within the capital region; investigated origin, commuting regions, migration reasons, and satisfaction of residential areas through a survey of case study areas such as new towns. And She drew a conclusion that people prefer migration to the first generation new town if their education levels and household incomes are higher, ages are higher, and migration distance is shorter.

Choi, Y. and Kim, H. J. (2012) empirically analyzed the determinants of residential mobility in metropolitan regions and non-metropolitan regions at two different times, 1999 and 2008 using the KLIPS (Korean Labor & Income Panel Study) data. The determinants related on household characteristics such as gender and age, residential environment characteristics like housing types, and economic characteristics namely education spending and cultural spending. The major findings were that household characteristics and the residential characteristics were of critical importance in 1999 and influence of economical and cultural environments got higher in 2008. This trend was more significant in metropolitan regions than in non-metropolitan regions.

Yi, C. H. and Lee, S. I. (2012) also analyed the determinants of the duration of residence in current house after a household member's change according to the life-cycle variation using the Cox Proportional Hazard Model with KLIPS data from 2000 to 2008 for the Seoul Metropolitan Area. In the case of increased size of household, bigger size of household and households with school-aged students and younger children had longer duration of residence in current house. On the other hand, in the case of reduced size of household, households with school-aged students and younger children had longer duration of residence in current house. Meanwhile, the factors; education level of householder, the number of household members, household income, and hosing unit size were not significant statistically. These results show that the factors affecting the duration of residence at a place differed by the pattern of the household member's change.

Lee, C. H. (1998) conducted primary investigation of 21 town (i.e., 'dong'洞, a town-level administrative district in Korea) s' population changes in Bundang district before and after new town

development through statistics and literatures; performed a survey of households who have jobs in Seoul and who migrated initially to Bundang New Town in terms of the number of household members, age of householder, occupation and its location, education, housing income, housing unit size, a place of moving out, migration reason, and re-migration plan. And this study identified that Bundang New Town at the early stage of development performed the function of bed town since it was lack of self-sufficiency. The investigation of characteristics of migrants' households and housing and the analysis of population cohort changes of the areas are needed to be conducted at the same time in order for better analysis on the relationship among them.

Ryu, K. H. (2011) analyzed changes of population cohorts of Bundang New Town by age divided into development periods in a macro view and identified features. In a micro view as well, this study proposed changes of population cohorts and differences between Sunae-dong, located in the heart of Bundang New Town, and Yatap-dong, outside Bundang. However, this study proposed that the concrete basis to support the result was the limitation of the study.

Below are the representative precedent studies on the 'residential satisfaction' of new town residents, which predict the duration of residence in current conditions.

Lee, C. H. (2001) researched how the satisfaction of the residential environment in the new town was affected by transportation, urban facilities, and external environment conditions according to residents' characteristics such as duration of residence, housing unit size, housing tenure type, age of householders and education, and housing unit type through a household interview survey of first generation new towns around the metropolitan area and analyzed reasons for migration to the new town by each of five new towns. This study shows that the satisfaction of the residential environment in the new town was effected by facilities and chance of job opportunities through the multi regression analysis between residents' characteristics and the satisfaction of the residential environment based on the resident survey.

Cho, S. M. and Kang, S. J. (1997) surveyed the reasons why 272 Bundang New Town housekeepers chose the current house in 1995, time of initial stage of Bundang New Town development. This study analyzed the factors related with satisfaction of residence by a multiple

regression model. This model used a chracteristics of household (i.e., the number of household members, education level of housekeeper, household income and age of housekeeper) and characteristics of current residence (i.e., housing unit size, duration of residence, home ownership, interaction with neighbors and housing type) as dependent variables. Further this study estimated the satisfaction of residence in terms of convenience, beauty, sociality, education and economy.

From above precedent studies of new town residents one can draw some implications. First, most of precedent studies examined the determinant of migration, population structure, characteristics of household, and satisfaction of residence and so on by a household interview survey method. Second, these precedent studies used duration of residence, housing unit size, home ownership, age of householder, number of household members, and so on as survey items.

1.5.2 Variables

This thesis sets the variables for analyzing factors of population aging in metropolitan new towns as following steps. The first step reviews literatures on metropolitan new towns developed during the rapid growth era based on the operational definition in the third section of this chapter and examines the transition of the new town development policy in UK, Japan and Korea, then draws characteristics of these new towns.

The second step sets three analysis items (i.e., Development background and process, Housing unit type and supply method, and Demographic transition) relating with the characteristics of metropolitan new towns deduced in the first step based on literatures review on the demographic characteristics and aging factors of metropolitan new town residents.

The last step determines four categories of variables; Population aging (a dependent variable), Population movement characteristics (independent variable 1), Residential characteristics (independent variable 2) and Living environment (independent variable 3) (See Table 1-1). These four categories of variables are drawn by the results of 1) comparative analysis between apartment complexes developed in the initial stage of Tama New Town, Japan and Bundang New Town, Korea

in terms of three analysis items in the second step (§4.4), 2) transition process of the first generation new towns in Seoul metropolitan area (§3.3), and 3) literature reviews on the demographic characteristics and aging factors of metropolitan new town residents in Korea (§1.5.1).

Table 1-1. Variables of empirical analysis (household interview survey)

<A dependent variable>	<Independent variable1>	<Independent variable2>	<Independent variable3>
Population Aging	**Population movement characteristics**	**Residential Characteristics**	**Living Environment**
• Demographic characteristics of household • Cause of population aging	• Migration • Commuting • Duration of residence	• Home ownership • Housing unit size • Diversity of housing unit type within own complex	• Satisfaction in current residential condition • Reason to select an apartment complex

1.5.3   Data analysis

This thesis uses both quantitative and qualitative research method to analyze factors affecting population aging in metropolitan new towns developed during the rapid growth era.

To find out factors of population aging in these new towns, this thesis basically analyzes demographic change characteristics using the time series analysis method. For this reason, this thesis uses the official statistical data (i.e., population and housing census data, resident registration data) provided periodically in each year. In addition, political background or physical condition (e.g., background and process, housing unit type and supply method, etc.) that is impossible to get through the statistical data is described based on archival data at that time.

Particularly, in order to examine changes in the characteristics of residents and households in metropolitan new towns, it is necessary to carry out long-term follow up study on any new town resident. Thus, this thesis cannot help conducting household interview survey in some typical apartment complexes, Bundang New Town, Korea in order to collect information not offered by official statistical data. That point is one of the originality of this thesis compared with precedent studies.

Figure 1-4. Analysis framework
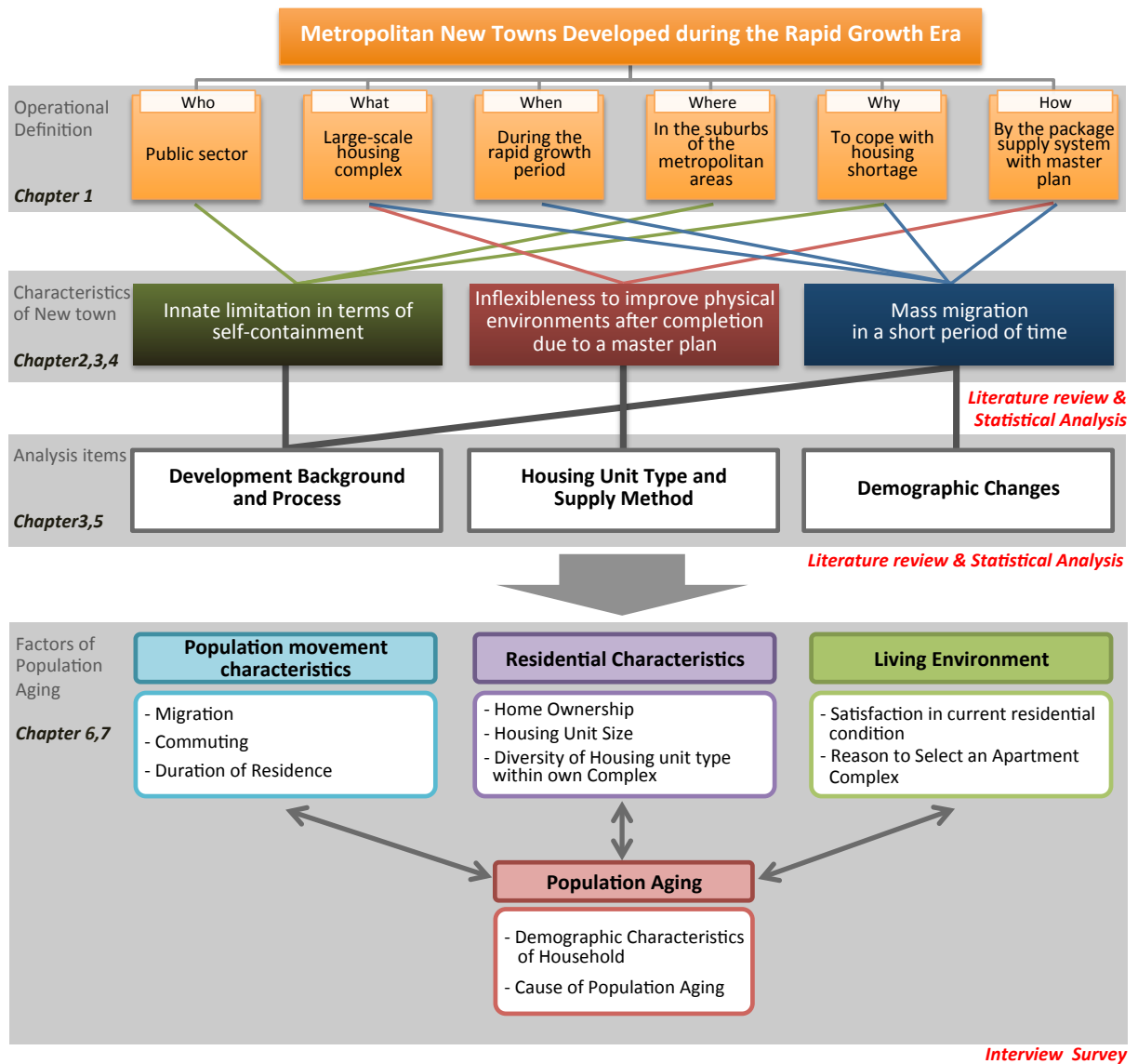
Chapter 2　Characteristics of Metropolitan New Towns in Japan

Chapter 2 examines characteristics of Japanese metropolitan new towns developed during the rapid growth era based on the literature reviews of the precedent studies. The first two sections of Chapter 2 introduce the background of new town development and then describes the transition of the new town development policy by dividing into five periods. The last two sections of this chapter examines characteristics of Japanese metropolitan new towns developed during the rapid growth era and points out the major issues of Japanese metropolitan new towns according to the arrival of the era of population aging and decline.

2.1　Background of new town development

In the Japanese case, it is important to recognize the process how the emphasis in housing policy has shifted from the construction of housing projects to the development of new towns (Kurokawa, 1978).

After World War II, Japanese government has conducted the housing supply policy to cope with the housing shortage problems in the metropolitan areas by establishing three key systems; Government Housing Loan Corporation 住宅金融公庫, Public Housing 公営住宅 and Japan Housing Corporation 日本住宅公団.

'Government Housing Loan Corporation' was established by enacting the Government Housing Loan Corporation Act 住宅金融公庫法 in 1950. This corporation support citizens as they acquire quality homes in a sound and secure manner and to ensure that effective use of residential stocks, financing (housing loan programs) are provided to citizens of every class for the necessary funds to build, purchase, or renovate homes in the event that there is difficulty in receiving financing from private institutions, including banks (Ministry of finance Japan's homepage). In the following year, Public Housing Act 公営住宅法 was enacted to encourage the prefectural and municipal governments throughout the country to build public housing with subsidies from the national treasury (Kurokawa, 1978).

In 1955, Japan Housing Corporation was established to provide housing in large metropolitan areas where housing shortages were the most severe due to population concentration by the Japan

Housing Corporation Act 日本住宅公団法 sequentially The Japan Housing Corporation had a strong power to conduct the housing supply project on a broad region beyond prefectural and municipal administrative district (Japan Housing Corporation, 1981; Kurokawa, 1978).

Figure 2-1. Location of the large-scale housing complex in Tokyo metropolitan area
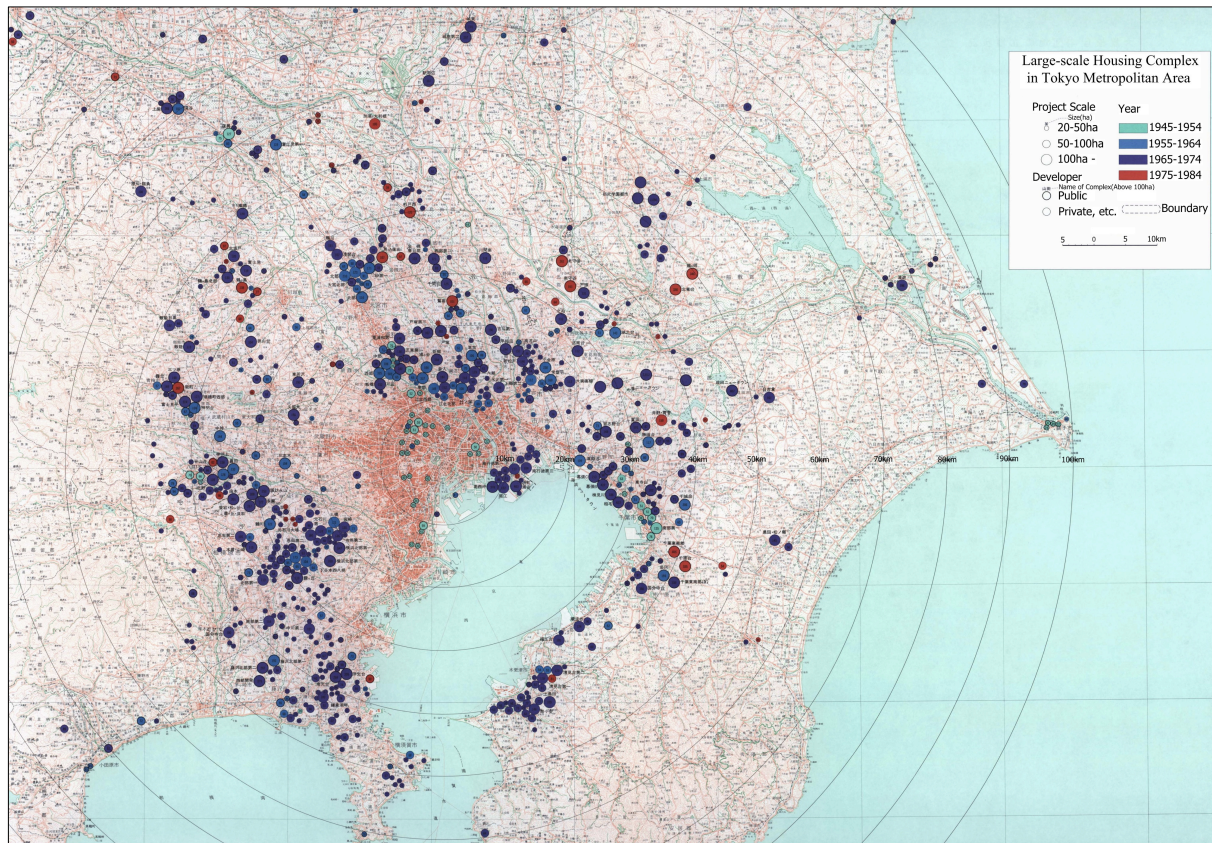
Source : MLIT 国土交通省国土地理院, 1984. Quoted in Kim, 2013.

Table 2-1. The Japan Housing Corporation's Development area ratio by year and by distance in the Tokyo metropolitan area

Year \ Distance from Tokyo CBD	inner 10km	10-20 km	20-30 km	30-40 km	40-50 km	50-60 km
From 1945 to 1954	42%	16%	10%	27%	5%	-
From 1955 to 1964	1%	33%	23%	31%	10%	2%
From 1965 to 1974	2%	11%	24%	34%	19%	10%
From 1975 to 1984	-	1%	7%	48%	37%	7%

Source : MLIT 国土交通省国土地理院, 1984. Quoted in Kim, 2013.

Since the early 1960s, the amounts of residential land development projects of the Japan Housing Corporation had been rapidly increased due to the accelerating urban sprawl. In this situation, the Japan Housing Corporation began to change their development strategy from the construction of a lot of medium size housing complex near to big city to the development of some large-scale new towns far from main cities by investing a lot of money for development of the infrastructure including roads, water supply system, sewerage, and railroads as well as community facilities (Kiuchi and Inouchi, 1976; Japan Housing Corporation, 1981). In 1963, the Japanese government enacted the New Housing and Urban Development Act 新住宅市街地開発法 (Act No. 134 of 1963) for the promotion of the large-scale new town development project – that is, New Housing and Urban Development Project 新住宅市街地開事業. This Act provides the public organizations concerned with power of eminent domain and designated 34 development projects by 1973 (Kiuchi and Inouchi, 1976).

Table 2-2. Summary of the major metropolitan residential new towns in Japan

	Tama 多摩	Kohoku 港北	Chiba 千葉	Senri 千里
Area (ha)	2,892	1,341	1,933	1,160
Residence	35.3%	57.8%	28.8%	41.7%
Road	19.5%	22.0%	22.3%	16.9%
Green	18.4%	9.4%	9.4%	20.8%
Public (including Business & Commercial)	26.8%	10.8%	39.5%	20.6%
Population (Proposed)	342,200	220,000	143,300	150,000
Housing unit (Proposed)	-	-	45,600	37,330
Location from CBD of main city	W 30km (JR Tokyo Stn.)	SW 25km (Nihonbashi Stn.)	NE 30km (Otemachi Stn.)	N 12km (JR Osaka Stn.)
Administrative district	Tama city, Hachioji city, Inagi city, Machida city	Tsuzuki district Yokohama city	Funabashi city, Inzai city, Shiroi city	Suita city, Toyonaka city
Transit	Keio Tama Line, Odakyu Sagamihara Line	Subway Line 3 of Yokohama city	Hokuso Line, Narita Express railway	Kita Osaka Express railway, Osaka Monorail, Hankyu Senri Line
Expressway	No	Tomei Expressway	No	Meishin Expressway
Developer	Tokyo Metropolitan Government, Japan Housing Corporation, Tokyo Metropolitan Housing Corporation	Japan Housing Corporation	Chiba Prefecture, Japan Housing Corporation	Osaka Prefecture
Development Method	New Housing and Urban Development Project, Land readjustment project	Land readjustment project	New Housing and Urban Development Project	Planned unit housing development and management一団地住宅経営事業, New Housing and Urban Development Project (*from 1964)
Construction Period	1966-2000	1974-2006	1969-2014	1960-1970
First Occupancies	1971	1981	1979	1962

Source: Fukuhara, 1998, p 21. revised by below sources;
   Tama NT: Urban Renaissance Agency. 2006. TAMA NEW TOWN (PR brochure).
   Kohoku NT: Urban Development Corporation都市基盤整備公団. Kohoku New Town (PR brochure).
   Chiba NT: Website of Urban Renaissance Agency (http://www.ur-net.go.jp/chiba-nt/chiba-nt/tochi.html
   Senri NT: Yamamoto, 2009.

2.2 Transition of the new town development policy

According to the research conducted by MLIT 国土交通省 of Japan with JICE (Japan Institute of Construction Engineering) 国土技術研究センター and targeting the suburb new towns which are planned with more than 50,000 proposed populations and more than 500ha in size by the public sector, a history of the Japanese new town development is divided into five phases based on the social background, housing policy and the main role of the new town projects (MLIT, 2004; Hayashi, 2010).

To look at other literature, Miyamoto (2005) of Japan's Urban Renaissance Agency (*abbr.* UR) 都市再生機構 divided transition of the Japanese new town development policy into six periods, Takahashi and Hayakawa (2009) and National Land Development Council in MLIT (2009) into three phases.

This thesis describes transition of the Japanese new town development policy by five phases based on periodization of MLIT with JICE, which is embracing other literature.

Phase I: The beginning of new town project (around 1960-1965)

In Japan experiencing rapid economic growth period since 1955, rapid migration to metropolitan areas (e.g., Tokyo, Osaka and Nagoya) took place. For this reason, Japan had to promptly supply housing and residential land having good residential environment in large quantities that can cope with housing demand, centered on those metropolitan areas. As Japan Housing Corporation was founded for housing supply and large scale planned housing development in 1955, the development plan of Tokiwadaira Complex[2] 常盤平団地 was announced. Osaka prefecture started Japan's largest new town, Senri 千里 New town as the executor of the development project located about 12km away to the north of JR Osaka station in 1960. As the New Housing and Urban Development Act 新住宅市街地開発法 enabling housing complex development was enforced in 1963

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[2] Tokiwadaira Complex 常盤平団地 is the large scaled rental housing complex located in Matsudo city 松戸市, Chiba prefecture 千葉県. This complex is the second largest apartment complex constructed by Japan Housing Corporation composed with middle-rise apartment house and has about 5,300 households.

through land expropriation, the supply of high quality large scaled housing complexes were promoted (Hayashi, 2010).

Phase II: Expansion and stagnation of large-scale new town project (1965-1973)

During this period, large scaled new town projects were continuously carried out as well. The construction of Tama 多摩 New town representing Japan commenced in 1966, and the Seishin 西神 New town, Tsukuba Scientific City 筑波研究学院都市, Chiba 千葉 New town and Narita 成田 New town project were also implemented, too.

In the meantime, as urban sprawl phenomenon was continued due to population increase in metropolitan areas, a development control policy, through which Administrative Guideline for Housing Site Development 宅地開発指導要綱 was established and operated by local governments, began to be executed in order to reduce financial burden needed to readjust pubic urban facilities spent by urban area expansion. This implementation bought about stagnation period of the new town projects (Hayashi, 2010).

Phase III: Stagnance of new town project caused by the change of the housing demand (1973-1979)

According to Housing Census, the number of housing units exceeded the number of households in the entire prefectures in 1973. Such a situation became an occasion that Japanese housing problem turned from quantitative securing aspect into qualitative improvement issue. In addition, Japan's rapid economic growth came to an end, because of oil crisis that occurred in the fall of 1973. Population migration to metropolitan areas also sharply declined, and migration to top three metropolitan areas (i.e., Tokyo, Osaka and Nagoya) was stagnant in 1976.

As housing and housing site supply became stagnant in the metropolitan areas, due to the factors including high housing prices, suburbanization of housing site supply and increase in person trip time (commuting time) and distance, the housing site-related public urban facilities maintenance

promotion project system to support housing site development in a different way from the general public urban facilities maintenance project was adopted in 1978. This system was undertaken so as to reduce local government's financial burden and promote planned housing site development, such as new town development (Hayashi, 2010).

Phase IV: Expansion of multi-functional new town project for the conversion of economic and industrial structure (1980-mid 1990s)

In 1980, an effort to reorganize R&D strongholds and create characterful housing complexes that reflected regional characteristics and environment in linkage with industrial promotion instead of previous bedroom town. To increase corporate investment in R&D, diversify business and downsize management, together with industrial structure shift, land demand to relocate factories, research centers and universities to suburban areas increased. In line with such a trend, the functions of new towns showed a sign of change (Takahashi and Hayakawa, 1993).

The New Housing and Urban Development Act, which made large quantity housing supply possible during the housing shortage period, was enacted to specialize the construction of residential land. Therefore, it was impossible to secure self-containment facilities including workplace in addition to facilities required for residents' living in legal terms at the time of the enactment of the act. Through the New Housing and Urban Development Act revision in 1986, the location of special business facilities such as factories, company offices and research centers in harmony with good residential environment within new towns was allowed. In this manner, multi-functionalization was actively promoted within large scaled new towns. In reality, starting from Atsuki 厚木 New town in Kanagawa Prefecture 神奈川県, Tama New Town, Kohoku 港北 New town and Chiba New Town tried to attract educational, research and business facilities. Tsukuba Scientific City tried self-proliferation growth by expanding and developing private research center complexes surrounding the area since the Tsukuba International Expo in 1985. In this way, efforts to shift from existing bedroom town-focused new town project to multi-functional new town project continued (Miyamoto, 2005; Lim and Kim, 2011).

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In the meantime, temporary expansion and acceleration of housing and housing site supply through new town took place in the latter part of the 1980s, due to bubble economy.

Phase V: Suspension of new town project by reduction of the house demand entirety and phenomena of migration to downtown (since mid 1990s)

Since the collapse of the bubble economy, the tendency of people returning to the city centers, by which population resided in the suburbs of metropolitan areas migrated to city centers, began to occur, as apartment houses construction was actively undertaken in the city centers of metropolitan areas. With this, population decrease and population aging accelerated, and the deterioration of housing and urban facilities and regional vitality decline took place in the initial stage metropolitan new towns built in the rapid growth era (Miyamoto, 2005; Hayashi, 2010).

Although, Japan Housing Corporation played a pivotal role in promoting Japan's new town projects consistently up to 1995, since its foundation, no new town development project was undertaken, since 2001, because of such economic and social circumstances change. According to Japanese government's Readjustment and Rationalization Plan for Special Agencies set in December 2001, the Japan Housing Corporation was reorganized to the UR 都市再生機構, Incorporated Administrative Agency in 2004. This agency, UR is carrying out urban renaissance, residential environment improvement, disaster recovery and suburban environment maintenance instead of suspending housing supply projects and new town development projects.

Table 2-3. Periodization of the Japanese new towns by MLIT, 2004

Phase	Name	Period	Characteristics	Typical example
I	The beginning of new town project	From 1960 to 1965	Mass housing supply with a good residential environment	Senri NT, Kozoji NT, Senboku NT
II	Expansion and stagnation of large-scale new town project	From 1965 to 1973	Local area maintenance, Leading the local promotion	Tama NT, Seishin NT, Tsukuba Scientific City, Chiba NT, Narita NT, Hokusetsu & Hokushin NT
III	Stagnance of new town project caused by the change of the housing demand	From 1973 to 1979	Promotion of improvement and the diversification of the quality of the housing	Tama NT, Kohoku NT
IV	Expansion of multi-functional new town project for the conversion of economic and industrial structure	From 1980 to the middle of 1990s	Coping with the slump of the suburbs housing demand and the bubble economy	Tsukuba Scientific City, Kansai Science City, Nagaoka NT, Iwaki NT
V	Suspension of new town project by reduction of the house demand entirety and phenomena of migration to downtown	Since the middle of 1990s	Difficulty with the suburb new town projects based on the assumption of a rise in real estate prices	-

Source: MLIT, 2004.

Figure 2-2. Development History and Background for the Japanese New Towns
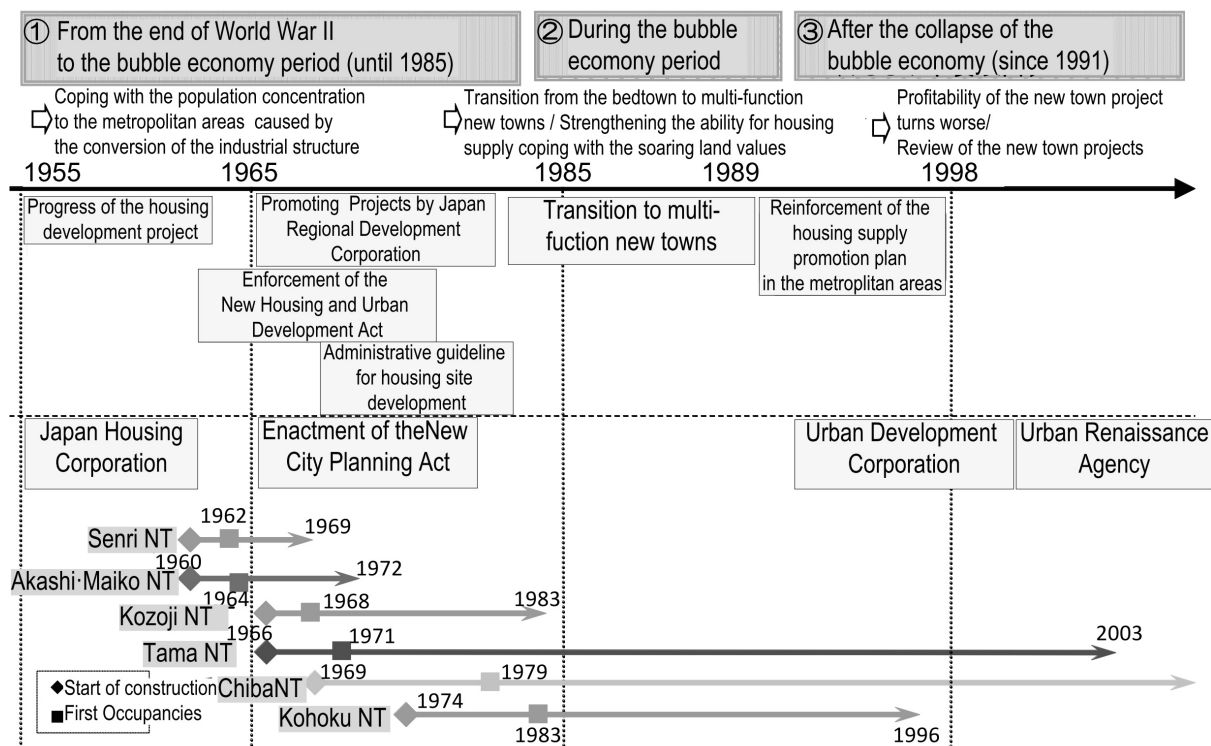
Source: Hayashi, 2010. Quoted in Kim, 2013.

2.3 Characteristics of Japanese metropolitan new towns developed during the rapid growth era

In 1976, Kiuchi and Inouchi criticized the lack of the less self-containment in the Japanese new towns planned during the rapid growth era comparing with that in UK and western countries. Whereas the concept of suburban new towns in UK was the marriage of town and country as well as working place and place to live, Japan's ones were focused on supplying more housing units. Hence, the planners and developers did not attempt to realize the original concepts of a suburban new town (e.g., preservation of the natural environment, fostering desirable human relations, access of home to jobs, etc.). Furthermore, the main concern for improvement of living environment was limited to physical installations, and even there the level of development is rather low because of shortage of public investment. They also pointed out that Japanese new towns were planned along or near rapid-commuting railway lines to the mother cities, whereas American new towns were planned along expressways along which the inhabitants can travel to the mother city by car.

Kurokawa (1978) also emphasized that new town development in Japan had been criticized in terms of the British concept of developing self-contained new towns, furthermore, the financial problem of who should pay for facility construction was one of the problems over which developers and local governments confront each other.

Tohoku Regional Advancement Center 東北産業活性化センター (2008) enumerated the characteristics of Japanese initial new towns as follows: 1) new towns were constructed to cope with the urban sprawl caused by the housing shortage and the population inflow in the metropolitan areas since World War II, 2) new towns are one of the planned residential areas by the various development methods such as the New Housing and Urban Development Project based on the neighborhood unit theory, the Land readjustment project 土地区画整理事業, the Planned unit housing development and management 一団地住宅経営事業, etc., 3) even though there are few jobs within new towns, it is not inconvenient to daily life due to the well-equipped urban infrastructure and urban facilities such as shopping centers, schools and hospitals, 4) it is apart from workplaces in the main city because of the

low jobs-housing balance, 5) the white-collars working in the CBD of main cities are forming the main residential class, 6) a detached house and an apartment house are mixed in the residential area, 7) the main new town developers are each municipal government, a public corporation and private companies, 8) new town developments have proceeded along the railway lines.

Asami (2008) stated that Japanese new towns had the inherent limitation to have to rely on their mother cities because they were located in the suburbs of the metropolitan area. As these new towns have equipped all kinds of infrastructure and urban facilities according to the comprehension plan established prior to construction, there is no problem in terms of urban facilities - such as roads, schools, water supply system, etc. - comparing to the urbanized areas. On the other hand, for that characteristic of new towns, it is not until the severe deterioration of the physical environment has occurred that reforming the urban structure has been considered. In addition, an age bias phenomenon of the residents and households in the suburb new towns is more serious than that of the urbanized areas because homogeneous people moved in any residential complex during the short period. He, however, thinks that a suburb new town is the privileged area that middle-class residents are living in together and there is no conflict between social classes like that of the United States.

Doteuchi (1999) pointed out the demographic characteristics of Japanese metropolitan new towns as follows. First, acceleation of population aging is predictable because new towns residents are a highly concentrated age distiribution. Furtermore, children (i.e., the second generation of the initial occupancy generation) is likely to discourage form living together with their parents or nearby due to high land prices, limited choice of residence type, and the belabored housing situation.

Hayashi (2010) also emphasized that the characteristics of the new towns planned during the rapid growth era in Japan were a massive uniform housing supply and a migration of the same generation at the same time, the inflexible neighborhood planning based on the neighborhood unit theory by Clarence A. Perry, a new town boundary located in the multiple municipal administrative districts, the participation of multiple developers in the new town development project and the development of hilly areas.

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Proceeding from what has been examined above, we could summarize the characteristics of the Japanese new towns planned during the rapid growth era as follows: 1) these initial stage new towns were constructed under the leadership of the central government to cope with the housing shortage problem caused by enormous migration of people into the metropolitan areas, 2) there was no consideration for the self-containment facilities within either the master plan or the law promoted the new town developments because housing supply was the prime purpose of developing a new town. Consequently, workers live in the new towns cannot help commuting to their mother cities by rapid train, 3) a lot of homogeneous residents moved in new towns at the same time. The main reason is that the Japan Housing Corporation supplied a massive uniform housing to shorten the housing supply time in the new towns planned during the rapid growth era, 4) the urban infrastructure and urban facilities including the housing were supplied as a package intentionally by the inflexible master plan based on the Clarence A. Perry's neighborhood unit theory.

2.4 Issues of the Japanese metropolitan new towns in the era of population aging and decline

As the tendency of people returning to the city centers 都心回帰 for housings has become more remarkable since the collapse of the bubble economy, new towns constructed in the suburbs of the metropolitan area during the rapid growth era are on the decline. Representative new towns constructed during the same period, including Tama New Town, have multiple problems, such as fertility decline and aging of the residents, aging buildings, and declined neighboring centers, thus accelerating the decline of new towns (Kimura and Takiguchi, 2006).

Those new towns, including Senri New Town and Tama New Town, which were constructed during the rapid growth era when the new town project began to be implemented strategically in the metropolitan areas in Japan, put restrictions on income for housing corporation at the time of occupancy and the houses for installment sale required the ability to pay the housing price in a lump sum or long-term repayment of housing mortgage loan. For this reason, early new towns were occupied by a large number of relatively homogenous generations around those in their 30s to 40s and

by people with similar household composition in a short period (Tohoku Regional Advancement Center, 2008). As a young generation grew older, they moved out of new towns to look for a job outside of new town area because metropolitan new towns were planned to perform the function of a bed town which was lack of self-sufficiency basically. These young people lived in not its own new town but other areas didn't want to move in new towns due to lacking a proper job. Furthermore, parent's generation grew older and retired, and one-generation alone lived in current house of new towns without children generation. Therefore, aging is getting worse and the population has been reduced (Doteuchi, 1999).

In the policy aspect, poor association between city planning (master plan) and housing planning (sub-plan) is indicated as one of the errors in the Japanese New Town policy. New towns planned during the rapid growth era had another goal of *massive housing supply* to resolve the housing shortage in addition to the goal of establishing a new city in the suburb at that time and the former couldn't but be adopted to solve the social phenomenon of population concentration toward cities at that time. However, no close association between city planning (master plan) for controlling the entire new town and housing planning as a sub-plan led to mass-supply of uniform and small-sized housing units, which has become a major cause of population aging in Japan's new towns. It is believed that this resulted from the administrative system where local governments and the Japan Housing Corporation in charge of housing supply failed to build a horizontal and organic cooperation system but each moved vertically (Kimura and Takiguchi, 2006).

Due to these characteristics, Japanese metropolitan new towns developed during the rapid growth era have the following problems in the population decline and aging era. The most serious problem is aging of residents and the lack of urban facilities for the elderly people (Ueno and Matsumoto, 2011). The neighborhood units that had been occupied since the initial stage of the development in the 1960s and 70s are showing a tendency to be aged more rapidly than the national average and have a population structure that cannot avoid rapid progression of aging over time because young generations are less likely to migrate in these neighborhood units and the initial occupants of these neighborhood units belong to the age group as time goes on.

Over and above, as massive housing units and construction of infrastructures were implemented in a short period, physical update of these facilities will be concentrated on a certain period of time. This leads to the continuous increase of maintenance and management expenditure on public facilities and to the reduction in the number of students, which makes a plan to utilize closed schools as an important issue. In addition, these new towns also have the lack of urban facilities for the elderly people in the face of population aging. With the increase of the aged population, demand of housing and urban facilities for the elderly has been also increased. Housing and urban facilities for the elderly people (e.g., the elevator in building, the elderly nursing center, etc.) were not considered in the initial master plan from the beginning (Deteuchi, 1999; Ueno and Matsumoto, 2011). However, there is no space to install them practically due to the rigidity of land use plan by a master plan. Further, the skewed age composition of new town residents is likey to increase demand for public services, especially related with the elderly, whereas public finances of local governments will be strained by decreasing tax revenue in the era of population aging and decline (Deteuchi, 1999).

Table 2-4. Population and population growth rate in Tokyo metropolitan area

Area	Total population (thousands)					Population growth rate (%)			
	1990	1995	2000	2005	2010	1990-1995	1995-2000	2000-2005	2005-2010
Japan	123,611	125,570	126,926	127,768	128,057	1.6	1.1	0.7	0.2
Capital region*	39,396	40,402	41,322	42,379	43,467	2.6	2.3	2.6	2.6
Tokyo metropolitan area**	31,797	32,577	33,418	34,479	35,618	2.5	2.6	3.2	3.3
Tokyo Prefecture	11,856	11,774	12,064	12,577	13,159	-0.7	2.5	4.3	4.6
District area in Tokyo Prefecture	8,164	7,968	8,135	8,490	8,946	-2.4	2.1	4.4	5.4
Chuo, Chiyoda and Minato districts in Tokyo Prefecture	266	244	268	326	375	-8.3	9.8	21.6	15.0
Neighboring 4 prefectures of Tokyo metropolitan area***	7,600	7,825	7,904	7,900	7,849	3.0	1.0	-0.1	-0.6

*. Capital region 首都圏: Tokyo metropolitan area and Neighboring 4 prefectures of Tokyo metropolitan area
**. Tokyo metropolitan area 東京圏: Saitama prefecture 埼玉県, Chiba prefecture 千葉県, Kanagawa prefecture 神奈川県 and Tokyo prefecture 東京都
***. Neighboring 4 prefectures of Tokyo metropolitan area: Ibaraki prefecture 茨城県, Tochigi prefecture 栃木県, Gunma prefecture 群馬県, Yamanashi prefecture 山梨県

Source: Statistics Japan. Population Census of Japan in each year. Quoted in MLIT, 2014.

2.5 Conclusion

This chapter examined characteristics of Japanese metropolitan new towns developed during the rapid growth era based on the literature reviews of the precedent studies.

The first two sections of Chapter 2 introduced the background of new town development and then described the transition of the new town development policy by dividing into five periods. The Japanese Government constructed large-scaled new towns in the metropolitan area as bedroom towns until 1973 with the purpose of local maintenance and development but they changed the purpose of the new town project into raising its self-containment after mid-1980s. Meanwhile, the new town project premised on the assumption that its value of the property will be on the rise experienced difficulties after the collapse of the bubble economy in the end of 1990s. Low population growth and aging phenomenon also brought reduced housing demand. Hence, public sector finally stopped involving the new town project.

The last two sections of this chapter examined characteristics of Japanese metropolitan new towns developed during the rapid growth era, and then pointed out the major issues of Japanese metropolitan new towns in the era of population aging and decline.

Japanese new towns planned during the rapid growth era have some characteristics as follows: 1) construction under the leadership of the central government, 2) lack of the self-containment facilities, 3) a massive migration of homogeneous people and households at the same time by a massive uniform housing supply method, 4) urban infrastructure and urban facilities supplied by the inflexible master plan based on the Clarence A. Perry's neighborhood unit theory.

Metropolitan new towns developed during the rapid growth era in Japan have the following problems with the population decline and aging era. The neighborhood units that had been occupied since the initial stage of the development in the 1960s to 70s show a tendency to be aged more rapidly than the national average and have a population structure that cannot avoid rapid progression of aging over time. In terms of metropolitan new town's characteristics, one reason for population aging in these communities is that a lot of homogeneous residents had moved in the housing units supplied by

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a master plan during the short period at the initial stage of new town development. Considered from the residents' migration pattern, another reason for population aging is that young generations are less likely to migrate in these neighborhood units whereas the initial occupants who have lived continuously in these neighborhood units belong to the age group as time goes on.

Furthermore, as massive housing units and construction of infrastructures were implemented in a short period, physical update of these facilities will be concentrated on a certain period of time. This leads to the continuous increase of maintenance and management expenditure on public facilities. With the increase of the aged population, demand of housing and urban facilities for the elderly has been also increased. These new towns also have the lack of urban facilities for the elderly people in the face of population aging because housing and urban facilities for the elderly people (e.g., the elevator in building, the elderly nursing center, etc.) were not considered in the initial master plan from the beginning. What is worse, there is no space to install them practically due to the rigidity of land use plan by a master plan.

Chapter 3   Evolution of Tama New Town in Tokyo metropolitan area, Japan

Chapter 3 examines the background and process of new town developments, the housing unit type and supply method, and the demographic changes of Tama New Town residents in Japan that had experienced population aging problems. In particular, the third section of this chapter focuses on the population structure by age, ratio of population aged 65 and over, and migration based on the literature reviews and population census data.

3.1   Objective and process of new town development

3.1.1   Development objective and evaluation of accomplishment

The idea of Tama New Town can be viewed to start from 'the Basic Policy of Southern Tama 南多摩 New Town Construction' established by the Bureau of Capital Region Development Tokyo Metropolitan Government, as the New Housing and Urban Development Act was enacted in 1963. However, the actual framework of Tama New Town development project is founded on Tama New Town Development Plan 1965 executed by the City Planning Institute of Japan in 1965. The plan intended to realize the idea of united urban function 聯合都市構想 to share city functions between five cities (i.e. Tama, Machida, Hino, Sagamihara and Tama New Town) in Tama area including Tama New Town to lower dependence on Tokyo CBD, as well as supply housing and housing sites in large quantities and prevent external urban extension through Tama New Town construction.   Namely, Tama New Town was planned to expand city center functions as a central hub of united urban area, where job-housing proximity is possible, as well as housing and housing site supply, being independent from the Tokyo CBD (Maeda, 2000; Takahashi and Hayakawa, 1993).

Tama New Town contributed to the supply of planned housing and housing sites massively in responding to population concentration in the Tokyo Metropolitan Area occurred during the rapid growth era from the housing plan and urban management perspectives. Tama New Town is rated positively in that it effectively responded to the prevention of urban sprawl in Tama area from an urban planning perspective. Meanwhile, the Tama New Town development project promoted

stronghold creation by introducing high dimensional urban functions in areas including Tama Center

to secure self-containment of city, but it was not properly executed. Also, the original plan to create

independent united urban area with job-housing proximity is criticized in that the plan is still lower in

job-housing proximity, compared to Tokyo CBD, in view of the person trip survey result or census

analysis result (Maeda, 2000; Takamizawa, et al., 1992).

Figure 3-1. Location and master plan of Tama New Town
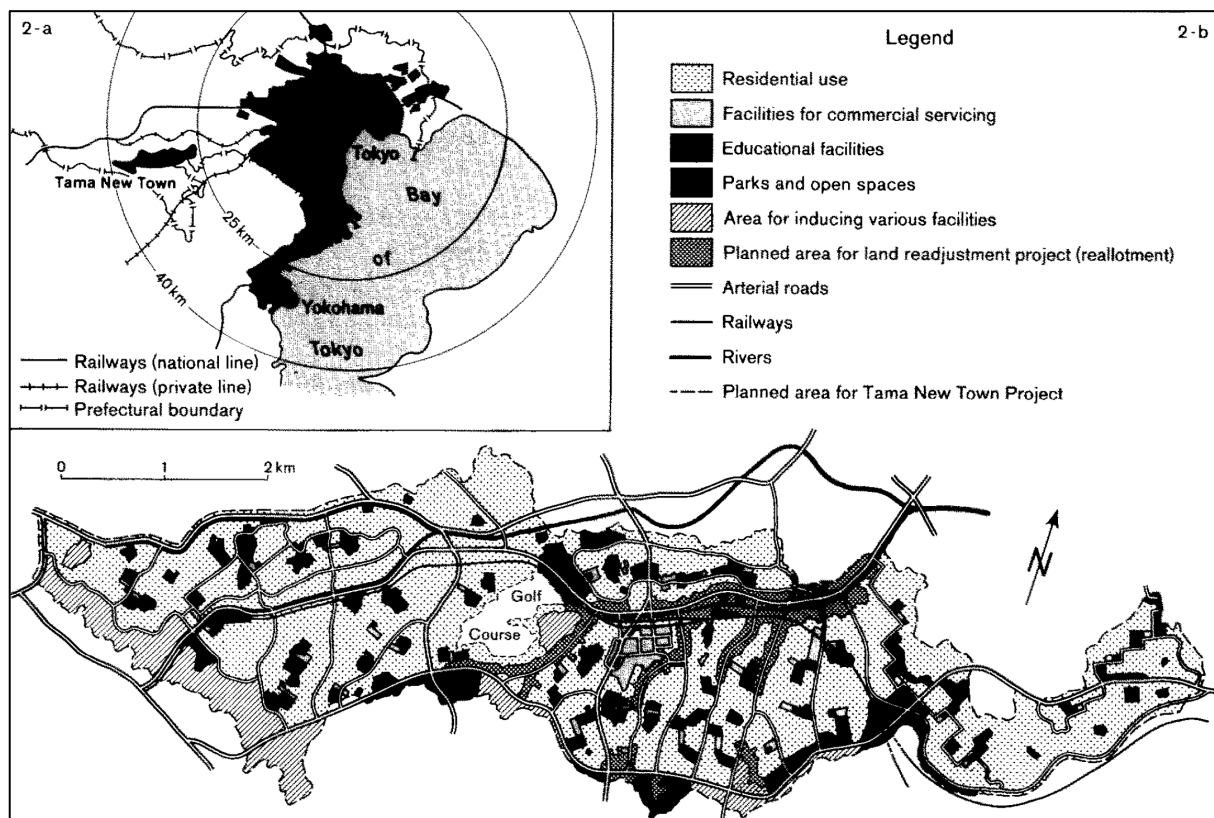
Source: Kiguchi and Inouchi, 1976.

3.1.2   Development process and characteristics

The Tama New Town development project was promoted in full swing through urban

planning decision in December 1965 and project authorization in 1966. Developers of the New

Housing and Urban Development project were consisted in three parties - Tokyo Metropolitan

Government, Tokyo Metropolitan Housing Supply Corporation and Japan Housing Corporation. In

March 1971, initial occupancy started through promotion of the relevant public project, housing construction project and public interest facilities construction project together. In the fall of 1971, however, the New Housing and Urban Development project was temporarily suspended, due to the administrative and financial problem of Tama city. To solve such a problem, Tama city established 'the Administrative and 'Financial Guideline for Tama New Town and Local Housing Construction' 多摩ニュータウンにおける住宅建設と地元の行財政要綱. As a result, the project resumed. The 120 persons/ha in population density, 55% of rental housing ratio and 30% or more of green area and open space set forth in the guideline became important indices in carrying out the development project. In 1979, rental housing ratio was reduced to 45%, housing unit size became larger, centered on 3LDK and 3DK and detached housing ratio declined to 10% or less by partially revising the guideline (Maeda, 2000).

Figure 3-2. The first moving-in of Tama New Town

Source: The Daily Yomiuri
on 27 March 1971 evening newspaper.

Figure 3-3. The groundbreaking ceremony of Tama New Town

Source: The Daily Yomiuri on 2 June 1969 evening newspaper.

The Keio Ogamihara line 京王相模原線 and Odakyu Tama line 小田急多摩線 were open to the Tama Center station in October 1974 and October 1975, respectively. In Tama Center area, which is the center of Tama New Town, 'Okanoue Plaza'丘の上プラザ, which can be the first phase commercial facilities, was open in April 1980. After the introduction of business function was reviewed in an effort to ensure local government's financial soundness by increasing local employment opportunities and to promote job-housing proximity, the business facilities were located in the service industry area in 1983. Such a change was connected with a trend to shift Tama New Town function from bedroom town to multi-function city. Through partial revision of the 'New Housing and Urban Development Act' mainly for specific business facilities introduction in May 1986, commercial and business facilities began to be actively attracted in various places including Tama Center area.

Housing supply was made, centered on apartment houses, led by public sector including Japan Housing Corporation and Tokyo Metropolitan Housing Supply Corporation, based on housing policy at the initial stage of development. Since then, various types of housing were supplied through joint housing installment sale between the public and private sectors, as private sector took part in the project actively (Maeda, 2000).

It is divided into 21 districts, each with about 3000 to 5000 houses and apartments, each with two elementary schools and one junior high school as well as a neighborhood center with shops, police station, post office, clinics and the like. Several neighborhoods form one district, each of which are centered around a commuter rail station.

Figure 3-4. Land use plan of Tama New Town
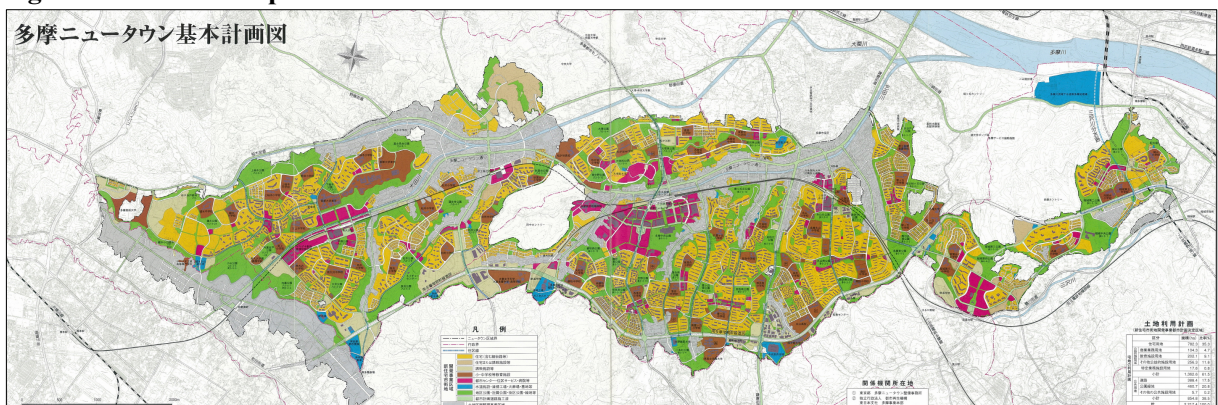
Source: Urban Renaissance Agency in Japan, 2006.

Tama New Town is not a municipality in itself; instead, it straddles the pre-existing boundaries of Tama 多摩, Hachioji 八王子, Inagi 稲城 and Machida 町田 cities, and each area is administered by its respective municipal authorities, all of which come under the jurisdiction of Tokyo Metropolitan Government. New Housing and Urban Development project was extended to Hachioji city and Inagi city areas step by step, starting from Tama city 多摩市 area, where initial stage development was conducted. In Hachioji city area, Horinouchi 堀之内 Station Plaza Center and Karakida 唐木田 Station Plaza Center were developed as central districts, and Nagaike 長池 district and Karakida 唐木田 district were developed as residential areas. In Inagi city 稲城市 area, Yokodai 陽光台 district and Wakabadai 若葉台 district were developed as central districts (Black and Dillon, 2008).

In 2000, all sections of Tama monorail 多摩モノレール crossing south-north were open[3], and the population of Tama New Town exceeded 200,000 in 2004, and Tokyo Metropolitan Government's development project was finished by this time. In stead of finishing implementation of new town development by Tokyo Metropolitan Government itself, Tokyo Metropolitan Government announced a sales promotion project for a publicly owned 95.3-hectare site in Hachioji City on the western side of Tama New Town so as to take new initiatives to deal with the slump in New Town development (The Daily Nikkei 日本経済新聞 on 12 January 1999). Under this scheme, private companies could build housing on public land, and sell the housing and land jointly with the public sector, Tokyo Metropolitan Government. This business model was viewed as a promising new form of government-business collaboration (Doteuchi, 1999). In 2006, UR (i.e., Urban Renaissance Agency: former Japan Housing Corporation), another main player of Tama New Town development project put disposition announcement on the undisposed land that UR had as part of an action to complete the project early, and declared the end of Tama New Town development project at public sector level (MLIT, 2010).

Compared to Senri 千里 New town built in Osaka 大阪 metropolitan area in the 1960s, the most important difference between Senri New Town and Tama New Town was delayed construction

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[3] Tama Monorail operated between Tachigawa 立川 station and Tama Center 多摩センター station was originally scheduled to be connected to Machida 町田 station (Tama university, 2009).

period.   The reasons why Tama New Town project was delayed in the initial stages of the project included: 1) financial problem of Tama city, 2) problem of buried cultural properties, 3) social and economic situation change after oil crisis, 4) simultaneous implementation with land readjustment project. Meanwhile, despite procrastinated project in the initial stages, the reason why construction was conducted smoothly until economic bubble burst is conjectured to be the existence of demand of land for specific business that could be adopted within new town with the revision of the New Housing and Urban Development Act in 1986 together with robust demand of housing sites in the Tokyo Metropolitan Area and continuous price jump before bubble burst (Matui and Takamizawa, 1992; Takamizawa, et al, 1992).

Figure 3-5. Development method and developer by neighborhood units in Tama New Town
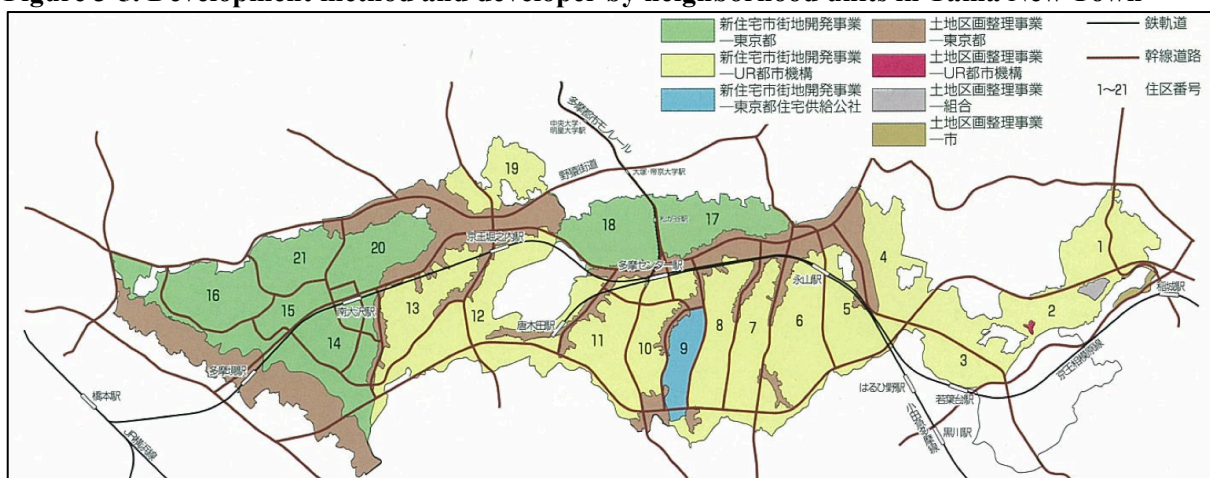
Source: Urban Renaissance Agency in Japan, 2006. Quoted in Kim, 2013.

Figure 3-6. Initial occupancy of Tama New Town districts developed by New Housing and Urban Development Project

新住事業区域の各住区の入居開始年
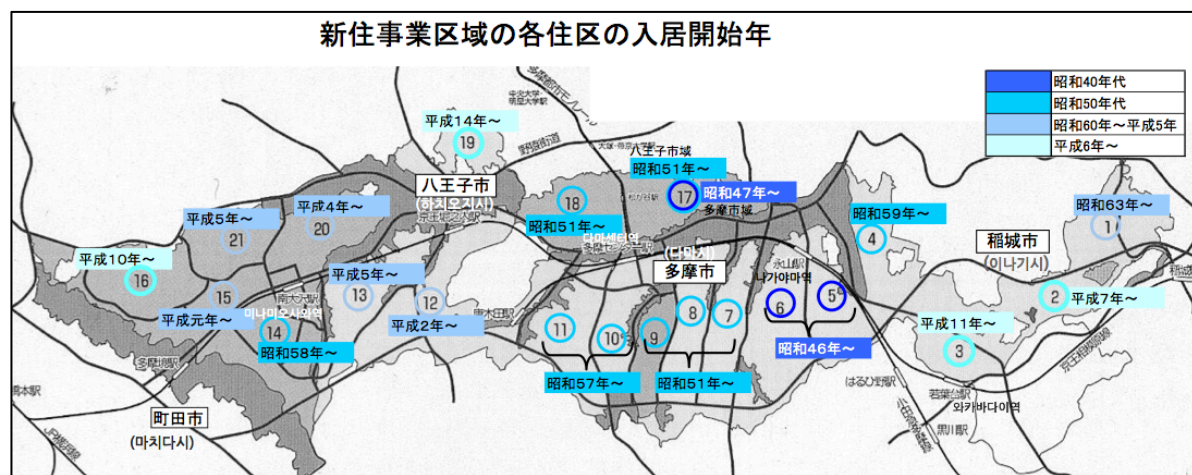
City	No.	Districts	Time of initial occupancy	Developer of Project
Hachioji City	12	堀之内・別所	1990	UR
	13	松木	1993	UR
	14	南大沢	1983	Tokyo Metropolitan Government
	15	南大沢	1989	Tokyo Metropolitan Government
	16	鑓水	1998	Tokyo Metropolitan Government
	17*	鹿島	1976	Tokyo Metropolitan Government
	18	松が谷	1976	Tokyo Metropolitan Government
	19	堀之内・越野	2002**	UR
	20	南大沢・下柚木	1992	Tokyo Metropolitan Government
	21	上柚木	1993	Tokyo Metropolitan Government
Inagi City	1	向陽台	1988	UR
	2	長峰	1995	UR
	3	若葉台	1999	UR
Tama City	4	聖ヶ丘	1984	UR
	5	諏訪	1971	UR
	6	永山	1971	UR
	7	貝取	1976	UR
	8	豊ヶ丘	1976	UR
	9	落合	1976	Tokyo Housing Corporation
	10	落合・南野	1982	UR
	11	和田・愛宕・東寺方	1982	UR
	11	鶴牧・唐木田・南野	1972	Tokyo Metropolitan Government

*. District No.17 is divided into two cities, Tama City and Hachioji City.
**. Time to start selling housing site by private sectors.

Source: Tokyo Metropolitan Government, 2011. Quoted in Kim, 2013.

3.2 Housing unit type and supply method

For 28 years (1970-1997) from the 1970s, when the initial occupancy of Tama New Town started, until just before housing demand declined in the suburban area and return to city center occurred, 43,313 houses were supplied in the types of rental housing and house for installment sale with various sizes led by the public sector within Tama New Town.

During the period, 26,470 units, 61% of total amount of housing, were supplied by Japan Housing Corporation. Tokyo Metropolitan Housing Supply Corporation 東京都住宅供給公社, in charge of the development of Block No. 9, Ochiai 落合 district, supplied about 16% of housing units. Tokyo Metropolitan Government, in charge of the New Housing and Urban Development project of Blocks No. 14, 15, 17 and 18, supplied about 21% of housing units in the type of metropolitan dwelling house. As a whole, the public sector supplied most housing (about 98%) within the new town. The private sector supplied 784 units of housing, which is even less than 2% of total amount of housing from the 1980s mostly in the relatively big size of 3LDK or more.

Looking into by housing unit size, small sized housing units with the plane of 3 or less rooms (1K-3DK) were mainly supplied in early 1970s, when development including Suwa-Nagyama 諏訪・永山 district and Wada·Atago·Higashiteragata 和田・愛宕・東寺方 district was conducted, which can be called the initial stage of Tama New Town development area. However, housing unit ratio with large plane of 4DK or more began to increase, as time went on. In terms of type of home ownership, rental housing was supplied about four times more than houses for installment sale in the initial stage occupancy area. However, the ratio of houses for installment sale rose. Therefore, during the whole period from 1970 to 1997, the houses for installment sales and rental housing were supplied in similar ratios.

Table 3-1. Type of housing supply and housing unit by period in Tama New Town (1970 - 1997)

Period of housing supply	Type of housing supply	1K~1LDK	2DK~2LDK	3DK	3LDK	4DK~4LDK	Lager than 5DK	Unknown	Total	
1970-1974 (Sale:Rent =20:80)	Rent by Tokyo Metropolitan Government*	0	0	3,122	0	0	0	0	3,122	(36.3%)
	Rent by Japan Housing Corporation	183	1,610	1,780	0	0	0	0	3,573	(41.6%)
	Sale by Japan Housing Corporation	0	0	1,230	0	0	0	0	1,230	(14.3%)
	Rent by Tokyo Metropolitan Housing Supply Corporation	0	196	0	0	0	0	0	196	(2.3%)
	Sale by Tokyo Metropolitan Housing Supply Corporation	0	0	202	268	0	0	0	470	(5.5%)
	Sale by private sector	0	0	0	0	0	0	0	0	(0.0%)
	Sub total	183	1,806	6,334	268	0	0	0	8,591	(100.0%)
1975-1979 (Sale:Rent =46:54)	Rent by Tokyo Metropolitan Government	0	0	1,450	0	46	0	0	1,496	(15.5%)
	Rent by Japan Housing Corporation	0	858	1,212	0	20	0	0	2,090	(21.7%)
	Sale by Japan Housing Corporation	0	0	902	1,482	557	0	0	2,941	(30.5%)
	Rent by Tokyo Metropolitan Housing Supply Corporation	0	300	1,304	0	0	0	0	1,604	(16.6%)
	Sale by Tokyo Metropolitan Housing Supply Corporation	0	0	1,030	363	118	0	0	1,511	(15.7%)
	Sale by private sector	0	0	0	0	0	0	0	0	(0.0%)
	Sub total	0	1,158	5,898	1,845	741	0	0	9,642	(100.0%)
1980-1988 (Sale:Rent =69:31)	Rent by Tokyo Metropolitan Government	6	47	1,502	72	20	0	0	1,647	(14.0%)
	Rent by Japan Housing Corporation	70	491	475	510	129	0	0	1,675	(14.3%)
	Sale by Japan Housing Corporation	0	81	0	3,078	2,747	206	0	6,112	(52.1%)
	Rent by Tokyo Metropolitan Housing Supply Corporation	0	28	241	31	0	0	0	300	(2.6%)
	Sale by Tokyo Metropolitan Housing Supply Corporation	0	0	0	868	433	130	0	1,431	(12.2%)
	Sale by private sector	0	14	0	162	268	124	0	568	(4.8%)
	Sub total	76	661	2,218	4,721	3,597	460	0	11,733	(100.0%)
1989-1997 (Sale:Rent =51:49)	Rent by Tokyo Metropolitan Government	12	123	851	336	33	0	1,375	2,730	(20.5%)
	Rent by Japan Housing Corporation	532	687	309	1,173	110	0	0	2,811	(21.1%)
	Sale by Japan Housing Corporation	125	706	0	2,580	2,373	254	0	6,038	(45.2%)
	Rent by Tokyo Metropolitan Housing Supply Corporation	1	325	0	618	106	0	0	1,050	(7.9%)
	Sale by Tokyo Metropolitan Housing Supply Corporation	0	20	0	225	226	31	0	502	(3.8%)
	Sale by private sector	0	0	0	0	100	0	116	216	(1.6%)
	Sub total	670	1,861	1,160	4,932	2,948	285	1,491	13,347	(100.0%)
Total (1970-1997) (Sale:Rent =49:51)	Rent by Tokyo Metropolitan Government	18	170	6,925	408	99	0	1,375	8,995	(20.8%)
	Rent by Japan Housing Corporation	785	3,646	3,776	1,683	259	0	0	10,149	(23.4%)
	Sale by Japan Housing Corporation	125	787	2,132	7,140	5,677	460	0	16,321	(37.7%)
	Rent by Tokyo Metropolitan Housing Supply Corporation	1	849	1,545	649	106	0	0	3,150	(7.3%)
	Sale by Tokyo Metropolitan Housing Supply Corporation	0	20	1,232	1,724	777	161	0	3,914	(9.0%)
	Sale by private sector	0	14	0	162	368	124	116	784	(1.8%)
	Total	929 (2.1%)	5,486 (12.7%)	15,610 (36.0%)	11,766 (27.2%)	7,286 (16.8%)	745 (1.7%)	1,491 (3.4%)	43,313 **(100.0%) (100.0%)	

*Shaded cells represent a rental housing.

** Total number of supplied housing units in Tama New Town is 52,095 units until March 31, 2006.

Source: Tokyo Metropolitan Government 東京都多摩都市整備本部, 1998. Quoted in Kim, 2013.

Table 3-2. Summary of housing supply in Suwa-Nagayama district in Tama New Town

District	Type of housing supply	Complex	Number of households in complex	Initial occupancy	Density of Bldg.	Type of housing unit	Number of house-holds	Total Floor Area (sq. m.)	Avg. Total Floor Area (sq. m.)	Site area (sq. m.)	Floor Area Ratio	Parking capacity (Car)	Parking lot per house-hold
Suwa district	Rent by Japan Housing Corporation	諏訪団地	541	1971	Mixed	2DK	352	52.7/56.9	56.28	63,800	53.10%	381	0.7
						3DK	180	54.04					
						2DK（店舗付）	9	-					
		グリーンメゾン諏訪-2	74	1979	High-rise	3DK	66	67.8/68.4	69.68	12,700	40.60%	23	0.3
						4DK	8	82.9					
		諏訪一丁目ハイツ	143	1985	Middle & High-rise	1LDK	22	36.9	58.05	23,400	40.20%	67	0.5
						2DK	13	49.8					
						2LDK	44	63.0/63.2					
						3DK	52	63.0/63.2					
						2LDK	6	65.4					
						3DK	6	65.9					
		Sub total	758										
	Sale by Japan Housing Corporation	諏訪団地	640	1971	Middle-rise	3DK	640	48.85	48.85	64,396	52.90%	209	0.3
		タウンハウス諏訪	58	1979-1980	Low-rise	3LDK	58	82.7	86	11,075	46.30%	36	0.6
		グリーンメゾン諏訪	136	1979	High-rise	3LDK	128	78.1	79.1	25,965	41.80%	115	0.8
						4LDK	8	94.6/96.9					
		ホームタウン諏訪	107	1986	Mixed	-	-	-	105	24,614	51.30%	107	1
		Sub total	941										
	Rent by Tokyo Metropolitan Government	諏訪団地（4丁目）	992	1971	Middle-rise	3DK	162	36.6	38.13	92,517	46.50%	393	0.4
						3DK	830	38.4					
		諏訪団地（5丁目）	432	1971	Middle-rise	3DK	32	36.6	38.3	49,280	38.00%	-	-
						3DK	400	38.4					
		諏訪団地（4丁目）	80	1978	Middle-rise	-	-	-	56.81	8,449	58.50%	-	-
		諏訪団地（3丁目）	40	1979		-	-	-	57.1	8,800	35.00%	-	-
		Sub total	1,544										
	Suwa district		3,243										
Nagayama district	Rent by Japan Housing Corporation	永山団地	3,313	1971-1976	Mixed	1DK	183	30.7-31.7	54.1	301,296	61.90%	1974	0.6
						2DK	919	39.5-45.7					
						3DK	1,022	54.0-56.7					
						3K	460	47.7					
						2DK	418	52.7-56.9					
						2DK	144	44.9					
						3DK	144	56.3					
						施設付住宅	23	-					
		フラザ永山	134	1991	High-rise	-	-	-	30.64	2,361	299.00%	78	0.6
		Sub total	3,447										
	Sale by Japan Housing Corporation	永山団地	884	1971-1977	Middle & High-rise	3DK	590	48.9-51.2	55.6	83,659	66.50%	605	0.7
						3LDK	294	66.17					
		エステート永山-3	178	1980	Middle-rise	3LDK	156	76.9-77.3	79	29,610	47.50%	110	0.6
						4LDK	22	93					
		メゾネット永山-5	130	1980	Middle-rise	3LDK	65	82.6-82.8	90.6	16,400	85.40%	94	0.7
						4LDK	65	98.5-98.8					
		タウンハウス永山-5	391	1980-1982	Low-rise	-	-	-	101.8	73,109	52.30%	299	0.8
		ヒルサイド永山	36	1993	Low & Middle-rise	-	-	-	133.3	5,735	79.00%	36	1
		Sub total	1,619										
	Sale by Private Sector	オーベル多摩永山	145	2004	Middle-rise				82.27	8,589	-	-	
	Nagayama district		5,211										
	Suwa-Nagayama district		8,454										

Source: MLIT 国土交通省住宅局, 2010. 3. Quoted in Kim, 2013.

3.3 Demographic changes

3.3.1 Population structure by age

As of 2010, the population of Tama New Town was 216,400, and was lower than the proposed population of 342,000, but the population is on the continuous rise. Looking into the changes by administrative district, the population in Tama city area, where initial stage development was undertaken between the 1970s and 1980s, decreased, after it reached its peak in 1993. However, the population in Hachioji city, Inagi city and Machida city areas, where development was conducted since then, increased continuously. Actually, population increase or decrease occurred in the neighborhood unit, according to development period even within Tama New Town (Shimizu, 2007).

Figure 3-7. Total population changes in Tama New Town by city
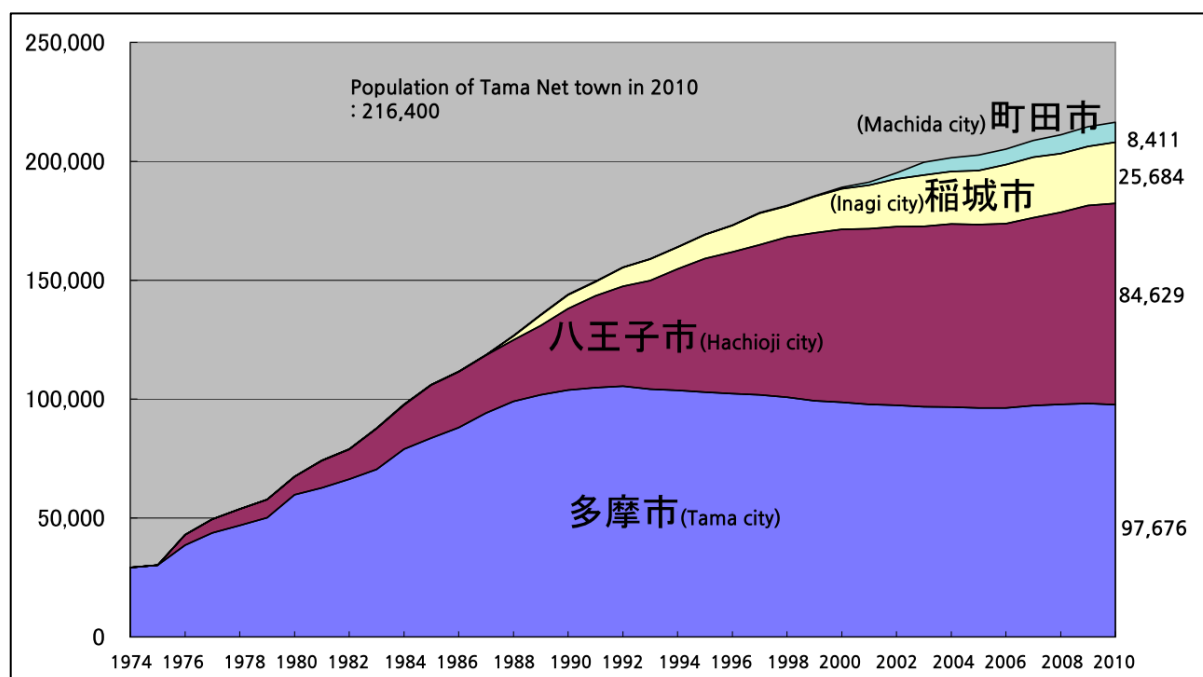
Source: Tokyo Metropolitan Government, 2011. Quoted in Kim, 2013.

Population decrease within Tama New Town took place seriously, centered on the apartment house complexes, whose occupancy started in the initial stages of the 1970s and where movement was inconvenient, due to far away from metro station, among the apartment house complexes built through the New Housing and Urban Development project. The areas where population increased

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were the areas where land readjustment project was executed (housing site creation areas) and the areas that were not included in the new town. The population increase trend was remarkable in the areas close to stations and proximity was good. In these areas, new apartment houses were continuously supplied (Miyazawa, 2006).

Concerning the characteristics of the districts, where population was reduced for more than 10 and less than 10%, respectively, based on 1995 and 2000 census results, there were many small rental apartment houses having housing plane of 2DK and 50sq. m. in area for the district, where population fell by more than 10%. For population structure, out-migration greatly exceeded in-migration between 0~14 years of age. However, in-migration was more for population of 65 and over. The district, where population decreased for less than 10%, was consisted in mainly 3DK or larger apartment houses, occupied by relatively recently. Out-migration was more than in-migration in their late 20s, and in-migration was more than out-migration in the population of 10 and younger in terms of age. This phenomenon can be explained by out-migration of child generation by household division. However, population decline was conducted gently, due to in-migration of young households having children, centered on existing housing or rental housing (Miyazawa, 2006).

Figure 3-8. Rate of population cohort changes in Tama New Town between 1995 and 2000
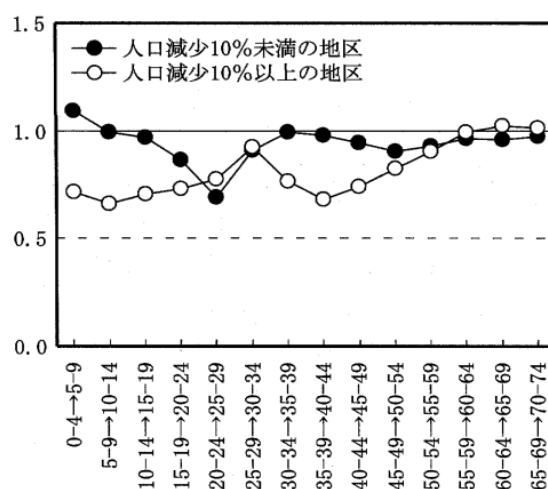
Note: Black points represent districts where population decreased for less than 10% and white points more than
    10% of population cohort changes from 1995 to 2000.
Source: Statistics Japan. Population Census of Japan in each year. Quoted in Miyazawa, 2006; Kim, 2013.

As a typical case, looking into population structure change of Suwa 2-chome 諏訪２丁目[4],

where Suwa 諏訪 complex (initial occupancy in 1971) is located, one of the initial occupancy

complexes in Tama New Town, for past 30 years, gentle aging process was shown until 1990, and

aging accelerated from 1995. The pyramid type of population structure at the time of initial

occupancy was altered to reverse pyramid type in 2010.

Table 3-3. Population cohort changes in Suwa 2-chome, Tama New Town

Age	1975	1980	1985	1990	1995	2000	2005	2010
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
0 - 4	20.3%	11.9%	10.0%	7.6%	5.3%	4.8%	4.5%	3.3%
5 - 9	12.9%	14.4%	9.1%	7.9%	6.0%	3.7%	3.1%	3.9%
10 - 14	5.3%	8.8%	9.6%	7.5%	5.7%	4.3%	2.2%	4.7%
15 - 19	1.9%	3.8%	6.8%	8.7%	6.5%	4.2%	4.2%	5.4%
20 - 24	2.4%	3.0%	3.8%	6.1%	7.8%	6.0%	4.7%	5.2%
25 - 29	9.4%	6.8%	7.4%	5.3%	7.4%	8.5%	7.0%	4.6%
30 - 34	19.3%	14.7%	10.9%	8.0%	7.7%	8.5%	10.1%	5.5%
35 - 39	13.8%	14.1%	13.9%	9.9%	6.6%	6.9%	6.4%	7.6%
40 - 44	6.8%	9.4%	9.2%	12.0%	8.2%	5.2%	5.6%	8.2%
45 - 49	3.1%	5.5%	6.9%	8.3%	10.7%	7.6%	4.4%	7.0%
50 - 54	1.5%	3.0%	4.7%	6.6%	8.2%	10.5%	7.9%	5.1%
55 - 59	0.7%	1.6%	3.0%	4.8%	7.4%	9.8%	10.3%	5.8%
60 - 64	1.1%	0.8%	1.7%	3.1%	5.2%	7.8%	10.5%	8.0%
65+	1.4%	2.1%	2.9%	4.2%	7.3%	12.2%	19.1%	31.0%
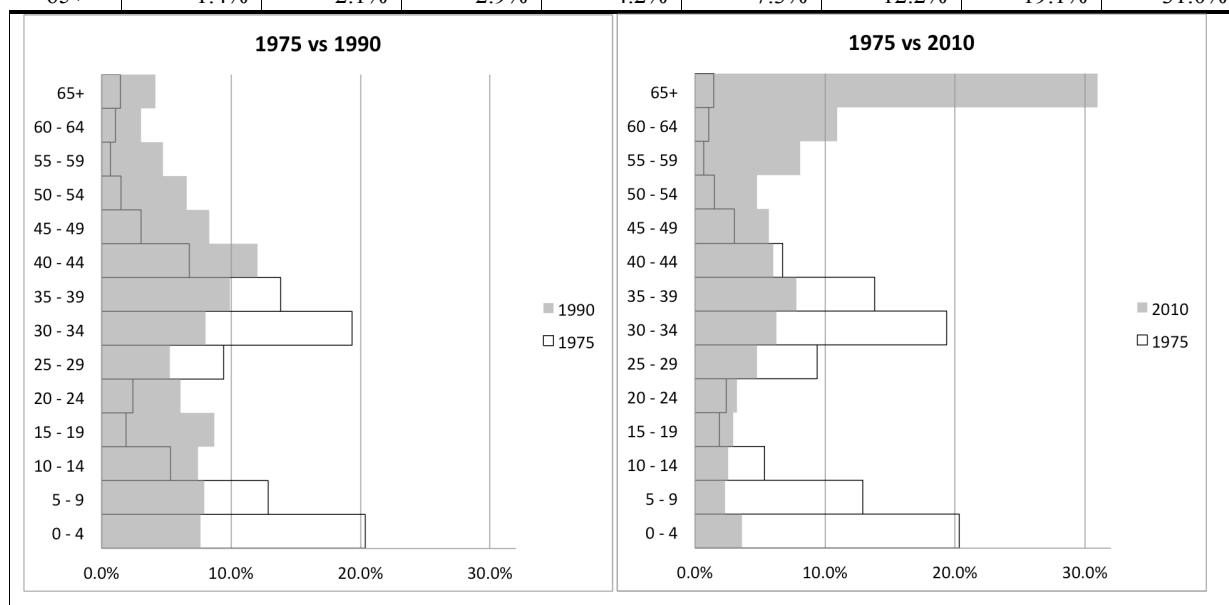
Source: Statistics Japan. Population Census of Japan in each year. Quoted in Kim, 2013.

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[4] In this area, reconstruction started in December 2011, after receiving the approval of reconstruction project from Tokyo Metropolitan Government in November 2011.

Figure 3-9. Panoramic view of Suwa-Nagayama district in Tama New Town
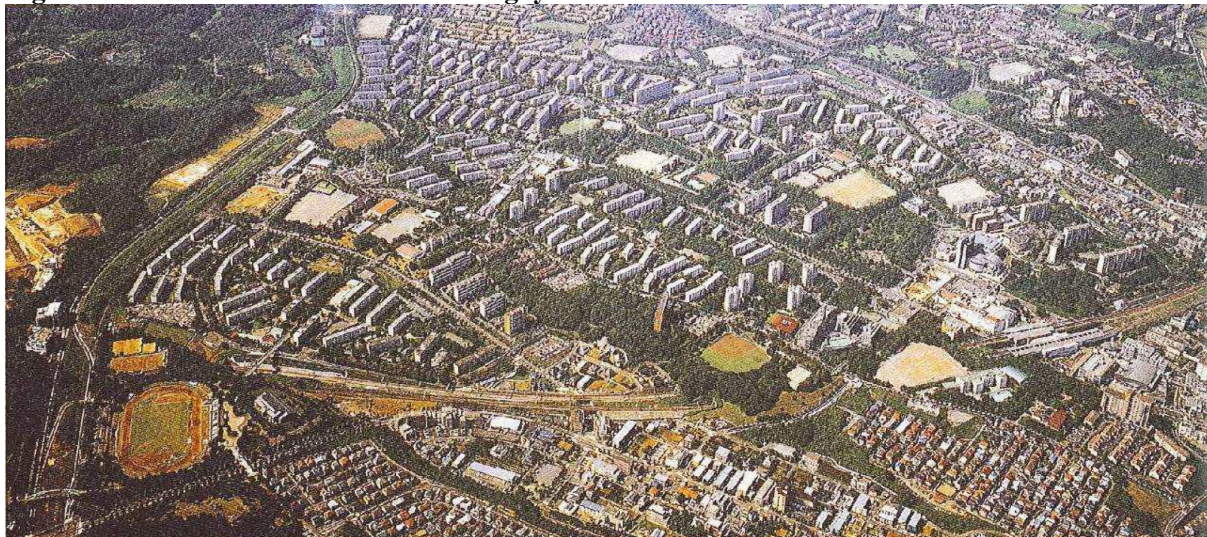
Source: Urban Renaissance Agency in Japan, 2008. Quoted in Tokyo Metropolitan Government, 2011b.

3.3.2   Ratio of population aged 65 and over

The ratio of population aged 65 and over in the areas developed in relatively initial stages including Suwa-Nagayam 諏訪・永山 district, Wada・Atago・Higashiteragata 和田・愛宕・東寺方 district and Matsugaya 松が谷 district among Tama New Town neighborhood units maintained higher level than the average in Tama New Town, and population rather declined (Shinohara, 2006; Tokyo Metropolitan Government, 2011).

The following figure shows the relationship between the initial occupancy period by complex and the ratio of population aged 65 and over targeting 18 neighborhood units within Tama New Town in diagram. According to this figure, the ratio of population aged 65 and over was lower, if an area was recently developed district, and the ratio was remarkably higher, if occupancy in a complex started in the initial stages of Tama New Town development. The ratios in the 7 neighborhood units during the initial occupancy period having higher ratio of population aged 65 and over were over the average ratio of Tama city since 2002. Their ratios were on the rapid increasing trend by exceeding the ratio of population aged 65 and over in all areas of Tama New Town.

Figure 3-10. Relationship between time of initial occupancy of district and Ratio of population aged 65 and over

多摩ニュータウンの入居開始年次と高齢化率の関係（H22年）

高齢化率

- 和田 36.8%
- 東寺方 35.1%
- 愛宕 28.2%
- 諏訪 26.3%
- 永山 24.9%
- 松が谷 24.7%
- 豊ヶ丘 23.9%
- 鹿島 23.8%
- 貝取 22.0%
- 聖ヶ丘 22.6%
- 東京都平均 20.3%
- 落合 19.1%
- 鶴牧 15.2%
- 唐木田 15.3%
- 向陽台 13.4%
- 長峰 13.5%
- 別所 10.8%
- 中沢 8.3%
- 松木 6.8%
- 若葉台 6.8%

入居開始年次

多摩ニュータウンの初期入居地区の高齢化率の推移

高齢化率（%）

多摩NT初期入居地区
（和田、東寺方、愛宕、諏訪、永山、松が谷、鹿島）

多摩地域）
八王子市（全域）
多摩市（全域）
多摩NT（全域）

26.0%
20.2～20.4%
16.0%

○ 入居時期が早い地域ほど、高齢化率が高い。
○ 初期入居地区における高齢化率は、平成18年頃から多摩
ニュータウン全域を上回り伸びてきている。
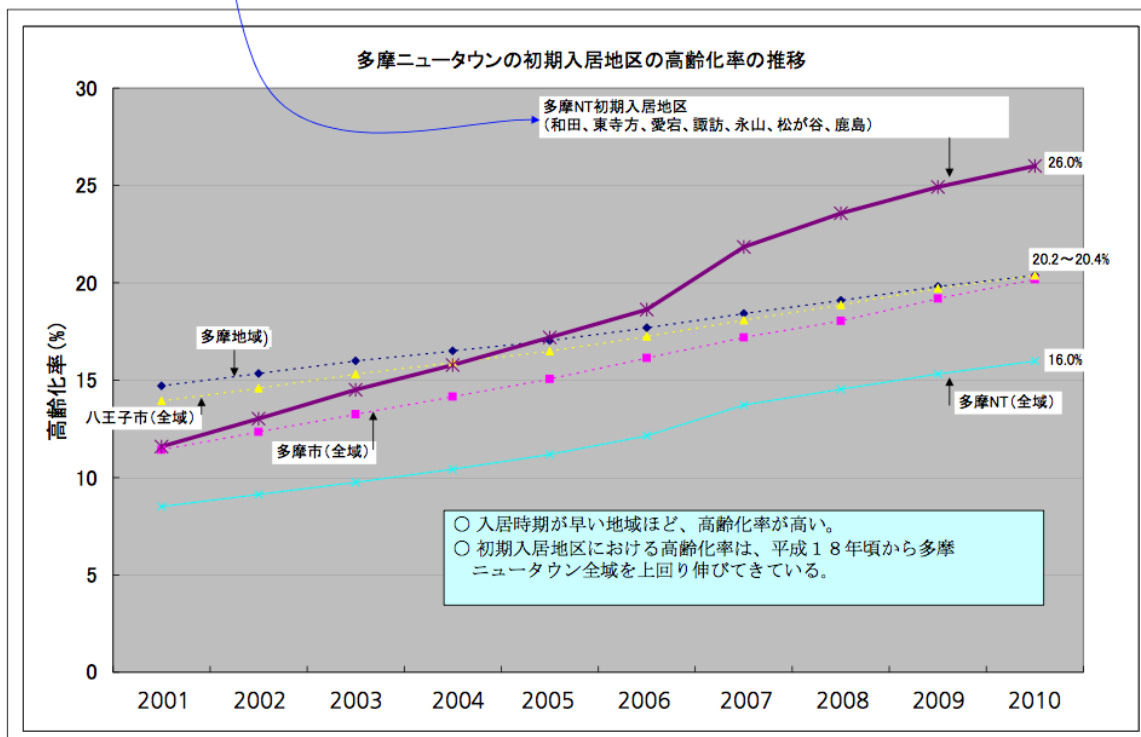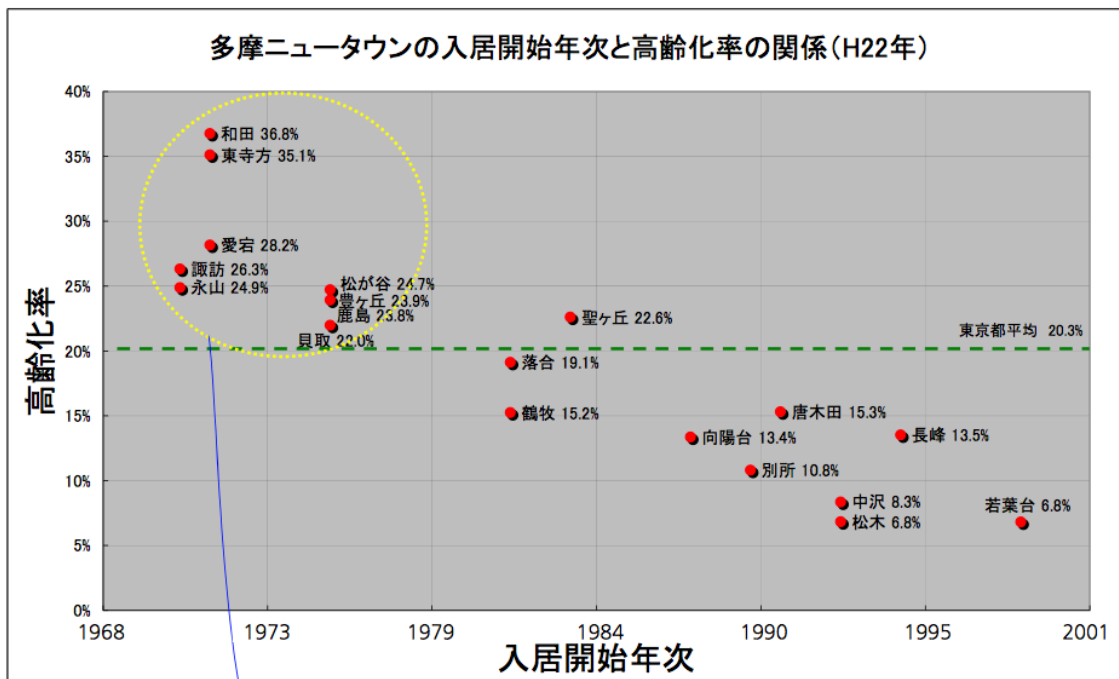
備考
・都全体、多摩地域、多摩市（全域）、八王子市（全域）は、東京都総務局統計資料「住民基本台帳による東京都の世帯と人口」より。毎年1月時点の人口
・上記以外は、都市整備局多摩ニュータウン人口調査より。毎年10月時点の人口

Source: Shinohara, 2006; Tokyo Metropolitan Government, 2011. Quoted in Kim, 2013.

3.3.3 Migration[5]

Because, a new town within Japan's large city has a strong image as a bedroom town, where people commuting to main city live, it is considered the ratio of people migrated from main city would be high. However, survey on the previous residential area of new town residents in the suburbs of metropolitan area shows results different from the forecast (Sugiura and Ishizaki, 1999). As a result of surveying the previous residential areas of households residing around the Minamiosawa 南大沢 station in Hachioji city within Tama New Town in October 1997, The area having the highest ratio as the previous residential area was Tama district, adjacent to Tama New Town, which took up 34%, and those who migrated from inside of new town accounted for 33%. Meanwhile, the ratio of those migrated from Tokyo 23 special wards area was only 14%. When Tama New Town was divided into east and west geographically, the western area of Tama New Town including Minamiosawa took up 24% of total residential areas (Sugiura, 1998). A study that examined the actual conditions of nongovernment condominium residents in New Housing and Urban Development Project area 新住宅市街地開発事業地区 of Tama New Town showed similar results (Kashu, et al., 2007).

Unlike general prediction, the reason why more residential area migration was shown within Tama New Town, instead of main city, Tokyo 23 special wards area, was that new housing was continually supplied in other areas within the new town, since Tama New Town construction project was conducted even during the survey period. In Tama city, where Tama New Town development commenced in early 1970s, the rental housing supplied by public sector project executors, Japan Housing Corporation, Tokyo Metropolitan Government and Tokyo Metropolitan Housing Supply Corporation, was finished mostly in the 1990s. However, housing site for installment sale in the

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[5] Japanese National Census surveys population migration in every 10 years, and the publicly opened statistical survey unit is up to the level of municipalities 市町村. For this reason, an analysis using the National Census survey results on Tama New Town-related population migration data spanning some districts of 4 cities is impossible. Although, there are data for household and population of Tokyo Metropolitan Government by resident registration offered by Tokyo Metropolitan Government, only data for recent several years are available, and the data from 1971, when the initial occupancy of Tama New Town commenced, were judged to be difficult to be acquired. Therefore, this study arranged data on population migration using precedent studies that were conducted by each period.

private sector continued since then. Lots of new housing supply inside of the new town for such a long time, and continuous residing within the new town with high satisfaction on residential environment by those who migrated into the area (Fukuhara, 1998; Wakabayashi, 1998) brought about a result raising migration ratio within the new town. In terms of system, a preferential right to buy housing for installment sale was offered to local residents targeting newly supplied apartment houses, which helped increase migration ratio within the new town (Sugiura and Ishizaki, 1999).

According to the study (Kitanami and Kishii, 2003) identified residential area change trend of child generation of the Japanese Baby Boomers 団塊世代 in Tama New Town through questionnaire[6] surveys targeting 19 towns 町丁目, where initial stage occupancy started, except the areas with less than 100 people and the areas, where a land readjustment project was carried out among 59 towns 町丁目 within Tama city[7], the household separation period of the second generation was faster in the case of rental household than homeowner in terms of home ownership. The reason was that most rental housing, built by the public sector, was small for the two generations to live together in the initial stage development areas in Tama New Town (Kato, 2011).

3.4 Conculsion

This chapter analyzed the development objective and process of new town development, housing unit type and supply method and demographic changes of Tama New Town, focused on the initial stage development areas.

From development objective and development process aspect, Tama New Town divided the entire new town into 21 districts composed by several neighborhood units and had been developed for

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[6] Questions are the condition of living together or separately of Japanese Baby Boomers (first generation) and their child generation (second generation), residential area change trend after household separation of the second generation (e.g., the second generation's gender and age, and the first generation's age, years of residing, housing unit type and housing ownership status), the intension of the second generation still living with the first generation to settle in the new town and settlement evaluation.
[7] The reaon why this study targeted not Tama New Town but Tama city is that about 70% of the popupation lives in Tama New Town area as well as about 60% of the total administrative district area belongs to Tama New Town area.

40 years of long term. Tama New Town had a limitation that it was planned as a bedroom town to supply housing within the metropolitan area from the start of the construction project, self-containment function introduction was made possible through the revision of the New Housing and Urban Development Act in 1986. Even though attempts to raise self-containment continue, since then, accomplishment is still not great.

As concerns housing unit type and supply method of Tama New Town, the public sector supplied housing, centered on small-sized rental housing with 3DK or less in the 1970s, the initial stages of development. Housing supply centered on the small-sized rental housing accelerated the quick household separation of child generation, which functioned as one of the cause of population aging. However, larger housing unit type (4DK or more) began to be supplied by the public sector, and private sector's apartment houses for installment sale began to be built on the disposed land by Japan's Urban Renaissance Agency 都市再生機構 to the private sector. Consequently, about 43,000 units were supplied by 1997, and about 78% of those were housing with 3LDK and less.

According to the results to compare the characteristics of population structure change, population continued to increase in overall Tama New Town, but, rapid aging was in progress, centered on the apartment house complexes developed in the initial stage of the new town development (mainly Tama city area), and also the ratio of population aged 65 and over increased in proportion with the initial occupancy period of the housing complexes.

Lastly, relatively homogeneous generations and households migrated in large quantities in a short period of time, centered on 30s to 40s in the initial stages of Tama New Town development from a population migration aspect. Also, population migration was more around the adjacent areas and within Tama New Town, compared to main city, Tokyo 23 special wards area.

Chapter 4 Characteristics of Metropolitan New Towns in Seoul Metropolitan Area, Korea

Chapter 4 examines characteristics of metropolitan new towns developed during the rapid growth era in Seoul metropolitan areas, Korea based on the literature reviews of the precedent studies and official statistic data. The first two sections of this chapter introduce the background of new town development and then describes the transition of the new town development policy by dividing into three periods. The third section analyzes the demographic characteristics (i.e., the change of population structure, movement pattern, residential characteristics and socioeconomic characteristics of residents) of the first generation new towns in Seoul metropolitan area using the population and housing census data for the last 20 years. The last section of Chapter 4 points out issues of the first generation new towns in Seoul metropolitan area and then prospect status of these new towns in the era of population aging and decline.

4.1 Background of new town development

In the early 1980s, Korea government was forced to adopt a retrenchment policy to prevent economic overheating and stabilize the political chaos. As a result of this retrenchment policy, the Korean economy suffered from severe recession. Thus, housing policy of the early 1980s started with various incentive measures to promote housing construction business. Government also relaxed the anti-speculation measures, such as lowering the capital gains tax rate, interest rate cuts from 25% in 1979 to 10% in June 1982. However, these expansion-oriented economic policies not only revived the economy but also made the real estate price fluctuation sharp and increase the number of the speculators in the real estate market (Koh, 2004; Sohn, et al. 2006; KRIHS, 2008).

In addition, inflow of the massive funds formed by large-scale development projects for supporting the international events held in Seoul (such as International Monetary Fund General meeting in 1984, Seoul 1986 Asian Games and Seoul 1988 Olympic Games), the export-friendly global economy conditions (such as a low oil price, a low interest rate and depreciation of the Korean currency) and the 13th President Election bought about the nationwide land speculations (Sohn, et al., 2006).

Figure 4-1. Trend of the housing sale price increase rate in Korea (1986-2010)
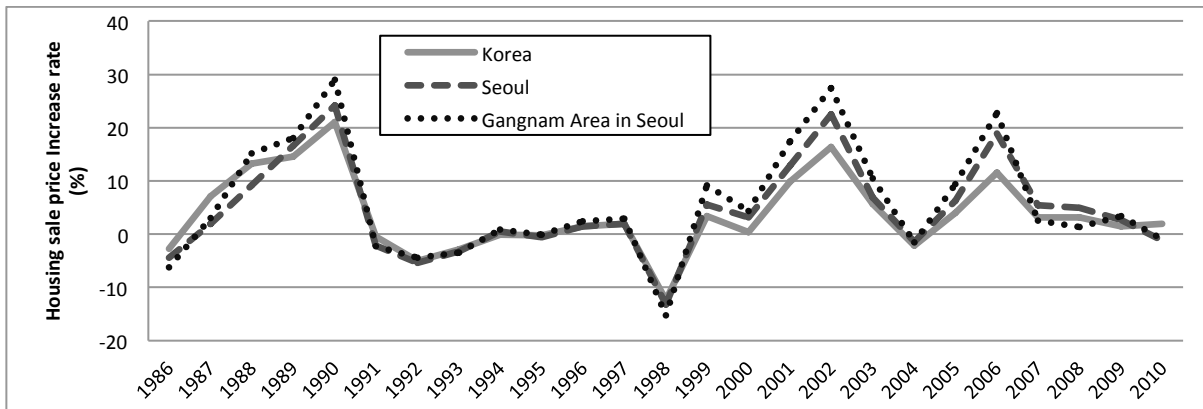
Source: Kookmin Bank, "National housing price trend research."

At this time, a preference for an apartment was also increased. This phenomenon increased the portion of the apartment housing type in the supplied housing sharply, e.g., 36.3% in 1980, 58.1% in 1985 and 56.7% in 1990. Therefore, an apartment not only created the new housing culture but also played a major role of increasing the housing price as a target of speculation (KRIHS, 2008). And the housing shortage problem in the metropolitan area was exacerbated by the high population growth in the 1960s and rural-to-urban migration and changes in the family structure in the 1970s and 1980s (Koh, 2004).

Figure 4-2. Soaring housing prices in Seoul cause by the Seoul 1988 Olympic games.

Source: The Daily Kyunghyang on 28 July 1988

In this situation, Rho Tae-Woo administration (1987-1993) announced the 'Two Million Housing Unit Construction Plan 住宅二百万戸建設計画 (1988-1992)' as regime's national agenda on 13 May 1988 in order to solve the housing shortage problems radically. It seemed impossible to supply two million housing units - about a third of housing stock in 1987, 6.45 million - within five years by this national project (The compilation committee for the Korean Economy: Six Decades of Growth and Development, 2011).

Figure 4-3. The Announcement of the Bundang and Ilsan New Town construction plan

Source: The Daily Dong-A on 27 April 1989.

In spite of its grand scheme and significant implications, the announcement of the Two Million Housing Unit Construction Plan did not communicated with the media and the public. They had already experienced the housing development promises of the previous governments that never implemented[8], and expected the same for the Two Million Housing Unit Construction Plan, which

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[8] The previous military regimes also had particularly sought to solve the housing problem in Seoul, and had announced the national housing development plans, similar to the Two Million Housing Unit Construction Plan, accompanying their politically controversial actions. For instance, there had been President Park Chung-hee's 2.5 million housing development plan (1972-1981) and President Chun Doo-hwan's 5 million housing development plan (1980-1989) following his illegitimate coming to power (Yu, 2011). However, these national plans were not implemented because government's economic officials advocated that the plan was too costly to implement (Koh, 2004). The Two Million Housing Unit Construction Plan was different its predecessors,

they considered merely as the new regime's attempt to gain political support. Therefore, in March 1989, the Blue House 青瓦台 created a special committee, which planned to build the massive-scale, metropolitan residential new towns; Bundang and Ilsan new town. This committee announced the new town development plan on 27 April 1989, and it triggered much interest among the media and the public (GDPC, 2013; KOLAND, 1997; Sohn, 2003; Yu, 2011).

Besides Bundang and Ilsan new town, the central government promoted more three new towns; Pyeongchon and Sanbon new town announced at the same time of the Two Million Housing Unit Construction Plan, on 13 September 1988 and Jungdong new town in 27 April 1989 which have the nature of new town in town. Generally, these five new towns are called the 'first generation new towns in the Seoul metropolitan area' 首都圈第一期新都市. These First generation new towns are located in the Seoul metropolitan area in a distance of 20 to 25km, one hour commuting distance from Seoul CBD and supplied 294,000 housing units in the Two Million Housing Unit Construction Plan. These five new towns were rapidly completed within 5 to 6 years by a special law, "Residential Land Development Promotion Act"宅地開発促進法 (enacted in 1980) which made simplify the construction process.

4.2 Transition of the new town development policy

New town policies in Korea could be divided into three phases roughly. The first phase is in the late 1980s when the five new towns in Seoul metropolitan area were developed as part of the Two Million Housing Unit Construction Plan (1988). The second phase is caused by the urban sprawl in the rural areas and fringe areas of the first generation new towns since 2000s. In the third phase, unlike the first and second phases, new town projects has been downsizing and canceled due to recession of the real estate market since the Subprime mortgage crisis (2007) in United States.

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because it was the only national housing construction plan that was accomplished. This national project was completed early in August 1991 with the result, 2.14 million housing units exceeded the goal of the project (Yu, 2011; The compilation committee for the Korean Economy: Six Decades of Growth and Development, 2011).

Phase I: Two Million Housing Unit Construction Plan and development of the first generation new towns in Seoul metropolitan area (in the late 1980s)

These five new towns mentioned the previous section - Bundang, Pyeongchon, Sanbon, Jungdong and Ilsan new town - were the first metropolitan residential new towns on the outskirts of Seoul, Korea. Even before the development of these five new towns in Seoul metropolitan area, some similar types of large-scale (more than 3.3 million sq. m.) residential complex had been developed in or around Seoul. For example, Jamsil (1971), Gaepo (1981), Mokdong (1983) and Sang-gye (1986) residential complex were constructed as a new town in town in Seoul. Even though Gwacheon new town (1971) was developed out of Seoul - in a distance of 15km from Seoul CBD - for relocating the administrative function from Seoul, there was no case that had been developed in the suburban area of Seoul metropolitan area for the housing supply except these five metropolitan new towns until 1980s. For this reason, we commonly call these five new towns 'the first generation new towns in Seoul metropolitan area.'

In 1980s, as has been mentioned in the previous section, the Korean government implemented the massive housing supply policy such as 'the Two Million Housing Unit Construction Plan' in order to control the real estate speculation caused by the housing shortage in the Seoul metropolitan area and the monetary growth, and these first generation new towns were promoted as the key policy of the Two Million Housing Unit Construction Plan.

These first generation new towns in the Seoul metropolitan area were designated large patches of commercial and business areas (See Table 2-6) based on naive criteria in order to relocate some part of public agencies in Seoul and invite private companies. The goal of self-containment adopted in these five new towns was rather limited in the balance between land uses of working and living within the communities (Lee and Ahn, 2005).

Table 4-1. Summary of the first generation new towns in Seoul metropolitan area

New Town	1 Bundang 盆唐	2 Pyeongchon坪村	3 Sanbon 山本	4 Jungdong 中洞	5 Ilsan 一山
Main Function	Main CBD of SMA. Self-contained city.	New CBD in Anyang city	New CBD in Gunpo city. Garden city with good landscape.	New CBD in Bucheon city. Supporting residential area of Seoul-Incheon Industrial Belt.	Main city in West SMA. Garden city with art & culture. An advance base for unification Korea
Area (ha)	1964	511	420	546	1574
Residential	32.3%	37.8%	43.1%	34.4%	33.4%
Commercial & Business	8.4%	4.8%	4.2%	10.4%	7.8%
Road	19.7%	23.2%	15.2%	25.9%	14.4%
Green	19.4%	15.7%	15.4%	10.7%	23.5%
Public & Others	20.2%	18.5%	22.1%	18.6%	20.9%
Proposed Population (in 2010*)	390,320 (394,609)	168,188 (146,505)	167,896 (165,419)	165,740 (168,241)	276,000 (284,802)
Housing unit	97,580	42,047	41,974	41,435	69,000
Density** (Person/ha)	199	329	399	304	175
Net Density*** (Person/ha)	489	795	844	678	425
FAR (%)	184	204	205	226	169
Location from Seoul CBD	SE 25km	S 20km	S 25km	W 20km	NW 20km
Administrative district	Seongnam city, Gyeonggi Province	Anyang city, Gyeonggi Province	Gunpo city, Gyeonggi Province	Bucheon city, Gyeonggi Province	Goyang city, Gyeonggi Province
Transit	Seoul subway Line 3, New Bundang Line	Seoul subway Line 4	Seoul subway Line 4	Seoul subway Line 1 & 7	Seoul subway Line 3
Expressway	Seoul Ring Epwy., Gyeongbu Epwy., Bundang-Naegok Epwy., Bundang-Suseo Epwy.	Seoul Ring Epwy.	Seoul Ring Epwy.	Seoul Ring Epwy., Gyeong-in Epwy.	Seoul Ring Epwy., Jayu-ro
Developer	Korea Land Development Corporation	Korea Land Development Corporation	Korea Housing Corporation	Buchoen city, Korea Land Development Corporation, Korea Housing Corporation	Korea Land Development Corporation
Development Method	Housing site development project	Housing site development project	Housing site development project	Housing site development project	Housing site development project
Announcement of construction plan	27 Apr. 1989	13 Sep. 1988	13 Sep. 1988	27 Apr. 1989	27 Apr. 1989
District Designation	4 May. 1989	27 Feb. 1989	27 Feb. 1989	22 Apr. 1989	20 Jun. 1989
Construction Period	30 Aug. 1989-31 Dec. 1996	30 Aug. 1989-31 Dec. 1995	30 Aug. 1989-31 Jan. 1995	8 Feb. 1990-31 Jan. 1996	31 Mar. 1990-31 Dec. 1995
First Occupancies	Sep. 1991	Mar. 1992	Apr. 1992	Feb. 1993	Aug. 1992

* Population based on the Population and Housing Census 2010. Quoted in Kim, 2013.

**Density= (Proposed Population)/(Whole area)

***Net Density= (Proposed Population)/(Residential area + Commercial area)

Source: MLTM. 2012. New town development manual. The second generation new towns in Seoul metropolitan area (in the 2000s)

Phase II: Urban sprawl in the quasi-agricultural zone and development of the second generation new towns in Seoul metropolitan area (2000-2007)

During the 1990s, there was no designation for a new town due to the negative image of the first generation new towns with the nature of a 'bed town' in the metropolitan area and criticism of the massive housing injection in such a short time. Therefore, the national housing and land development policy was turned over to the small and distributed housing site development and permission of development in the Quasi-agricultural and forest zone 準農林地域 located near urbanized areas. However, such a change in the housing and land development policy bought about serious urban sprawl with a poor infrastructure in the rural areas and fringe areas of the first generation new towns, especially Quasi-agricultural and forest zone in the situation that there was in sustainable demand for the housing supply in the metropolitan area. In 2000s, the Korean government had eventually begun to designate the metropolitan new town districts against boarder area in the Seoul metropolitan area to prevent the urban sprawl and severe housing price increases (Lee, S. M. et al., 2004). Generally, we call these new towns designated since 2001 'the second generation new towns in the Seoul metropolitan area' 首都圈第二期新都市.

Since 2001, the Korean government has developed ten second generation new towns in Seoul metropolitan area which are capable of accommodating about 1,573 thousand people (604 thousand unit) in the 13,039ha by 2016 to stabilize property prices and to prop up the slowing economy. These second generation new towns have been constructed by the advanced planning method, the consideration of ecological aspects and the various public-private partnership in comparison with the first ones In addition, various methods for a self-contained city have been devised in both planning and maintenance stage because they are located at long distances about 30 to 60km from Seoul CBD (Kim, H. S., et al., 2009).

Table 4-2. Summary of the second generation new towns in Seoul metropolitan area

New town	6. Unjeong	7. Dongtan1	8. Dongtan2	9. Pangyo	10. Gwanggyo
Area (ha)	1,650	904	2,402	892	1,131
Proposed Population	215,061	124,326	286,000	87,789	77,783
Housing Unit	87,282	40,921	115,323	29,263	31,113
Density* (Person/ha)	130	138	119	98	69
Location from Seoul CBD	NW 28km	S 40km	S 45km	SE 22km	S 30km
Administrative district	Paju city, Gyeonggi Province	Hwaseong city, Gyeonggi Province	Hwaseong city, Gyeonggi Province	Seongnam city, Gyeonggi Province	Suwon city, Gyeonggi Province
Developer	Land and Housing Corporation, Paju city	Land and Housing Corporation	Land and Housing Corporation, Gyeonggi Urban Innovation Corporation	Land and Housing Corporation, Gyeonggi province, Seongnam city	Suwon city, Yong-in city, Gyeonggi Province, Gyeonggi Urban Innovation Corporation
Development method	Housing site development project				
District Designation	4 Jan. 2001 (1st) 13 Dec. 2003(2nd) 28 Jun. 2007 (3rd)	30 Apr. 2001	20 Dec. 2007	26 Dec. 2001	30 Jun. 2004
Construction Period	20 May 2003- 31 Dec. 2017	14 Dec. 2001- 31 Dec. 2013	9 Jul. 2008- 31 Dec. 2015	30 Dec. 2003- 31 Dec. 2014	30 Dec. 2005- 31 Dec. 2013
Initial Occupancies	Jun. 2009	Jan. 2007	Jan. 2015	Dec. 2008	Jul. 2011
Status	Under Construction	Under Construction	Under Construction	Under Construction	Completion

New town	11. Hangang	12. Okjeong/Hoecheon	13. Wirye	14. Godeok	15. Geomdan
Area (ha)	1,173	1,142	680	1,341	1,118
Proposed Population	167,155	168,477	105,980	134,680	177,000
Housing Unit	60,345	60,170	42,392	54,499	70,800
Density* (Person/ha)	142	147	156	100	117
Location from Seoul CBD	W 30km	N 30km	SE 18km	S 58km	W 25km
Administrative district	Gimpo city, Gyeonggi Province	Yangju city, Gyeonggi Province	Seoul, Seongnam city, Hanam city	Pyeongtaek city, Gyeonggi Province	Incheon
Developer	Land and Housing Corporation	Land and Housing Corporation	Land and Housing Corporation	Land and Housing Corporation, Gyeonggi Province, Gyeonggi Urban Innovation Corporation, Pyeongtaek Urban Corporation	Incheon Metropolitan Government, Land and Housing Corporation, Incheon Development Corporation
Development method	Housing site development project				
District Designation	31 Aug. 2004	30 Dec. 2004 (1st) 30 May 2006 (2nd)	21 July 2006	21 Sep. 2006	28 Jun. 2007
Construction Period	13 Dec. 2006- 31 Dec. 2013	30 Mar. 2007- 31 Dec. 2013	5 Aug. 2008- 31 Dec. 2017	30 May 2008- 31 Dec. 2020	6 Feb. 2009- 31 Dec. 2015
Initial Occupancies	Mar. 2008	Nov. 2014	Dec. 2013	2nd half of 2018	2nd half of 2017
Status	Under Construction	Under Construction	Under Construction	Under Construction	Under Construction

*Density= (Proposed Population)/(Whole area)

Source: MLTM homepage (updated on 26 January 2012); Land and Housing Corporation. "List of the Housing site development project." (Based on 31 December 2011). Quoted in Kim, 2013.

Figure 4-4. Location of the first and second generation new towns in Seoul metropolitan area

6. Unjeong
1,650 ha
79,488 units

12. Okjeong/Hoecheon
1,142 ha
58,975 units

11. Hangang
1,173 ha
59,900 units

5. Ilsan
1,574 ha
69,000 units

13. Wirye
680 ha
42,947 units

15. Geomdan
1,812 ha
92,000 units

4. Jungdong
546 ha
41,435 units

Seoul

9. Pangyo
892 ha
29,263 units

2. Pyeongchon
511 ha
42,047 units

Incheon

1. Bundang
1,964 ha
97,580 units

3. Sanbon
420 ha
41,974 units

10. Gwanggyo
1,131 ha
31,000 units

7. Dongtan1
904 ha
40,921 units

8. Dongtan2
2,402 ha
115,195 units

10km
20km
30km
40km
50km
60km

Index

Name of NT	1st generation New towns
Area (ha)	in Seoul metropolitan area
Housing units	

Name of NT	2nd generation New towns
Area (ha)	in Seoul metropolitan area
Housing units	

14. Godeok
1,341ha
58,300 units

Source: MLTM homepage (updated on 26 January 2012); Land and Housing Corporation. "List of the Housing site development project." (Based on 31 December 2011).

59

Phase III: Downsizing new town projects due to the recession of the real estate market (since 2008)

Since the Subprime mortgage crisis in United States in 2007, real estate prices have continued to fall all over the country due to a series of government measures to cool the housing market and global recession. It is more serious in the first generation new towns in Seoul metropolitan area, which were completed about twenty years past and where an apartment housing type occupies above 80% of the whole housing units. On the other hands, unsold apartments have appeared in some of the second generation new towns in Seoul metropolitan area which are not long after being completed or under-constructed.

Figure 4-5. Trend of the apartment housing price for the first generation new towns in Seoul metropolitan area (2002-2011)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Seoul	852	1,001	1,037	1,114	1,223	1,586	1,602	1,644	1,663	1,655
Gangnam district, Seoul	1,649	2,158	2,149	2,644	2,287	3,677	3,458	3,408	3,503	3,364
Seocho district, Seoul	1,109	1,356	1,445	1,647	2,037	2,878	2,689	2,732	2,919	2,964
Songpa district, Seoul	911	1,162	1,260	1,341	1,496	2,636	2,370	2,422	2,507	2,411
Bundang New town	798	962	1,041	1,154	1,357	1,920	1,800	1,680	1,644	1,655
Pyeongchon New town	611	702	744	847	1,114	1,518	1,435	1,379	1,365	1,324
Sanbon New town	537	567	548	551	626	1,068	1,047	1,030	990	963
Jungdong New town	521	624	677	681	767	1,012	1,054	1,043	1,039	1,024
Ilsan New town	565	619	654	702	811	1,329	1,292	1,260	1,199	1,128

Note: Gangnam, Seocho and Songpa districts in Seoul are generally referred to as 'Gangnam 3 districts'江南三区, the most expensive residential areas in Korea.
Source: Doctor Apart Homepage (www.drapt.com).

Figure 4-6. Trend of the apartment housing price increase rate for the first generation new towns in Seoul metropolitan area (2002-2011)

	2003	2004	2005	2006	2007	2008	2009	2010	2011
• • • • Seoul	17.5%	3.6%	7.4%	9.8%	29.7%	1.0%	2.6%	1.2%	-0.5%
– – – Gangnam district, Seoul	30.9%	-0.4%	23.0%	-13.5%	60.8%	-6.0%	-1.4%	2.8%	-4.0%
– – – Seocho district, Seoul	22.3%	6.6%	14.0%	23.7%	41.3%	-6.6%	1.6%	6.8%	1.5%
– – – Songpa district, Seoul	27.6%	8.4%	6.4%	11.6%	76.2%	-10.1%	2.2%	3.5%	-3.8%
—◆— Bundang New town	20.6%	8.2%	10.9%	17.6%	41.5%	-6.3%	-6.7%	-2.1%	0.7%
—▲— Pyeongchon New town	14.9%	6.0%	13.8%	31.5%	36.3%	-5.5%	-3.9%	-1.0%	-3.0%
—●— Sanbon New town	5.6%	-3.4%	0.5%	13.6%	70.6%	-2.0%	-1.6%	-3.9%	-2.7%
—■— Jungdong New town	19.8%	8.5%	0.6%	12.6%	31.9%	4.2%	-1.0%	-0.4%	-1.4%
—▲— Ilsan New town	9.6%	5.7%	7.3%	15.5%	63.9%	-2.8%	-2.5%	-4.8%	-5.9%
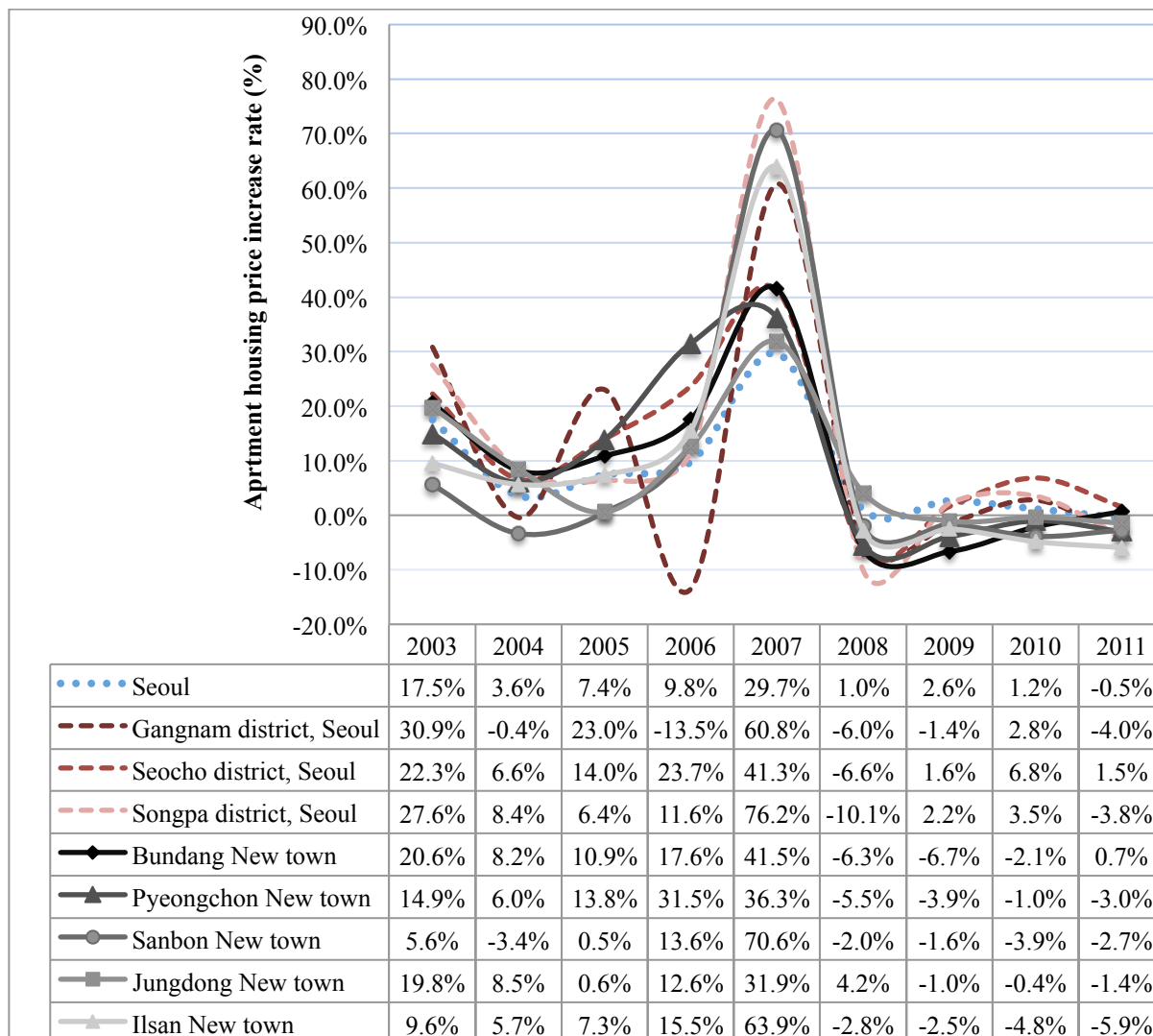
Note: Gangnam, Seocho and Songpa districts in Seoul are generally referred to as 'Gangnam 3 districts'江南三区, the most expensive residential areas in Korea.
Source: Doctor Apart Homepage (www.drapt.com)

Eventually, in 2011, the first annulled 'Prearranged area for housing site development' 宅地開発予定地区 by no housing demand emerged even in Seoul metropolitan area where population has still been increasing now in Korea. Since the Housing site development promotion act 宅地開発促進法 has been enacted in 1980, some small-scale prearranged areas for housing site development designated not in Seoul metropolitan area but in the local areas have been annulled by no housing demand before. In 2011, however, housing project developers such as the Korea Land and Housing Corporation and local governments conducted the massive designation cancellation of the prearranged

area for housing site development. Moreover, it is the first time that the large-scale prearranged areas for housing site development (about 7,000 sq. m.) designated in Seoul metropolitan area were annulled by no housing demand.

Figure 4-7. Annulled areas of the prearranged area for housing site development due to no housing demand and Housing sale price increase rate in Korea (1986-2011)
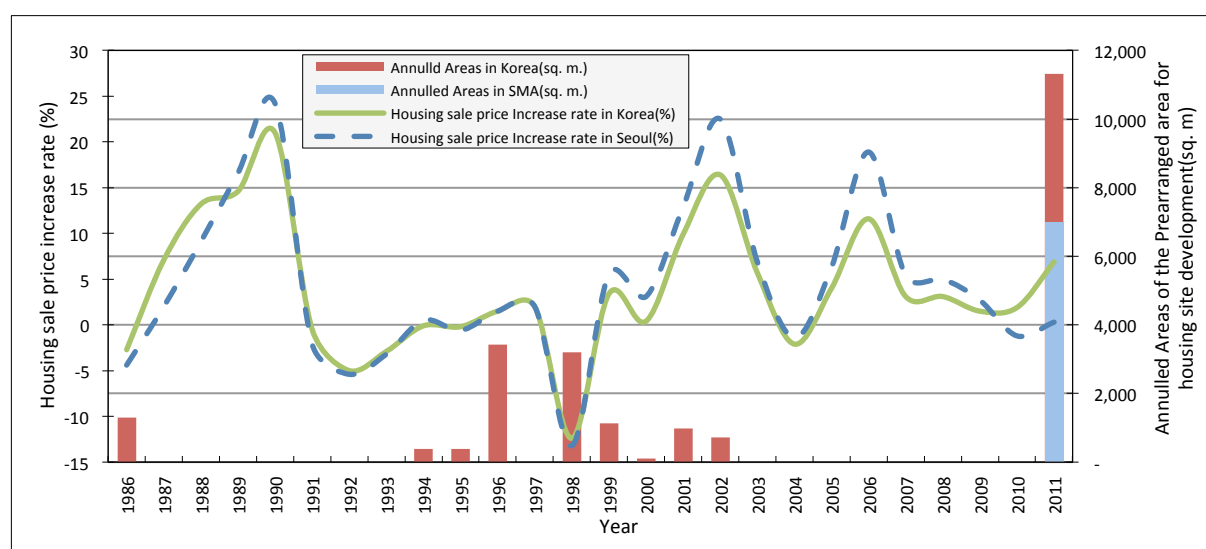
Source: Kookmin Bank, "National housing price trend research"; Land and Housing Corporation. "List of the annulled districts of the prearranged area for housing site development." (Based in June 2011).

Table 4-3. List of annulled housing site development projects in Seoul metropolitan area

Name of district	Type of development project	Area (sq. m.)	Process				Development method	Approval authority
			District Designation	Development Plan	Implementation Plan	**Annulment**		
Goyang Pundong2	Large- scaled housing complex	964	28 Mar. 2007	18 Dec. 2008	-	**14 Aug. 2013**	Land expropriation	MOLIT
Osan Segyo3	New Town	5,086	25 Sep. 2009	25 Sep. 2009	-	**6 May 2011**	Land expropriation	MLTM
Paju Neunggeum	Large- scaled housing complex	1,289	Proposed	-	-	**24 Feb. 2011**	Land expropriation	MLTM
Hwaseong Jangan	Large- scaled housing complex	1,326	14 Dec. 2006	23 Oct. 2008	-	**2 May 2012**	Land expropriation	MLTM
Incheon Geomdan2	New Town	3,465	31 Mar. 2010	31 Mar. 2010	31 Dec. 2010	**10 May 2013**	Land expropriation	MOLIT

Note: MLTM国土海洋部 was reorganized to MOLIT国土交通部 on March 23, 2013.
Source: MOLIT, 2014.

Figure 4-8. Notification of the Ministry of Land, Transport and Maritime Affairs for the designation annulment of the 'Segyo 3' prearranged area for housing site development in Seoul metropolitan area

국토해양부 고시 제 2011-207 호

국토해양부 고시 제 2009-914 호('09.9.25)호로 택지개발예정지구 지정고시된 오산세교(3) 택지개발사업에 대하여
「택지개발촉진법」제 23 조 및 같은 법 시행령제 16 조의 규정에 의하여 택지개발예정지구 지정 취소를 고시하고 ,
「토지이용규제기본법」제 8 조 및 같은 법 시행령 제 7 조의 규정에 의한 지형도면 등을 다음과 같이 고시합니다.

<div align="right">2011. 5. 6.
국 토 해 양 부 장 관</div>

1. 택지개발예정지구의 명칭 : 오산세교(3) 택지개발예정지구

2. 시행자의 명칭 및 주소와 대표자의 성명
　　가. 명 칭 : 한국토지주택공사
　　나. 주 소 : 경기도 성남시 분당구 정자동 217
　　다. 성 명 : 이 지 송

3. 개발대상토지 및 사업지구의 위치 및 면적
　　가. 위 치 :경기도 오산시 금암동, 궐동, 가장동, 서동, 가수동,벌음동, 누읍동, 탑동, 두곡동 일원
　　나. 면 적 : 5,086,000 ㎡
　　다.개발대상토지 : 게제생략

4. 처분의 내용 및 사유
　　가. 내 용 : 택지개발예정지구 지정 취소
　　나.사 유 :택지개발촉진법 제 23 조 제 1 항 제 3 호의 규정에 의한 택지개발사업의 계속 시행 불가능

5. 택지개발예정지구 취소 내역
　　가. 택지개발예정지구 지정(변경) 조서

지구명	위 치	면 적(㎡)			비 고
		기 정	변 경	증 감	
오산세교(3) 택지개발 예정지구	경기도오산시 금암동 등 9 개동 일원	5,086,000	-	감)5,086,000	

　　나. 택지개발예정지구 지정(변경) 사유서

지구명	변경내용	변 경 사 유
오산세교(3) 택지개발 예정지구	택지개발 예정지구 지정취소	·택지개발촉진법 제23조 제1항 제3호의 규정에 의한 택지개발사업의 계속 시행 불가능

　　다.「국토의 계획 및 이용에 관한 법률」에 따른 용도지역 및 도시계획시설의 환원 또는 폐지에 관한 사항
　　 - 실시계획 수립 고시되지 않은 지구로서 환원대상이 없으나, 해당 지방자치 단체에서 처분할 사항 등이 있을 경우 이에 대한
　　　환원 등은 해당 지방자치단체에서 별도 조치

6. 관련도면
ㅇ택지개발예정지구 지정의 취소 지형도면(S=1:1,200) : 게제생략

7.관계도서 열람방법 : 택지개발예정지구 지정의 취소 고시 관계도서는 아래 장소에서 비치하여 일반에게 공람.
ㅇ 공람장소 : 경기도 택지계획과(☎ 031-8008-3254)오산시 도시과(☎ 031-371-4725)
　　　　　　한국토지주택공사 오산사업본부(☎ 031-831-5062)

Source: MLTM homepage.

On September 1st 2014, the Korean government announced a set of measures aimed at stimulating the country's real estate market that include reducing the minimum requirement period of implementing the housing reconstruction project up to 30 years. Furthermore, the Korean government will also repeal the special act, 'Residential Land Development Promotion Act' 宅地開発促進法 that have led to the development of large-scaled residential new towns enacted in 1980. This policy change for the housing supply method was drawn by the fact that the real estate market is apparently experiencing an oversupply (MOLIT, 2014; Yonhap News Agency, 2014).

Table 4-4. Periodization of new town development in Seoul metropolitan area

Phase	Name	Period	Characteristics	Typical example
I	Two Million Housing Unit Construction Plan and development of the first generation new towns in SMA	In the late 1980s	Implementation of the massive housing supply policy, such as 'the Two Million Housing Unit Construction Plan' to cope with housing shortage and stabilize the real estate market in SMA	Bundang NT, Ilsan NT, Pyeongchon NT, Sanbon NT, Jungdong NT
II	Urban sprawl in the quasi-agricultural zone and development of the second generation new towns in SMA	2000-2007	Development of the ten second generation new towns in SMA within 60km from Seoul CBD to solve the serious urban sprawl with a poor infrastructure in the rural areas and fringe areas of the first generation new towns, especially Quasi-agricultural and forest zone	Unjeong NT, Dongtan 1 and 2 NT, Pangyo NT, Gwanggyo NT, Hangang NT, Okjeong/Hoecheon NT, Wirye NT, Godeok NT, Geomdan NT
III	Downsizing new town projects due to the recession of the real estate market	Since 2008	Designation annulment of prearranged area for housing site development due to the recession of real estate market since the subprime mortgage crisis in United States in 2007	Designation annulment of Segyo 3 NT and Geomdan 2 NT

Source: Kim, J. E., 2013.

4.3 Demographic changes of the first generation new towns in SMA, Korea

4.3.1 Data and variables

This section of this chapter analyzed the changes of population structure by age (e.g., ratio of population cohorts and ratio of population aged 65 and over), movement pattern (e.g., migration and commuting area, duration of residence), residential characteristics (e.g., home ownership) and socio-

economic characteristics of residents (e.g., education level, occupation) of the first generation new towns in Seoul metropolitan area (Bundang, Ilsan, Pyeongchon, Sanbon, and Jungdong), which were built as part of The Two Million Housing Unit Construction Plan in the late of 1980s, through four junctures of 1995, 2000, 2005 and 2010.

The statistical data of the new Towns are not yet constructed by City/County/District (Si 市/Gun 郡/Gu 區) level, therefore, the statistical data of town-level administrative district in Korea (Eup 邑/Myeon 面/Dong 洞) level should be used in order to comprehend the characteristics of the New Towns. Thus, this thesis traced the changes of Dong in new towns from 1995 to 2010 and established the analysis scope of each juncture by new town level. But the boundaries of Bundang New Town and sanbon new town are not identical with the boundaries of their Dong or they included changes of boundaries of 'Dong'. These are indicated as limitations of procurement of data.

This thesis determined the objects of analysis for the new towns that had data provided by Si-Gun-Gu level like below. Bunadang district Seongnam city is for Bundang New Town, Ilsandong district and Ilsanseo district Goyang city are for Ilsan New Town[9], Dongan district Angyang city is for Pyeongchon new Town, Gunpo city is for Sanbon new Town, and Wonmi district Bucheon city is for Jungdong New Town. In order to reflect more characteristics of The First Generation New Towns, the objects of analysis are limited to the residents who migrated after 1992[10] and live in an apartment complex.[11]

After establishing the spatial scope by each period, as a unit of statistical data like above, this study compared and analyzed the characteristics of population structure and population migration of each new town by each period based on the Population and Housing Census. The total data of the

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[9] According to the change of administrative boundary, the whole area of Goyang city in 1995, Ilsan district Goyang city in 2000, Ilsandong district and Ilsanseo district Goyang city since 2005 were determined as the object of analysis.

[10] Since the first move-in time of the new towns was from 1991 to 1993, the residents who lived in the new town area before the first move-in time were excluded from the research.

[11] Among the new town residents, only those who lived in apartment complex became the object of analysis as 85~98% of housing unit type of the first generation new towns in SMA is apartment complex.

census, which provide of town-level administrative district in Korea (Eup/Myeon/Dong) level data, by year were used for analyzing population structures (population structure by age and ratio of population aged 65 and over) and the sample data of the Population and Housing Census[12] which provide City/County/District (Si/Gun/Gu) level data and include characteristics of residents, were used for analyzing population migration (areas of move-in and commute) and characteristics of residents.

Table 4-5. Data and analysis items for transition process of the first generation new towns in SMA

Item		Data	Data Source				Survey zone
			1995	2000	2005	2010	
Population structure	Total population	The number and ratio of population by 5 years old	Population and Housing Census				Town-level administrative district (Eup/Myeon/ Dong)
	Ratio of population cohorts	The number and ratio of population by 5 years old					
	Ratio of population aged 65 and over	Ratio of population aged 65 and over to total population					
Movement pattern	Proportion changes of population migration area	The number and ratio of samples by move-out area 5 years ago	Population and Housing Census 2% sampling (type B)			Population and Housing Census 10% sampling (Micro Data Service System)	City/County/ District (Si/Gun/Gu)
	Proportion changes of commuting area	The number and ratio of samples by commuting area currently					
	Duration of residence	The number and ratio of samples by residence period of residents moved into a new town since 1991					
Residential characteristics	Home ownership	The number and ratio of samples by homeowner and rental household					
Socio-economic items	Educational level	The number and ratio of samples by Graduated educational institute for population aged 6 and over					
	Occupation	The number and ratio of samples by Job classification					

Table 4-6. Town-level administrative districts ('dong') change of the first generation new towns in SMA, Korea

New Town	District, City(2010)	Dong (Town-level administrative district)				
		1995	2000	2001	2005	2010
Bundang New town	Bundang district, Seongnam city	Bundang-dong	Bundang-dong	Bundang-dong	Bundang-dong	Bundang-dong
		Chorim-dong	Chorim-dong	Sunae1-dong	Sunae1-dong	Sunae1-dong
		Naejeong-dong	Naejeong-dong	Sunae2-dong	Sunae2-dong	Sunae2-dong
		Sunae-dong	Sunae-dong	Sunae3-dong	Sunae3-dong	Sunae3-dong
		(divided from Jeongja-dong and Geumgok-dong)	Singi-dong	Jeongja1-dong	Jeongja1-dong	Jeongja1-dong
		Jeongja-dong	Jeongja-dong	Jeongja2-dong	Jeongja2-dong	Jeongja2-dong
		(divided)	Buljeong-dong	Jeongja3-dong	Jeongja3-dong	Jeongja3-dong
		Seohyeon-dong	Seohyeon-dong	Seohyeon1-dong	Seohyeon1-dong	Seohyeon1-dong
		Seodang-dong	Seodang-dong	Seohyeon2-dong	Seohyeon2-dong	Seohyeon2-dong
		Imae-dong	Imae-dong	Imae1-dong	Imae1-dong	Imae1-dong
		Maesong-dong	Maesong-dong	Imae2-dong	Imae2-dong	Imae2-dong
		Yatap-dong	Yatap-dong	Yatap1-dong	Yatap1-dong	Yatap1-dong
		Hatap-dong	Hatap-dong	Yatap2-dong	Yatap2-dong	Yatap2-dong
		Jungtap-dong	Jungtap-dong	Yatap3-dong	Yatap3-dong	Yatap3-dong
		Guemgok-dong	Guemgok-dong	Guemgok-dong (divided)	Guemgok1-dong	Guemgok-dong
				(divided)	Guemgok2-dong	Gumi1-dong
		(divided)	Gumi-dong	Gumi-dong	Gumi-dong	Gumi-dong
Ilsan New town	Ilsandong district, Goyang city	(divided from Ilsan3-dong)	Ilsan4-dong	Ilsan4-dong	Jeongbalsan-dong	Jeongbalsan-dong
		Baekseok-dong	Baekseok-dong	Baekseok-dong	Baekseok-dong	
					(divided)	Baekseok1-dong
					(divided)	Baekseok2-dong
		Madu1-dong	Madu1-dong	Madu1-dong	Madu1-dong	Madu1-dong
		Madu2-dong	Madu2-dong	Madu2-dong	Madu2-dong	Madu2-dong
		(divided form Madu2-dong & Juyeop1-dong)	Janghang2-dong	Janghang2-dong	Janghang2-dong	Janghang2-dong
	Ilsanseo district, Goyang city	Juyeop1-dong	Juyeop1-dong	Juyeop1-dong	Juyeop1-dong	Juyeop1-dong
		Juyeop2-dong	Juyeop2-dong	Juyeop2-dong	Juyeop2-dong	Juyeop2-dong
		(divided)	Daehwa-dong	Daehwa-dong	Daehwa-dong	Daehwa-dong
		Ilsan3-dong	Ilsan3-dong	Ilsan3-dong	Ilsan3-dong	Ilsan3-dong
Pyeongchon New town	Dongan district, Anyang city	Buheung-dong	Buheung-dong	Buheung-dong	Buheung-dong	Buheung-dong
		Daran-dong	Daran-dong	Daran-dong	Daran-dong	Daran-dong
		Burim-dong	Burim-dong	Burim-dong	Burim-dong	Burim-dong
		Pyeongan-dong	Pyeongan-dong	Pyeongan-dong	Pyeongan-dong	Pyeongan-dong
		Guiin-dong	Guiin-dong	Guiin-dong	Guiin-dong	Guiin-dong
		Beomgye-dong	Beomgye-dong	Beomgye-dong	Beomgye-dong	Beomgye-dong
		Sinchon-dong	Sinchon-dong	Sinchon-dong	Sinchon-dong	Sinchon-dong
		Galsan-dong	Galsan-dong	Galsan-dong	Galsan-dong	Galsan-dong
Sanbon New town	Gunpo city	Sanbon1-dong	Sanbon1-dong	Sanbon1-dong	Sanbon1-dong	Sanbon1-dong
		Sanbon2-dong	Sanbon2-dong	Sanbon2-dong	Sanbon2-dong	Sanbon2-dong
		Gwangjeong-dong	Gwangjeong-dong	Gwangjeong-dong	Gwangjeong-dong	Gwangjeong-dong
		Jaegung-dong	Jaegung-dong	Jaegung-dong	Jaegung-dong	Jaegung-dong
		Ogeum-dong	Ogeum-dong	Ogeum-dong	Ogeum-dong	Ogeum-dong
		Suri-dong	Suri-dong	Suri-dong	Suri-dong	Suri-dong
		Gungnae-dong	Gungnae-dong	Gungnae-dong	Gungnae-dong	Gungnae-dong
Jungdong New town	Wonmi district, Bucheon city	Jung1-dong	Jung1-dong	Jung1-dong	Jung1-dong	Jung1-dong
		Jung3-dong	Jung3-dong	Jung3-dong	Jung3-dong	Jung3-dong
		(divided)	Jung4-dong	Jung4-dong	Jung4-dong	Jung4-dong
		Jung2-dong	Jung2-dong	Jung2-dong	Jung2-dong	Jung2-dong
		Sang-dong	Sang-dong	Sang-dong	Sang-dong	Sang-dong
		Sang1-dong	Sang1-dong	Sang1-dong	Sang1-dong	Sang1-dong
				(divided)	Sang2-dong	Sang2-dong
				(divided)	Sang3-dong	Sang3-dong
		~~Yakdae-dong~~	~~Yakdae-dong~~	~~Yakdae-dong~~	~~Yakdae-dong~~	~~Yakdae-dong~~
	Ojeong district, Bucheon city	~~Sinheong-dong~~	~~Sinheong-dong~~	~~Sinheong-dong~~	~~Sinheong-dong~~	~~Sinheong-dong~~

Note: 1. Bundang New Town: Even though some parts of 'Yatap 3-dong', 'Imae 1-dong', 'Seohyeon 1-dong', 'Bundang-dong', 'Geumgok-dong' and 'Gumi 1-dong' are not included in Bundang New Town area, all parts of administrative districts are included as analysis object regions in this thesis. Some parts of administrative districts not included in Bundang New Town have extremely small size of population than those of entire administrative districts.

2. Ilsan New Town: 1) belongs to just Goyang city (had no district) before 1995, Ilsan district, Goyang city from 1996 to 1994 and Ilsandong district and Ilsanseo district, Goyang city since 2005. 2) 'Janghang 2-dong' was divided from 'Janghang-dong' in 1996. 'Janghang-dong' in 1995 had a similar size of population with 'Janghang 1-dong' in 1996. Therefore, this thesis regards that 'Janhang 2-dong' area had almost no population before 1995.

3. Pyeongchon New Town: After completed Pyeongchon New Town development project, private sectors constructed apartment complexes in 'Guiin-dong' area where were excluded from new town district at the beginning stage.

4. Sanbon New Town: Even though some parts of 'Sanbon 1-dong' are not included in Sanbon New Town area, all parts of administrative districts are included as analysis object regions in this thesis.

5. Jungdong New Town: 1) 'Sang 2-dong' and 'Sang 3-dong' were divided from 'Sang 1-dong' in 2003. So, data of 'Sang 1-dong' before 2002 contains data of 'Sang 2-dong' and 'Sang 3-dong'. 2) Even though some parts of 'Yakdae-dong' and 'Sinheong-dong' are included in Jungdong New Town area, this thesis exclude these area designated as a manufacturing area and located in cogeneration plant from analysis object regions.

4.3.2 Population structure

Total population

The first move-in only took 3 to 4 years from the announcement of development[13] for The First Generation New Towns In Metropolitan Area. New town construction plan was finished within 1995 except for road construction project in Budang new town. According to the census of 1995, the resident population of the new towns reached the late of 70% to 90% of planned population within the short period of 3 to 4 years for this reason.

Until the census of 2005, in spite of the economic crisis in 1988, the population of these new towns constantly increased owing to the overall internal and external upturn of the real estate business. According to the census of 2010, the population of the new towns, except for Jungdong new town, decreased compared with that of 2005 because of a remorseless slowdown in population growth and the downturn of the real estate business after the U.S. subprime mortgage debacle. Unless the slowdown in population growth and economic growth called social and economic conditions improve, the problems of the first generation new towns in Seoul metropolitan area, which have been over 20 years and under deterioration of housing and infrastructure will be continued.
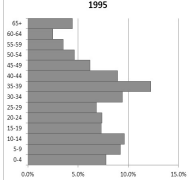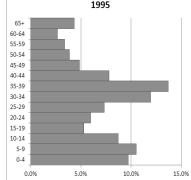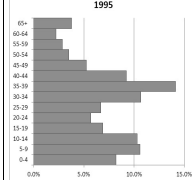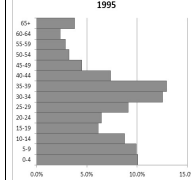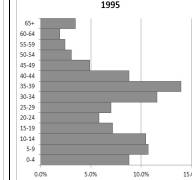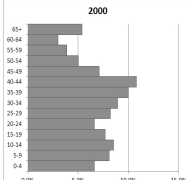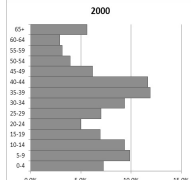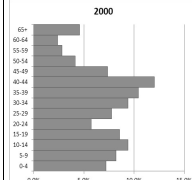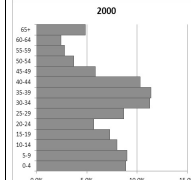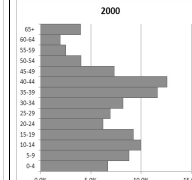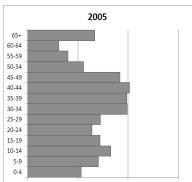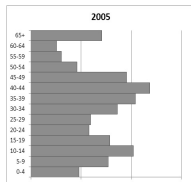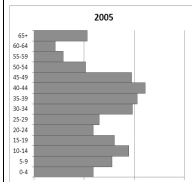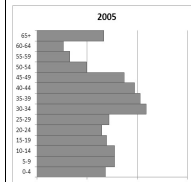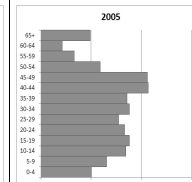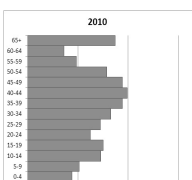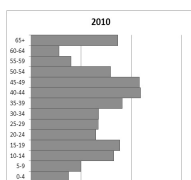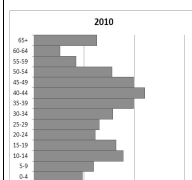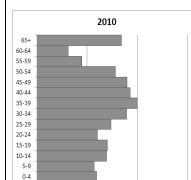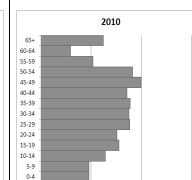
Population cohorts

The type of population pyramid of the 5 new towns was 'extensive type' in the early stage as the new towns were formed of 30s to 40s householders and their children who needed new houses. Because of the upsurge of real estate price, the majority of the population changed from 30s to 40s who had higher purchasing power and low birth rate and aging are intensifying, hence, the type of population pyramid is also changing form 'extensive type' to 'constrictive type'. But the households of Bundang, Pyeongchon and Ilsan new towns except those of Sanbon and Jungdong new towns have

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[13] The development of Bundang, Ilsan and Jungdong new towns were announced on April 27, 1989 and the development of Pyeongchon and Sanbon new towns were announced on September 13, 1988.

comparatively higher rates of student children who are 10 to 19 years old thanks to better educational environments.

Table 4-7. Population cohort changes in the first generation new towns in SMA, Korea

New Town	Bundang NT	Ilsan NT	Pyoengchon NT	Sanbon NT	Jungdong NT
Proposed Population	390,320	276,000	168,188	167,896	165,740
In 1995	POP*: 314,527 AR**: 4.4%	POP: 212,445 AR: 4.3%	POP: 150,039 AR: 3.8%	POP: 168,862 AR: 3.8%	POP : 152,324 AR: 3.4%
Ratio of Population cohorts by 5yrs (%)					
In 2000	POP: 376,263 AR: 5.4%	POP: 272,555 AR: 5.6%	POP: 54,556 AR: 4.6%	POP: 186,341 AR: 4.9%	POP: 167,677 AR: 4.0%
Ratio of Population cohorts by 5yrs (%)					
In 2005	POP: 414,575 AR: 6.7%	POP: 304,524 AR: 7.1%	POP: 154,825 AR: 5.3%	POP: 180,206 AR: 6.7%	POP: 167,851 AR: 4.9%
Ratio of Population cohorts by 5yrs (%)					
In 2010	POP: 394,609 AR: 8.7%	POP: 284,802 AR: 8.7%	POP: 146,505 AR: 6.3%	POP: 165,419 AR: 8.4%	POP: 168,241 AR: 6.2%
Ratio of Population cohorts by 5yrs (%)					

*'POP'=Total population by Population and Housing Census
**'AR' = ratio of population aged 65 and over to the total population
Source: Statistics Korea. Population and Housing Census in each year. Quoted in Kim, 2013.

Ratio of population aged 65 and over

The ratio of aging (ratio of population aged 65 and over in total population) in the new towns, which was based on the analysis of the total data of the census from 1995 to 2010, is generally low compared with the those in metropolitan areas and the whole nation. A careful look suggests that the ratios of aging of Bundang and Isan new towns which were developed on a large scale in suburbs is constantly higher and becoming faster than those of Pyeongchon, Sanbon and Jungdong new towns which were developed next to old city. One more notable thing is that the ratio of aging in Sanbon new town is faster than any other new towns. Constant monitoring is needed for Sanbon new towns in case of emergence of problems caused by rapid aging.

Figure 4-9. Change of 'ratio of population aged 65 and over' in SMA, Korea
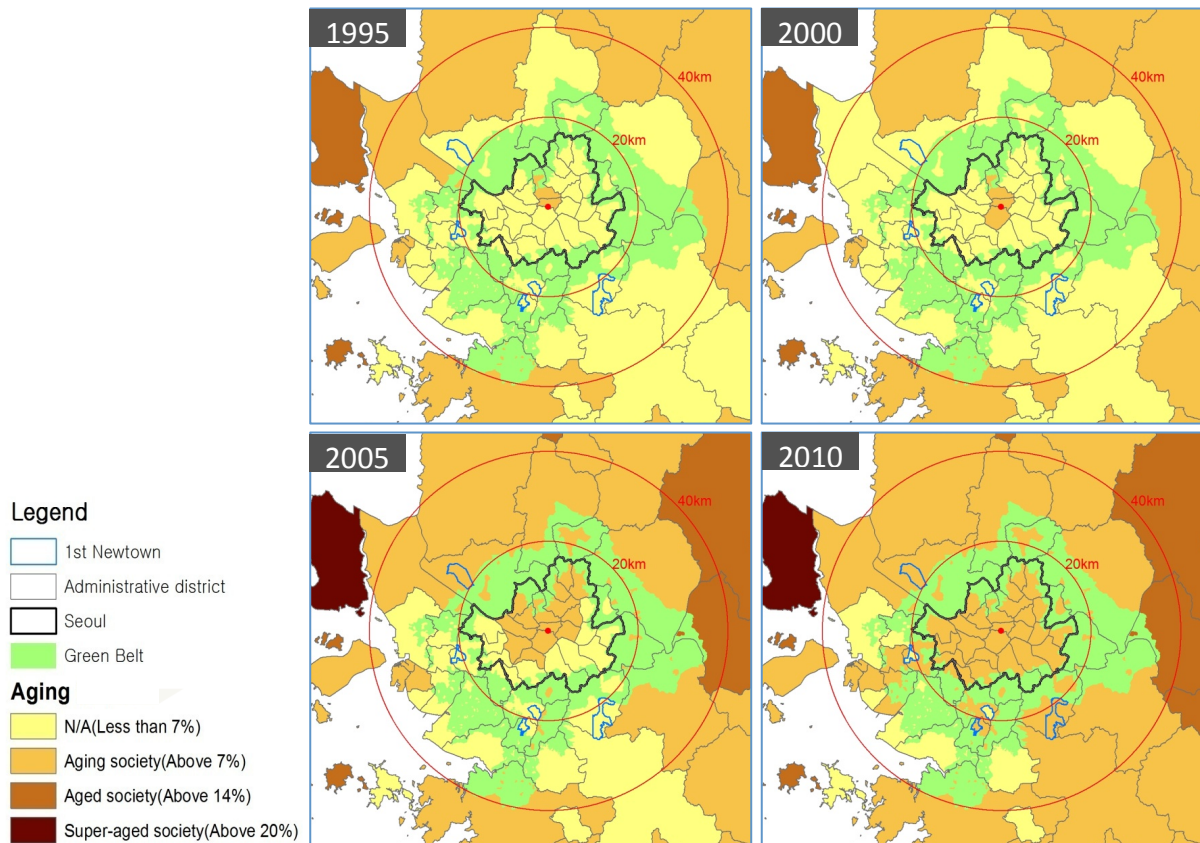
Source: Statistics Korea. Population and Housing Census in each year. Quoted in Kim, 2013.

4.3.3 Movement pattern

Mgration area changes

In this paragraph, this study analyzed where the residents in new towns are from based on the sample data of the Population and Housing Census about the residence where the residents lived in 5 years ago. This study divided the move-out area, which the residents lived in 5years ago, into metropolitan area and non-metropolitan area and analyzed statistics of metropolitan area by metropolitan government of Seoul, Gyeonggi and Incheon. Meanwhile, this study separated Gangnam 3 districts (Seocho district, Gangnam district, Songpa district) which have comparatively high income from Seoul area and divided Gyeonggi area into Northern area of Gyeonggi Province and Southern area of Gyeonggi Province by Han river.

The ratio of residents who moved in from Seoul were high in 1995, the early stage of new town construction. But now the ratio is declining and the ratio of the residents moving inside new towns are increasing. Especially, the residents who moved in from Seoul were about two third of total population (60.0% for Bundang, 65.9% for Isan) in Bundang and Ilsan New Towns which were developed on a large scale in suburbs in the eraly stage of development (1995).

In the case of Bundang New Town that has good accessibility from Gangnam 3 districts, the residents who moved in from Gangnam 3 districts were over a quarter (26.8%). This worked as one of the causes that Bundang New Towns became high-class residential area. Meanwhile, the residents from Gangnam 3 districts were only 7.2% in case of Ilsan New Town. Move-out area of new town residents (i.e., from where people move in new towns) might be a crucial reason that causes social, cultural and economic differences of new towns in early stage of new towns. Therefore, this could be one of the most important elements in the evolution of new towns.

In the early stage of the new town development, 1995, about 90% of residents in these five new towns had experienced migration, but that proportion gradually decreased to about 50% in 2010. This means that population migration is stabilizing quantitatively.

Table 4-8. Proportion changes of population migration area in the first generation new towns in SMA, Korea

(Unit: %)

New town	Bundang NT				Ilsan NT				Pyeongchon NT			
Year	1995	2000	2005	2010	1995	2000	2005	2010	1995	2000	2005	2010
Number of samples (thousands)*	258	157	177	190	252	158	210	197	176	109	158	120
Total percentage	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Within new town	15.5	35.4	50.3	52.7	15.6	34.2	55.6	61.5	32.9	44.4	49.0	57.0
Out of new town	84.6	64.6	49.6	47.3	84.4	65.8	44.4	38.5	67.2	55.5	51.1	43.0
SMA	78.9	53.4	37.5	39.7	77.9	56.5	36.6	31.1	62.9	45.7	42.2	35.5
Seoul	69.0	41.1	22.7	21.8	65.9	42.2	24.6	18.0	44.7	24.8	17.2	14.2
Gangnam 3 districts	26.8	18.9	12.1	7.6	7.2	6.0	21.5	1.9	8.2	5.8	13.6	3.4
Non-Gangnam 3 districts	42.2	22.2	10.6	14.2	58.7	36.2	3.1	16.2	36.5	19.0	3.6	10.8
Incheon	0.8	1.3	0.9	1.1	1.7	1.9	2.6	2.1	1.4	1.3	1.3	1.2
Gyeonggi	9.1	11.0	13.9	16.8	10.3	12.4	9.4	11.0	16.8	19.6	23.7	20.2
Southern area	8.4	8.5	11.8	14.2	8.9	9.8	6.2	6.4	16.1	18.2	21.4	18.5
Northern area	0.7	2.5	2.1	2.5	1.4	2.6	3.2	4.7	0.7	1.4	2.3	1.7
Non-SMA	5.6	11.1	12.1	7.6	6.6	9.2	7.9	7.3	4.2	9.9	8.8	7.5

New town	Sanbon NT				Jungdong NT			
Year	1995	2000	2005	2010	1995	2000	2005	2010
Number of samples (thousands)*	130	94	97	103	144	92	128	106
Total percentage	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Within new town	12.5	32.4	48.1	55.2	47.8	59.7	56.8	64.4
Out of new town	87.6	67.6	52.0	44.8	52.2	40.3	43.3	35.6
SMA	82.3	58.8	42.6	37.5	46.5	32.2	37.0	28.9
Seoul	41.2	24.8	17.2	11.8	30.4	18.0	12.3	12.7
Gangnam 3 districts	8.2	4.6	13.8	2.0	2.8	2.3	11.4	1.1
Non-Gangnam 3 districts	33.0	20.2	3.4	9.8	27.6	15.7	0.9	11.6
Incheon	1.4	1.6	1.9	1.5	9.5	6.6	17.8	9.1
Gyeonggi	39.7	32.4	23.5	24.2	6.6	7.6	6.9	7.1
Southern area	38.5	30.2	22.5	22.7	5.8	6.3	5.3	6.0
Northern area	1.2	2.2	1.0	1.5	0.8	1.3	1.6	1.1
Non-SMA	5.3	8.8	9.4	7.3	5.7	8.1	6.2	6.7

* This analysis was only given to residents who have experiences of migration (lived in the different residence five years ago) among the whole sample of census.

Note 1. 'Within new town' represents Bundang district, Seongnam city in case of Bundang NT, Ilsandong district and Ilsanseo district, Goyang city in case of Ilsan NT, Dongan district, Anyang city in case of Pyeongchon NT, Gunpo city in case of Sanbon NT and Wonmi district, Bucheon city in case of Jungdong NT respectively.

2. Seocho district, Gangnam district and Songpa district are called 'Gangnam 3 districts'.

3. 31 cities of Gyeonggi Province are subdivided into 'Southern area of Gyeonggi Province' (Gwacheon, Gwangmyeong, Gwangju, Gunpo, Gimpo, Seongnam, Buchoen, Suwon, Siheong, Ansan, Anseong, Anyang, Yangpeong, Yeoju, Osan, Yongin, Uiwang, Icheon, Pyeongtaek, Hanam and Hwaseong) and 'Northern area of Gyeonggi Province' (Gapyeong, Goyang, Guri, Namyangju, Dongducheon, Yangju, Yeoncheon, Paju and Pocheon) by Han river.

Source: Statistics Korea. 2% sample data (without weight) in 1995, 2000 & 2005, and 10% sample data (with weight) in 2010 of Population and Housing Census. Quoted in Kim, 2013.

Figure 4-10. Proportion changes of population migration area in the first generation new towns in SMA, Korea
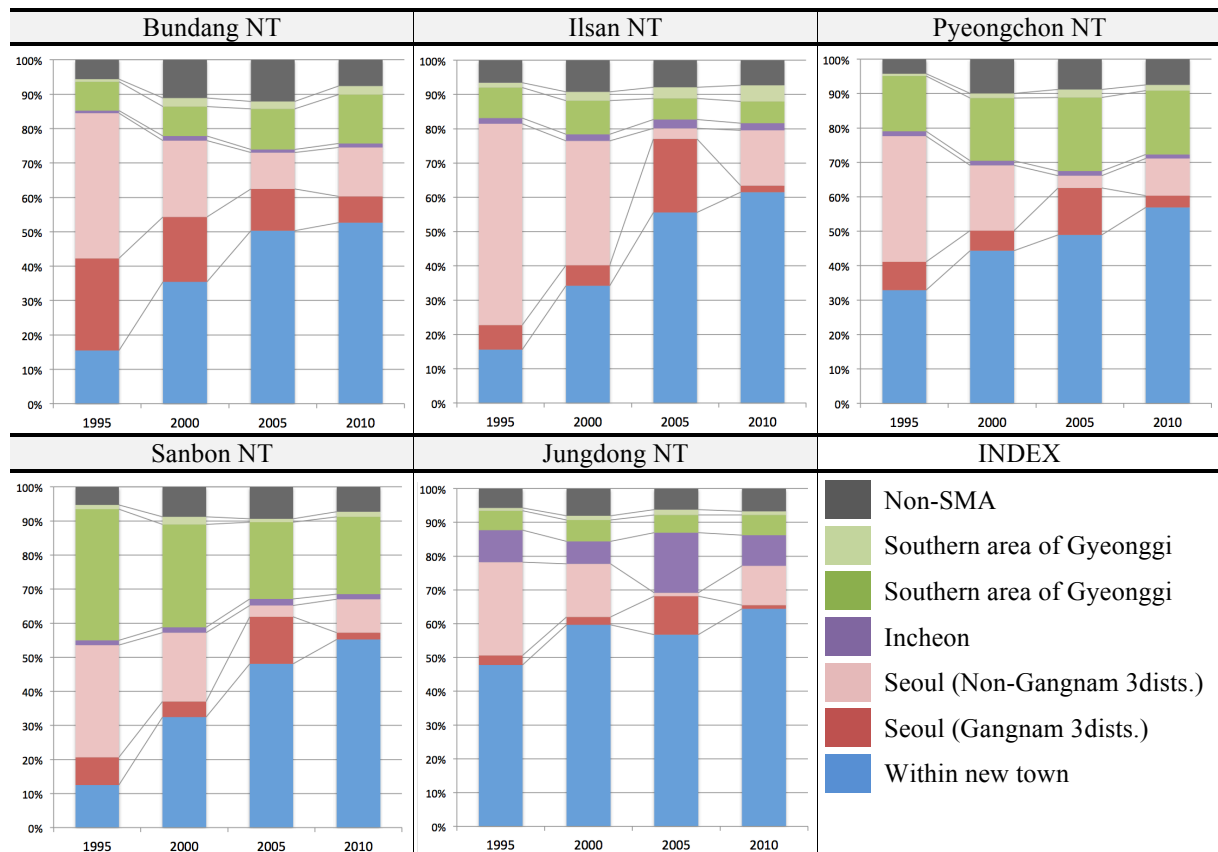
Source: Statistics Korea. 2% sample data (without weight) in 1995, 2000 & 2005, and 10% sample data (with weight) in 2010 of Population and Housing Census. Quoted in Kim, 2013.

Commuting area changes

According to the analysis on the residents' commuting areas of the first generation new towns in Seoul metropolitan area, the ratios of residents' commute to Seoul are constantly declining. Especially, the ratio of the residents' commute to Seoul of Bundang and Ilsan new towns which are developed in suburbs were over 60% and higher than those of the other new towns. It declined to 30% and it is same level of the ratio of the residents's commute inside new towns. This is consistent with the result that self-sufficiency of The First Generation New Towns In Metropolitan Area is increasing.

Table 4-9. Proportion changes of commuting area in the first generation new towns in SMA, Korea

(Unit: %)

New town	Bundang NT				Ilsan NT				Pyeongchon NT			
Year	1995	2000	2005	2010	1995	2000	2005	2010	1995	2000	2005	2010
Number of samples (thousands)*	258	157	177	190	252	158	210	197	176	109	158	120
Total percentage	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Within new town	15.5	35.4	50.3	52.7	15.6	34.2	55.6	61.5	32.9	44.4	49.0	57.0
Out of new town	84.6	64.6	49.6	47.3	84.4	65.8	44.4	38.5	67.2	55.5	51.1	43.0
SMA	78.9	53.4	37.5	39.7	77.9	56.5	36.6	31.1	62.9	45.7	42.2	35.5
Seoul	69.0	41.1	22.7	21.8	65.9	42.2	24.6	18.0	44.7	24.8	17.2	14.2
Gangnam 3 districts	26.8	18.9	12.1	7.6	7.2	6.0	21.5	1.9	8.2	5.8	13.6	3.4
Non-Gangnam 3 districts	42.2	22.2	10.6	14.2	58.7	36.2	3.1	16.2	36.5	19.0	3.6	10.8
Incheon	0.8	1.3	0.9	1.1	1.7	1.9	2.6	2.1	1.4	1.3	1.3	1.2
Gyeonggi	9.1	11.0	13.9	16.8	10.3	12.4	9.4	11.0	16.8	19.6	23.7	20.2
Southern area	8.4	8.5	11.8	14.2	8.9	9.8	6.2	6.4	16.1	18.2	21.4	18.5
Northern area	0.7	2.5	2.1	2.5	1.4	2.6	3.2	4.7	0.7	1.4	2.3	1.7
Non-SMA	5.6	11.1	12.1	7.6	6.6	9.2	7.9	7.3	4.2	9.9	8.8	7.5

New town	Sanbon NT				Jungdong NT			
Year	1995	2000	2005	2010	1995	2000	2005	2010
Number of samples (thousands)*	130	94	97	103	144	92	128	106
Total percentage	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Within new town	12.5	32.4	48.1	55.2	47.8	59.7	56.8	64.4
Out of new town	87.6	67.6	52.0	44.8	52.2	40.3	43.3	35.6
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Gangnam 3 districts	8.2	4.6	13.8	2.0	2.8	2.3	11.4	1.1
Non-Gangnam 3 districts	33.0	20.2	3.4	9.8	27.6	15.7	0.9	11.6
Incheon	1.4	1.6	1.9	1.5	9.5	6.6	17.8	9.1
Gyeonggi	39.7	32.4	23.5	24.2	6.6	7.6	6.9	7.1
Southern area	38.5	30.2	22.5	22.7	5.8	6.3	5.3	6.0
Northern area	1.2	2.2	1.0	1.5	0.8	1.3	1.6	1.1
Non-SMA	5.3	8.8	9.4	7.3	5.7	8.1	6.2	6.7

* This analysis was only given to residents who have experiences of migration (lived in the different residence five years ago) among the whole sample of census.

Note 1. 'Within new town' represents Bundang district, Seongnam city in case of Bundang NT, Ilsandong district and Ilsanseo district, Goyang city in case of Ilsan NT, Dongan district, Anyang city in case of Pyeongchon NT, Gunpo city in case of Sanbon NT and Wonmi district, Bucheon city in case of Jungdong NT respectively.

2. Seocho district, Gangnam district and Songpa district are called 'Gangnam 3 districts'.

3. 31 cities of Gyeonggi Province are subdivided into 'Southern area of Gyeonggi Province' (Gwacheon, Gwangmyeong, Gwangju, Gunpo, Gimpo, Seongnam, Buchoen, Suwon, Siheong, Ansan, Anseong, Anyang, Yangpeong, Yeoju, Osan, Yongin, Uiwang, Icheon, Pyeongtaek, Hanam and Hwaseong) and 'Northern area of Gyeonggi Province' (Gapyeong, Goyang, Guri, Namyangju, Dongducheon, Yangju, Yeoncheon, Paju and Pocheon) by Han river.

Source: Statistics Korea. 2% sample data (without weight) in 1995, 2000 & 2005, and 10% sample data (with weight) in 2010 of Population and Housing Census. Quoted in Kim, 2013.

Figure 4-11. Proportion changes of commuting area in the first generation new towns in SMA, Korea
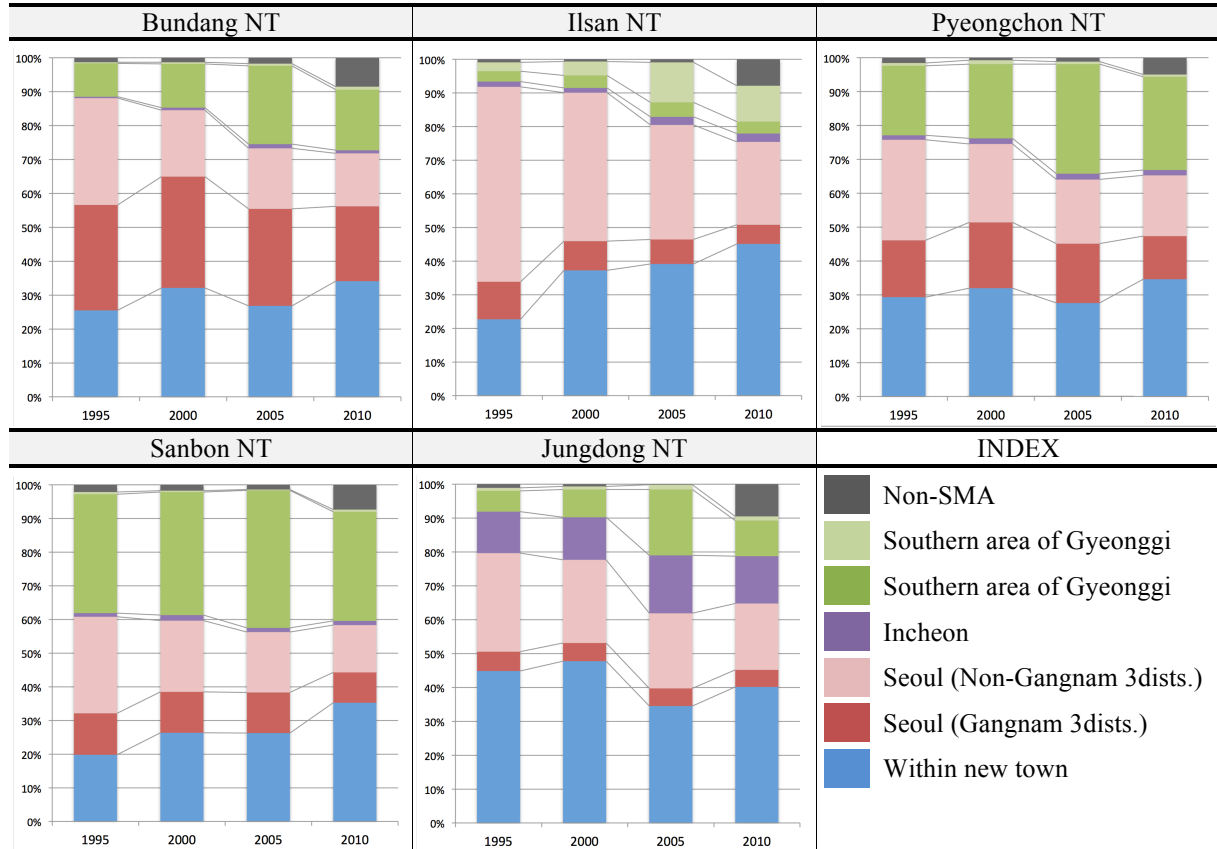
Source: Statistics Korea. 2% sample data (without weight) in 1995, 2000 & 2005, and 10% sample data (with weight) in 2010 of Population and Housing Census. Quoted in Kim, 2013.

Duration of residence

The ratio of population migrating and living in new towns from the initial new town construction period (1991~1994) (population ratio corresponding to the item at the top in each year in the following figure) showed a continuous downtrend. Jungdong New Town showed the lowest ratio of residents living for less than 2 years, who were conjectured to live in rental house, not in own home. However, there were deviations by period and new town overall, and the ratios generally matched the ratios of rental residents in terms of home ownership ratio that was analyzed below.

Table 4-10. Duration of residence of the first generation new town residents in SMA, Korea

(Unit: %)

New town	Bundang NT				Ilsan NT				Pyeongchon NT				Sanbon NT				Jungdong NT			
Year	1995	2000	2005	2010	1995	2000	2005	2010	1995	2000	2005	2010	1995	2000	2005	2010	1995	2000	2005	2010
Number of Samples (thousands)*	278	298	305	355	283	281	320	378	193	198	236	249	144	169	172	201	157	180	217	240
Total percentage	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Less than 1year	31.7	16.2	15.2	20.3	53.0	17.9	17.3	15.6	14.5	18.3	17.7	17.0	19.5	13.5	16.1	22.0	35.0	12.4	12.4	11.8
1-2 years	23.1	17.0	14.6	20.5	30.0	19.1	13.4	10.7	24.1	20.6	22.9	13.5	30.5	15.1	13.2	9.8	26.4	15.0	8.3	12.9
2-3years	28.9	7.5	12.9	6.4	14.1	8.9	17.8	10.4	37.7	7.8	15.6	7.6	36.8	13.3	15.3	8.9	35.4	10.9	17.3	9.7
3-5years	16.3	14.8	19.1	10.6	2.9	15.1	22.0	18.9	23.6	11.7	16.8	13.4	13.2	16.7	17.0	15.0	3.3	15.8	25.0	13.5
5-10years	-	44.4	17.9	21.7	-	39.1	16.4	27.6	-	41.6	14.0	30.6	-	41.3	21.0	24.4	-	45.9	18.3	30.5
10-15years	-	-	20.2	9.6	-	-	13.0	9.6	-	-	13.0	9.8	-	-	17.4	10.8	-	-	18.7	12.4
15-20years	-	-	-	10.8	-	-	-	7.1	-	-	-	8.1	-	-	-	9.1	-	-	-	9.2

* This analysis was only given to whole residents of census.
Source: Statistics Korea. 2% sample data (without weight) in 1995, 2000 & 2005, and 10% sample data (with weight) in 2010 of Population and Housing Census. Quoted in Kim, 2013.

Figure 4-12. Duration of residence of the first generation new town residents in SMA, Korea
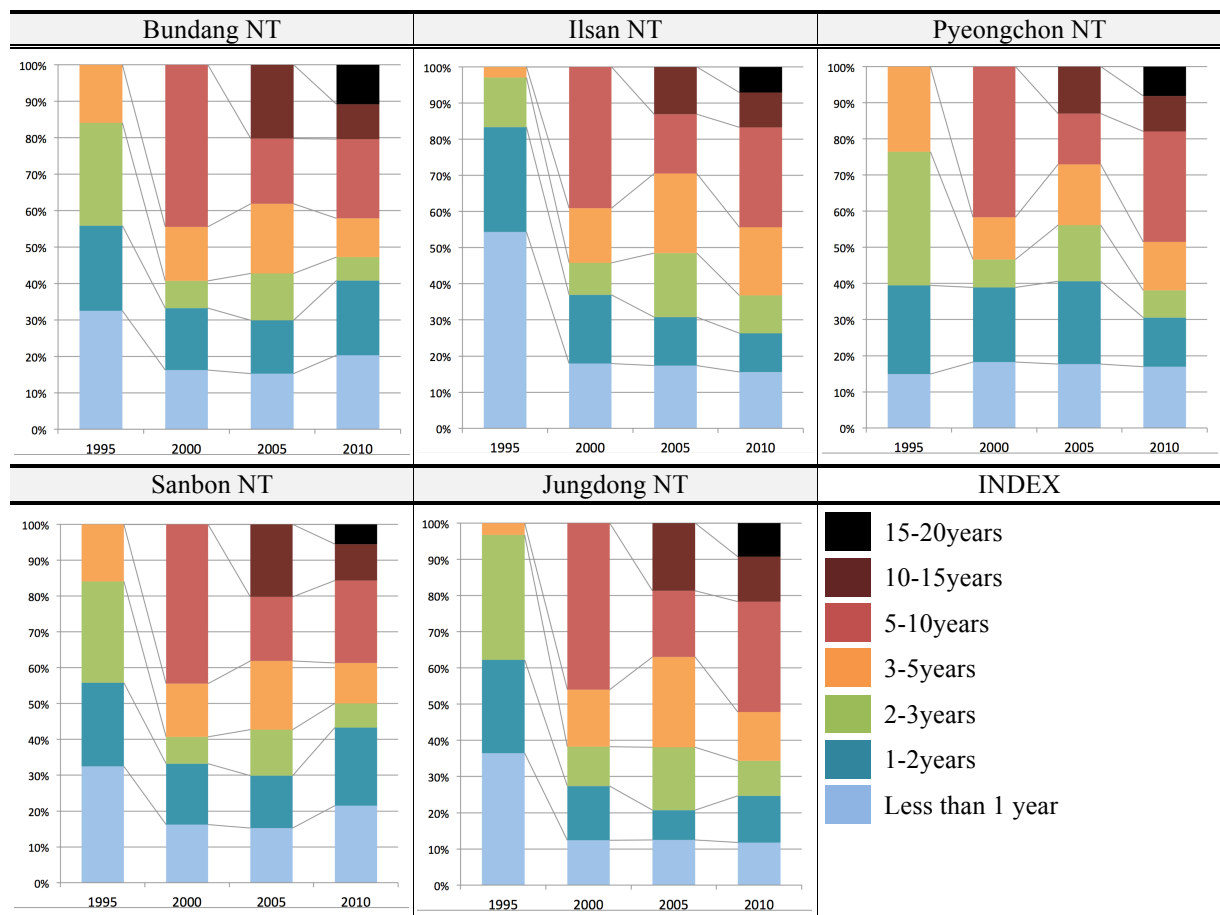
Source: Statistics Korea. 2% sample data (without weight) in 1995, 2000 & 2005, and 10% sample data (with weight) in 2010 of Population and Housing Census. Quoted in Kim, 2013.

4.3.4   Residential characteristics

This Section analyzed proportion changes of duration of residence and home ownership type of the residents in the first generation new town using the sample data of Population and Housing Census regarding the four periods during 1995 to 2010.

Home Ownership Type

Home ownership ratio in all five new towns kept approximately 60~70%. The ratio of rental occupants in Bundang New Town gradually increased, and thus, its ratio was the highest among the five new towns in 2010. However, any special trend was not demonstrated in the remaining new towns. As home ownership ratio was high, the increasing trend of the duration of residence was exhibited in general.

Table 4-11. Home ownership type in the first generation new towns in SMA, Korea

(Unit: %)

New town	Bundang NT				Ilsan NT				Pyeongchon NT				Sanbon NT				Jungdong NT			
Year	1995	2000	2005	2010	1995	2000	2005	2010	1995	2000	2005	2010	1995	2000	2005	2010	1995	2000	2005	2010
Number of Samples* (thousands)	278	298	305	355	283	281	320	378	193	198	236	249	144	169	172	201	157	180	217	240
Total percentage	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Home owner	73.4	66.7	67.6	57.6	72.1	67.5	71.2	65.1	61.9	67.8	70.9	67.4	66.8	70.0	72.4	65.4	63.9	72.5	76.0	70.5
Rental household	26.6	33.3	32.4	42.4	27.9	32.5	28.8	34.9	38.1	32.2	29.1	32.6	33.2	30.0	27.6	34.6	36.1	27.5	24.0	29.5

* This analysis was only given to whole residents of census.
Source: Statistics Korea. 2% sample data (without weight) in 1995, 2000 & 2005, and 10% sample data (with weight) in 2010 of Population and Housing Census. Quoted in Kim, 2013.

Figure 4-13. Home ownership type in the first generation new towns in SMA, Korea
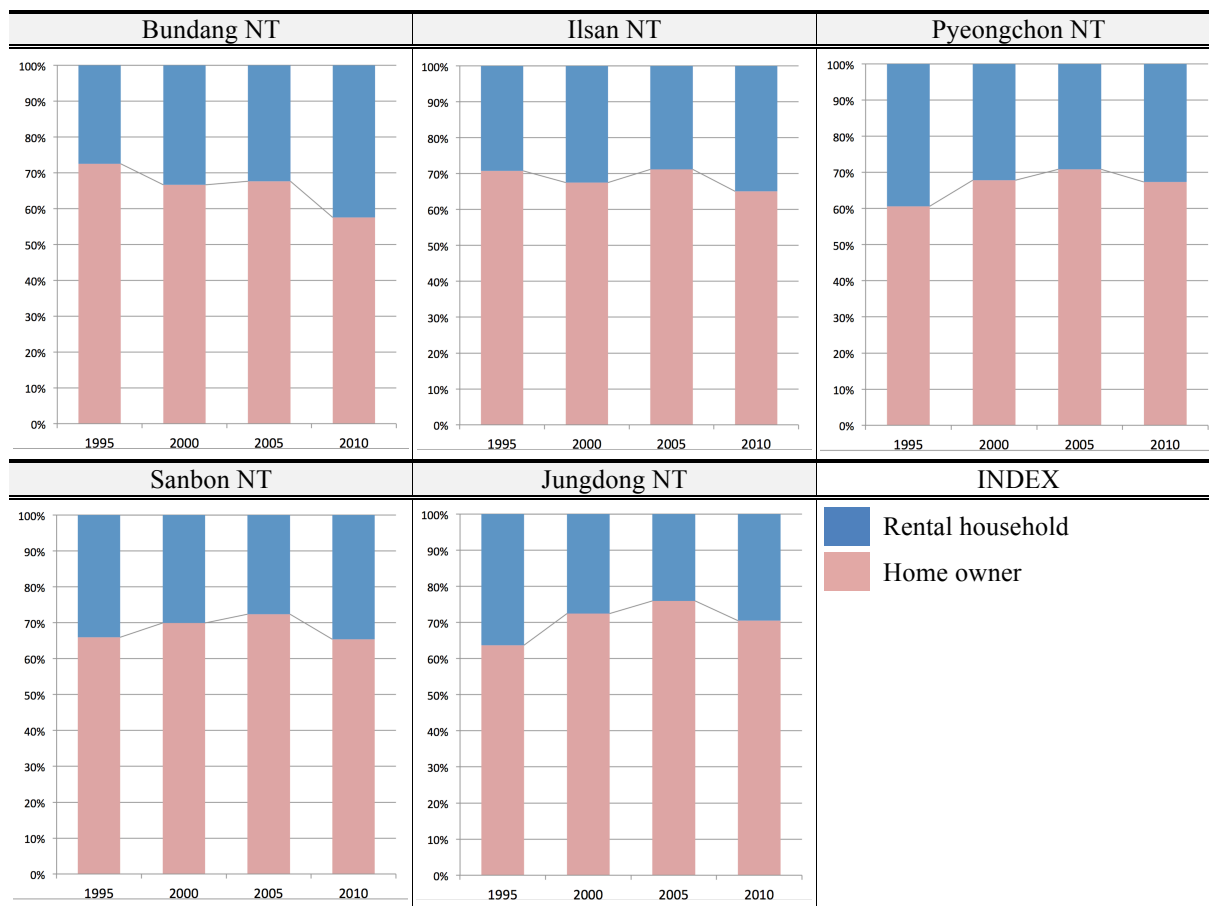
Source: Statistics Korea. 2% sample data (without weight) in 1995, 2000 & 2005, and 10% sample data (with weight) in 2010 of Population and Housing Census. Quoted in Kim, 2013.

4.3.5   Socioeconomic items

This Section analyzed proportion changes of education level and occupation of the residents in the first generation new town using the sample data of Population and Housing Census regarding the four periods during 1995 to 2010.

Education Level

Overall, the ratio of university graduates and graduate school graduates went up, and 57.1% of the total residents in Bundang New Town were the university and graduate school graduates in 2010, which showed the highest education level among five new towns.

Table 4-12. Education level of the first generation new town resudents in SMA, Korea

(Unit: %)

New town	Bundang NT				Ilsan NT				Pyeongchon NT				Sanbon NT				Jungdong NT			
Year	1995	2000	2005	2010	1995	2000	2005	2010	1995	2000	2005	2010	1995	2000	2005	2010	1995	2000	2005	2010
Number of Samples (thousands)*	211	234	245	298	204	207	247	311	141	151	184	206	107	127	136	164	114	135	174	200
Total percentage	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Elementary school	12.3	10.6	9.9	9.0	10.0	10.9	11.9	10.7	14.0	10.9	10.0	9.9	13.7	11.5	10.5	10.1	15.3	13.1	12.3	10.4
Middle school	11.7	10.4	8.0	8.4	10.8	10.0	9.6	10.8	14.3	12.4	9.7	10.2	12.2	13.8	10.7	10.5	16.6	15.0	11.9	11.7
High school	32.9	30.9	24.0	25.5	39.3	36.1	32.8	33.9	39.6	38.3	31.8	31.2	39.9	37.7	35.0	35.8	42.4	43.8	40.5	37.8
Collage	37.7	42.0	48.6	46.4	36.3	38.8	40.6	39.2	29.0	34.3	42.6	42.4	31.4	34.4	38.5	39.0	23.6	25.8	32.7	36.2
Graduate school	5.4	6.2	9.5	10.7	3.7	4.2	5.1	5.5	3.0	4.1	5.8	6.3	2.9	2.6	5.3	4.5	2.1	2.3	2.6	3.9

* This analysis was only given to residents except under 6 years old and non-respondents among the whole sample of census.

Source: Statistics Korea. 2% sample data (without weight) in 1995, 2000 & 2005, and 10% sample data (with weight) in 2010 of Population and Housing Census. Quoted in Kim, 2013.

Figure 4-14. Education level of the first generation new town resudents in SMA, Korea
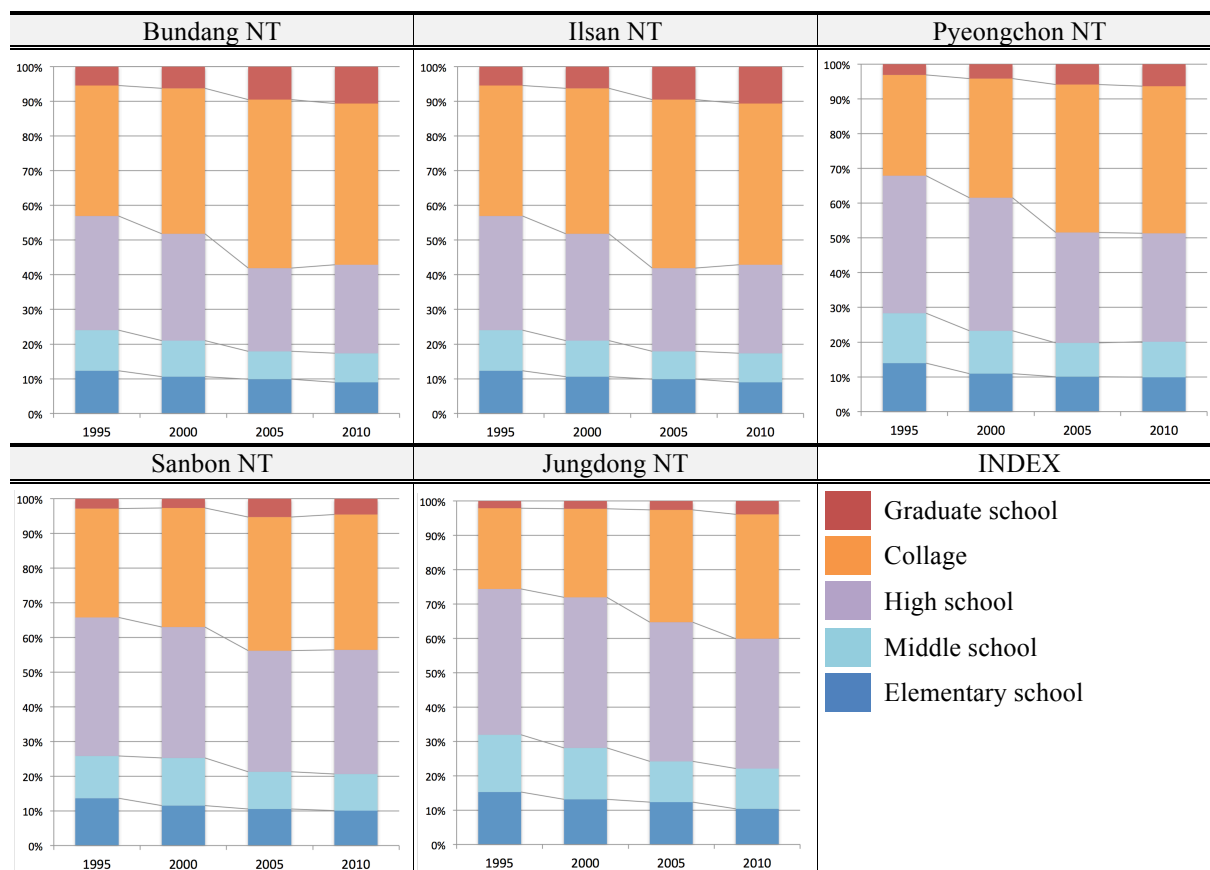
Source: Statistics Korea. 2% sample data (without weight) in 1995, 2000 & 2005, and 10% sample data (with weight) in 2010 of Population and Housing Census. Quoted in Kim, 2013.

Occupation

As a result of analyzing each occupation type ratio by large scaled classification of occupations, office workers including managers, professionals & related workers and clerks exceeded 60% in four new towns, except Jungdong New Town. The office worker ratio in Bundang New Town, where more business facilities were relatively located, due to geographical condition adjacent to Gangnam 3 districts in Seoul, was the highest, among the five new towns. Jungdong New Town, located at the Gyeongin axis, which had been playing a hub axis of industrial and production functions in Seoul Metropolitan Area, showed higher ratio of production workers, compared to the other four new towns.

Table 4-13. Occupation of the first generation new town resudents in SMA, Korea

(Unit: %)

New town	Bundang NT				Ilsan NT				Pyeongchon NT				Sanbon NT				Jungdong NT			
Year	1995	2000	2005	2010	1995	2000	2005	2010	1995	2000	2005	2010	1995	2000	2005	2010	1995	2000	2005	2010
Number of Samples (thousands)*	97	103	110	149	103	96	114	157	67	74	89	111	52	62	64	89	58	67	84	108
Total percentage	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Managers	13.2	21.4	12.1	9.4	7.6	13.4	7.5	6.3	8.2	12.0	7.9	6.7	8.7	11.8	5.7	4.8	12.4	9.5	7.8	4.7
Professionals and related workers	36.1	34.0	39.9	37.1	36.9	28.8	30.8	29.2	34.3	28.9	34.3	32.4	36.9	28.6	32.0	30.3	25.8	28.2	25.8	27.4
Clerks	18.4	20.0	25.3	23.7	12.8	23.5	26.8	21.9	15.6	23.2	26.1	24.2	13.3	20.4	25.1	23.5	13.1	17.8	23.2	21.8
Service workers	5.0	5.4	5.6	6.3	7.4	5.8	7.1	8.2	5.7	5.0	6.9	7.0	6.8	6.1	5.5	6.9	5.4	6.7	7.5	7.8
Sales workers	11.2	7.6	8.7	9.9	15.2	11.7	10.6	13.3	10.6	11.4	8.0	10.5	11.2	10.1	8.8	11.2	10.5	11.4	11.7	11.8
Skilled agricultural, forestry and fishery workers	0.3	0.1	0.1	0.3	0.9	0.3	0.6	0.4	0.6	0.3	0.3	0.3	0.1	0.1	0.2	0.3	0.2	0.1	0.1	0.1
Craft and related trades workers	7.2	2.7	3.0	4.0	9.3	6.2	6.9	6.1	9.0	6.1	6.6	5.8	7.8	8.7	7.5	6.1	11.3	8.3	9.2	7.2
Equipment, machine operating & assembling workers	4.6	4.2	3.0	3.8	6.0	5.0	5.5	7.3	10.1	7.7	6.6	7.1	8.2	8.7	10.1	9.8	16.1	13.3	10.7	11.9
Elementary workers	3.0	4.6	2.3	5.5	3.6	5.2	4.1	7.3	5.8	5.4	3.4	6.0	6.7	5.6	5.0	7.1	5.2	4.7	3.9	7.3

* This analysis was only given to residents except non-classified workers and non-respondents among the whole sample of census.

Source: Statistics Korea. 2% sample data (without weight) in 1995, 2000 & 2005, and 10% sample data (with weight) in 2010 of Population and Housing Census. Quoted in Kim, 2013.

Figure 4-15. Home ownership type in the first generation new towns in SMA, Korea
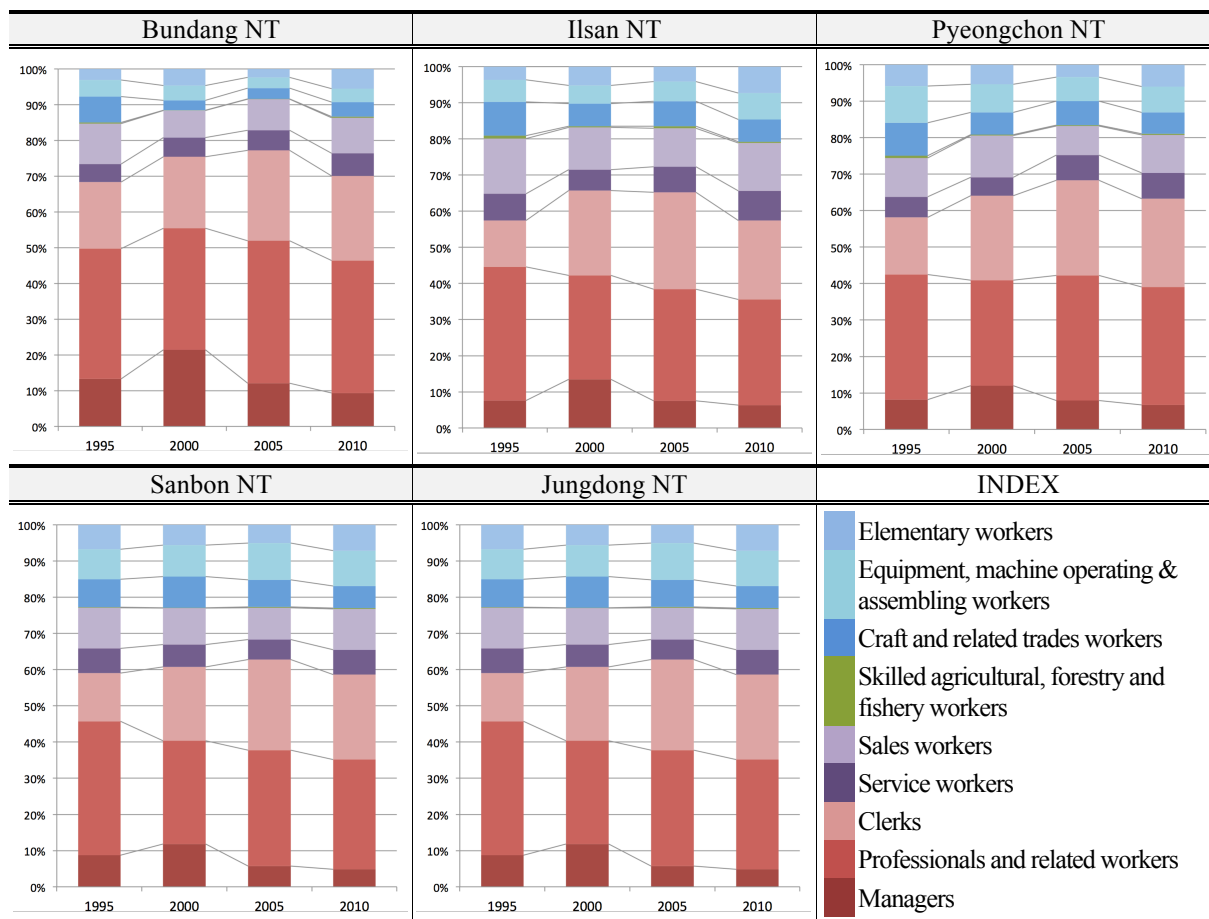
Bundang NT	Ilsan NT	Pyeongchon NT
Sanbon NT	Jungdong NT	INDEX

INDEX:
- Elementary workers
- Equipment, machine operating & assembling workers
- Craft and related trades workers
- Skilled agricultural, forestry and fishery workers
- Sales workers
- Service workers
- Clerks
- Professionals and related workers
- Managers

Source: Statistics Korea. 2% sample data (without weight) in 1995, 2000 & 2005, and 10% sample data (with weight) in 2010 of Population and Housing Census. Quoted in Kim, 2013.

4.4 Issues of the first generation new towns in SMA in the era of population aging and decline

4.4.1 Vulnerability of population structure

In the next 40 years, population of Korea will be projected to age more rapidly than that of any other country. Korea has the lowest fertility rate (1.15 per woman in 2009) in the world and slowing population growth in terms of long-term growth outlook. (Nomura international limited, 2011).

Figure 4-16. Comparison of Korea's age pyramid in 2010 (left) and 2050 (right)
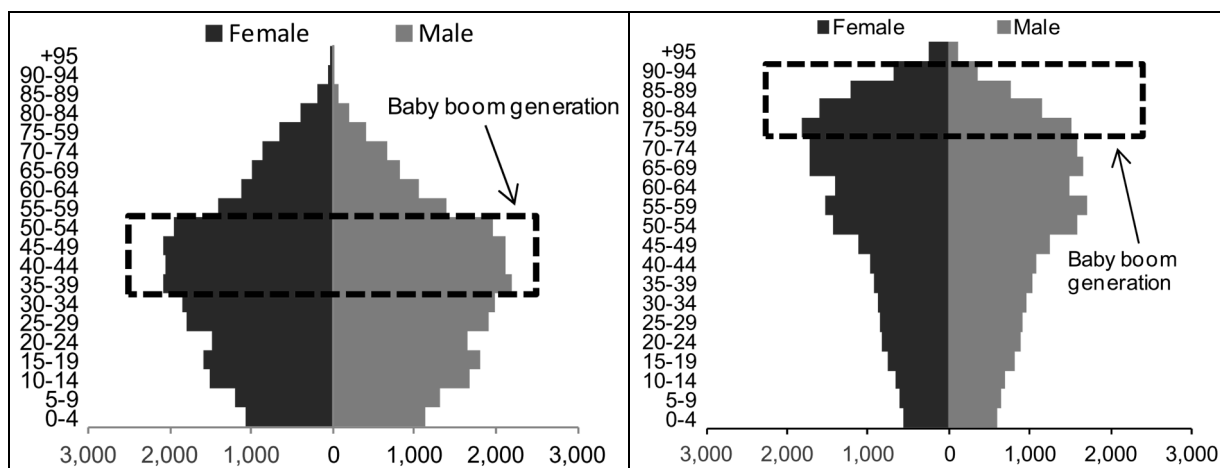
Source: CEIC and Nomura Global Ecomonics; Nomura international limited, 2011.

OECD report also shows that Korea is ahead of OECD countries in the pace of 'Aging'. It took 115 years for France to move from an aging to an aged society, 72 years for the United States, 40 years for Germany and 24 years for Japan. However, it will take only 18years for Korea (OECD, 2009).

Figure 4-17. Ratio of population aged 65 and over to the total population
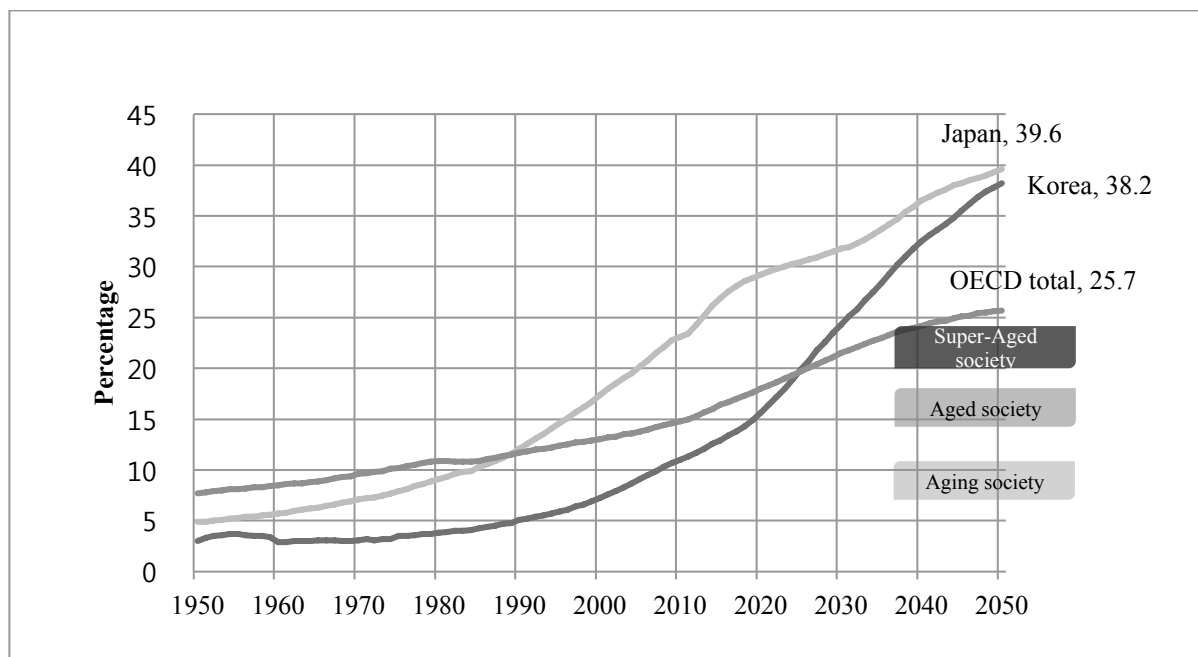
Source: OECD, 2009.

Table 4-14. Aging trend in the major countries

	Year of arrival			The time required (Year)	
	Aging society 高齢化社会 (7%)*	Aged society 高齢社会 (14%)	Super-Aged society 超高齢社会 (20%)	To Aged society	To Super-Aged society
Korea	2000	2018	2026	**18**	**8**
Japan	1970	1994	2006	24	12
Germany	1932	1972	2010	40	38
USA	1942	2014	2030	72	16
France	1864	1979	2019	115	40

Note: The number between ( ) is the ratio of population aged 65 and over to the total population
Source: Statistics Korea, 2007; KHIDI and MOHW, 2008: 31.

The number of the labor force (i.e., population aged 15 to 64) will be also expected to reduce from 2017, peak value is 36millions. As a result, the increasing rate of 'the ratio of the inactive elderly population aged 65 and over to the labor force'老齢人口扶養比 from 2005 to 2050 will become the best in OECD countries (OECD, 2009).

Figure 4-18. Ratio of the inactive elderly population aged 65 and over to the labor force
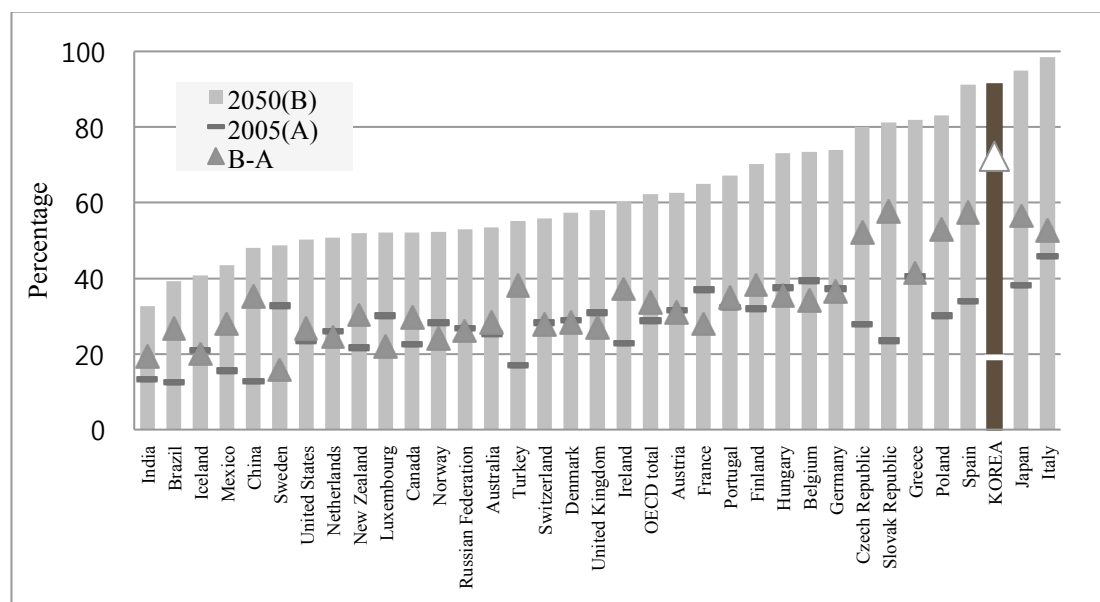
Note: Percentage (%) = (population aged 65+)/(population 15 to 64) x100
Source: OECD, 2009.

Figure 4-19. Dependency ratio of Korea
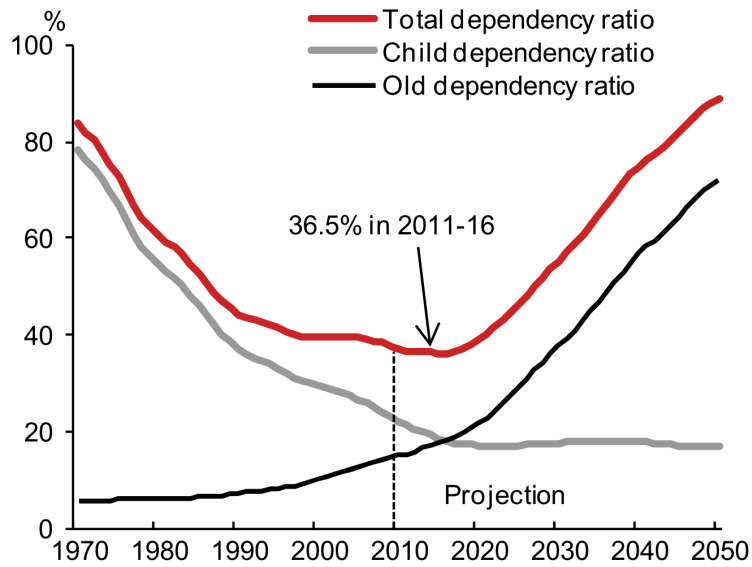
Source: CEIC and Nomura Global Ecomonics; Nomura international limited, 2011.

Demographic sweet spot of Korea will last only until 2016. After that, Korea will face headwinds as old-age dependency starts to rise sharply and significantly (Nomura international limited, 2011). Population increases until 2018, and then comes to turn into a tendency to decrease afterwards on a national scale. However, the population of the Seoul metropolitan area is continually growing by 2030.

Figure 4-20. Population forecasting in Seoul metropolitan area, Korea
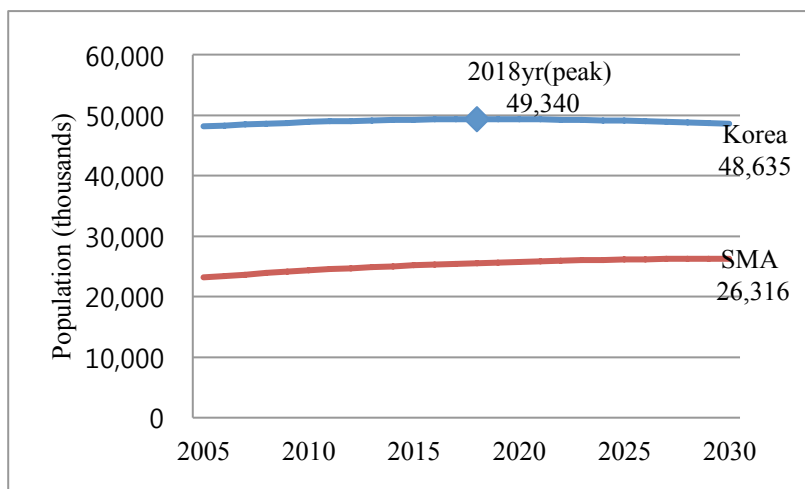
Source: Statistics Korea, 2007.

The first generation new towns in SMA had the high population growth by homeowners moved in these new towns from the early to the mid-1990s, the steady state by the mid-2000s and the minus growth rate in the late 2000s.

Figure 4-21. Rate of population growth in the first generation new towns in SMA by year
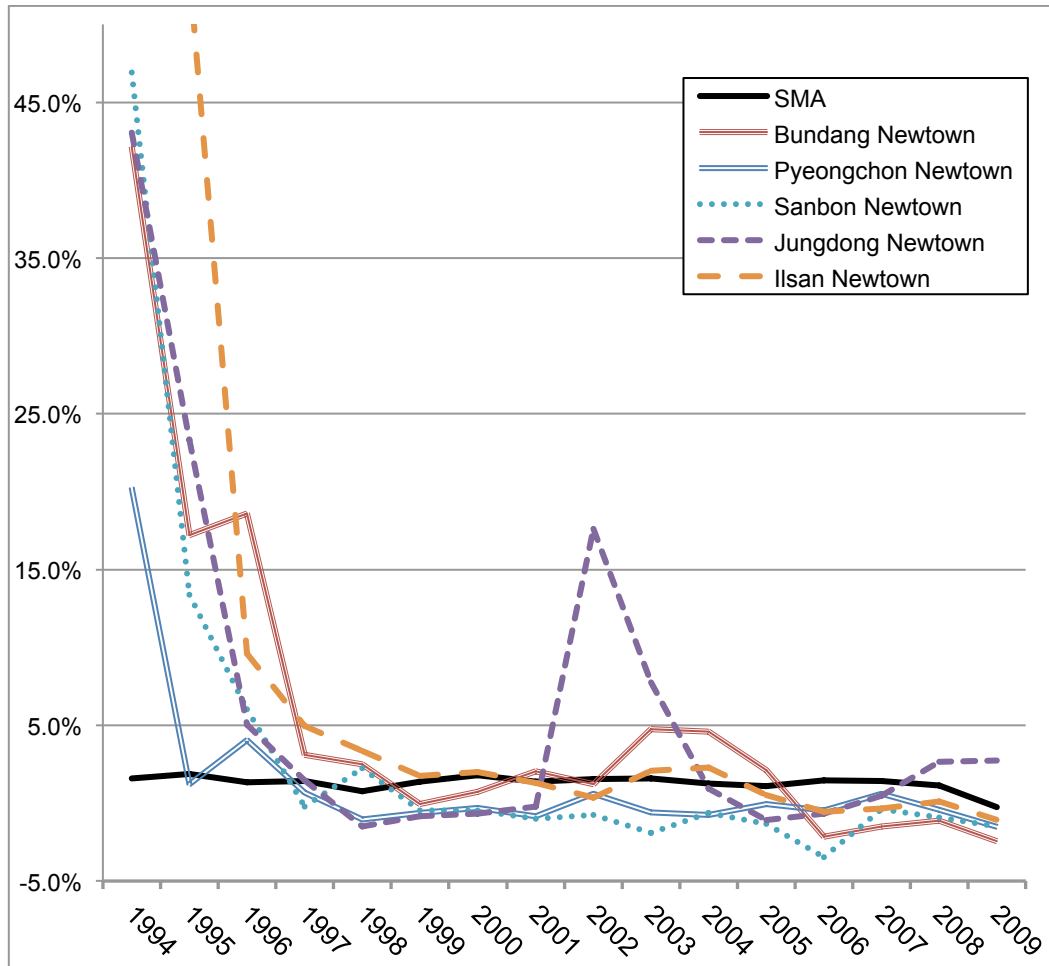
Source: Seoul Special city, Incheon Metropolis and Gyeonggi Province. Resident registration data in each year.

In 2000s, the rate of population growth of main city including the new town grows bigger than that of its new town. It means that many developments (including the illegal) have occurred around the new towns to use these good urban facilities (such as park, school, shopping mall, transportation systems, etc.) for noting.

Figure 4-22. Comparison of the rate of population growth between the 1st generation new towns and their main city (2000s)
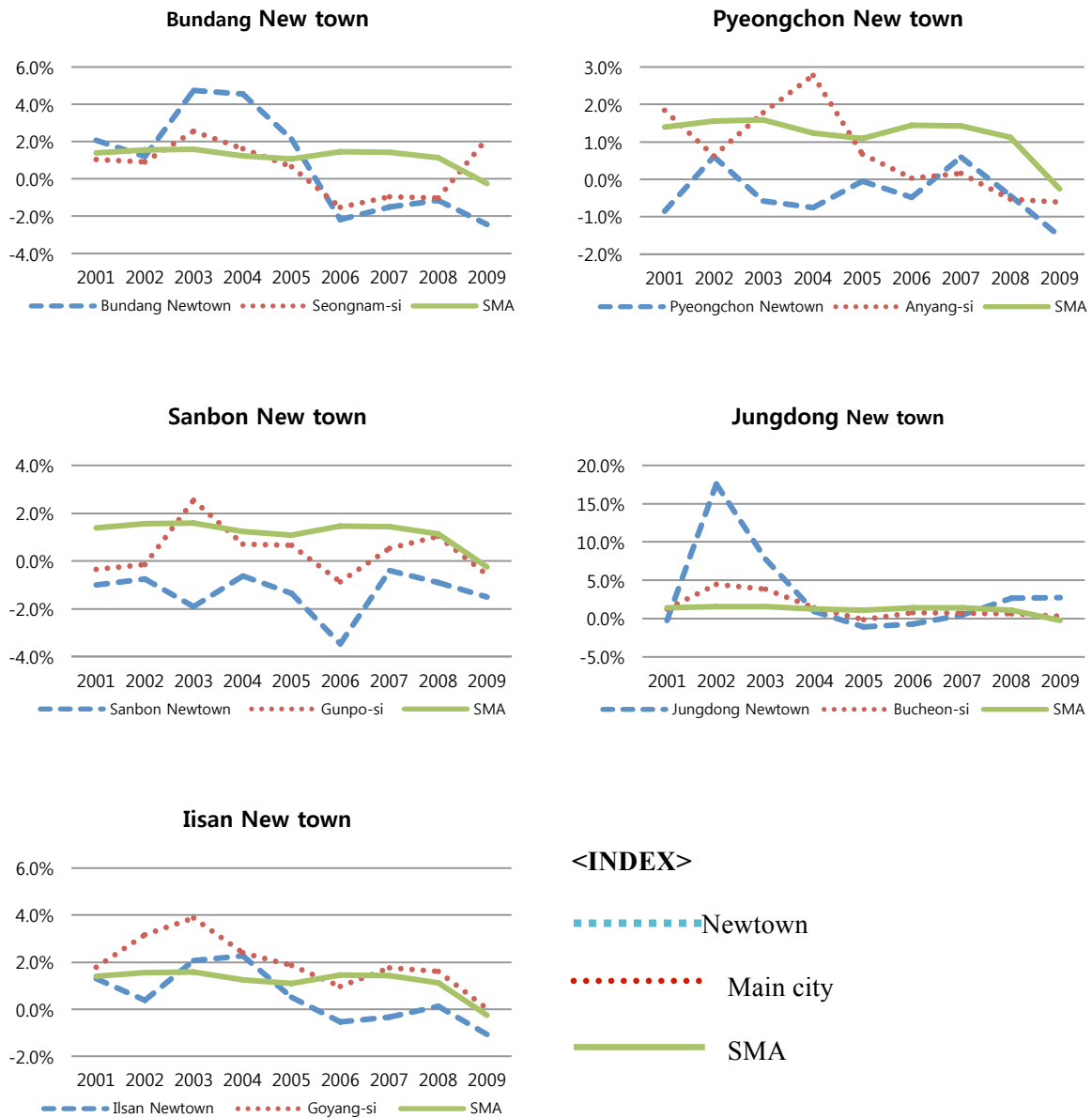
Bundang New town

Pyeongchon New town

Sanbon New town

Jungdong New town

Iisan New town

<INDEX>

············· Newtown

············· Main city

—— SMA

Source: Seoul Special city, Incheon Metropolis and Gyeonggi Province. Resident registration data by each year.

4.4.2 Probability of the collapse in real estate values (bubble burst)

Many economists have warned the collapse in real estate values in Korea, especially in the 1st generation new towns in SMA since 'subprime mortgage crisis' (2007).

Nomura Securities Co. analyzed that the economic environment of South Korea as of today and that of Japan in the late 1980s when the bubble started have three aspects in common: A rapid economic rebound after an external shock (financial crisis in 2007), a stable consumer price increase and excess liquidity based on low-interest rate (Nomura international limited, 2011).

Actually, real estate prices of the entire country have continued to fall due to a series of government measures to cool the housing market and global recession since October 2009. It is more serious in the 1st generation new towns.

Figure 4-23. Trend of the apartment housing price increase rate for the first generation new towns in Seoul metropolitan area since 2008
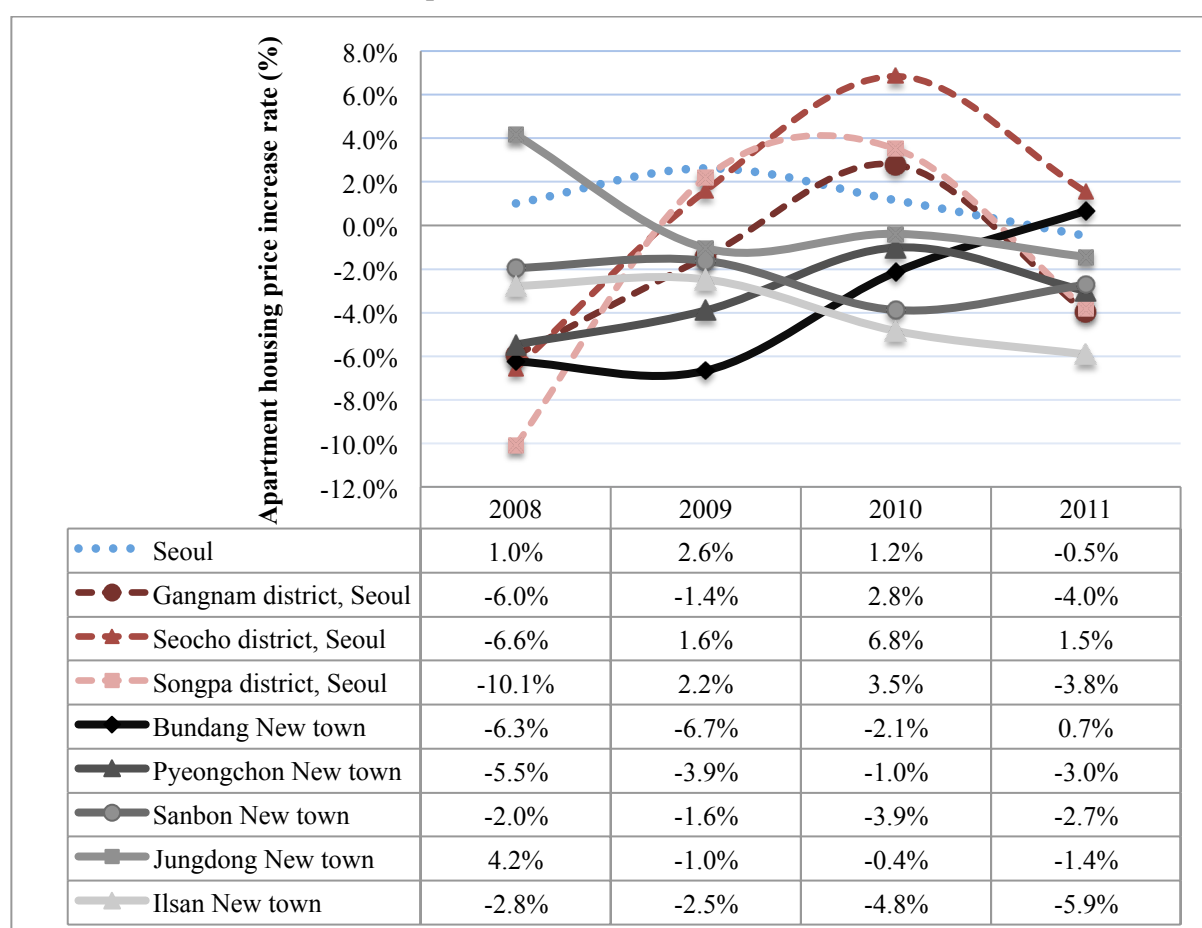
	2008	2009	2010	2011
• • • • Seoul	1.0%	2.6%	1.2%	-0.5%
– •– Gangnam district, Seoul	-6.0%	-1.4%	2.8%	-4.0%
– ★– Seocho district, Seoul	-6.6%	1.6%	6.8%	1.5%
– ■– Songpa district, Seoul	-10.1%	2.2%	3.5%	-3.8%
Bundang New town	-6.3%	-6.7%	-2.1%	0.7%
Pyeongchon New town	-5.5%	-3.9%	-1.0%	-3.0%
Sanbon New town	-2.0%	-1.6%	-3.9%	-2.7%
Jungdong New town	4.2%	-1.0%	-0.4%	-1.4%
Ilsan New town	-2.8%	-2.5%	-4.8%	-5.9%

Note: Gangnam, Seocho and Songpa districts in Seoul are generally referred to as 'Gangnam 3 districts'江南三区, the most expensive residential areas in Korea.
Source: Doctor Apart Homepage (www.drapt.com)

4.4.3 Decrepit housing complex and infrastructure

Although only about 20 years have passed since they were built, the framework of the buildings in the 1st generation new towns in SMA were bent in many residential complexes due to poor construction. The major reason is that government built 2 million housing units at a time in 5 years[14]. Most of complexes have suffered from lacking in parking space. In that time (the early 1990s), the building standard about parking lot is 0.8car/household. But these days, all the household of the residential complex has one or more cars. Even though it is necessary to rebuild or reconstruct the residential complexes, it is realistically difficult to promote remodeling or reconstruction project due to global economic recession or opposition from some residents. For typical example, some 'union of residents for remodeling' was organized in Pyeongchon and Bundang New Towns[15] during the mid-2000s and has promoted the remodeling of their complexes. These unions, however, suspended their all activities due to a slump in the real estate market and global recession.

Figure 4-24. PR Banner for remodeling project by union of residents

Note: Photographed at 'Mokryeon 3rd complex' in Pyeongchon New Town on April 19, 2008.

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[14] At that time, some construction companies used the 'sea sand' in materials of the reinforced concrete of residential buildings for lack of sand. As a result, degree of strength in reinforced concrete grew weaker and the framework of the buildings was bent.

[15] The 'union of residents for remodeling' was organized in 'Mokryeon 3rd complexes' and 'Hyangchon Hyeondae 4th complex' in Pyeongchon New town.

4.4.4 Massive housing supply by readjustment of Green Belt area

The Korean government established the plan to readjustment of Green Belt area 開発制限区域 designated in 1970s for the public function. According to this plan 141 sq. km. (about 9% of total Geen Belt area in SMA, 1,541 sq. km.) in SMA can be adjusted by 2020 (Kim, J. E. and Park, J. G., 2007; MLTM, 2007). In 2009, it is possible to dissolve the Green Belt area additionaly for buiding the national rental apartment complexes by the revision of master plan (i.e., '2020 Area-wide Urban Planning for the Capital Region') (See Table 2-11). Of these dissoloved area, some areas have been use to build the national rental housing complexes. With a good accessibility to Seoul, these housing complexes built in Green Belt areas are superior to other residential complexes in SMA including the first generation new towns.

Figure 4-25. The Location of adjustable Green Belt areas in SMA
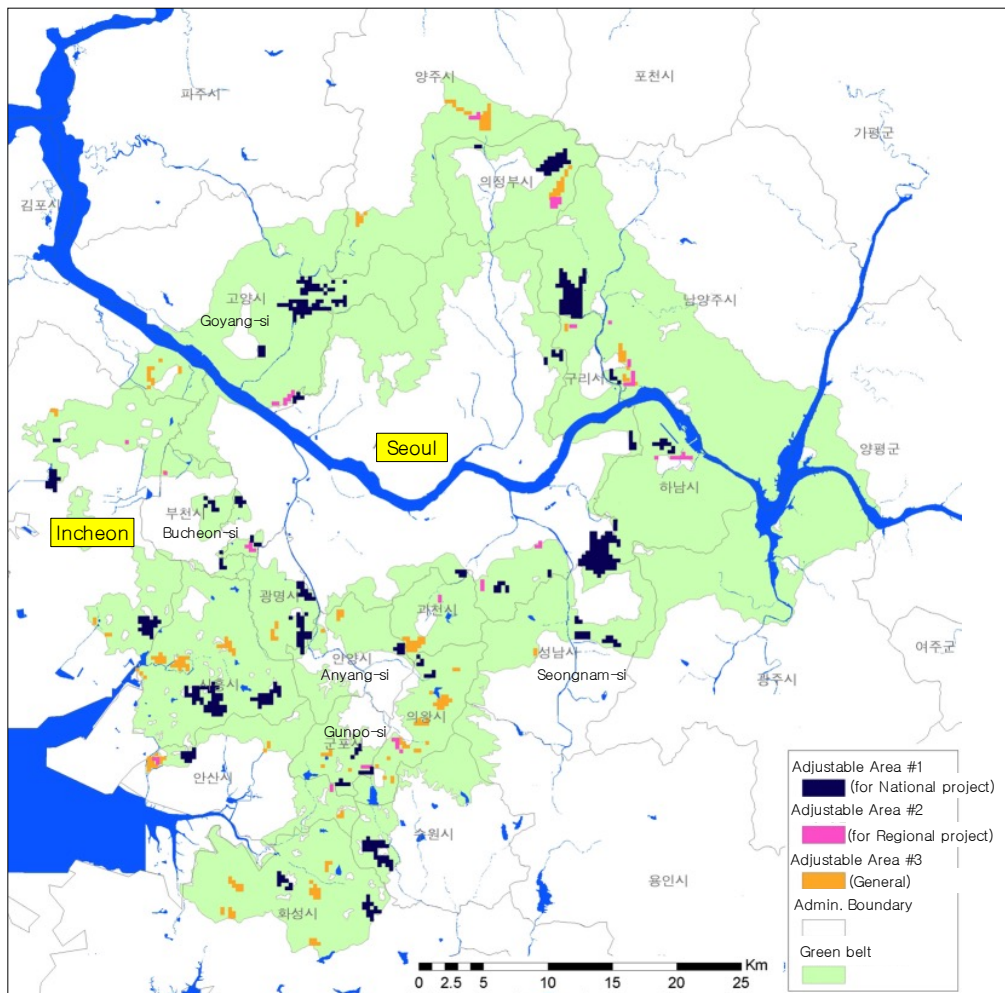
Source: MLTM, 2007.

Table 4-15. A total amount of the dissolved GB area for the rental house by zone in SMA

Zone	Adjustable GB area (sq. km.)	Administrative district
Central	40-60	Seoul, Goyang, Uijeongbu, Guri, Hanam, Seongnam, Gwangmyeong, Gwacheon, Namyangju
Western & Northern	20-40	Incheon, Bucheon, Gimpo, Siheung, Paju, Yeoncheon, Dongducheon, Yangju, Pocheon
Eastern & Southern	Below 20	Gapyeong, Yangpyeong, Gwangju, Icheon, Yeoju, Suwon, Anyang, Uiwang, Gunpo, Ansan, Yongin, Osan, Hwaseong, Pyeongtaek, Anseong

Source: MLTM, 2009.

4.4.5 Reduction of housing demand by public agency relocation from capital region

President Roh Moo-hyun's administrative (2003-2008) had been pushing the plan to relocate the government ministries and public agencies out of SMA to promote diffusion of power and provide a comfortable living environment for the Greater Seoul Metropolitan Area.

To achieve this national policy, the previous government planned to construct ten 'Innovative city'革新都市, six 'Company town'企業都市 and 'New Administrative city(renamed as 'Sejong city')[16] 行政中心複合都市 out of SMA which are capable of accommodating about 962 thousand people.

Table 4-16. Summary of cities and towns related with public agency relocation policy

Type	Name of city	Population (in thousand)	Name of city	Population (in thousand)
New Administrative city 行政中心複合都市	Sejong	500	-	-
Innovative city 革新都市	Jeonju	20	Jinju	40
	Naju	50	Daegu	30
	Ulsan	20	Jeju	5
	Busan Gangseo	60	Wonju	25
	Gimcheon	25	Eumseong	40
Company town 企業都市	Muan	55	Haenam	20
	Muju	12	Wonju	25
	Chungju	20	Taean	15

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[16] This government is trying to revise the function of 'New Administrative city'

4.5   Conclusion

This chapter examined characteristics of metropolitan new towns developed during the rapid growth era in Seoul metropolitan areas, Korea based on the literature reviews of the precedent studies and official statistic data.

The first two sections of this chapter introduce the background of new town development and then describes the transition of the new town development policy by dividing into three periods. In the late 1980s, large scaled new town projects were planed as part of 'The Two Million Housing Construction Plan' (1988~1992) and the first generation new towns (Bundang, Ilsan, Pyeongchon, Sanbon, Jungdong) were constructed in order to solve housing shortage and stabilize real estate price. In the 2000s, the Korean government announced 'the second generation new town project' supplying ten new towns by 2020 in order to control urban sprawl around the quasi-agricultural and forest zone and the first generation new towns. But the aftereffects of global economic crisis caused by the subprime mortgage debacle in the U.S. since 2007, the depression of domestic real estate market and low population growth reduced housing demand, therefore, in 2010s, some parts of the second generation new town project were canceled. Meanwhile, the deterioration problem is emerging in the first generation new towns which have already been over 20 years.

The third section analyzed the demographic characteristics (i.e., the change of population structure, movement pattern, residential characteristics and socioeconomic characteristics of residents) of the first generation new towns in Seoul metropolitan area using the population and housing census data for the last 20 years. Based on the census, this thesis applied a time series analysis to the change of population structure and the trend of movement pattern in the growth process of the first generation new towns for the last 20 years in this chapter. The total population constantly increased to 80~90% of the planed population within 3~4years from the initial occupancy but it decreased in 2010 compared with 2005 according to the census data because of low population growth and global economic recession. The households whose householders were 30s to 40s and had school age children represented the largest portion in the beginning of new town development. However, the population

pyramid changes from 'expansive type' to 'constrictive type' because of fertility decline and population aging. This phenomenon is especially prominent in Sanbon new town and Jungdong new town. Meanwhile, the ratio of population aging is comparatively higher in Bundang New Town and Ilsan new town that were developed in the suburbs with large scale.

As for migration, the proportion of the migrants from Seoul was high in 1995, the beginning of the development. However, the migration has been gradually stabilized and the proportion of migrants within the new town has comparatively increased whereas the proportion of the migrants from Seoul has decreased as time goes on. The proportion of the commuters to Seoul was about 60% in the beginning but it decreased to about 30% that is the same with the proportion of the commuters inside the new town. This shows that the self-containment of the first generation new towns is improving. When it comes to the educational and vocational level of the residents in the new towns, they are in mid-upper class. The proportion of the residents who migrated in the beginning of the development is continuously decreasing and 60~70% of the residents possess their own house.

In view of these results of analysis for the first generation new towns in Seoul metropolitan area, it is quite likely that the time to revitalize the new towns with the reconstruction and remodeling projects has not come yet. In terms of the ratio of population aged 65 and over and its growing trend, the possibilities of urban emptiness and deterioration of vitality caused by the age profile imbalance are relatively low in current condition of these five new towns just judging from only the statistics. Even though showing the highest ratio of population aged 65 and over among the first generation new towns in Seoul metropolitan area (SMA), Bundang and Ilsan New Towns still maintained the lower rate than that of Seoul special city and even SMA in 2010. Moreover, Pyeongchon and Jungdong New Towns maintained 6% level even in 2010 by virtue of the influx of the population from their vicinity.

However, the total population of four new towns among the first generation new towns except Jungdong New Town started to decrease in 2010. In addition, the proportion of the residents who had experienced migration has decreased from about 90% in the early stage of new town development, 1995, to about 50% in 2010, namely, population migration in these first generation new towns has been stabilized gradually. If these situations continue, it cannot exclude the possibility that

these metropolitan new towns experience the rapid population decline and aging due to the similar internal and external factors like the case of Tama New Town. Therefore, it must not be overlooked to monitor the changes of the age profile and the population aging trend consistently in case of metropolitan new towns.

In physical point of view, it is too early to promote the remodeling or reconstruction projects of apartment buildings or complexes through the method to demolish whole structure and build it again even though some apartment buildings of the first generation new towns in SMA have factors related with the structural safety concerns the construction process and the central government reduced the minimum requirement period of implementing the housing reconstruction project as an institutional measure to stimulate the country's real estate market. Actually, it has not been reported that the apartment buildings need to be reconstructed or remodeled due to the structural problems yet and there is no case to implement the remodeling or reconstruction projects in the first generation new towns of SMA, Korea. Recently, some apartment resident committee in the first generation new towns have promoted resident's own activities to maintain and improve housing conditions by replaced decrepit facilities partially instead of a method to demolish whole structure and build it again.

The last section of Chapter 4 pointed out issues of the first generation new towns in Seoul metropolitan area and then prospect status of these new towns in the era of population aging and decline. Issues of Korean metropolitan new towns according to the arrival of the era of population aging and decline are also similar to the Japan's case, such as 1) Vulnerability of population structure, 2) Probability of the collapse in real estate values (bubble burst), 3) Decrepit housing complex and infrastructure, 4) Massive supply of housing units and residential sites in Seoul metropolitan area (e.g., readjustment of Green Belt area), and 5) Reduction of housing demand in Seoul metropolitan area (e.g., public agency relocation from the capital region).

Chapter 5   Evolution of the Bundang New Town in Seoul Metropolitan Area, Korea

Chapter 5 analyzes the development backgrounds, development processes, housing unit types and supply methods, and population structure changes by age, and migration of Bundang New Town in Korea. The latter part of Chapter 5 compares the demographic change characteristics in Bundang New Town, Korea with that of Tama New Town in Japan.

5.1   Objective and process of new town development

5.1.1   Development objective

Bundang New Town was developed under the following three basic principles: 1) trying to ease the urban problems like traffic, residence and congestion of Seoul through new town construction maximally using the advantage of Bundang New Town being located nearby Seoul Metropolitan Area. 2) developing as a self-contained city by awarding new town's own functions that share some functions of Seoul Metropolitan Area beyond residential function-oriented development. 3) accommodating the functions not essentially requiring being located in CBD , although the new town had a nature of a satellite city, according to location characteristics of a new town (KOLAN, 1997).

To achieve the goals above, the following three function principles that the new town must accommodate were set up: 1) self-containment of city function[17] required for a city having 400,000 population, 2) planned function[18] for new town characteristics development, 3) transferable function[19] from Seoul. For these functions to be exerted, the land use plan was devised (KOLAN, 1997).

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[17] 1) Living convenience function including commerce and service suitable for residents' everyday life 2) Security and social order keeping function 3) Educational function satisfying residents' characteristics and needs 4) Self-containment of city's industrial function required for city growth and creation, etc.

[18] 1) Information industry function including software (Telecom Plaza), large distribution and leisure industry function 2) Function for mutual complementation with adjacent cities such as Seongnam city and Suwon city, and other business, commercial and finance-related function.

[19] 1) Residential function to share residential demand to be accommodated by Seoul and SMA 2) Business-related function transferred from Seoul (private sector companies and public organizations) 3) City functions to be inevitably located within SMA, although they need to be transferred from Seoul.

5.1.2 Development process and characteristics

Starting from the approval of the first phase (Model Complex 示範団地) implementation on October 16, 1989 to the seventh phase (some underground roadway and underground parking lot) completion on December 31, 1996, Bundang New Town was built over about 7 years. Because housing construction was completed in the sixth phase, it can be seen that actual construction period of Bundang New Town was 6 years.

The fact that it took only 6 months from new town development plan announcement on April 27, 1989, to the approval of housing site development plan in August 30, 1989, approval of implementation plan in Octorber 16, 1989 and construction commencement of housing site creation in November 8, 1989, and that it took only 2 years and 5 months up to the initial occupancy in September 30, 1991 can be the most important characteristics in Bundang New Town development process. Such a fast policy decision-making and implementation was quite effective to control real estate price hike, arising from the lack of housing supply those days.

Table 5-1. Schedule of construction for housing site creation and implementation plan of Bundang New Town by phase

Phase	Construction for housing site creation				Implementation plan		
	Size (Area, Length)	The date of the Start of construction	The date of Completion of construction	The Time required (Date)	Area	The date of Approval	The date of Completion of Housing site development project
Total	-	**November 8, 1989**	**October 31, 1996**	**2549**	**1964 ha**	**October 16, 1989**	**December 31, 1996**
Phase I	83.5 ha	November 8, 1989	September 26, 1991	687	86 ha	October 16, 1989	June 30, 1993
Phase II	504.9 ha	October 17, 1990	November 19, 1993	1129	507 ha	June 16, 1990	June 30, 1995
Phase III	527.7 ha	July 2, 1990	December 31, 1993	1278	573 ha	June 16, 1990	June 30, 1995
Phase IV	309.2 ha	September 15, 1991	May 31, 1994	989	331 ha	December 31, 1990	December 31, 1995
Phase V	319.4 ha	December 20, 1991	October 20, 1994	1035	303 ha	December 31, 1990	December 31, 1995
Phase VI	133.0 ha	April 13, 1992	October 4, 1994	904	130 ha	December 31, 1990	December 31, 1995
Phase VII	5.3 km	June 4, 1994	October 31, 1996	880	34 ha	December 31, 1994	December 31, 1996

Note: Phase VII is the development phase for constructing traffic facilities (e.g. underpass, underground parking lot, etc.)

Source: Korea Land Corporation, 1997.

Some people, however, argue that short-term development to achieve two million housing construction goal causes side effects including problems in building safety and durability, due to high possibility of easy iron bar's corrosion as a result of using sea sand, as earth and sand was insufficient to build the apartment buildings those days. Many cases of showing lower strength of ferroconcrete in the first phase apartment houses built in SMA than standard or fast aging of buildings are appearing.

Figure 5-1. Development phases of Bundang New Town, Korea
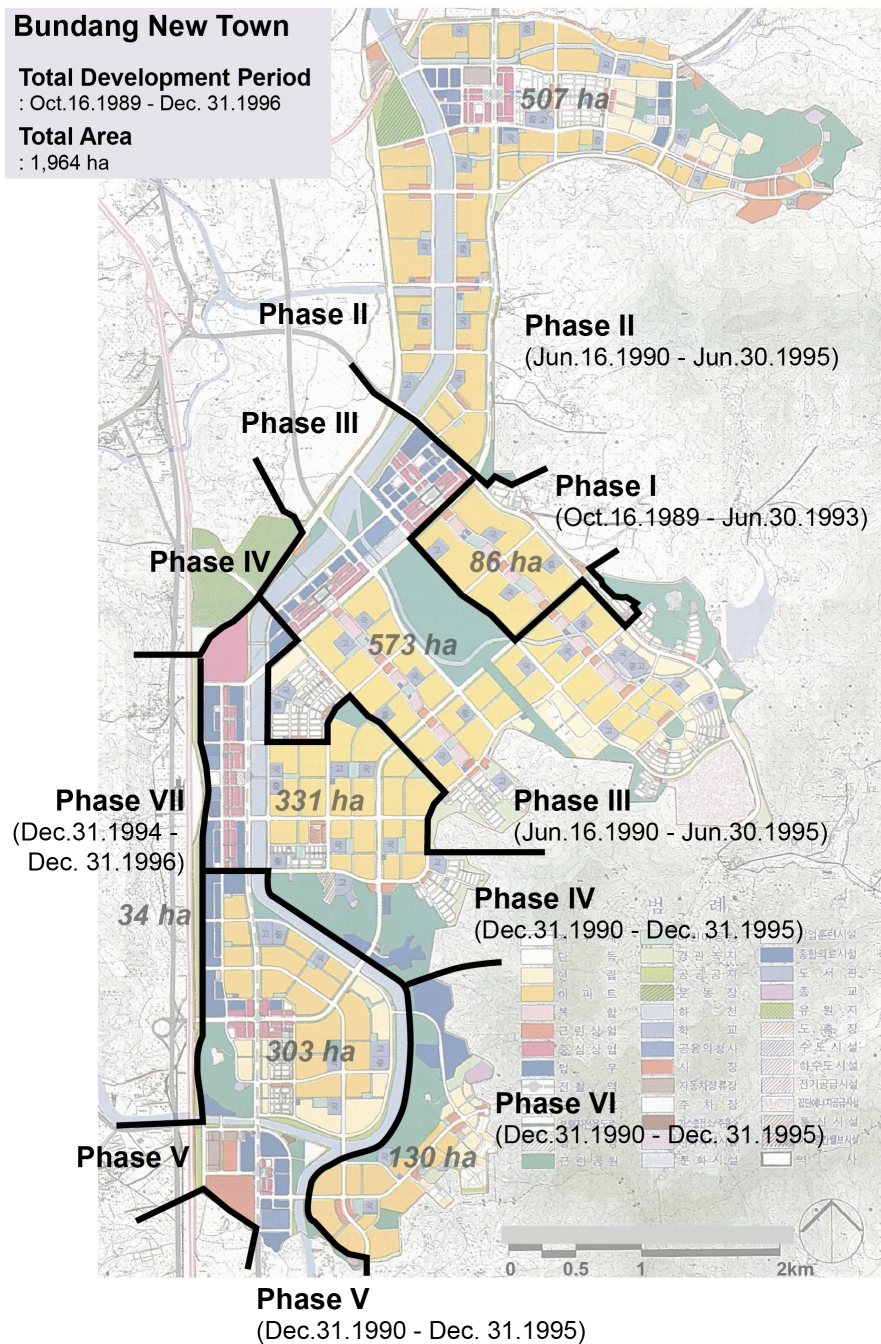
Source: Korea Land Corporation, 1997. Quoted in Kim, 2013.

Table 5-2. Major events of the Bundang New Town development

Date	Event
Apr. 4, 1989	Instruction of Review for Housing Site Development in Bundang District by the Ministry of Construction
	Meeting of the Blue House special committee for New town construction
10,	Selection of the proposed site for New town by the Blue House special committee
27,	Announcement of Bundang and Ilsan New Town Construction Plan
Jul. 21,	Holding a public hearing for New town Development Plan
30,	Establishment of Conceptual Development Plan
Aug. 2,	Initiation of Land Compensation Assessment
30,	Modification of Designation Prearranged Area (1st) / Housing Site Development Plan
Sep. 9,	Announcement of Competition Winner for the First Town
Oct. 4,	Decision for Urban Design Implementation Policy
11,	Public notice of Land Expropriation Plan and Initiation of Land Expropriation
16,	Implementation plan of Phase I (the First town) / Modification of Development plan (1st)
Nov. 8,	Construction Commencement of Housing Site Creation of Phase I (the First town)
15,	Instruction of Review for Public Agency Invitation Strategy in New town
23,	Approval for Housing Site Supply of Phase I
	Modification of Housing Site Development Plan (2nd) and Implementation plan of Phase I
25,	The first Apartment Sale
Jan. 25, 1990	Announcement of Countermeasure for the Emigration for New town Development
Jun. 7,	Construction Initiation of Bundang Subway line (Bundang - Suseo)
16,	Modification of Designation Prearranged Area (2nd) and Housing Site Development Plan(3rd) / Implementation plan of Phase II & III
Jul. 2,	Construction Commencement of Housing Site Creation of Phase II
Aug. 3,	Implementation of Urban Design Policy in the Priority Construction District (Sale on September 1990)
Oct. 17,	Construction Commencement of Housing Site Creation of Phase III
Nov. 8,	Holding a public hearing for Housing
Dec. 31,	Modification of Designation Prearranged Area (3rd) and Housing Site Development Plan(4th) / Implementation plan of Phase IV & V
Apr. 1, 1991	Conduction of Survey for Residential Environment in Bundang New Town
Jun. 13,	Approval of Site Supply for Apartment-style Factory
Sep. 15,	Construction Commencement of Housing Site Creation of Phase IV
30,	The First Occupancies in the First Town
Dec. 20,	Construction Commencement of Housing Site Creation of Phase V
31,	Modification of Designation Prearranged Area (4th), Housing Site Development Plan(4th) and Implementation plan of Phase I (2nd) / Implementation plan of Phase VI
Apr. 13, 1992	Construction Commencement of Housing Site Creation of Phase VI
28,	Modification of Implementation plan of Phase III, IV & V (1st)
Dec. 28,	Modification of Designation Prearranged Area (5th), Housing Site Development Plan (6th), Implementation plan of Phase I (3rd), Implementation plan of Phase III, IV & V (2nd) and Implementation plan of Phase II & VI (1st)
Feb. 25, 1993	Review for Self-contained function in New Town
Jun. 30,	Completion of Housing Site Development Project Phase I
Feb. 23, 1994	Modification of Designation Prearranged Area (6th), Housing Site Development Plan (7th), Implementation plan of Phase III, IV & V (3rd) and Implementation plan of Phase II & VI (2nd)
	Modification of Housing Site Development Plan (8th) and Implementation plan of Phase IV & V (4th)
Jun. 4,	Construction Commencement of Housing Site Creation of Phase VII
Sep. 1,	Opening of Bundang Subway line (Bundng - Suseo)
30,	Completion of Road construction (Bundang - Jukjeon)
Nov. 15,	Completion of Road construction (Bundang - Naegok)
Dec. 20,	Modification of Designation Prearranged Area (7th), Housing Site Development Plan (9th), Implementation plan of Phase II to VII
	Completion of Road construction (Bundang - Suseo)
Jun. 30, 1995	Modification of Designation Prearranged Area (8th), Housing Site Development Plan (10th), Implementation plan of Phase II to VII
	Completion of Housing Site Development Project Phase II & III
	Completion of Road construction (Pangyo IC - Pungdeock)
Dec. 18,	Modification of Designation Prearranged Area (9th), Housing Site Development Plan (11th), Implementation plan of Phase IV to VII
31,	Completion of Housing Site Development Project Phase IV, V and VI
Dec. 31, 1996	Completion of Housing Site Development Project Phase VII
May. 9, 2000	Modification of Urban Design (alteration of the purpose of use) in Baekgung-Jeongja Block, Bundang New Town by Seongnam city

Source: Korea Land Corporation, 1997.

Figure 5-2. Administrative districts change belong to Bundang New Town by 'Dong'

1995   1996-2000

2001-2004   2008-2010
(2005-2007)

<Index>

☐   Administrative districts belong to Bundang New Town by 'Dong'

▨   Boundary of Bundang New Town

▨   Boundary of the Green Belt areas
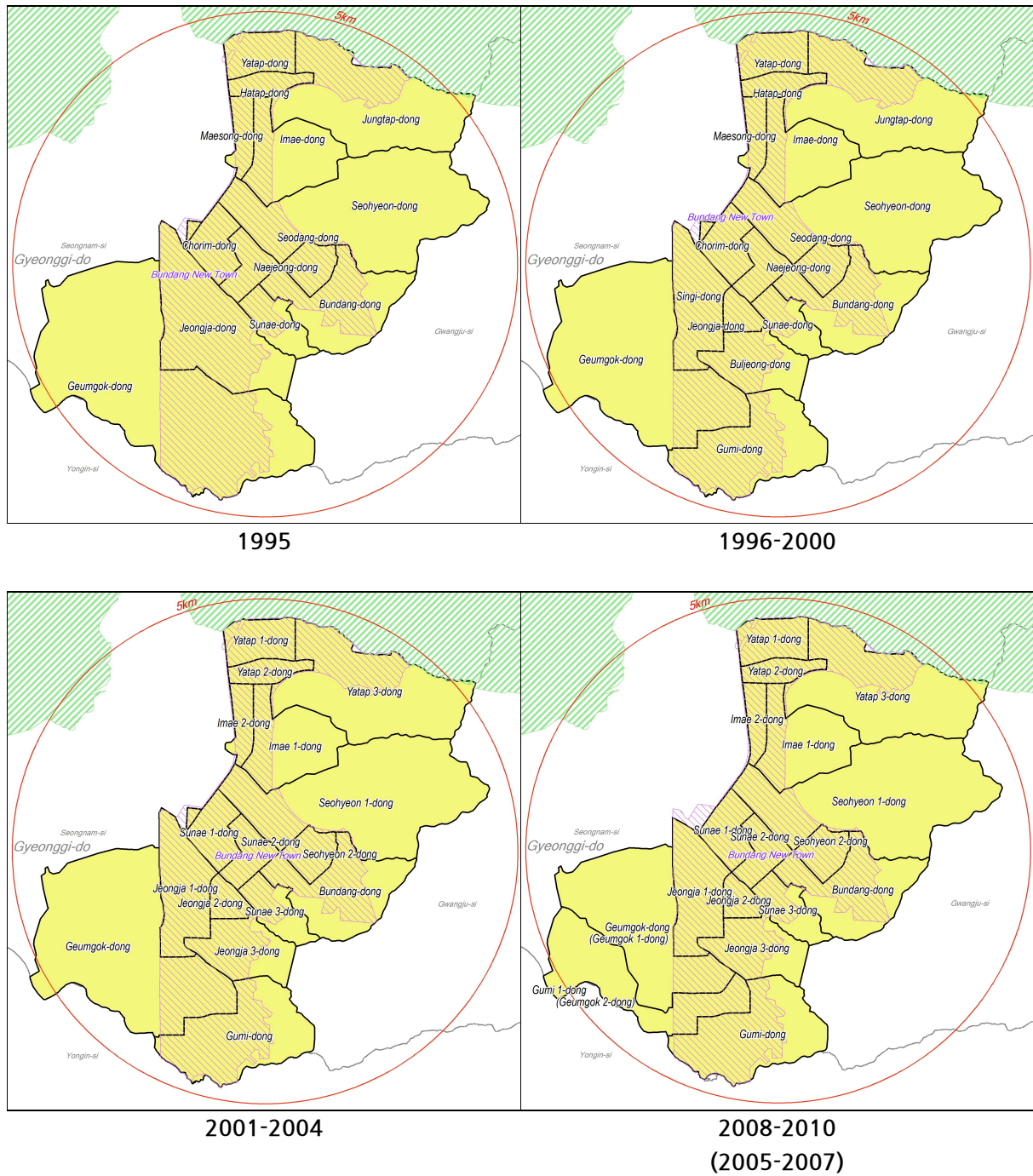
Note: 'Dong(洞)' is the town-level administrative district in Korea.

Figure 5-3. Administrative districts change belong to Bundang New Town by 'Dong'

1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010

Imae-dong *<renamed>* Imae 1-dong
<divided> Maesong-dong *<renamed>* Imae 2-dong
<divided> Yatap-dong *<renamed>* Yatap 1-dong
<divided> Hatap-dong *<renamed>* Yatap 2-dong
<divided> Jungtap-dong *<renamed>* Yatap 3-dong
Bundang-dong
<divided> Seohyeon-dong *<renamed>* Seohyeon 1-dong
<divided> Seodang-dong *<renamed>* Seohyeon 2-dong
<divided> Chorim-dong *<renamed>* Sunae 1-dong
<divided> Sunae-dong *<renamed>* Sunae 3-dong
<divided> Naejeong-dong *<renamed>* Sunae 2-dong
<divided> Jeongja-dong *<renamed>* Jeongja 2-dong
<divided> Buljeong-dong *<renamed>* Jeongja 3-dong
<divided> Singi-dong *<renamed>* Jeongja 1-dong
Geumgok-dong
Geumgok 1-dong *<renamed>* Geumgok-dong
Geumgok 2-dong *<renamed>* Gumi 1-dong
<divided> Gumi-dong

Note: 'Dong(洞)' is the town-level administrative district in Korea.

5.2   Housing unit type and supply method

88,104 apartment houses ranging from 5-story building to high rise 30-story building were supplied in various types in line with housing demand in the area of 4,837,159 sq.m., taking up 76% of total housing sites within Bundang New Town.

Rental apartment houses within Bundang New Town were supplied in the type of small housing with about average exclusive area of 36 sq.m. (15.7 pyeong in area of housing for installment sale) targeting low-income brackets from a social welfare aspect, rather than demand in housing market. Meanwhile, the apartment house for installment sale can be divided into the apartment house smaller or larger than the Scale of National Housing in Korea (exclusive area of 85 sq.m.). In the case of housing smaller than the Scale of National Housing in Korea (average area for installment sale: 25.5 pyeong), the housing over 60 sq.m. and within 85 sq.m. in exclusive area with three rooms in general took up the highest ratio at 61.9%. Concerning the housing larger than the Scale of National Housing in Korea (average area for installment sale: 43.6 pyeong), housing over 102 sq.m. and within 135 sq.m. in exclusive area with four rooms in general accounted for the highest ratio at 61.8%.

Looking into housing unit size, housing supply plan was established to supply 32.6% of housing over 60 sq.m. and within 85 sq.m. (3 rooms), 25.1% of housing over 40 sq.m. and within 60 sq.m. (2~3 rooms) and 2.12% of housing over 102 sq.m. and within 135 sq.m. (4 rooms) in exclusive area. In terms of housing density, 179% of average floor space ratio was applied to the apartment houses within the Scale of National Housing in Korea that took up about 2/3 (65.8%) of total housing supply.   And, 193% of average floor space ratio was applied to the apartment houses larger than the Scale of National Housing in Korea. In this manner, overall population density was adjusted.

Table 5-3. The number of apartment housing units by size and type of hosing supply in Bundang New Town

Type of housing supply		The number of apartment housing unit by size (Exclusive area)							Avg. FAR* (Avg. sale area)
		Within 40 sq.m.	Over 40 and within 60 sq.m.	Over 60 and within 85 sq.m.	Over 85 and within 102 sq.m.	Over 102 and within 135 sq.m.	Over 135 sq.m.	Total	
Rent (13%)		7,095 (61.8%)	4,384 (38.2%)	0 (0.%)	0 (0.%)	0 (0.%)	0 (0.%)	11,479 (10%)	151% (15.7py***)
Sale (87%)	Under scale of National Housing**(53%)	0 (0.%)	17,695 (38.1%)	28,739 (61.9%)	N/A	N/A	N/A	46,434 (10%)	179% (25.5py)
	Exceed scale of National Housing**(34%)	N/A	N/A	N/A	6,769 (22.4%)	18,648 (61.8%)	4,772 (15.8%)	30,189 (10%)	193% (43.6py)
Total (10%)		7,096 (8.1%)	22,080 (25.1%)	28,740 (32.6%)	6,769 (7.7%)	18,648 (21.2%)	4,772 (5.4%)	88,104 (10%)	-

*FAR = Floor Area Ratio

**Scale of National Housing in Korea means a housing unit size under 85sq.m. (exclusive area).

***py(pyeong, 坪) = 3.3058sq.m.

Source: Korea Land Corporation, 1997.

Table 5-4. Summary of housing supply in Model complex, Bundang New Town

Name of complex	Initial occupancy	Max/Min Floors	Type of building	Exclusive area (sq.m.)	Type of housing unit by sale area (py)	Number of rooms	Number of households	Ratio of household in housing complex	Parking capacity (Car)	Parking lot per household
Samsung-Hanshin	Sep. 1991	28/5	Sub Total	-	-	-	1,781	100.0%	2,672	1.5
			Stairs access	60	22	3	210	11.8%		
			Stairs access	84.69	32	3	858	48.2%		
			Stairs access	133.3	49	4	464	26.1%		
			Stairs access	171.52	63	6	34	1.9%		
			Stairs access	192.15	34	6	215	12.1%		
Hanyang	Sep. 1991	30/5	Sub Total	-	-	-	2,398	100.0%	4,838	2
			Corridor access	28.71	12	1	360	15.0%		
			Corridor access	35.1	15	2	414	17.3%		
			Stairs access	59.37	22	2	40	1.7%		
			Corridor access	59.13	24	3	209	8.7%		
			Stairs access	84.93	34	3	180	7.5%		
			Stairs access	84.99	34	3	171	7.1%		
			Stairs access	101.66	36	4	20	0.8%		
			Stairs access	134.87	47	4	50	2.1%		
			Stairs access	134.87	49	4	512	21.4%		
			Stairs access	148.94	55	3	139	5.8%		
			Stairs access	164.18	59	4	233	9.7%		
			Stairs access	164.59	60	4	34	1.4%		
			Stairs access	193.68	68	5	1	0.0%		
			Stairs access	220.83	77	5	31	1.3%		
			Stairs access	215.4	77	6	4	0.2%		
Hyundai	Jun. 1992	30/4	Sub Total	-	-	-	1,695	100.0%	2,542	1.5
			Stairs access	49.41	18	2	66	3.9%		
			Stairs access	59.55	22	3	160	9.4%		
			Tower	84.95	34	3	466	27.5%		
			Stairs access	108.75	39	4	90	5.3%		
			Stairs access	129.56	47	4	470	27.7%		
			Stairs access	164.04	59	5	110	6.5%		
			Stairs access	174.58	64	5	34	2.0%		
			Stairs access	186.24	67	5	171	10.1%		
			Stairs access	189.63	68	5	56	3.3%		
			Stairs access	193.44	70	6	56	3.3%		
			Stairs access	414.68	78	5	4	0.2%		
			Stairs access	218.49	79	6	4	0.2%		
			Stairs access	218.75	79	6	8	0.5%		
Useong	Sep. 1991	30/5	Sub Total	-	-	-	1,874	100.0%	1,850	1
			Corridor access	45.99	17	2	55	2.9%		
			Stairs access	59.73	22	2	110	5.9%		
			Stairs access	59.76	23	2	55	2.9%		
			Corridor access	64.8	26	2	245	13.1%		
			Stairs access	75.9	29	3	190	10.1%		
			Stairs access	84.88	32	2	84	4.5%		
			Stairs access	84.6	32	3	558	29.8%		
			Stairs access	129.21	47	4	172	9.2%		
			Stairs access	131.48	50	4	6	0.3%		
			Stairs access	132.6	50	3	18	1.0%		
			Stairs access	134.04	53	4	155	8.3%		
			Stairs access	164.79	60	5	12	0.6%		
			Stairs access	164.4	63	5	136	7.3%		
			Stairs access	193.99	73	6	78	4.2%		
Total							7,748			

Note: Shaded cell means the housing units under scale of National Housing in Korea Standard
Source: Homepage of DAUM real estate (http://realestate.daum.net).

Unlike Tama New Town, housing supply by master plan was executed to the whole areas of the new town within 4~5 years[20] from the initial migration to Bundang New Town, and therefore, no huge meaning can be found to analyze housing supply characteristics by period. One characteristic thing was that the land use plan was altered for the construction of residential and commercial units in some areas including Jeongja-dong in the beginning of the 2000s, and change in housing supply method occurred. As feasibility of new town project deteriorated, due to the slump of disposal in the originally planned commercial and business sites within Bundang New Town, Korea Land Corporation and Seongnam city modified urban design to make residential use possible in the Baekgung-Jeongja district, where commercial and business facilities were planned to be located in 2000. This actually became an opportunity for about 6.5% (5,407 units) of housing supply plan amount within Bundang New Town to be additionally supplied in the high density residential and commercial complex unit type around Jeongja-dong.

Table 5-5. Summary of residential and commercial complexes in Baekgung-Jeongja Block, Bundang New Town

Name of complex	Initial occupancy	Max/Min Floors	FAR	Exclusive area (sq.m.)	Number of households	Number of rooms	Parking capacity (Car)	Parking lot per household
Royal Palace	Feb. 2003	32/28	738%	137.76 - 244.49	576	3-5	1,256	2.2
We've the Zenith	Mar. 2002	30/26	428%	84.98 - 157.33	157	3-5	248	1.6
Adena Palace	May 2003	27/21	424%	84.94 - 164.03	203	3-5	396	2.0
I park Bundang1	May 2003	34/31	644%	78.06 - 244.60	541	2-5	1,090	2.0
I park Bundang2	May 2003	31/31	647%	84.96 - 162.02	224	3-4	412	1.8
I park Bundang3	May 2003	34/24	668%	84.92 - 171.39	307	3-4	560	1.8
Michelan Chereville	Sep. 2003	38/7	644%	17.71 - 273.88	800	1-4	1,516	1.9
Park view	Jul. 2007	35/30	355%	84.99 - 244.70	1,829	3-5	3,130	1.7
Saint view Regency	Aug. 2004	17/6	-	100.18 - 209.05	86	3-4	150	1.7
Dongyang Pargon	Oct. 2004	18/3	374%	80.06 - 193.06	344	3-4	638	1.9
Samsung Adena Luce	Dec. 2001	25/18	321%	84.98 - 153.05	259	3-4	405	1.6
The sharp star park	Mar. 2007	36/33	414%	84.93 - 117.23	378	3-4	825	2.2
Total					5,704			

Source: Homepage of DAUM real estate (http://realestate.daum.net). Quoted in Kim, 2013.

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[20] Since the initial occupancy to the Model Complex 示範団地 at the end of September 1991, although Bundang New Town development project (housing site development project in Seongnam-Bundang district) was finished with the phase 7 project (road construction) at the end of 1996 as the last phase, the phases 4, 5 and 6 projects for actual housing site creation were completed at the end of 1995, and thus, most apartment houses supply was completed during this period.

5.3 Demographic changes and prospects

5.3.1 Population structure by age and ratio of population aged 65 and over

As mentioned in Chapter 4 (See Table 4-7), the total population of Bundang New Town increased until 2005 but it has decreased because of the development of its vicinity since 2010.

While the ratio of population aged 65 and over has been on the gradual increase in Bundang New Town, from 4.4% (compared with 5.9% nationally and 4.5% for Seoul metropolitan area) in 1995 to 8.7% (compared with 11.3% nationally and 9.2% for Seoul metropolitan area) in 2010, it has been kept the lower than that of the whole nation or the Seoul metropolitan area.

Figure 4.4 showed a comparison of the variation in the population structure for each administrative Dong in Bundang New Town between 2000 and 2010. With the progression of fertility decline and population aging, the ratio of the children of school age and their parents is generally on the decrease. In particular, such a decrease is remarkable in such areas as Yatap 1-dong, Yatap 2-dong, and Gumi-dong within Bundang New Town. In the region where this phenomenon is remarkable, it is impossible to exclude a likelihood of rapid population aging if the current situation lasts.

Table 5-6. Population structure by age in Bundang New Town (1995-2010)

Age	1995		2000		2005		2010	
Total	314,539	(100.0%)	376,278	(100.0%)	414,590	(100.0%)	394,625	(100.0%)
0-4	24,505	(7.8%)	24,887	(6.6%)	22,104	(5.3%)	17,412	(4.4%)
5-9	28,962	(9.2%)	30,545	(8.1%)	29,169	(7.0%)	20,263	(5.1%)
10-14	30,216	(9.6%)	32,109	(8.5%)	34,299	(8.3%)	28,823	(7.3%)
15-19	22,970	(7.3%)	29,032	(7.7%)	29,924	(7.2%)	29,638	(7.5%)
20-24	23,293	(7.4%)	24,928	(6.6%)	26,505	(6.4%)	24,714	(6.3%)
25-29	21,442	(6.8%)	30,941	(8.2%)	29,984	(7.2%)	28,544	(7.2%)
30-34	29,681	(9.4%)	33,621	(8.9%)	41,074	(9.9%)	32,643	(8.3%)
35-39	38,550	(12.3%)	37,739	(10.0%)	40,974	(9.9%)	37,203	(9.4%)
40-44	28,083	(8.9%)	40,711	(10.8%)	42,088	(10.2%)	39,203	(9.9%)
45-49	19,473	(6.2%)	26,718	(7.1%)	38,145	(9.2%)	37,202	(9.4%)
50-54	14,558	(4.6%)	18,904	(5.0%)	23,075	(5.6%)	31,125	(7.9%)
55-59	11,061	(3.5%)	14,544	(3.9%)	16,686	(4.0%)	19,184	(4.9%)
60-64	7,778	(2.5%)	11,253	(3.0%)	12,806	(3.1%)	14,326	(3.6%)
65+	13,966	(4.4%)	20,345	(5.4%)	27,756	(6.7%)	34,345	(8.7%)

Source: Statistics Korea. Population and Housing Census in each year.

Figure 5-4. Comparison of population cohorts by dong in Bundang New Town between 2000 and 2010
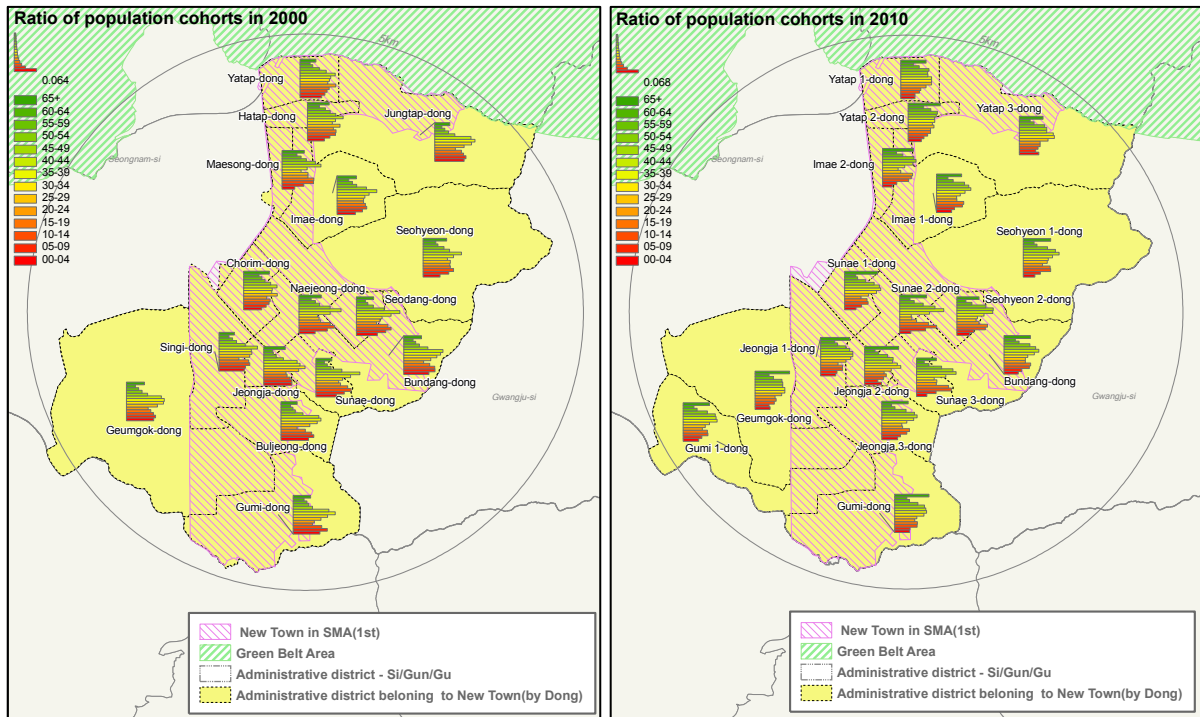
Source: Statistics Korea. Population and Housing Census, 2000 and 2010.

5.3.2 Migration

This section of Chapter 4 analyzed the change in the number of migration people and the net-migration[21] trend in Bundang New Town from 1995 to 2010 by using domestic population migration statistical data based on resident registration in-migration declaration.

In the case of 1995, this study analyzed migration and net-migration by age covering all areas of Seongnam city, because the migration data of resident registration by age were provided down to only city and county (gun, 郡) level. In 1995 alone, 77,724 people of net-migration occurred in all age cohorts in Seongnam city, which accounted for 8.8% of total resident registration-based population in Seongnam city. Regarding Bundang New Town, the occupancy to the Model complex in Bundang New Town started on Sep. 30, 1991, and most housing site development projects were completed at the end of 1995. For this reason, it would not be irrational to interpret large scale in-

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[21] (Net-migration) = (In-migration) - (Out-migration)

migration took place in Seongnam city, because of the Bundang New Town development project those days.

Table 5-7. In/Out and Net-migration by age in Bundang New Town, 1995

Age	IN-migration (A)		OUT-migration (B)		Net-migration (A-B)		Population by resident registration		Gross migration rate*	
1995	Bundang NT	Seongnam city	Bundang NT	Seongnam city	Bundang NT	Seongnam city	Bundang NT	Seongnam city	Bundang NT	Seongnam city
0-4		15,734		-9,607		6,127		76,321		33.2%
5-9		13,904		-7,524		6,380		71,387		30.0%
10-14		10,008		-5,016		4,992		74,943		20.0%
15-19		8,601		-3,631		4,970		67,620		18.1%
20-24		16,439		-8,356		8,083		79,687		31.1%
25-29		24,024		-15,143		8,881		89,865		43.6%
30-34	No	22,118	No	-12,901	No	9,217	No	96,046	No	36.5%
35-39	DATA	18,285	DATA	-9,721	DATA	8,564	DATA	94,905	DATA	29.5%
40-44		10,515		-5,398		5,117		64,110		24.8%
45-49		7,708		-3,524		4,184		46,916		23.9%
50-54		5,995		-2,590		3,405		38,287		22.4%
55-59		4,587		-2,089		2,498		29,789		22.4%
60-64		3,574		-1,803		1,771		20,349		26.4%
65+		7,499		-3,964		3,535		36,438		31.5%
Total		168,991		-91,267		77,724		886,663		29.4%
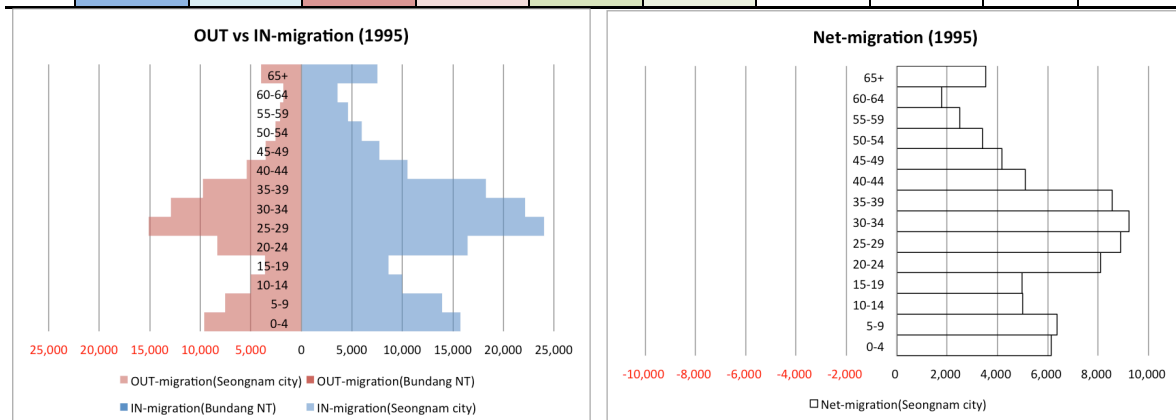
*Gross migration rate=[(The number of IN-migration)+(The number of OUT-migration)]/(Population by Resident Registration)
Source: Statistics Korea. Resident Registration Data in each year.

In 2001[22], the increase of age cohorts from late 20s to 40s was remarkable, and the children (0 to14 years of age) of those householders showed an uptrend. Meanwhile, out-migration was more than in-migration in the 15~19 years of age, corresponding to high school student-age, and age cohort

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[22] This thesis analyzed by replacing 2000 with 2001 because the migration data based on resident registration in the units of town-level administrative district (eup/myeon/dong) has been offered since 2001.

of 45 and over. In comparison of the migration and net-migration trend in Bundang New Town those days with Seongnam city, to which Bundang New Town belonged, similar patterns were shown in general, except for some age cohorts. The net-migration population size sharply fell to 0.2% level (0.8% level in Bundang New Town area) of resident registration-based population in Seongnam city, compared to that in 1995. From this, population migration by new town development project can be viewed to reach stable period.

Table 5-8. In/Out and Net-migration by age in Bundang New Town, 2001

Age	IN-migration (A)		OUT-migration (B)		Net-migration (A-B)		Population by resident registration		Gross migration rate*	
2001	Bundang NT	Seongnam city	Bundang NT	Seongnam city	Bundang NT	Seongnam city	Bundang NT	Seongnam city	Bundang NT	Seongnam city
0-4	6,082	9,999	-5,451	-10,586	631	-587	25,582	60,844	45.1%	33.8%
5-9	5,629	8,253	-4,297	-8,581	1,332	-328	31,162	69,222	31.9%	24.3%
10-14	4,121	5,282	-3,453	-5,620	668	-338	34,781	68,447	21.8%	15.9%
15-19	2,802	5,098	-3,967	-5,910	-1,165	-812	29,254	68,094	23.1%	16.2%
20-24	4,204	10,458	-4,285	-8,776	-81	1,682	25,073	73,865	33.9%	26.0%
25-29	10,118	20,223	-7,691	-16,490	2,427	3,733	31,293	88,790	56.9%	41.3%
30-34	10,576	17,614	-8,489	-16,459	2,087	1,155	39,801	97,890	47.9%	34.8%
35-39	7,421	11,228	-5,908	-10,948	1,513	280	38,103	87,872	35.0%	25.2%
40-44	5,469	8,340	-5,352	-8,866	117	-526	42,838	92,563	25.3%	18.6%
45-49	3,142	5,222	-3,946	-6,040	-804	-818	29,790	65,938	23.8%	17.1%
50-54	2,123	3,724	-2,761	-4,145	-638	-421	17,892	44,253	27.3%	17.8%
55-59	1,827	3,167	-2,289	-3,554	-462	-387	14,573	36,333	28.2%	18.5%
60-64	1,689	2,724	-1,910	-3,015	-221	-291	11,571	29,435	31.1%	19.5%
65+	3,662	5,384	-3,562	-5,617	100	-233	22,644	49,234	31.9%	22.3%
Total	68,865	116,716	-63,361	-114,607	5,504	2,109	394,357	932,780	33.5%	24.8%
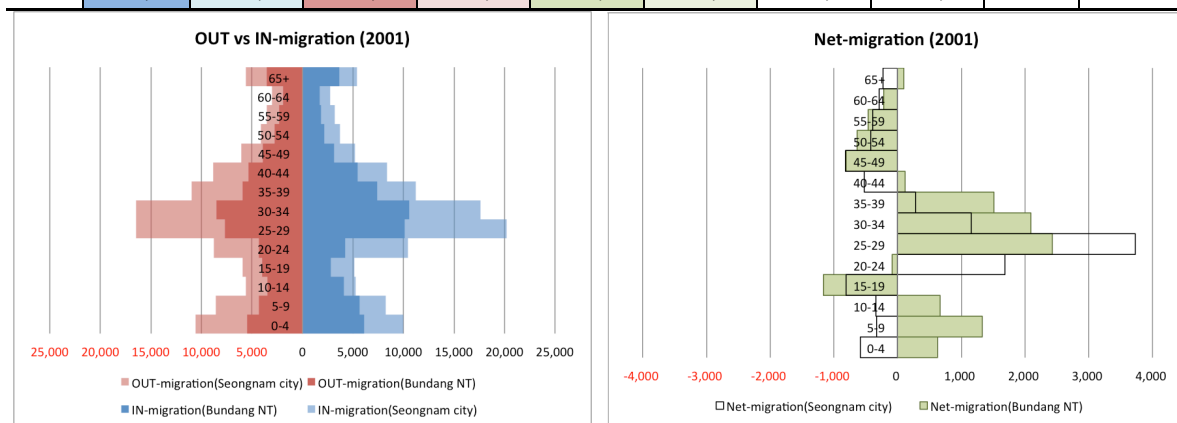
*Gross migration rate=[(The number of IN-migration)+(The number of OUT-migration)]/(Population by Resident Registration)
Source: Statistics Korea. Resident Registration Data in each year.

In 2005, the population migration pattern similar to that in 2001 was demonstrated. Although, migration amount (total of in-migration and out-migration populations) dropped, compared to 2001, net-migration population was 7,412 (net-migration population in Seongnam city was 279 in the same period), which showed a slight increase.

Table 5-9. In/Out and Net-migration by age in Bundang New Town, 2005

Age	IN-migration (A)		OUT-migration (B)		Net-migration (A-B)		Population by resident registration		Gross migration rate*	
2005	Bundang NT	Seongnam city	Bundang NT	Seongnam city	Bundang NT	Seongnam city	Bundang NT	Seongnam city	Bundang NT	Seongnam city
0-4	3,861	6,071	-3,740	-7,442	121	-1,371	23,506	50,858	32.3%	26.6%
5-9	3,944	5,598	-3,160	-5,932	784	-334	30,950	62,525	23.0%	18.4%
10-14	3,424	4,646	-2,480	-4,248	944	398	37,665	71,864	15.7%	12.4%
15-19	2,219	3,872	-2,768	-4,169	-549	-297	33,260	64,929	15.0%	12.4%
20-24	4,369	9,145	-3,681	-7,661	688	1,484	28,186	72,910	28.6%	23.1%
25-29	9,371	16,820	-6,663	-14,447	2,708	2,373	33,513	87,628	47.8%	35.7%
30-34	9,957	15,180	-8,468	-16,175	1,489	-995	45,550	102,728	40.5%	30.5%
35-39	6,468	9,505	-5,316	-9,490	1,152	15	45,532	96,107	25.9%	19.8%
40-44	4,641	7,119	-4,029	-6,824	612	295	45,193	92,034	19.2%	15.1%
45-49	3,002	5,173	-3,309	-5,766	-307	-593	40,181	84,650	15.7%	12.9%
50-54	1,776	3,397	-2,086	-3,734	-310	-337	24,392	56,526	15.8%	12.6%
55-59	1,538	2,656	-1,609	-2,904	-71	-248	17,220	42,224	18.3%	13.2%
60-64	1,422	2,340	-1,440	-2,552	-18	-212	13,611	33,888	21.0%	14.4%
65+	3,394	5,338	-3,225	-5,237	169	101	29,782	64,204	22.2%	16.5%
Total	59,386	96,860	-51,974	-96,581	7,412	279	448,541	983,075	24.8%	19.7%
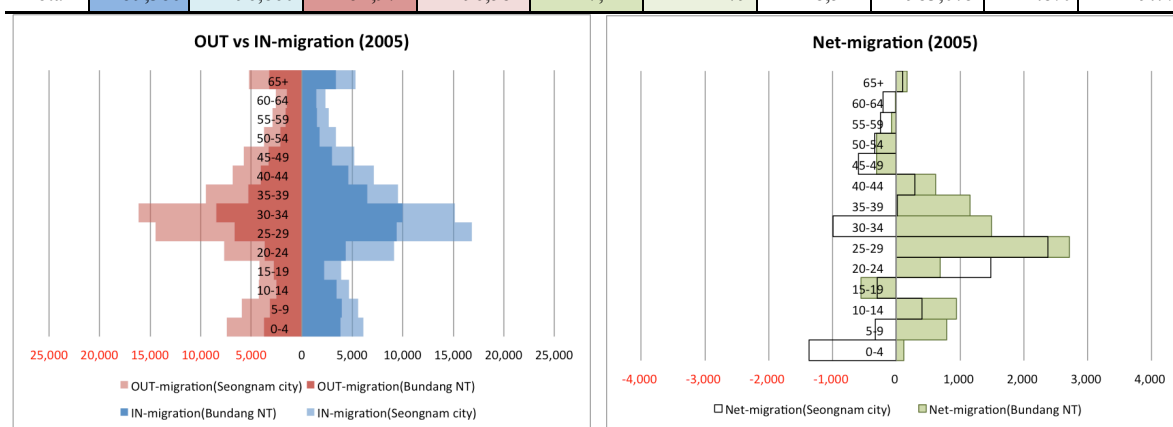
*Gross migration rate=[(The number of IN-migration)+(The number of OUT-migration)]/(Population by Resident Registration)
Source: Statistics Korea. Resident Registration Data in each year.

In 2010, net-migration shifted to minus growth, because out-migration was more than in-migration, due to real estate industry recession. Compared to slight increase of the population aged 5~9, 25~29 and 30~34, the out-migration population was more than the in-migration population in

other age cohorts. Compared to 793 population increase in Seongnam city by the migration those days, the population in Bundang rather fell by 6,626 people, which is judged that occupancy in adjacent Pangyo New town had greatly affected.   The downtrend of net-migration is forecasted to continue until adjacent areas' development like Pangyo New town is finished and countermeasures against physical deterioration of apartment houses are devised.

Table 5-10. In/Out and Net-migration by age in Bundang New Town, 2010

Age	IN-migration (A)		OUT-migration (B)		Net-migration (A-B)		Population by resident registration		Gross migration rate*	
2010	Bundang NT	Seongnam city	Bundang NT	Seongnam city	Bundang NT	Seongnam city	Bundang NT	Seongnam city	Bundang NT	Seongnam city
0-4	3,043	5,627	-3,554	-6,365	-511	-738	18,292	43,649	36.1%	27.5%
5-9	2,965	4,865	-2,686	-4,222	279	643	21,464	46,583	26.3%	19.5%
10-14	2,935	4,922	-2,922	-3,915	13	1,007	31,062	63,243	18.9%	14.0%
15-19	2,456	4,624	-3,980	-4,758	-1,524	-134	33,662	70,818	19.1%	13.2%
20-24	2,945	6,718	-3,652	-5,922	-707	796	26,846	63,446	24.6%	19.9%
25-29	6,961	14,238	-6,304	-13,242	657	996	28,806	78,559	46.0%	35.0%
30-34	7,878	14,276	-7,795	-14,983	83	-707	33,356	84,364	47.0%	34.7%
35-39	6,499	11,478	-6,543	-11,523	-44	-45	39,056	91,652	33.4%	25.1%
40-44	4,837	8,610	-5,137	-7,982	-300	628	41,702	92,924	23.9%	17.9%
45-49	3,299	6,565	-4,867	-6,966	-1,568	-401	38,492	88,504	21.2%	15.3%
50-54	2,360	5,275	-3,797	-5,915	-1,437	-640	32,048	79,844	19.2%	14.0%
55-59	1,603	3,678	-2,322	-3,951	-719	-273	19,957	53,074	19.7%	14.4%
60-64	1,337	2,872	-1,658	-2,921	-321	-49	14,504	39,487	20.6%	14.7%
65+	3,255	6,094	-3,782	-6,384	-527	-290	35,378	84,043	19.9%	14.8%
Total	52,373	99,842	-58,999	-99,049	-6,626	793	414,625	980,190	26.9%	20.3%
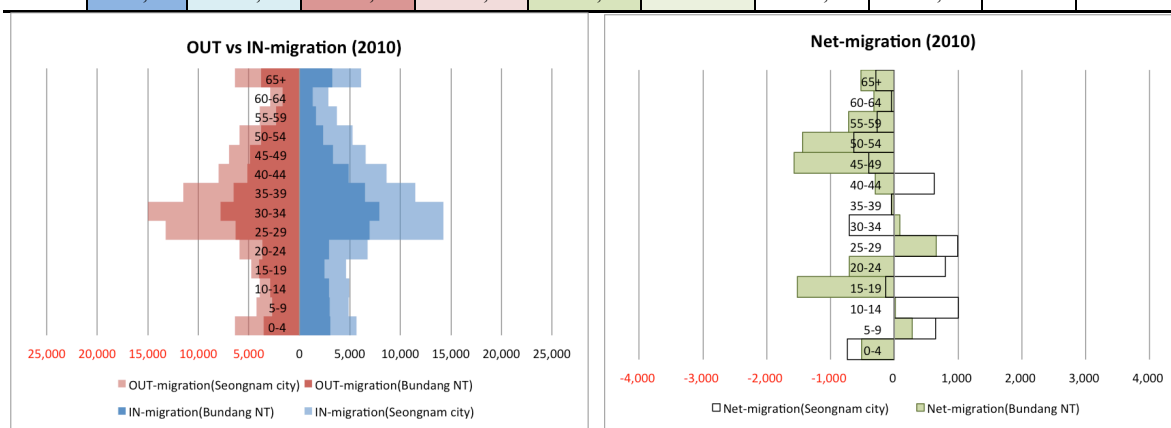
*Gross migration rate=[(The number of IN-migration)+(The number of OUT-migration)]/(Population by Resident Registration)
Source: Statistics Korea. Resident Registration Data in each year.

5.4 Comparison with Tama New Town

This thesis compared change trends from the initial occupancy in new towns through spatial classification of both countries' (Korea and Japan) ratios of population aged 65 and over into 1) the whole country- 2) Seoul and Tokyo Metropolitan Area- 3) main city[23]- 4) new town[24]- 5) town-level administrative district where the initial occupancy complex was located in the concerned new town[25].

Figure 5-5. Comparison of administrative district between Japan and Korea
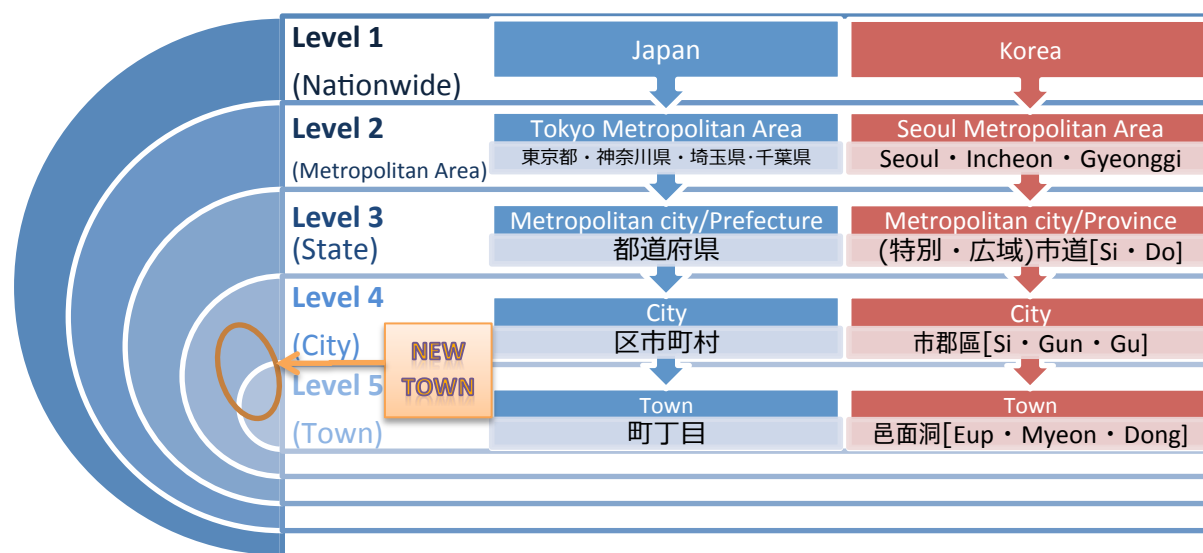
Looking into Japan, first, in the case that about 60% of city administrative district corresponded to Tama city, which accounted for initial stage Tama New Town development district (occupied in the 1970s), Tama New Town showed 5%p lower ratio of population aged 65 and over than Tokyo Metropolitan Area and Tokyo Metropolitan Government as well as across Japan until 2005 (34 years after the initial occupancy). However, Tama New Town showed higher ratio of

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[23] As analysis target, this thesis had to compare only Tokyo 23 special wards area, corresponding to Japan's 3) main city, which is similar to Seoul Metropolitan city in nature, and therefore, this thesis used statistical data of all areas of Tokyo Metropolitan Government, due to limitation in data acquisition.

[24] For Japan, the towns concerned in four cities in Tama New Town as analysis target of 4) new town had to be chosen, but only Tama city area, where about 60% of total administrative district corresponded to Tama New Town area and where initial new town development was conducted, was chosen as the analysis target area for the ratio of population aged 65 and over.

[25] For Japan, this thesis set Suwa-Nagayama district, where Suwa-Nagayama complex was located, and the entire Seohyeon 1-dong, where Model Complex of Bundang New Town was located in the case of Korea, as the analysis target area for the ratio of population aged 65 and over in terms of 5) town-level administrative district where the initial occupancy complex was located in the concerned new town.

population aged 65 and over than Tokyo Metropolitan Area and Tokyo Metropolitan Government in 2010 (39 years after the initial occupancy), as rapid aging was carried out after 1995 (24 years after the initial occupancy).

The ratio of population aged 65 and over in Suwa-Nagayama 諏訪·永山 district, where the initial occupancy complex was located within Tama New Town, showed extreme change, compared to Tama city. Suwa-Nagayama district showed about 1% of ratio of population aged 65 and over by the time less than 10 years since the initial occupancy (by 1980). From 1990 (19 years after the initial occupancy), aging speed became rapidly fast (4.0%), and its ratio exceeded the ratio in Tama city in 2000 (11.2%) (29 years after the initial occupancy). In 2005, the ratio of population aged 65 and over in Suwa-Nagayama district exceeded that of Tokyo Metropolitan Area (39 years after the initial occupancy), and was 25.0%, exceeding that of nationwide ratio in Japan in 2010.

In comparison with the whole country, Seoul Metropolitan Area and Seoul in terms of change in the ratio of population aged 65 and over in Bundang New Town for the past 20 years, the lower level of ratio in Bundang New Town was maintained.   Seohyeon 1-dong, where the Model Complex of Bundang New Town was located, showed higher ratio of population aged 65 and over than Bundang New Town, Seoul and Seoul Metropolitan Area until 2000 (9 years after the initial occupancy). However, its ratio slowed down than the comparison targets from 2005 (14 years after the initial occupancy) and showed relatively lower level (8.4%) in 2010 (19 years after the initial occupancy).   The reason why the ratio of population aged 65 and over in Seohyeon 1-dong increased slower than the comparison targets was that the in-migration of households having school age children was continually maintained.

At present of the time, when 19 years had passed, since the start of occupancy, it is difficult to assert the current speed of the ratios of population aged 65 and over in Bundang New Town and Seohyeon 1-dong will be maintained. As seen in Japanese case, the metropolitan new towns having quite young population structure in the initial stages of development compared to other regions, through large scale migration of 30 to 40s householders in the rapid growth era have the possibility to facing the population aging problems rapidly due to internal and external factors (e.g. decrease of

housing prices, deterioration of apartment house complex, reduction of preference on suburban residential area).

Table 5-11. Comparison of 'Ratio of population aged 65 and over' between Japan and Korea by the time elapsed since the initial occupancy housing complexes in each new town

Time elapsed since the initial occupancy housing complexes*	4 years	9 years	14 years	19 years	24 years	29 years	34 years	39 years
Japan	1975	1980	1985	1990	1995	2000	2005	2010
1) Japan	7.9%	9.1%	10.3%	12.1%	14.6%	17.4%	20.2%	23.0%
2) Tokyo Metropolitan Area**	5.9%	7.0%	8.1%	9.4%	11.6%	14.4%	17.5%	20.6%
3) Tokyo Metropolitan Government	6.3%	7.7%	8.9%	10.6%	13.0%	15.9%	18.5%	20.4%
4) Tama city	4.0%	4.5%	5.4%	5.7%	7.8%	11.1%	15.8%	20.9%
5) Suwa & Nagayama	1.4%	1.9%	2.8%	4.0%	6.5%	11.2%	17.8%	25.0%
Korea	1995	2000	2005	2010	2015***	2020***	2025***	2030***
1) Korea	5.9%	7.3%	9.3%	11.3%	13.1%	15.7%	19.9%	24.3%
2) Seoul Metropolitan Area	4.5%	5.6%	7.3%	9.2%	11.0%	13.5%	17.5%	21.8%
3) Seoul Special City	4.2%	5.4%	7.3%	9.6%	11.9%	14.6%	18.7%	22.8%
4) Bundang New Town	4.4%	5.4%	6.7%	8.7%	No Data			
5) Seohyeon 1-dong	5.5%	6.8%	7.0%	8.4%	No Data			
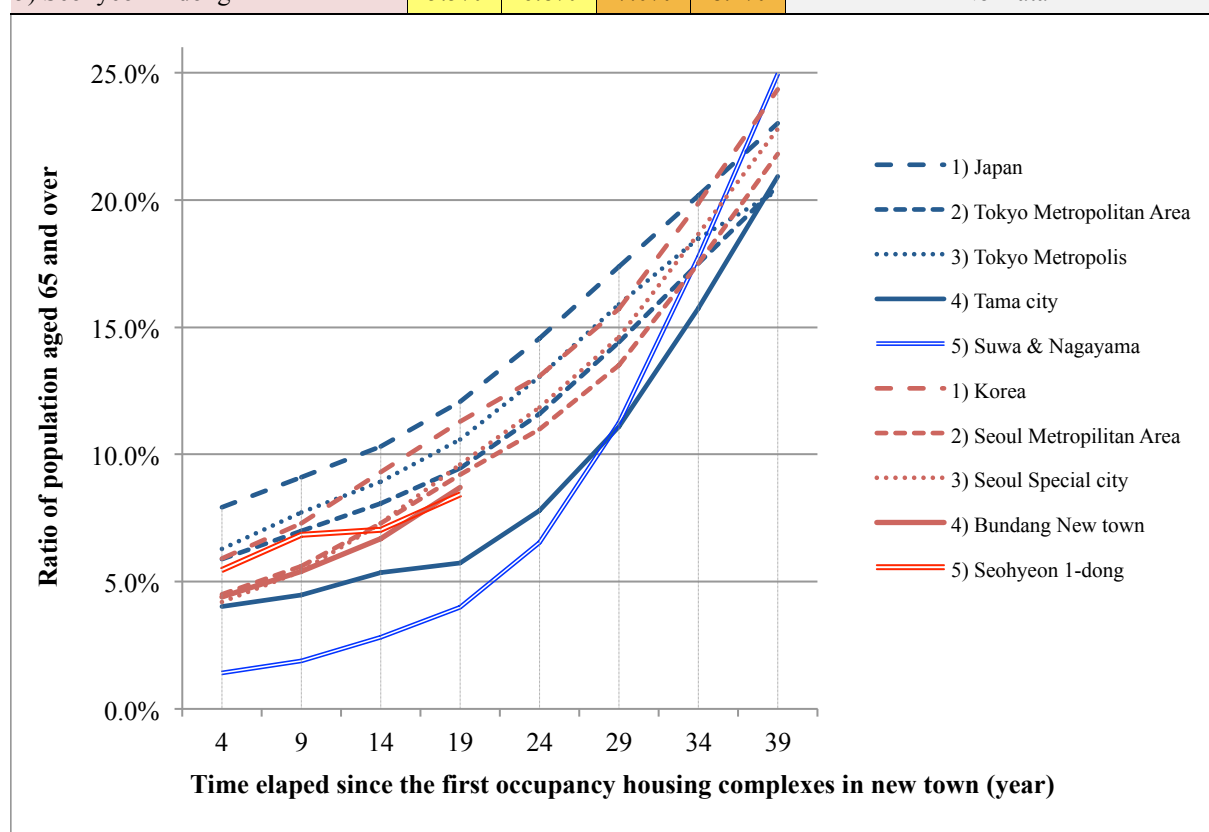
* in case of Japan : since 1971, in case of Korea : since 1991
** Tokyo, Kanagawa and Saitama Prefecture
*** Population Projection by Statistics Korea (June 2012)
Source: Census by Statistics Japan and Korea in each year. Quoted in Kim, 2013.

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From development background and development process aspect, Bundang New Town took only 2 years and 5 months from development plan announcement (April 27, 1989) to the initial occupancy of the Model Complex (September 30, 1991) whereas Tama New Town was developed for 40 years of long term. Also, entire new town development project was finished within 7 years of short period, compared to Tama New Town.

From the initial stages of Bundang New Town planning, the self-containment of city function was considered in establishing the land use plan. However, KOLAND, the developer of Bundang New Town development project judged that commercial and business land was planned excessively at the time when about 10 years had passed since the construction commencement. For this reason, the land use plan change was implemented to shift the land for such self-containment facilities into resident use land in 2000. As a result, the lack of business land was caused within the new town, as Bundang New Town grew as a stronghold in the Seoul Metropolitan Area at the time when 20 years passed. Although, Tama New Town had a limitation that it was planned as a bedroom town to supply housing within the metropolitan area from the start of the construction project, self-containment function introduction was made possible through the revision of the New Housing and Urban Development Act in 1986. Even though attempts to raise self-containment continue, since then, accomplishment is still not great.

Concerning Tama New Town in housing unit type and supply method, the public sector supplied housing, centered on small-sized rental housing with 3DK or less in the 1970s, the initial stages of development. Housing supply centered on the small-sized rental housing accelerated the quick household separation of child generation, which functioned as one of the cause of population aging. However, larger housing unit type (4DK or more) began to be supplied by the public sector, and private sector's apartment houses for installment sale began to be built on the disposed land by Japan's Urban Renaissance Agency 都市再生機構 to the private sector. Consequently, about 43,000 units were supplied by 1997, and about 78% of those were housing with 3LDK and less. In Bundang New Town, starting from the occupancy to the Model Complex in 1991, about 88,000 apartment houses were supplied over 4~5 years of short period of time (apartment houses for installment sale: rental

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housing = 87:13). About 2/3 of total housing were supplied as the scale of national housing with exclusive area of 85 ㎡ or less by 1997. Meanwhile, since the modification of urban design for Baekgung-Jeongja district in the 2000s, about 5,400 apartment houses were additionally supplied around Jeongja-dong in the type of residential and commercial complex unit.

According to the results to compare the characteristics of population structure change, population continued to increase in overall Tama New Town, but, rapid aging was in progress, centered on the apartment house complexes developed in the initial stage of the new town development (mainly Tama city area), and also the ratio of population aged 65 and over increased in proportion with the initial occupancy period of the complexes.

In the case of Bundang New Town, although population contented to increase by 2005, the population within the new town area began to decrease, because of adjacent area's development projects. From an aging aspect, lower ratio of population aged 65 and over and aging speed were maintained, compared to Seoul Metropolitan Area and Seoul, owing to continual inflow of school age children; however, a possibility of aging is going up, due to sluggish real estate transactions, centered on some large-sized housing units.

Lastly, relatively homogeneous generations and households migrated in large quantities in a short period of time, centered on 30s to 40s in the initial stages of Tama New Town development from a population migration aspect. Also, population migration was more around the adjacent areas and within Tama New Town, compared to main city, Tokyo 23 special wards area.

In Bundang New Town, 80% of the proposed population migrated in 3~4 years, since the initial occupancy had started within the new town. As s a result of 1995 Population and Housing Census, the ratio of households migrated from Seoul was 69% and the ratio of Gangnam 3 districts (gu, 區) was 27%, which was the highest ratio among the five new towns, which greatly contributed Bundang New Town's growth as a luxury housing area of Seoul metropolitan area. As for the size of net-migration on the basis of resident registration-based in-migration declaration, after large scale in-migration, equal to 8.8% of Seongnam city population, occurred in 1995, the size entered into a stable

trend, and a trend increasing little by little until 2005. But, net-migration shifted into minus growth for the first time in 2010, because of real estate market recession and occupancy in adjacent Pangyo New Town.

By the comparison of characteristics between Tama New Town and Bundang New Town, this thesis could draw some conclusions as follows. According to the comparison of the housing unit and housing supply types in both new towns, the population aging process like Tama New Town may not occur in the first generation new towns in Seoul metropolitan area, Korea. Tama New Town shows higher ratio of population aged 65 and over in the initial development areas. From the housing unit type, one of the reasons for the higher ratio of population aged 65 and over is that the housing units in the initial development areas could not accommodate residential space for the households with growing children, and then this lacking of residential space in a housing unit encouraged the separation of generation. Further, this separation of generation has expedited the population aging in the development areas of initial stage of Tama New Town.

In the types of the housing supply, rental housing complexes showed higher ratio of population aged 65 and over than those of housing for sale in Tama New Town. In case of Bundang New Town, on the other hand, various sized housing units had been supplied within a single complex in a short period and the rental housing units were supplied with low proportion comparatively[26]. According to the comparison of the supplied housing unit type and housing supply method in both new towns, the population aging process like Tama New Town may not occur in Bundang New Town, Korea in current situation. However, the demographic structural vulnerability caused by the impeded migration has been also increased in some communities of Bundang New Town since the mid-2000s (See Figure 5-4). This impeded migration is mainly related with living condition, housing unit size and diversity of housing unit type within own complex according to the household survey. As

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[26] Bundang New Town also has three apartment complexes composed only small-sized (exclusive area of below 50 sq. m.) rental housing units and the ratio of population aged 65 and over of these three complexes is higher than that of other complexes in Bundang New Town.

occupancy in adjacent Pangyo New Town has started in earnest since 2008, the size of out-migration from Bundang New Town exceeded the size of in-migration into Bundang New Town (See Table 5-10). This migration pattern of Bundang New Town will be accelerated and maintained until Pangyo New Town's development comes to the final stage of completion.

Table 5-12. Comparison of Characteristics between Tama New Town and Bundang New Town

Category	Tama New Town in Japan	Bundang New Town in Korea
Overview	· Area: 2,884ha · Proposed population: 340,000 · Location: 30km from Tokyo CBD	· Area: 1,964ha · Proposed population: 390,000 · Location; 25km from Seoul CBD
Development Background and Objective	· Solve housing shortage and prevent indiscreet city section sprawl around Tokyo Metropolitan Area · In charge of central hub function between five cities (united urban area) in Tama area planned to lower dependence on Tokyo CBD	· Ease urban problems such as traffic, dwelling problem and congestion in Seoul. · Foster self-containment of city sharing some functions of Seoul Metropolitan Area.
Development Period	· Idea and planning: 1965 · Project commencement: 1965 · Initial occupancy: 1971 · End of project: 2006 (UR)* · Development mode: New Housing and Urban Development Project (apartment house supply area) and land readjustment project	· Idea and planning: 1989 · Project commencement: 1989 · Initial occupancy: 1991 · End of project: 1996 · Development mode: Housing site development project
Development Process	· Supply housing by project enforcer over long term by dividing entire new town into 21 districts composed by several neighborhood units. · Promoted self-containment function within the new town through relevant act revision in 1986	· It took only 2 years and 5 months from the project announcement to the initial occupancy, and the entire project was finished within 7 years of short period of time. · Changed urban design in 2000 for disposed land for urban-containment facilities to be used as residential use.
Housing Unit Type and Supply Method	· Public sector supplied housing, centered on small-sized rental housing with 3DK or less in the initial stages of development in early 1970s. · 78% of housing were supplied to the size of 3LDK or less for 30 years since the initial stages of the development (1970~1997). · Large-sized housing began to be built since the latter part of the 1970s and private sector started to build the apartment houses for installment sale on the land disposed by UR.	· Starting from the occupancy of Model Complex in Bundang New Town, about 88,104 units of apartment houses were supplied over 4~5 years of short-period of time (apartment house for installment sale: rental housing = 87:13). · 2/3 of total housing were supplied to the Scale of National Housing in Korea or smaller. (Before 2000). · About 5,400 units of housing were additionally supplied in the type of residential and commercial complex unit, since the modification of urban design for Baekgung-Jeongja district in the 2000s.
Population Structure (Aging)	· Although population continued to increase at entire new town level, rapid aging was in progress (Suwa-Nagayama district's ratio of population aged 65 and over: 25%), centered on the apartment house complexes developed in the initial stage of new town development (mainly Tama city district). · In the initial stages-developed complexes with quick initial occupancy period, the ratio of population aged 65 and over increased proportionally. · Children generation's household separation was faster, due to narrow housing unit size among the rental housing residents from the initial stage households.	· Although population continued to increase until 2005, net-migration shifted to minus growth in 2010, owing to Pangyo New town development. · Although lower ratio of population aged 65 and over and aging speed were maintained, compared to Seoul Metropolitan Area and Seoul, because of continuous inflow of school age children, an aging possibility was concerned, due to real estate transaction slowdown, centered on large-sized housing units.
Migration	· Relatively homogenous generations and households, centered on 30s to 40s, migrated in large quantities in a short period of time in the initial stages of development. · There was more population migration in the adjacent areas and Tama New Town, compared to main city, Tokyo 23 special wards area.	· 80% of the proposed population migrated in 3~4 years, since the initial occupancy. The ratio of households migrated from Seoul was 69%, and the ratio of Gangnam 3 districts was 27%, the highest among 5 new towns (1995 Census). · Uptrend of continuous population migration within the new town

Note: Although, the development project of Urban Renaissance Agency (UR) was finished in 2006, the unsold lots are still being disposed to the private sector.

Chapter 6   Empirical Analysis on Population Aging-Related Characteristics of Bundang New Town Residents

Chapter 6 provides an empirical analysis (i.e., interview survey) on population aging-related characteristics of Bundang New Town residents in Korea. This household interview survey was conducted targeting two neighborhood units showing a different demographic transition pattern during the past about 10 years. Questionnaires of interview survey were designed according to the previous results that the characteristics of metropolitan new towns developed during the rapid growth era (in Chapter 2 and 4), demographic characteristics of residents in metropolitan new towns (in Chapter 4) and factors of population aging phenomenon in the initial development housing complexes in Tama New Town, Japan (in Chapter 3). In addition to these criteria, target areas of survey were chosen with the statistical analysis result of chapter 5. The middle part of Chapter 6 conducts Pearson's chi-squared test and correlation analysis as well as identifies primary survey results by variables and factors of questionnaire. The latter half of Chapter 6 analyzes the correlations between population aging-related factors (i.e., age of householder, number of household members and household composition) and summaries resident's opinion on the cause of population aging.

6.1   Outline of household interview survey

This household interview survey was conducted from November 8 to December 7 of 2012 in case of some parts of apartment complexes in Yatap 2-dong and from May 2 to 30 of 2013 in case of the others in Yatap 2-dong and Sunae 1-dong. A total of two hundred households participated in this interview survey.

6.1.1   Selection of target areas

According to census data analysis, unlike the other 'dong 洞's (town-level administrative district in Korea) in Bundang New Town, a population pyramid of Yatap 2-dong has been turning into a 'constrictive type' from 'expansive type' because the ratio of household with school age children has decreased since 2005. Looking into the Table 6-1 closely, the average ratio of 10 to 19years old residents of Yatap 2-dong was 1.2% higher than that of Bundang New Town in 1995. But this ratio of Yatap 2-dong became 1.9% lower than that of Bundang New Town in 2010. The average ratio of residents aged 65 and over of Yatap 2-dong was 0.5% higher than that of Bundang New Town in 1995. But this ratio of Yatap 2-dong increased 9.9% and became 1.2% higher than that of Bundang

New Town in 2010. In the era of fertility decline and population aging, the latter has a higher chance to accelerate further under this type of population cohorts (See Figure 5-4 and Table 6-1). One of the causes of the difference in population structure between two towns ('dong') is that migration of household, especially with school age children has occurred more frequently in Sunae 1-dong than Yatap 2-dong (See Table 6-2).

These two towns ('dong') have some similarities, such as land use pattern in the neighboring area (e.g., location of subway station, commercial & business area, detached house area, etc.), size of population and the time of initial occupancies of apartment complex and the population cohorts from the initial stage (1995) to 2000 (See Table 6-3).

Yatap 2-dong was selected as a target area in order to find out the factors that caused this population cohort changes that shows differently in the other regions in Bundang New Town and to predict this area's changing direction of population cohorts.

Meanwhile, Sunae 1-dong was used as a comparison group of Yatap 2-dong because this area had a similar population structure in 1995 and 2000 according to census. Furthermore, Sunae 1-dong has maintained a relatively stable population structure since 2005 unlike Yatap 2-dong due to keeping up the ratio of household with student children.

More specifically, focusing on the characteristics of residents living in apartment complex of metropolitan new towns, this thesis conducted a household interview survey targeting some apartment complexes in each area (i.e., Block A in case of Yatap 2-dong and Block B in case of Sunae 1-dong).

Table 6-1. Comparison of age cohorts between Yatap 2-dong and Sunae 1-dong (1995-2010)

Year	Area	Sum	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+
1995	Bundang NT	314,539	24,505	28,962	30,216	22,970	23,293	21,442	29,681	38,550	28,083	19,473	14,558	11,061	7,778	13,966
		100.0%	7.8%	9.2%	9.6%	7.3%	7.4%	6.8%	9.4%	12.3%	8.9%	6.2%	4.6%	3.5%	2.5%	4.4%
	Yatap2-dong	20,075	1,257	1,693	1,978	1,649	1,587	1,288	1,520	2,261	1,907	1,448	1,164	783	548	992
		100.0%	6.3%	8.4%	9.9%	8.2%	7.9%	6.4%	7.6%	11.3%	9.5%	7.2%	5.8%	3.9%	2.7%	4.9%
	Sunae1-dong	15,999	914	1,237	1,567	1,202	1,289	1,033	1,122	1,757	1,464	1,167	984	805	571	887
		100.0%	5.7%	7.7%	9.8%	7.5%	8.1%	6.5%	7.0%	11.0%	9.2%	7.3%	6.2%	5.0%	3.6%	5.5%
2000	Bundang NT	376,278	24,887	30,545	32,109	29,032	24,928	30,941	33,621	37,739	40,711	26,718	18,904	14,544	11,253	20,345
		100.0%	6.6%	8.1%	8.5%	7.7%	6.6%	8.2%	8.9%	10.0%	10.8%	7.1%	5.0%	3.9%	3.0%	5.4%
	Yatap2-dong	19,516	955	1,265	1,590	1,615	1,459	1,825	1,400	1,579	2,016	1,602	1,295	1,016	679	1,220
		100.0%	4.9%	6.5%	8.1%	8.3%	7.5%	9.4%	7.2%	8.1%	10.3%	8.2%	6.6%	5.2%	3.5%	6.3%
	Sunae1-dong	15,518	802	1,007	1,139	1,180	1,019	1,513	1,256	1,280	1,497	1,205	958	826	680	1,156
		100.0%	5.2%	6.5%	7.3%	7.6%	6.6%	9.7%	8.1%	8.2%	9.6%	7.8%	6.2%	5.3%	4.4%	7.4%
2005	Bundang NT	414,590	22,104	29,169	34,299	29,924	26,505	29,984	41,074	40,974	42,088	38,145	23,075	16,686	12,806	27,756
		100.0%	5.3%	7.0%	8.3%	7.2%	6.4%	7.2%	9.9%	9.9%	10.2%	9.2%	5.6%	4.0%	3.1%	6.7%
	Yatap2-dong	18,672	874	1,018	1,282	1,361	1,439	1,532	1,616	1,429	1,548	1,892	1,439	1,022	737	1,483
		100.0%	4.7%	5.5%	6.9%	7.3%	7.7%	8.2%	8.7%	7.7%	8.3%	10.1%	7.7%	5.5%	3.9%	7.9%
	Sunae1-dong	17,836	725	1,166	1,422	1,071	1,089	1,507	1,989	1,788	1,750	1,463	930	750	630	1,556
		100.0%	4.1%	6.5%	8.0%	6.0%	6.1%	8.4%	11.2%	10.0%	9.8%	8.2%	5.2%	4.2%	3.5%	8.7%
2010	Bundang NT	394,625	17,412	20,263	28,823	29,638	24,714	28,544	32,643	37,203	39,203	37,202	31,125	19,184	14,326	34,345
		100.0%	4.4%	5.1%	7.3%	7.5%	6.3%	7.2%	8.3%	9.4%	9.9%	9.4%	7.9%	4.9%	3.6%	8.7%
	Yatap2-dong	17,825	726	878	1,063	1,223	1,231	1,430	1,343	1,465	1,451	1,543	1,613	1,243	849	1,767
		100.0%	4.1%	4.9%	6.0%	6.9%	6.9%	8.0%	7.5%	8.2%	8.1%	8.7%	9.0%	7.0%	4.8%	9.9%
	Sunae1-dong	17,788	629	927	1,283	1,224	883	1,308	1,751	1,983	1,899	1,616	1,164	715	604	1,802
		100.0%	3.5%	5.2%	7.2%	6.9%	5.0%	7.4%	9.8%	11.1%	10.7%	9.1%	6.5%	4.0%	3.4%	10.1%

Bundang New town (Total)
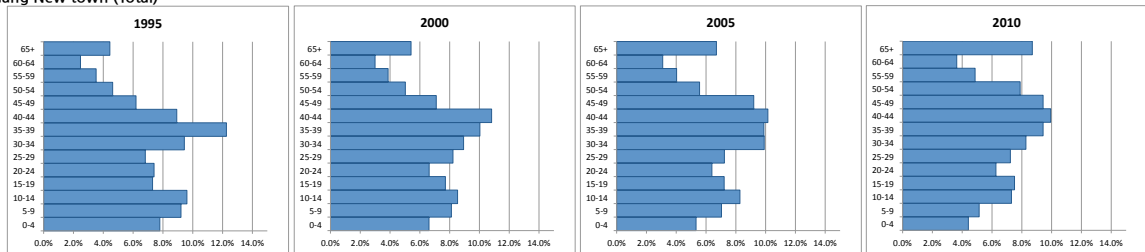
Yatap 2-dong
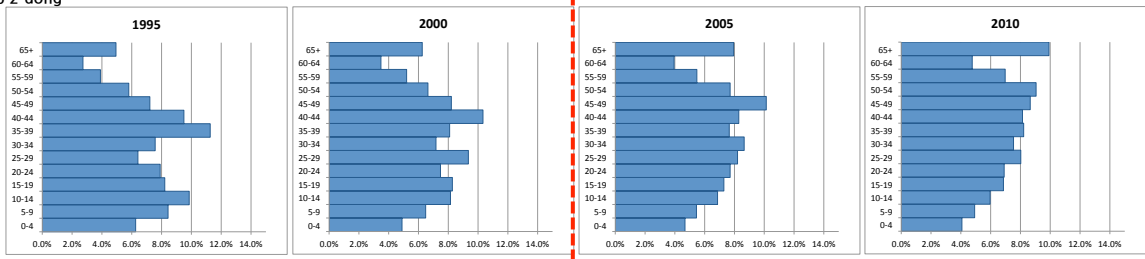
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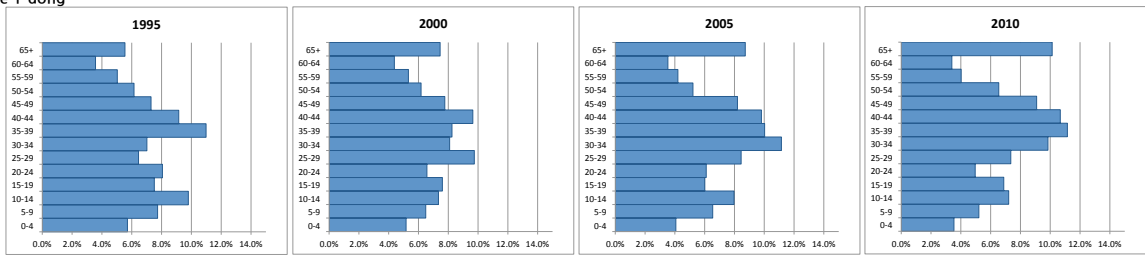
Source: Statistics Korea. Population and Housing Census in each year.

Table 6-2. Comparison of Net-migration by age between Yatap 2-dong and Sunae 1-dong

Year	Area	Migration	Age cohort														
			0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65+	Total
2001*	Yatap 2-dong	IN	336	327	295	291	341	606	624	437	444	286	190	140	113	283	4,713
		OUT	311	300	294	291	355	590	529	377	424	319	259	186	142	252	4,629
		Net**	25	27	1	0	-14	16	95	60	20	-33	-69	-46	-29	31	84
	Sunae 1-dong	IN	336	401	338	276	302	639	635	496	447	279	208	192	155	305	5,009
		OUT	272	233	221	300	301	544	482	331	360	299	213	160	132	271	4,119
		Net**	64	168	117	-24	1	95	153	165	87	-20	-5	32	23	34	890
2010	Yatap 2-dong	IN	214	231	217	219	216	363	444	458	332	237	206	124	93	201	3,555
		OUT	242	230	226	217	244	390	492	443	329	275	253	154	110	226	3,831
		Net**	-28	1	-9	2	-28	-27	-48	15	3	-38	-47	-30	-17	-25	-276
	Sunae 1-dong	IN	236	363	320	282	249	445	603	654	506	356	196	107	68	246	4,631
		OUT	240	264	340	349	261	449	643	586	484	397	277	144	98	274	4,806
		Net**	-4	99	-20	-67	-12	-4	-40	68	22	-41	-81	-37	-30	-28	-175
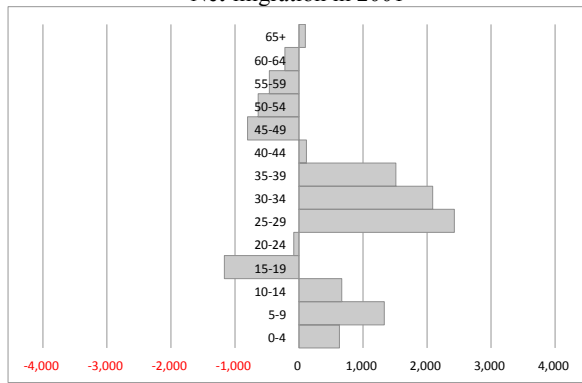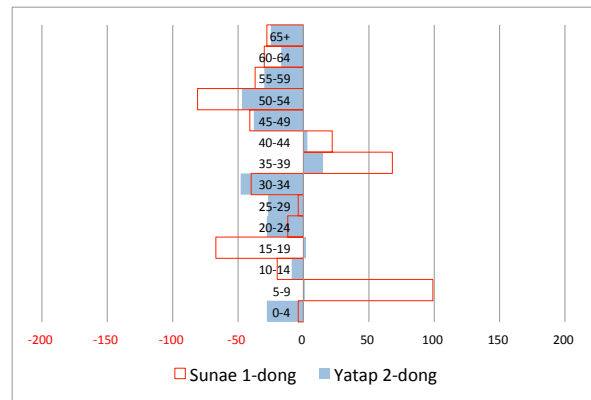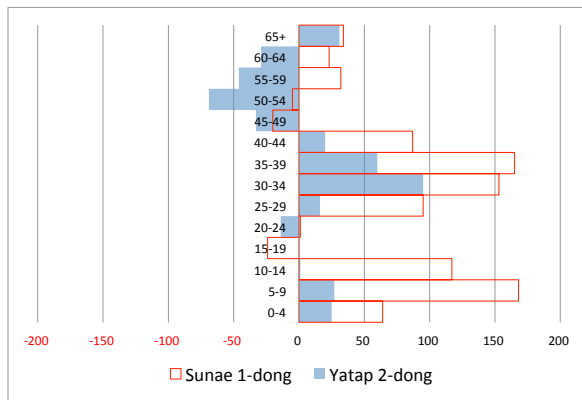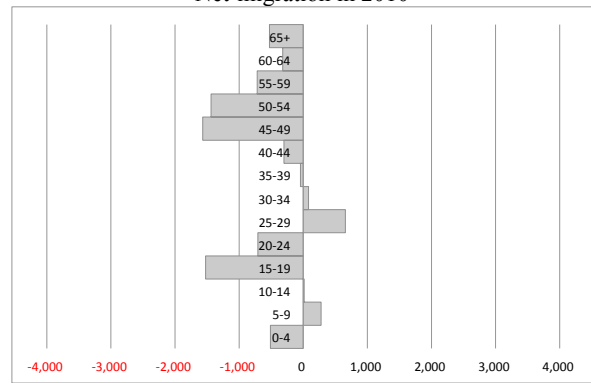
<Net-migration in 2001> <Net-migration in 2010>

*. This thesis analyzed by replacing 2000 with 2001 because the migration data based on resident registration in the units of town-level administrative district (dong) has been offered since 2001.

**. Net-migration = (The number of IN-migration) - (The number of OUT-migration)

Source: Statistics Korea. Resident Registration Data in each year.

Table 6-3. Summary of two towns ('dong') containing the target areas

Yatap 2-dong (Including Block A)	Items	Sunae 1-dong (Including Block B)
20,075 → 17,825	Population (1995 → 2010)	15,999 → 17,788
4.9% → 9.9%	Aging ratio (ratio of 65+) (1995 → 2010)	5.5% → 10.1%
5,698	Household (2010)*	4,340
5,296 units - **5,169** **(2,696)** - 115 - 18 - 0	Housing Total (2010) - **Apartment** **(in Block)** - Row house - Detached dwelling - House within commercial building	4,404 units - **4,394** **(2,634)** - 0 - 0 - 10
1992-1994	First Occupancies of apartment complexes	1992-1993
0.64 sq. km.	Area	1.03 sq. km.
Tan River	Adjacent Open space	Bundang Central Park
Seongnam Sports complex Seongnam Art center Seongnam Central Library Seongnam Intercity Bus Terminal NC Department store	Urban facilities within 800m Radius	Tan Riverside Park Bundang-gu office LOTTE Department store
Bundang-Suseo Expressway	Access road to Seoul (Main city)	Gyeongbu Expressway Bundang-Naegok Expressway Bundang-Suseo Expressway
Bundang Subway Line (Yatap Station)	Transit	Bundang Subway Line (Sunae Station)
	Land use plan	
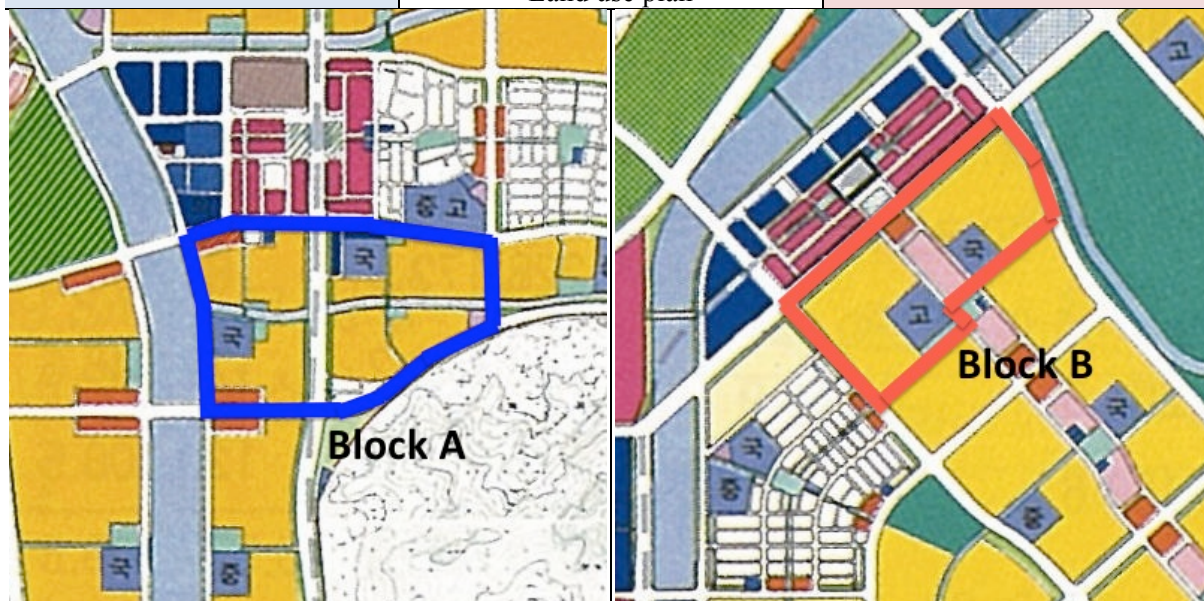
Source: Statistics Korea. Population and Housing Census in each year; Korea Land Corporation, 1997.
* Except 'commercial and business area'

6.1.2   Target apartment complexes and households

Two neighborhood units were selected as a household interview survey target in this thesis. Block A is composed with five apartment complexes ('Byeoksan', 'Gyeongnam', 'Gisan', 'Gyeonghyang' and 'Ssangyong-Jindeok') adjacent to Yatap subway station located in Yatap 2-dong, and Block B is composed with three apartment complexes ('Geumho' in Yangji 1 complex, 'Hanyang' in Yangji 5 complex and 'Geumho-Cheonggu' in Yangji 6 complex) adjacent to Sunae subway station located in Sunae 1-dong, Bundang New Town (Figure 6-1 and 6-2).

Five apartment complexes in Block A account for about 52% of the whole households in Yatap 2-dong and three apartment complexes in Block B account for about 60% of the whole households in Sunae 1-dong (See Table 6-3).

On the one hand, these two target apartment complexes have similar characteristics in terms of land use plan (including adjacent areas), total number of households, time of initial occupancies of apartment complexes and so on. On the other hands, these two target complexes have a differences in terms of diversity of housing unit types within its' own apartment complex (See Table 6-3).

Table 6-5 compares with population cohort changes between target apartment complexes (i.e., Block A and Block B) and their town-level administrative districts (i.e., Yatap 2-dong and Sunae 1-dong) to know whether these blocks represent their own town-level administrative districts in terms of population structure or not. It may safely be said that Block A in Yatap 2-dong might has a similar shape of population pyramid with whole of Yatap 2-dong whereas Block B has higher population cohorts of 0 to 19 years old and lower portion of 20s to 30s than whole of Sunae 1-dong. These results, however, have something in common with the reason that this thesis uses the case of Sunae 2-dong as a comparison group; proportion of school age children has been maintained high. So it has a respresentative to conduct household interview survey only for each Block (apartment complex) which is a part of Yatap 2-dong and Sunae 1-dong.

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Figure 6-1. Neighborhood map of Block A in Yatap 2-dong
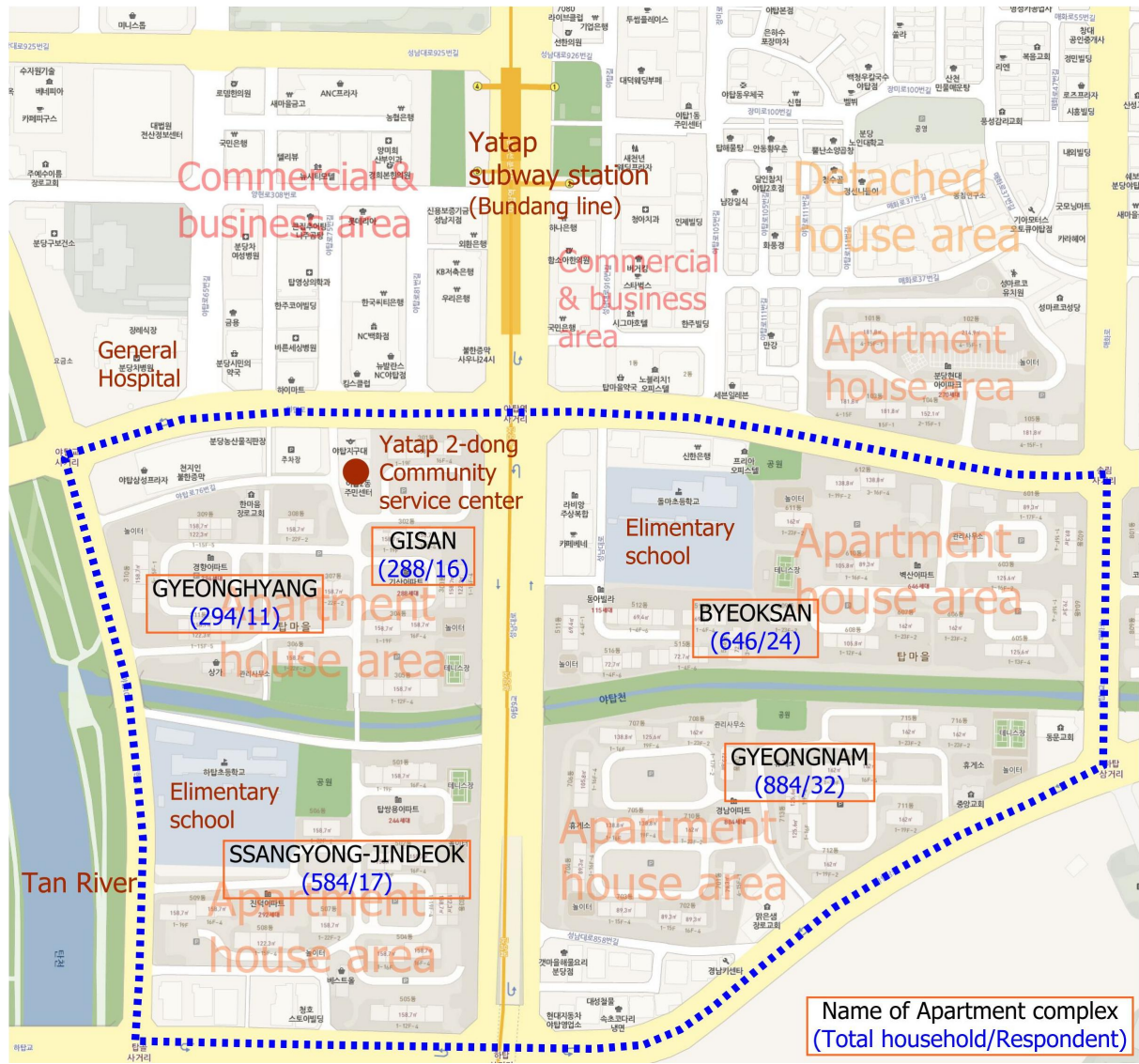
Note: The length of one side of the square = about 800m
Source: NAVER map (http://map.naver.com)
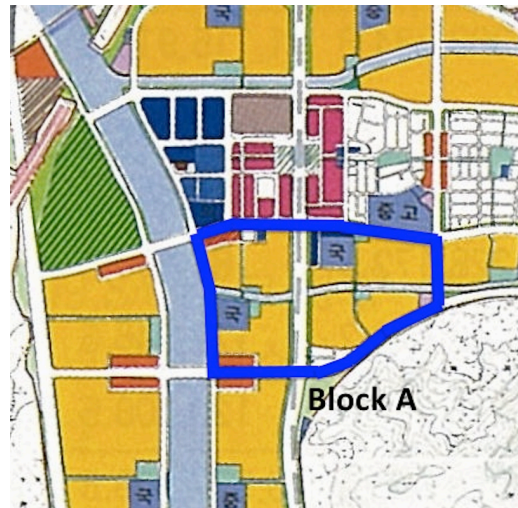
Land use plan of Block A

Figure 6-2. Neighborhood map of Block B in Sunae 1-dong

Note: The length of one side of the square = about 800m
Source: NAVER map (http://map.naver.com)
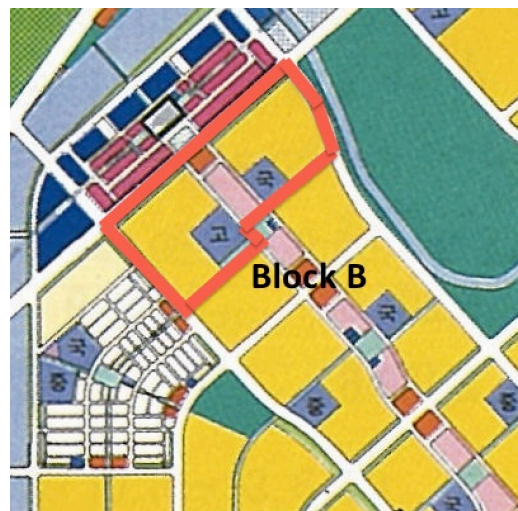
Land use plan of Block B

Table 6-4. Summary of target apartment complexes and the number of questionnaires by housing unit type

Target area	Name of apartment complex (Type*)	Initial occupancy	Max/Min. Floors	Type of building	Exclusive area (sq.m.)	Type of housing unit by sale area (py)**	Number of rooms	Number of house-holds	Ratio of house-hold in Block	Number of question naires	Building No.
Block A in Yatap 2-dong	Byeoksan (M)	May 1994	23/12	Sub Total	-	-	-	646	24%	**24**	
				Stairs access	*59.91*	*24*	*3*	*64*	*2%*	*2*	*604*
				Stairs access	*69.87*	*27*	*3*	*164*	*6%*	*9*	*601/602/608/610*
				Stairs access	*84.91*	*32*	*3*	*80*	*3%*		
				Stairs access	101.97	38	3	84	3%	3	603/605
				Stairs access	114.93	43	4	70	3%	10	606/607/609/611/612
				Stairs access	134.79	49	4	184	7%		
	Gyeong-nam (M)	Feb. 1994	23/15	Sub Total	-	-	-	884	32%	**32**	
				Stairs access	*59.91*	*24*	*3*	*60*	*2%*	*2*	*701*
				Stairs access	*69.87*	*27*	*3*	*186*	*7%*	*9*	*702/703/704/706*
				Stairs access	*84.91*	*32*	*3*	*64*	*2%*		
				Stairs access	101.97	38	3	142	5%	5	707(line 3-4)/709/713
				Stairs access	114.93	43	4	102	4%	16	705/707(line1-2)/ 708/ 710/711/712/714/715/716
				Stairs access	134.79	49	4	330	12%		
	Gisan (L)	Jul. 1993	22/16	Sub Total	-	-		288	11%	**16**	
				Stairs access	101.91	37	4	56	2%	6	303(exc. 48py type)
				Stairs access	131.4	48	4	232	9%	10	302/303(exc. 37py)/304/ 306/307
	Gyeong-hyang (L)	Jul. 1993	22/15	Sub Total	-	-	-	294	11%	**11**	
				Stairs access	101.91	37	4	112	4%	6	309/311(exc. 48py type)
				Stairs access	131.4	48	4	182	7%	5	301/308/310/309/ 311(exc. 37py type)
	Ssangyong-Jindeok (L)	Jun. 1993	22/12	Sub Total	-	-	-	584	22%	**17**	
				Stairs access	101.91	37	4	112	4%	5	503/508
				Stairs access	131.4	47	4	464	17%	12	305/501/502/504/505/ 506/507/509/503/508(exc. 37py)
				Stairs access	131.91	48	4	8	0%		
				Blcok A Total	-	-	-	2,696	100%	**100**	
Block B in Sunae 1-dong	Geumho in Yangji 1 complex (M)	Dec. 1992	26/12	Sub Total	-	-	-	918	35%	**34**	
				Stairs access	*84.9*	*32*	*3*	*246*	*9%*	*9*	*103/104/105/106*
				Stairs access	133.82	50	4	422	16%	16	101/102/112/113/114/ 115/116(exc. 69py type)
				Stairs access	164.25	61	5	172	7%		
				Stairs access	193.85	69	5	28	1%	9	107/108/109/110/111
				Stairs access	198.45	72	6	50	2%		
	Hanyang in Yangji 5 complex (M)	Apr. 1992	25/5	Sub Total	-	-	-	1430	54%	**53**	
				Corridor access	*28.38*	*11*	*1*	*100*	*4%*		*501/502/503/505/506/*
				Corridor access	*35.42*	*14*	*2*	*480*	*18%*	*37*	*507/508/509/510/511/*
				Corridor access	*42.93*	*17*	*2*	*200*	*8%*		*512/513/514*
				Stairs access	*48.93*	*18*	*2*	*230*	*9%*		
				Stairs access	*82.65*	*30*	*3*	*6*	*0%*	*7*	*515/516/517*
				Stairs access	*84.96*	*32*	*3*	*174*	*7%*		
				Stairs access	115.5	42	3	3	0%	1	518/527
				Stairs access	134.55	50	3	103	4%		
				Stairs access	142.15	53	5	2	0%		
				Stairs access	164.3	61	5	98	4%	8	519/528/529
				Stairs access	183.44	67	5	1	0%		
				Stairs access	200.66	73	6	33	1%		
	Geumho-Cheonggu in Yangji 6 complex (S)	Nov. 1992	22/18	Sub Total	-	-	-	286	11%	**13**	
				Stairs access	*59.63*	*23*	*3*	*79*	*3%*	*7*	*602*
				Stairs access	*59.94*	*23*	*3*	*79*	*3%*		
				Stairs access	*55.44*	*24*	*3*	*64*	*2%*	*3*	*601(exc. 28py type)*
				Stairs access	65.09	28	3	64	2%	3	601(exc. 24py type)
				Block B Total	-	-	-	2,634	100%	**100**	

Note: Italic letters represent housing units with the Scale of National Housing in Korea (within exclusive area 85 sq.m.)

* Type of apartment complex: (L) Large size-housing oriented complex, (M) Mixed complex, (S) Small size-housing oriented complex

** Type of housing unit by exclusive area (based on the Administrative rule for housing supply by MLTM, Korea)

Type	Exclusive area (sq.m.)
I	Within 60
II	Over 60 and within 85
III	Over 85 and within 102
IV	Over 102 and within 135
V	Over 135

Source: Homepage of DAMU real estate (http://realestate.daum.net)

Table 6-5. Comparison of population cohort changes between target apartment complexes and their town-level administrative districts (dong)

Year	Target area	Total	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85+
1995	Yatap2-dong	20,075	1,257	1,693	1,978	1,649	1,587	1,288	1,520	2,261	1,907	1,448	1,164	783	548	417	258	169	98	50
		100%	6.3%	8.4%	9.9%	8.2%	7.9%	6.4%	7.6%	11.3%	9.5%	7.2%	5.8%	3.9%	2.7%	2.1%	1.3%	0.8%	0.5%	0.2%
2000	Block A	10,864	471	771	921	891	830	953	654	899	1,133	916	795	603	393	301	200	100	21	12
		100%	4.3%	7.1%	8.5%	8.2%	7.6%	8.8%	6.0%	8.3%	10.4%	8.4%	7.3%	5.6%	3.6%	2.8%	1.8%	0.9%	0.2%	0.1%
	Yatap2-dong	19,516	955	1,265	1,590	1,615	1,459	1,825	1,400	1,579	2,016	1,602	1,295	1,016	679	498	332	202	105	83
		100%	4.9%	6.5%	8.1%	8.3%	7.5%	9.4%	7.2%	8.1%	10.3%	8.2%	6.6%	5.2%	3.5%	2.6%	1.7%	1.0%	0.5%	0.4%
2005	Block A	10,529	456	663	826	790	722	813	790	843	935	1,080	822	616	420	294	259	141	59	0
		100%	4.3%	6.3%	7.8%	7.5%	6.9%	7.7%	7.5%	8.0%	8.9%	10.3%	7.8%	5.9%	4.0%	2.8%	2.5%	1.3%	0.6%	0.0%
	Yatap2-dong	18,672	874	1,018	1,282	1,361	1,439	1,532	1,616	1,429	1,548	1,892	1,439	1,022	737	519	450	266	158	90
		100%	4.7%	5.5%	6.9%	7.3%	7.7%	8.2%	8.7%	7.7%	8.3%	10.1%	7.7%	5.5%	3.9%	2.8%	2.4%	1.4%	0.8%	0.5%
2010	Block A	10,123	372	587	710	740	631	772	647	826	910	917	918	692	506	350	250	190	85	20
		100%	3.7%	5.8%	7.0%	7.3%	6.2%	7.6%	6.4%	8.2%	9.0%	9.1%	9.1%	6.8%	5.0%	3.5%	2.5%	1.9%	0.8%	0.2%
	Yatap2-dong	17,825	726	878	1,063	1,223	1,231	1,430	1,343	1,465	1,451	1,543	1,613	1,243	849	605	469	358	214	121
		100%	4.1%	4.9%	6.0%	6.9%	6.9%	8.0%	7.5%	8.2%	8.1%	8.7%	9.0%	7.0%	4.8%	3.4%	2.6%	2.0%	1.2%	0.7%
1995	Sunae1-dong	15,999	914	1,237	1,567	1,202	1,289	1,033	1,122	1,757	1,464	1,167	984	805	571	372	223	148	91	53
		100%	5.7%	7.7%	9.8%	7.5%	8.1%	6.5%	7.0%	11.0%	9.2%	7.3%	6.2%	5.0%	3.6%	2.3%	1.4%	0.9%	0.6%	0.3%
2000	Block B	14,887	782	1,001	1,132	1,162	935	1,405	1,170	1,240	1,465	1,173	944	814	668	457	309	171	51	8
		100%	5.3%	6.7%	7.6%	7.8%	6.3%	9.4%	7.9%	8.3%	9.8%	7.9%	6.3%	5.5%	4.5%	3.1%	2.1%	1.1%	0.3%	0.1%
	Sunae1-dong	15,518	802	1,007	1,139	1,180	1,019	1,513	1,256	1,280	1,497	1,205	958	826	680	464	322	206	100	64
		100%	5.2%	6.5%	7.3%	7.6%	6.6%	9.7%	8.1%	8.2%	9.6%	7.8%	6.2%	5.3%	4.4%	3.0%	2.1%	1.3%	0.6%	0.4%
2005	Block B	14,022	627	1,066	1,310	927	665	861	1,235	1,401	1,502	1,246	792	643	542	466	403	235	89	12
		100%	4.5%	7.6%	9.3%	6.6%	4.7%	6.1%	8.8%	10.0%	10.7%	8.9%	5.6%	4.6%	3.9%	3.3%	2.9%	1.7%	0.6%	0.1%
	Sunae1-dong	17,836	725	1,166	1,422	1,071	1,089	1,507	1,989	1,788	1,750	1,463	930	750	630	570	478	285	150	73
		100%	4.1%	6.5%	8.0%	6.0%	6.1%	8.4%	11.2%	10.0%	9.8%	8.2%	5.2%	4.2%	3.5%	3.2%	2.7%	1.6%	0.8%	0.4%
2010	Block B	13,123	526	853	1,175	1,043	536	678	909	1,282	1,457	1,278	917	585	500	449	415	312	146	62
		100%	4.0%	6.5%	9.0%	7.9%	4.1%	5.2%	6.9%	9.8%	11.1%	9.7%	7.0%	4.5%	3.8%	3.4%	3.2%	2.4%	1.1%	0.5%
	Sunae1-dong	17,788	629	927	1,283	1,224	883	1,308	1,751	1,983	1,899	1,616	1,164	715	604	559	508	392	209	134
		100%	3.5%	5.2%	7.2%	6.9%	5.0%	7.4%	9.8%	11.1%	10.7%	9.1%	6.5%	4.0%	3.4%	3.1%	2.9%	2.2%	1.2%	0.8%

Block A
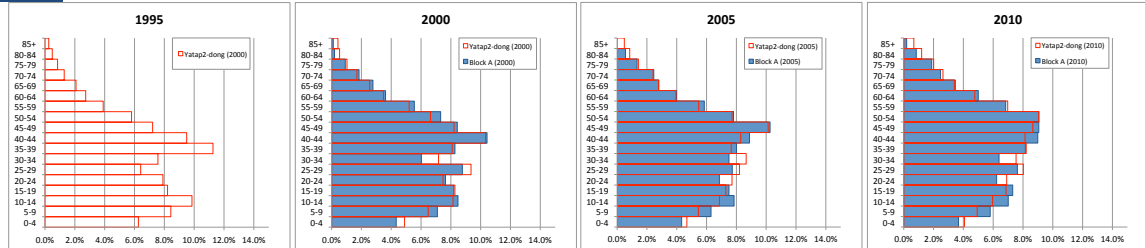
Block B
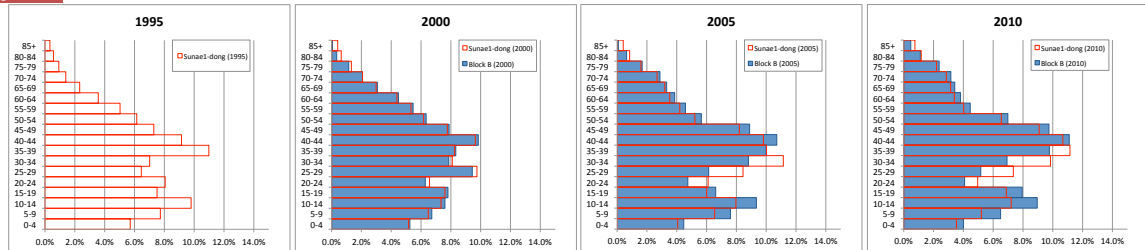
Source: Statistics Korea. Population and Housing Census in each year.

6.1.3 Variables and survey questions

Questionnaires of household interview survey were designed according to the previous results that the characteristics of metropolitan new towns developed during the rapid growth era (in Chapter 2 and 4), demographic characteristics of residents in metropolitan new towns (in Chapter 3 and 5) and factors of population aging phenomenon in the apartment complexes developed in the initial stage of Tama New Town, Japan (in Chapter 3). In addition to these results, this thesis conducted a pilot interview survey for 39 residents of Bundang New Town to check the results of front parts of this thesis.

Questionnaires were designed to deduce one dependent variable (related with population aging) and three independent variables (related with population movement characteristics, residential characteristics and living environment) (See Table 1-1). Each variable is related with some factors (level 1 and 2), moreover these factors are divided into several question items by stage. As the final outcome, each question items are expressed by each question (See Table 6-6).

Table 6-6. Variables, factors and question items in household interview survey

Variables	Factors (Level 1)	Factors (Level 2)	Question Item	Stage *	Question No.**
A dependent variable	Population Aging (§6.3)	Demographic characteristics of household	Age of householder	I	Q0-5/Q1-1
				M	Q0-5/Q4-1
				C	Q0-5
			Number of household member (including population aged 65 and over)	I	Q1-4
				M	Q4-4
				C	Q0-9/Q0-10
			Household composition	I	Q1-3
				M	Q4-3
				C	Q0-8
		Cause of population aging	Difference of population cohorts between Yatap2-dong and Sunae1-dong *[Residents' opinion]*	-	Q5-15
			High probability scenario of population aging *[Residents' opinion]*	-	Q5-16
Independent variables	Population movement characteristics (§7.1)	Migration	Time to move in Bundan New town	I	Q1-1
			Move-out area	I	Q1-5
				M	Q4-5
			Move-in area	C	Q0-1
				M	Q1-6
			Reason to move in Bundang NewTown *[Residents' opinion]*	I	Q1-7
			Reason to move within Bundang New Town *[Residents' opinion]*	M	Q4-6

	Commuting	Commuting or not	I	Q3-1
			C	Q5-1
		Commuting area	I	Q3-2
			C	Q5-2
		Commuting mode	I	Q3-3
			C	Q5-3
		Commuting route	I	Q3-4
			C	Q5-4
	Duration of residence	Time to move in current house	I	Q1-1
			M	Q4-1
		Condition of real estate transaction *[Residents'opinion]*	C	Q5-14/ Q5-14-1
		Intention & reason to live *[Residents'opinion]*	C	Q5-17/ Q5-17-1/ Q5-17-2/ Q5-17-3
Residential Characteristics (§7.2)	Home ownership	Home ownership	I	Q2-3
			M	Q4-7
			C	Q4-9
	Housing unit size	Housing unit size	I	Q2-4
			M	Q4-8
			C	Q2-4/Q4-10
		Satisfaction with housing unit size *[Residents'opinion]*	I	Q2-7
			C	Q5-13/ Q5-13-1/ Q5-13-2
Living Environment (§7.3)	Educational condition	Satisfaction for educational condition *[Residents'opinion]*	I	Q2-6
			C	Q5-12
		Number of student	I	Q3-7
			C	Q5-7
		Whether household has separated students or not	I	Q3-8
			C	Q5-8
		Number of separated students	I	Q3-9
			C	Q5-9
		Separation area	I	Q3-10
			C	Q5-10
		Reason for separation	I	Q3-11
			C	Q5-11
	Shopping condition	Satisfaction for shopping condition *[Residents'opinion]*	I	Q2-6
			C	Q5-12
		Shopping area/shop	I	Q3-5
			C	Q5-5
		Reason to visit	I	Q3-6
			C	Q5-6
	Transportation condition	Satisfaction for transportation condition *[Residents'opinion]*	I	Q2-6
			C	Q5-12
	Leisure and cultural facilities	Satisfaction for leisure and cultural facilities *[Residents'opinion]*	I	Q2-6
			C	Q5-12
	Medical and welfare facilities	Satisfaction for medical and welfare facilities *[Residents'opinion]*	I	Q2-6
			C	Q5-12
	Reason to select a complex	Reason to select the current apartment complex *[Residents'opinion]*	I	Q2-5
			M	Q4-11

*. I: Initial stage moved in Bundang New Town / M: Moved within Bundang New Town (if experienced) / C: Current status

**. See Appendix 3.

6.2 Characteristics of respondent households by target area

Prior to analyzing the factors on population aging by identifying the relations between independent and dependent variables, this study identified what attributes the 200 households that responded to interview had, based on the results drawn by collecting main questionnaire item presented above.

6.2.1 Factors related on the population aging (A dependent variable)

Age of householder

The average age of householder of 200 households that responded to the interview was 55.2 years old, and that of Block B (55.5 years old) was slightly higher than that of Block A (54.9 years old). In terms of householder's age, however, there is no statistical difference between two target areas (p = 0.752). If retirement age is set as 60 years old, the number of households (72 households) whose householder was over retirement age (60s or over) reaches 36% of the total households. Block A and Block B showed similar values at 33% and 35%, respectively. The age cohorts of the householders having the highest frequency were 40s and 50s, taking up 27%, respectively.

Table 6-7. Age of householder

Age of householder	Target area		
	Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total
30-34	4	4	8 (4.0%)
35-39	6	6	12 (6.0%)
40-44	14	16	30 (15.0%)
45-49	13	11	24 (12.0%)
50-54	13	13	26 (13.0%)
55-59	17	11	28 (14.0%)
60-64	10	8	18 (9.0%)
65-69	10	7	17 (8.5%)
70-74	4	8	12 (6.0%)
75-79	6	7	13 (6.5%)
80-84	2	4	6 (3.0%)
85-89	1	1	2 (1.0%)
Nonresponse	-	4	4 (2.0%)
Total	100	100	200 (100.0%)
Average	54.9 years old	55.5 years old	55.2 years old

Pearson Chi-Square: 8.414, p = 0.752

Number of household members

The average number of household members of the 200 households was 3.3 persons, and Block A (3.8 persons) was slightly more than Block B (3.0 persons). It can be said that the number of household members has a statistical difference between two target areas with a significance level of 1% (p = 0.001). The reason why Block B's average number of household members was smaller than those of Block A is that Block B's small-sized housing unit ratio was far too higher than Block A (See Table 6-4). For this reason, there were many households composed of one or two persons in Block B from the interviewed apartment complexes' housing unit size aspect.

Table 6-8. Number of household members

| Number of household members | Target area | | |
	Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total
1	0	16	16 (8.0%)
2	18	22	40 (20.0%)
3	22	20	42 (21.0%)
4	41	33	74 (37.0%)
5	13	7	20 (10.0%)
6	6	1	7 (3.5%)
7	0	1	1 (0.5%)
Total	100	100	200 (100.0%)
Average	3.8 members	3.0 members	3.3 members

Pearson Chi-Square: 23.732, p = 0.001

Looking into the interviewed 156 households, 105 households, two-thirds of the total households did not have the household member who was aged 65 and over. The remaining a third of households had one or two household members who were aged 65 and over. However, there is no statistical difference between two target areas (p = 0.255).

Table 6-9. Number of householder aged 65 and over

| Number of household members aged 65 and over | Target area | | |
	Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total
None	38	67	105 (52.5%)
1	6	19	25 (12.5%)
2	12	14	26 (13.0%)
Nonresponse	44*	-	44 (22.0%)
Total	100	100	200 (100.0%)

Pearson Chi-Square: 2.730, p = 0.255

Household composition

From an aspect of household composition, 129 households, about two-thirds of the total 200 households that responded to the interview, were two-generation households, and about 29% of one-generation households composed of only a couple or siblings followed.

Based on the survey result, it can be said that the household composition type of respondents has a statistical difference between two target areas ($p = 0.000$). Specifically speaking, the proportion of Block B's one-generation households (including one-person households) was about three times higher than that of Block A. As mentioned in the number of household members per household examined above, the reason is that small-sized housing unit ratio of Block B was far higher than that of Block A. The proportion of each household composition type in this interview survey matches up with census data in 2010 (See Table 6-11).

Table 6-10. Household composition by interview survey

Household composition	Target area			
	Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total	
One-generation household	15	43	58	(29.0%)
Two-generation household	76	53	129	(64.5%)
Three-generation household	9	4	13	(6.5%)
Four-generation household	-	-	-	(0.0%)
Non-relative household	-	-	-	(0.0%)
Total	100	100	200	(100.0%)

Pearson Chi-Square: 19.541, $p = 0.000$

Table 6-11. Household composition by census 2010

Household composition	Target area					
	Yatap 2-dong (Block A belongs to)		Sunae 1-dong* (Block B belongs to)		Total	
One-generation household	1674	(29.4%)	1314	(30.3%)	2988	(29.8%)
Two-generation household	3458	(60.7%)	2687	(61.9%)	6145	(61.2%)
Three-generation household	477	(8.4%)	296	(6.8%)	773	(7.7%)
Four-generation household	-	(0.0%)	-	(0.0%)	-	(0.0%)
Non-relative household	9	(0.2%)	-	(0.0%)	9	(0.1%)
Total	5698	(100.0%)	4340	(100.0%)	10038	(100.0%)

Source: Statistics Korea. *2010 Population and Housing Census of Korea*.
* Except 'commercial and business area'

6.2.2 Factors related on population movement characteristics (independent variable 1)

Time of initial migration to Bundang New Town (migration time)

To look at the period to migrate to Bundang New Town for the first time, this thesis divided into four stages according to the pattern of real estate price increases in Seoul metropolitan area from 1991, the initial occupancy began in Bundang New Town, to the present (2013): period of construction, from 1992 to 1997, the first half of maturity, from 1998 to 2002, the second half of maturity, from 2003 to 2007, and period of decline, from 2008 to 2012.

In the case of Block A, the proportion of households migrated during the period of construction (1991~1997) was the highest. In Block B, the proportion of households that occupied in the second half of maturity period (2003~2007) was the highest. Overall, Block A had higher proportion of migration during the initial development period of Bundang New Town, while Block B showed relatively even distribution in each period. It can be also said that the time of initial migration to Bundang New Town has a statistical difference between two target areas with a significance level of 5% ($p = 0.031$).

Table 6-12. Time of initial migration to Bundang New Town

Time of initial migration to Bundang New Town	Target area			
	Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total	
Period of construction (1991-1997)	35	25	60	(30.0%)
The first half of maturity (1998-2002)	26	19	45	(22.5%)
The second half of maturity (2003-2007)	21	32	53	(26.5%)
Period of decline (2008-2013)	12	24	36	(18.0%)
Nonresponse	6	-	6	(3.0%)
Total	100	100	200	(100.0%)

Pearson Chi-Square: 8.861, $p = 0.031$

Move-out area (migration area)

According to analysis on the places where the residents resided immediately before migrated to Bundang New Town for the first time, more than half of the migrated households (55%) migrated

from Seoul, and about 40% of them migrated from Gangnam 3 districts, luxurious residential areas in Korea. Actually, it is difficult to find out differences between Block A and Block B in this result ($p = 0.393$). However, Block A had slightly higher ratio of migration from Seongnam City and slightly lower ratio of migration from Gangnam 3 districts rather than Block B, due to Block A's closeness to Seongnam city's unmeditated urban area from a geographic aspect. All these were demonstrated from the Census and resident registration statistics (Refer to §4.3).

Table 6-13. Move-out areas at the initial migration to Bundang New Town

Move-out area at the initial migration to Bundang New Town		Target area			
		Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total	
Seoul metropolitan area	Seoul special city*	51	59	110	(55.0%)
	Gangnam 3 districts	20	24	44	(22.0%)
	Gyeonggi province**	32	30	62	(31.0%)
	Seongnam city	16	8	24	(12.0%)
	Incheon metropolitan city	1	0	1	(0.5%)
Non Seoul metropolitan area		10	9	19	(9.5%)
Nonresponse		6	2	8	(4.0%)
Total		100	100	200	(100.0%)

Pearson Chi-Square: 5.192, $p = 0.393$
*   including Ganam 3 districts
** including Seongnam city

Commuting

Concerning the question asking commuting (person trip) to the householders, about two-thirds of respondents said they were commuting and the remaining a third of respondents said they did not commute. While about 80% of the households whose householders were commuting when they initially migrated to Bundang New Town, the ratio has been decreased to approximately two thirds. This is probably because some householders have reached the retirement age. This phenomenon was similarly found in both two target areas. However, there is no statistical difference between two target areas at both the initial migration to Bundang New Town ($p = 0.705$) and present ($p = 0.547$).

Table 6-14. Whether respondent's householder commuted or not at the initial migration to Bundang New Town

Householder commuted at the initial migration to Bundang New Town	Target area			
	Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total	
Yes	79	82	161	(80.5%)
No	15	18	33	(16.5%)
Nonresponse	6	-	6	(3.0%)
Total	100	100	200	(100.0%)

Pearson Chi-Square: 0.143, *p* = 0.705

Table 6-15. Whether respondent's householder is currently commuting or not

Householder is currently commuting	Target area			
	Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total	
Yes	65	69	134	(67.0%)
No	35	31	66	(33.0%)
Total	100	100	200	(100.0%)

Pearson Chi-Square: 0.362, *p* = 0.547

Comparing the commuting area between time of initial migration to Bundan New town and present, consistent with the findings from the analysis of census data in the third section of Chapter 4, the proportion of the households commuting to Seoul and Gangnam 3 districts was higher in the initial stage of Bundang New Town development and more households migrated from Gyeonggi Province or within Seongnam city in more recent times. However, no significant variation was found in the target areas between the time of initial migration to Bundang New Town and the present.

Table 6-16. Commuting areas at the initial migration to Bundang New Town

Commuting area at the initial migration to Bundang New Town		Target area			
		Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total	
Seoul metropolitan area	Seoul special city*	54	45	99	(61.5%)
	Gangnam 3 districts	28	28	56	(34.8%)
	Gyeonggi province**	21	35	56	(34.8%)
	Seongnam city	13	26	39	(24.2%)
	Incheon metropolitan city	1	0	1	(0.6%)
Non Seoul metropolitan area		1	0	1	(0.6%)
Nonresponse		2	2	4	(2.5%)
Total		79	82	161	(100.0%)

Pearson Chi-Square: 8.222, *p* = 0.144

Table 6-17. Current commuting areas

Current commuting area		Target area			
		Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total	
Seoul metropolitan area	Seoul special city*	27	34	61	(45.5%)
	Gangnam 3 districts	15	23	38	(28.4%)
	Gyeonggi province**	35	33	68	(50.7%)
	Seongnam city	22	25	47	(35.1%)
	Incheon metropolitan city	0	0	0	(0.0%)
Non Seoul metropolitan area		1	2	3	(2.2%)
Nonresponse		2	0	2	(1.5%)
Total		65	69	134	(100.0%)

Pearson Chi-Square: 3.177, p = 0.529

Next, 'car' is the greatest part of commuting mode in the both Block A and Block B. Any characteristic point is not finded in analysis of commuting mode except that the number of househoulds commuting by walk in Block B is grater than that of Block A. In conclusion, 'commuting mode' has no significance in terms of population aging.

Table 6-18. Commuting mode at the initial migration to Bundang New Town (multiple responses)

Commuting mode at the initial migration to Bundang New Town	Target area			
	Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total	
Car	58	48	106	(61.3%)
Bus	16	10	26	(15.5%)
Transit	10	15	25	(14.9%)
Walk	1	9	10	(6.0%)
Nonresponse	1	0	1	(0.6%)
Total	86	82	168	(100.0%)

Table 6-19. Current commuting mode (multiple responses)

Current commuting mode	Target area			
	Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total	
Car	41	35	76	(55.1%)
Bus	14	7	21	(15.2%)
Transit	12	15	27	(19.6%)
Walk	1	12	13	(9.4%)
Nonresponse	1	0	1	(0.7%)
Total	69	69	138	(100.0%)

Duration of residence in current house

One of the questions related to Bundang New Town residents' aging was the duration of residence in the current house. The average 9.9 years has elapsed sicne respondents moved into current house in Bundang New Town. Block A (10.8 years) was longer than Block B (9.1 years) by about 1.7 years. This point is one of the characteristics that can distinguish Block A from Block B (p = 0.029 < 0.05). Also this thesis can conjecture that this point is closely related to the future trend of population aging in complexes.

Table 6-20. Duration of residence in current house of respondents

Duration of residence in current house	Target area		
	Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total
16 to 21 years	27	23	50 (25.0%)
11 to 15 years	24	13	37 (18.5%)
6 to 10 years	27	24	51 (25.5%)
Below 5 years	22	40	62 (31.0%)
Total	100	100	200 (100.0%)
Average	10.8 years	9.1 years	9.9 years

Pearson Chi-Square: 8.993, p = 0.029

6.2.3 Factors related on residential characteristics (independent variable 2)

Home ownership

In terms of residential characteristics, this thesis analyzed home ownership type of the respondent households. 153 households (76.5%) of the total 200 households owned their own homes and about 22% resided in rental homes regardless of target area (Block A or Block B). However, there is no statistical difference between two target areas (p = 0.362).

Table 6-21. Home ownership by target area

Home ownership	Target area		
	Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total
Home owner	78	75	153 (76.5%)
Rental household	19	25	44 (22.0%)
Nonresponse	3	-	3 (1.5%)
Total	100	100	200 (100.0%)

Pearson Chi-Square: 0.832, p = 0.362

Housing unit size

The sampling of this household interview survey was carried out in line with housing supply status by housing unit size of survey-target apartment complexes. For this reason, the housing unit sizes of the respondents show the ratio as exhibited in the Table 5-3 presented above. About half of housing unit type was exclusive area of 102 to 135 sq. m. in Block A, while exclusive area of less than 60 sq. m. was the highest proportion of households (47%) in Block B. It can be also said that the housing unit size has a statistical difference between two target areas (p = 0.000) as seen Tabel 6-4.

Table 6-22. Housing unit size by target area

| Housing unit size (sq. m.) | Target area | | |
	Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total
Within 60	4	47	51 (25.5%)
Over 60 and within 85	19	19	38 (19.0%)
Over 85 and within 102	27	-	27 (13.5%)
Over 102 and within 135	50	17	67 (33.5%)
Over 135	-	17	17 (8.5%)
Total	100	100	200 (100.0%)

Pearson Chi-Square: 96.509, p = 0.000

Looking into the only 156 respondent households, 97 households (62.2%) answered that they were safisfied with the current housing unit size. By target area, Block B's 68% of satisfaction on the current housing unit size was higher than Block A's satisfaction showing about 54%. Meanwhile, 'satisfaction with housing unit size' has no significance in terms of population aging.

Table 6-23. Satisfaction with housing unit size by target area

| Satisfaction with housing unit size | Target area | | |
	Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total
Too large	1	0	1 (0.5%)
Large	15	14	29 (14.5%)
Satisfactory	29	68	97 (48.5%)
Small	10	16	26 (13.0%)
Too small	1	2	3 (1.5%)
Nonresponse	44*	0	44 (22.0%)
Total	100	100	200 (100.0%)

Pearson Chi-Square: 6.543, p = 0.162
* This questionnaire was not interviewed in the some apartment complexes, Yatap 2-dong conducted in November 2012.

6.2.4 Factors related on living condition (independent variable 3)

Satisfaction with current residential condition

According to the survey results of satisfaction on transportation, education environment, shopping, leisure and culture, medical service and welfare, the respondents were satisfied with current surrounding conditions in general. However, households in some complexes in Block A were not surveyed, either, like in the survey of satisfaction on housing unit size.

Based on the survey results, it can be said that satisfaction with current residential condition has a statistical difference between two target areas; transportation, education, and medical service & welfare condition with a significance level of 1% (p = 0.001, 0.0000 and 0.005), and shopping and leisure & culture condition with 5% (p = 0.018 and 0.027) respectively.

Table 6-24. Satisfaction with current living environment

Satisfaction with current living environment		Target area			
		Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total	
Transportation	Satisfactory	48	75	123	(61.5%)
	Moderate	8	25	33	(16.5%)
	Unsatisfactory	0	0	0	(0.0%)
	Nonresponse	44*	-	44	(22.0%)
	Total	100	100	200	(100.0%)
Education	Satisfactory	41	94	135	(67.5%)
	Moderate	14	6	20	(10.0%)
	Unsatisfactory	1	0	1	(0.5%)
	Nonresponse	44*	-	44	(22.0%)
	Total	100	100	200	(100.0%)
Shopping	Satisfactory	48	91	139	(69.5%)
	Moderate	7	9	16	(8.0%)
	Unsatisfactory	1	0	1	(0.5%)
	Nonresponse	44*	-	44	(22.0%)
	Total	100	100	200	(100.0%)
Leisure and Culture	Satisfactory	48	83	131	(65.5%)
	Moderate	7	17	24	(12.0%)
	Unsatisfactory	1	0	1	(0.5%)
	Nonresponse	44*	-	44	(22.0%)
	Total	100	100	200	(100.0%)

Medical service and welfare	Satisfactory	48	75	123	(61.5%)
	Moderate	8	25	33	(16.5%)
	Unsatisfactory	0	0	0	(0.0%)
	Nonresponse	44*	-	44	(22.0%)
	Total	100	100	200	(100.0%)

[Transportation] Pearson Chi-Square: 15.975, $p = 0.001$
[Education] Pearson Chi-Square: 20.486, $p = 0.000$
[Shopping] Pearson Chi-Square: 10.125, $p = 0.018$
[Leisure and Culture] Pearson Chi-Square: 9,184, $p = 0.027$
[Medical service and welfare] Pearson Chi-Square: 10.735, $p = 0.005$

* This questionnaire was not interviewed in the some apartment complexes, Yatap 2-dong conducted in November 2012.

6.2.5   Socioeconomic factors (Background questions)

Education Level

As concerns the education level of householders, consistent with the results (57.1% in 2010) from the analysis of census data in Chapter 4, the ratio of the households whose householders have a college degree or more is about two thirds of total respondents in this question. More specipically, 87.5% of respondents in Block A have a college degree or more, and Block B is 56%. Through the result, there is a statistical difference between two target areas at the level of 1% ($p = 0.001$) in terms of educaton level of householder.

Table 6-25. Education level of householder

Education level of householder	Target area		Total	
	Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)		
Less than middle school graduate	2	11	13	(6.5%)
High school graduate	6	33	39	(19.5%)
College degree more	**48**	**56**	**104**	(52.0%)
Nonresponse	44*	-	44	(22.0%)
Total	100	100	200	(100.0%)

Pearson Chi-Square: 14 .262, $p = 0.001$

* This questionnaire was not interviewed in the some apartment complexes, Yatap 2-dong conducted in November 2012.

Household income

Monthly income of household showed an irregular distribution as seen the below table. Compared with Seongnam City and Gyeoggi Province, monthly income of respondents is higher level. There is no statistical difference between two target areas at the significance level of 10 % ($p = 0.170$).

Table 6-26. Monthly income of household

Monthly income of household	Target area				
	Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total		Seongnam City 2010 **	Gyeonggi Province 2010**
Below 1,000 USD	0	3	3	(1.5%)	13.0%	14.0%
1,000 to 2,000 USD	3	15	18	(9.0%)	22.9%	20.6%
2,000 to 3,000 USD	13	12	25	(12.5%)	23.4%	24.0%
3,000 to 4,000 USD	10	11	21	(10.5%)	18.9%	19.0%
4,000 to 5,000 USD	7	18	25	(12.5%)	11.1%	10.8%
5,000 to 7,000 USD	10	19	29	(14.5%)		
7,000 to 10,000 USD	7	9	16	(8.0%)	10.8%	13.6%
More than 10,000 USD	5	13	18	(9.0%)		
Nonresponse	45*	-	45	(22.5%)	-	-
Total	100	100	200	(100.0%)	100%	100%

Pearson Chi-Square: 10.333, $p = 0.170$

* This questionnaire was not interviewed in the some apartment complexes, Yatap 2-dong conducted in November 2012.
** Source: Gyeonggi Province. Gyeonggi Social index 2011: Distribution of monthly income of household.

6.3 Population aging-related characteristics of repondents (Dependent variable)

Prior to analyzing the factors on population aging by identifying the relations with dependent variables (i.e., population movement characteristics, residential characteristics and living environment) in the next chapter, this section examined the respondents' characteristics related with population aging and analyzed correlation between factors on the demographic characteristics of respondents household.

6.3.1 Correlation between factors on the demographic characteristics of household

As for age of householder by household composition, 32 households (16%) were composed of married elderly couples (one-generation household) or single elderly people (one-person

household). This means that households whose householder is the elderly are very likely to be composed only the elderly person (64% of all the elderly households in this thesis). The average age of one-generation householder is 64.5 years old, 13.2 years old higher than two-generation household's average of 51.3 years old. Most of the households whose householder is 40s to 50s (93 out of 108 households) were two-generation households composed of parents and children as students.

Table 6-27. Age of householder by household composition

Age of householder	Household composition				
	One-generation household*	Two-generation household	Three-generation household	Total	
30-34	5	1	2	8	(4.0%)
35-39	1	10	1	12	(6.0%)
40-44	0	**28**	2	30	(15.0%)
45-49	1	22	1	24	(12.0%)
50-54	3	21	2	26	(13.0%)
55-59	5	22	1	28	(14.0%)
60-64	10	7	1	18	(9.0%)
65+	**32**	15	3	50	(25.0%)
Nonresponse	1	3	0	4	(2.0%)
Total	58	129	13	200	(100.0%)
Average	64.5 years old	51.3 years old	52.2 years old	55.2 years old	

Pearson Chi-Square: 83.710, Asymptotic Significance (2-sided): 0.000
* Including 16 one-person households.

As for age of householder by the number of household members, 56 households (28%) have single or two household members. Further, as many as about 70% households consist of one or two members, one of whom as least is aged 60 and over. If retirement age is set as 60 years old, the households (40 households) whose householder was retired and consisted in single or two persons reaches 20% of the total households. The proportion of these households in Block B (27 households) is about two times higher than that of Block A (13 households). The reason for this is that the proportion of the apartment house which is smaller than the 'Scale of National Housing in Korea' (exclusive area of 85 sq.m.) in Bolck B is higher than that of Block A (See Table 6-4 and 6-22).

Table 6-28. Age of householder by the number of household members

Age of householder Block A & B	1 person	2 persons	3 persons	4 persons	5 persons	6 persons	7 persons	Total	
30-34	1	4	-	1	1	1	-	8	(4.0%)
35-39	-	1	3	6	1	1	-	12	(6.0%)
40-44	-	-	13	10	5	1	1	30	(15.0%)
45-49	1	-	3	16	4	-	-	24	(12.0%)
50-54	1	2	3	15	5	-	-	26	(13.0%)
55-59	2	3	6	15	1	1	-	28	(14.0%)
60-64	1	8	4	3	-	2	-	18	(9.0%)
65+	10	21	9	6	3	1	-	50	(25.0%)
Nonresponse	-	1	1	2	-	-	-	4	(2.0%)
Total	16	40	42	74	20	7	1	200	(100.0%)
Average (years old)	66.6	66.0	53.0	51.1	49.8	52.6	44.0	55.2	
Block A (in Yatap 2-dong)	1 person	2 persons	3 persons	4 persons	5 persons	6 persons	7 persons	Total	
30-34	-	2	-	-	1	1	-	4	(4.0%)
35-39	-	1	2	2	-	1	-	6	(6.0%)
40-44	-	-	5	5	3	1	-	14	(14.0%)
45-49	-	-	1	9	3	-	-	13	(13.0%)
50-54	-	2	3	5	3	-	-	13	(13.0%)
55-59	-	-	3	12	1	1	-	17	(17.0%)
60-64	-	4	2	3	-	1	-	10	(10.0%)
65+	-	9	6	5	2	1	-	23	(23.0%)
Nonresponse	-	-	-	-	-	-	-	-	(0.0%)
Total	-	18	22	41	13	6	-	100	(100.0%)
Block B (in Sunae 1-dong)	1 person	2 persons	3 persons	4 persons	5 persons	6 persons	7 persons	Total	
30-34	1	2	-	1	-	-	-	4	(4.0%)
35-39	-	-	1	4	1	-	-	6	(6.0%)
40-44	-	-	8	5	2	-	1	16	(16.0%)
45-49	1	-	2	7	1	-	-	11	(11.0%)
50-54	1	-	-	10	2	-	-	13	(13.0%)
55-59	2	3	3	3	-	-	-	11	(11.0%)
60-64	1	4	2	-	-	1	-	8	(8.0%)
65+	10	12	3	1	1	-	-	27	(27.0%)
Nonresponse	-	1	1	2	-	-	-	4	(4.0%)
Total	16	22	20	33	7	1	1	100	(100.0%)

Block A and B: Pearson Chi-Square: 106.815, Asymptotic Significance (2-sided): 0.000
Block A: Pearson Chi-Square: 44.819, Asymptotic Significance (2-sided): 0.023
Block B: Pearson Chi-Square: 90.636, Asymptotic Significance (2-sided): 0.000
Note: Red boxes mean the households whose householder might be entired (aged 60 and over) and composed only the elderly.

To comprehend the households consisted in only elderly people more precisely, this thesis classifies the household whose householder is over 60 with one or two members and consists of one generation as an 'elderly household'.

Next, Table 6-29 shows the result of cross correlation analysis among factors of the demographic characteristics of household; 'age of householder', 'number of household members' and 'household composition'. Firstly, there is a strong positive correlation ($r = 0.795$) between 'age of householder' and 'number of household members' with a significance level of 1%. Secondly, both 'number of household members' ($r = -0.409$) and 'household composition' ($r = -0.402$) have a negative correlation with 'age of householder' and each correlation is significant at the level of 1%. It means not only that the older householder, the smaller the number of household members (one-generation household), but it is also very likely that these one-generation households consist of only the elderly.

Table 6-29. Pearson correlations between three factors; age of householder, number of household members and household composition

Factors related with population aging	Age of householder			Number of household members			Household composition		
	r	p	N	r	p	N	r	p	N
Age of householder	1	-	196	**-0.409**	**0.000 ****	196	**-0.402**	**0.000 ****	196
Number of household members	**-0.409**	**0.000 ****	196	1	-	200	**0.795**	**0.000 ****	200
Household composition	**-0.402**	**0.000 ****	196	**0.795**	**0.000 ****	200	1	-	200

**. Correlation is significant at the level of 1%.
Note: [Household composition]: 1= One-generation, 2= Two-generation, 3= Three-generation household.

6.3.2 Residencts's opinion on the cause of population aging

Cause of differences of population cohorts between Yatap 2 and Sunae 1-dong

After showing population pyramid graphs of Yatap 2-dong and Sunae 1-dong in 2000 and 2010 to the respondents, this interview survey asked about the reasons for difference (up to two plural answers are possible). As a result, the most respondents answered reason for the difference was children's educational condition (e.g., school district, supplementary educational institute, etc.)between the two regions, and convenience of using leisure spaces like Central Park in Sunae 1-dong area was followed. Based on the result, it can be interpreted that good educational condition to induce households having school age children and pleasant leisure spaces, where people can enjoy leisure time, play a pivotal role in controlling population aging in specific areas.

However, the most frequent answer of elderly households was 'Convenience of using the good leisure spaces' instead of 'Difference of educational condition for children'.

Table 6-30. Cause of differences of population cohorts between Yatap 2-dong and Sunae 1-dong (multiple responses)

Cause of differences of population cohorts	Target area			
	Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total [Elderly household]	
Difference of traffic convenience for moving to Seoul by car, bus or subway	8 [2]	27 [8]	35 (10.9%)	[10 (15.6%)]
Difference of educational condition for children (e.g., school district, supplementary educational institute, etc.)	**52 [6]**	**61** [12]	**113 (35.2%)**	[18 (28.1%)]
High population mobility of Sunae 1-dong	18 [1]	21 [6]	39 (12.1%)	[7 (10.9%)]
Convenience of using the good leisure spaces (e.g., Central park, Tan river, etc.)	33 [2]	56 **[20]**	89 (27.7%)	**[22 (34.4%)]**
Difference of commercial supremacy between Yatap and Sunae subway station sphere of influence	14 [2]	19 [2]	33 (10.3%)	[4 (6.3%)]
Others	5 [2]	2 [1]	7 (2.2%)	[3 (4.7%)]
Nonresponse	4 [-]	1 [-]	5 (1.6%)	[- (0.0%)]
Total	134 [15]	187 [49]	321 (100.0%)	[64 (100.0%)]

Note: The figure in [ ] is the number of elderly households.

The most likely population aging scenario

By presenting various scenarios, in which population aging may occur in the apartment complexes under the situations of population decrease and real estate recession, a question on which scenario had the highest possibility was asked. As a result, the answer that demand for mid- and large-sized housing units fell, according to the decline of household members, which reduced real estate transaction in the apartment complexes, mainly composed of mid- and large-sized housing units in turn. Therefore, the answer that apartment residents' average age would relatively increase was the highest at about 30%. Also, the opinion that the apartment complex residents' average age would increase, due to difficulty in inflow of households, composed of 20s to 30s of young people, arising from expensive housing prices, took up about 16%. If the current situation continues, there is a need to recognize the possibility of population aging will be high in the mid- and large-sized housing units, rather than in the small-sized housing units.

Table 6-31. The most likely population aging scenario

Population aging scenario	Target area					
	Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total [Elderly household]			
High housing price → Young (20s to 30s) households have a difficulty in moving to these complexes due to the unaffordable housing price → Average age of residents becomes higher	9 [1]	22 [6]	31	(15.5%)	[7	(18.4%)]
Not good educational circumstance for children → Low in-migration ratio of 30s to 40s' households with school-age population → Average age of residents becomes higher	13 [1]	3 [-]	16	(8.0%)	[1	(2.6%)]
Reduced demand for a large-sized housing unit due to decline of household members → Decline of real estate transaction mainly composed of large-sized housing units → Average age of residents becomes higher	**30 [6]**	**29 [8]**	**59**	**(29.5%)**	**[14**	**(36.8%)]**
Affordable housing price of small-sized housing units → Preference for the elderly one-person or one-generation household → Average age of residents becomes higher	8 [1]	14 [4]	22	(11.0%)	[5	(13.2%)]
Others	2 [-]	6 [1]	8	(4.0%)	[1	(2.6%)]
No scenario among the choices	9 [-]	22 [6]	31	(15.5%)	[6	(15.8%)]
Nonresponse	29 [2]	4 [2]	33	(16.5%)	[4	(10.5%)]
Total	100 [11]	100 [27]	200	(100.0%)	[38	(100.0%)]

Pearson Chi-Square: 17.455, p = 0.004
Note: The figure in [ ] is the number of elderly households.

6.4 Conclusion

This chapter conducted Pearson's chi-squared test[27] as well as identified primary survey results by variables and factors of questionnaire. The purpose of conducting Pearson's chi-squared test is to measure whether respondents of each target area (Block A and Block B) have different attributes in terms of each factor.

According to the results of Pearson's chi-squared test, 'number of household members' and 'household composition' related with population aging (a dependent variable), 'housing unit size' related with residential characteristics (independent variables 2), 'satisfaction with transportation, education, and medical service & welfare condition' related with living condition (independent variables 3), and 'education level of householder' of background questions have a statistical difference between two target areas with a significance level of 1%, whereas 'time of initial migration to Bundang New Town' and 'duration of residence' related with population movement characteristics (independent variables 1), and 'satisfaction with shopping and leisure & culture condition' related with living condition (independent variables 3) have a statistical difference with a significance level of 5%. Meanwhile, 'age of householder' related with population aging (a independent variable), 'migration area' and all 'commuting' factors related with population movement characteristics (independent variables 3), and 'home ownership' related with residential characteristics have no statistical difference between two target areas (See Table 6-7 to 6-25).

In addition to Pearson's chi-squared test, correlation analysis using the Pearson correlation coefficient for each factor also conducted to examine the tendency of the direction and strength of the linear relationship between the two variables. The factors with tendency of direction and strength by target area are 'number of household members', 'household composition', 'housing unit size',

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[27] Pearson's chi-squared test (χ^2) is a statistical test applied to sets of categorical data to evaluate how likely it is that any observed difference between the sets arose by chance. It is suitable for unpaired data from large samples (Gosall and Gosall, 2012).

'satisfaction with transportation, education and shopping conditions' and 'education level of householder' (See Table 6-27).

Table 6-32. Pearson correlations between variables and target area

Variables	Factors		By target area (1=Block A, 2=Block B)		
			r^{28}	p	N
Population aging	Age of householder		0.022	0.757	196
	Number of household members		-0.267	0.000 *	200
	Household composition**		-0.299	0.000 *	200
	Population aging scenario [opinion]		0.107	0.171	167
Population movement characteristics	**Time of initial migration to Bundang New Town**		0.201	0.005 *	194
	Move-out area at the initial migration to Bundang New Town		-0.077	0.286	192
	Commuting or not	At the initial migration to Bundang New Town	0.027	0.707	194
		At present	-0.043	0.550	200
	Commuting area	At the initial migration to Bundang New Town	0.150	0.060	157
		At present	0.008	0.929	132
	Duration of residence in current house		-0.134	0.059	200
Residential characteristics	Home ownership		0.065	0.364	197
	Housing unit size		-0.313	0.000 *	200
	Satisfaction with housing unit size		0.106	0.187	156
Living environment	Satisfaction with current living environment**	**Transportation**	-0.294	0.000 *	156
		Education	-0.360	0.000 *	156
		Shopping	-0.226	0.005 *	156
		Leisure and Culture	-0.122	0.131	156
		Medical service and welfare	-0.039	0.629	156
Background questions	**Education level****		-0.278	0.000 *	156
	Household income		-0.013	0.877	155

*. Correlation is significant at the level of 1% (2-tailed).
** [Household composition]: 1= One-generation, 2=Two-generation, 3=Three-generation household
   [Satisfaction with current living environment]: 1= Satisfactory, 5= Unsatisfactory
   [Education level]: 1=Less than middle school graduate, 2=High school graduate, 3=College degree more.

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[28] Pearson correlations coefficient r is

$$r = \frac{\sum_i (x_i - \overline{x})(y_i - \overline{y})}{\sqrt{\sum_i (x_i - \overline{x})^2}\sqrt{\sum_i (y_i - \overline{y})^2}}$$

Base on the correlation analysis results, this chapter could draw some conclusion about characteristics of respondent households by target area as follows.

a) Household size (i.e., the number of household members) of Block B in Sunae 1-dong is bigger than that of Block A in Yatap 2-dong.

b) The proportion of one-generation household of Block B in Sunae 1-dong is higher than that of Block A in Yatap 2-dong.

c) Proportion of respondents moved into Block A at the initial development of Bundang New Town is higher than that of Block B. Furthermore, the proportion of households moved into Bundang New Town in Block B is relatively evenly distributed in each period (See Table 7-2) and average duration of residence is longer in Block A (10.8 years) and Block B (9.1 years) (See Table 6-20).

d) Degree of satisfaction with transportation, education and shopping condition of Block B in Sunae 1-dong is higher than that of Block A in Yatap 2-dong.

e) Householder's education level of Block A in Yatap 2-dong is higher than that of Block B in Sunae 1-dong.

The reason for analysis result b) and c) is that Block B has higher proportion of the small-sized housing units accommodate a suitable residential area for small-sized householders than Block A (See Table 6-4 and 6-22). In particular, result c) means that population movement has occurred more frequently in Block B than Block A. This frequent migration of household has served to alleviate the demographic structural vulnerability and maintained the stable population structure in Block B, Sunae 1-dong (See Table 6-1 and 6-2). In result d), good transportation, education and shopping conditions are also a help to maintain the low-vulnerable population structure in the era of population aging and decline by encouraging the influx of relatively large-sized households pursuing children's education. Meanwhile, this thesis is not able to explain the reason for result e) related with education level of householder.

In the third part of Chapter 6 examined the respondents' characteristics related with population aging and analyzed correlation between factors on the demographic characteristics of household (i.e., 'age of householder', 'number of householder members', and 'household

composition'). These three factors have a statistical correlation with a significance level of 1% (See Table 6-29). According to the correlation analysis, two characteristics were drawn about population aging-related factors as follows.

a) The size of household declines with age of householder (A small-sized household has an older householder than a large-sized household.).

b) It is also very likely that these one-generation households consist of only the elderly.

According to the result of asking the resident's opinion on the cause of population aging, most of respondents thought that 'education condition for children' was the most important cause of differences between population cohorts of two communities. Meanwhile, elderly household thought convenience of using the good leisure spaces was the most important cause of these differences (See Table 6-30).

In addition, about 30% of respondents thought that the most likely population scenario in their own apartment complex had relevance to the reduced demand for a large-sized housing unit, and worried about increasing the average aging of residents caused by the current real estate transaction condition mainly in the apartment complex composed of large-sized housing units (See Table 6-31).

Chapter 7   Analysis of Affecting Factors on the Population Aging Trend in Bundang New Town

Chapter 7 analyzes the factors affecting the aging trend of residents in Bundang New Town, Seoul metropolitan area, Korea based on the results of interview survey. To find the affecting factors on the population aging, this chapter analyzes the correlations between population aging-related factors (i.e., age of householder, number of household members, and household composition) and three categories of affecting factors; 1) population movement characteristics (i.e., migration, commuting, and duration of residence in current house), 2) residential characteristics (i.e., home ownership, housing unit size), and 3) living environment (i.e., satisfaction in current residential environment, and reason to select a complex) in Bundang New Town, Korea.

7.1   Population movement characteristics (independent variable 1) and population aging

7.1.1   Migration

Time of initial migration to Bundang New Town (migration time)

The correlation between the initial migration to Bundang New Town and the duration of residence in current house was examined. While it is natural that these two factors are strongly correlated with each other, incomplete agreement between them is due to the households that had moved within Bundang New Town before they began to reside in the current house following their initial migration to Bundang New Town. The majority of such households has a duration of residence of 5 years or shorter in current house and primarily lives in rental housing, not in their own housing. Since 165 out of 200 respondent households in total have the initial migration to Bundang New Town be consistent with the duration of residence in the current house, the 'initial migration to Bundang New Town' is also used as a variable with the same character as the 'duration of residence in the current house' in this study.

Table 7-1. Relation between time of initial migration to Bundang New Town and duration of residence in current house

Time of initial migration to Bundang New Town	Duration of residence in current house				
	Below 5 years	6 to 10 years	11 to 15 years	16 to 21 years	Total
Period of construction (1991-1997)	3	2	5	**50**	60 (30.0%)
The first half of maturity (1998-2002)	11	4	**30**	-	45 (22.5%)
The second half of maturity (2003-2007)	10	**43**	-	-	53 (26.5%)
Period of decline (2008-2013)	**36**	-	-	-	36 (18.0%)
Nonresponse	2	2	2	0	6 (3.0%)
Total	62	51	37	50	200 (100.0%)

Pearson Chi-Square: 352.308, p = 0.000

As concerns the age of householder by time of initial migration to Bundang New Town, householder's age did not display any tendency in three period of migration time except the 'Period of construction' (1991 to 1997). When Bundang New Town was under construction (1991 to 1997), the proportion of the elderly householder at present is higher than any other migration period. It means that most of the elderly householder (16 of total 38 elderly householders) at present migrated to Bundang New Town at the initial stage of development (1991 to 1997).

By target area, age of household has no statistical difference by the migration time both in Block A (p = 0.088) and Block B (p = 0.127). As mentioned in Chapter 6, it is noticeable that proportion of respondents moved into Block A (35%) at the initial development of Bundang New Town is higher than that of Block B (25%). Further, the proportion of households moved into Bundang New Town in Block B is relatively evenly distributed in each period.

Table 7-2. Age of householder by the time of initial migration to Bundang New Town

Age of householder	Time of initial migration to Bundang New Town					
Block A & B	Period of construction (1991-1997)	The first half of maturity (1998-2002)	The second half of maturity (2003-2007)	Period of decline (2008-2013)	Non response	Total
30-34	2	2	-	4	-	8 (4.0%)
35-39	-	1	7	3	1	12 (6.0%)
40-44	1	7	13	8	1	30 (15.0%)
45-49	4	8	8	4	-	24 (12.0%)
50-54	6	7	7	4	2	26 (13.0%)
55-59	12	7	4	3	2	28 (14.0%)
60-64	11	4	1	2	-	18 (9.0%)
65+	**23**	8	12	7	-	50 (25.0%)
Nonresponse	1	1	1	1	-	4 (2.0%)
Total	60	45	53	36	6	200 (100.0%)
[Elderly household]	**[16]**	[5]	[10]	[7]	[-]	[38] -

Block A (in Yatap 2-dong)	(1991-1997)	(1998-2002)	(2003-2007)	(2008-2013)	Non response	Total	
30-34	1	2	-	1	-	4	(4.0%)
35-39	-	1	3	1	1	6	(6.0%)
40-44	1	4	4	4	1	14	(14.0%)
45-49	3	5	5	-	-	13	(13.0%)
50-54	3	3	4	1	2	13	(13.0%)
55-59	8	4	2	1	2	17	(17.0%)
60-64	7	2	-	1	-	10	(10.0%)
65+	**12**	5	3	3	-	23	(23.0%)
Nonresponse	-	-	-	-	-	-	(0.0%)
Total	35	26	21	12	6	100	(100.0%)
[Elderly household]	**[7]**	[1]	[1]	[2]	[-]	[11]	-
Block B (in Sunae 1-dong)	(1991-1997)	(1998-2002)	(2003-2007)	(2008-2013)	Non response	Total	
30-34	1	-	-	3	-	4	(4.0%)
35-39	-	-	4	2	-	6	(6.0%)
40-44	-	3	9	4	-	16	(16.0%)
45-49	1	3	3	4	-	11	(11.0%)
50-54	3	4	3	3	-	13	(13.0%)
55-59	4	3	2	2	-	11	(11.0%)
60-64	4	2	1	1	-	8	(8.0%)
65+	**11**	3	9	4	-	27	(27.0%)
Nonresponse	1	1	1	1	-	4	(4.0%)
Total	25	19	32	24	-	100	(100.0%)
[Elderly household]	[9]	[4]	[9]	[5]	[-]	[27]	-

Block A and B: Pearson Chi-Square: 50.816, $p = 0.001$
Block A: Pearson Chi-Square: 30.179, $p = 0.088$
Block B: Pearson Chi-Square: 31.998, $p = 0.127$

Move-out area at the initial migration to Bundang New Town

According to Pearson's chi-squared test, any population aging related factor (i.e., age of householder ($p = 0.347$), number of household members ($p = 0.375$), and household composition ($p = 0.204$)) has no statistical difference by move-out area.

As for out-migration areas (move-out areas) by time of initial migration to Bundang New Town, slight variation is found in out-migration areas by time of initial migration. Consistent with the findings from the analysis of census data in Chapter 4, the proportion of the households migrating from Seoul and Gangnam 3 districts in Seoul was higher in the initial stage of Bundang New Town development and more people migrated from neighboring regions (Gyeonggi Province) over time. This implies that reliance on the main city, Seoul, becomes weaker as well as association with

neighboring regions becomes stronger over time. However, it cannot say that there is a statistical difference of move-out area by each time of migration ($p = 0.171$).

Table 7-3. Move-out areas at the initial migration to Bundang New Town by time of migration

Move-out area at the initial migration to Bundang New Town		Time of initial migration to Bundang New Town				
		Period of construction (1992-1997)	The first half of maturity (1998-2002)	The second half of maturity (2003-2007)	Period of decline (2008-2013)	Total [Elderly household]
Seoul metropolitan area	Seoul special city*	**42** **[12]**	25 [4]	27 [7]	16 [4]	110 (56.7%) [27 (71.1%)]
	Gangnam 3 districts	**20** **[6]**	9 [2]	12 [5]	3 [-]	44 (22.7%) [13 (34.2%)]
	Gyeonggi province**	13 [3]	14 [1]	**22** [3]	13 [1]	62 (32.0%) [8 (21.1%)]
	Seongnam city	7 [2]	7 [-]	7 [1]	3 [-]	24 (12.4%) [3 (7.9%)]
	Incheon metropolitan city	-	-	1 [-]	-	1 (0.5%) [- (0.0%)]
Non Seoul metropolitan area		5 [1]	5 [-]	3 [-]	6 [2]	19 (9.8%) [3 (7.9%)]
Nonresponse		-	1 [-]	-	1 [-]	2 (1.0%) [- (0.0%)]
Total		60 [16]	45 [5]	53 [10]	36 [7]	194 (100.0%) [38 (100.0%)]

Pearson Chi-Square: 20.016 [12.375], $p = 0.171$ [0.416]

Note: 1. The figure in [ ] is the number of elderly households.
     2. This analysis was only given to respondents answered the time of migration in Bundang New Town.
*. including Ganam 3 districts
**. including Seongnam city

Reason for migration (Resident's opinion)

According to the survey results of reason to move in Bundang New Town, the answer of 'Good accessibility to Seoul' was the most frequent in total and Block B, which answer is the second place in Block A. In Block A, however, 'for Purchasing more large house' was the most frequent answer, which was the sixth frequent answer.

Block A had its first place occupied by those who hoped to 'purchase a larger house', the number of whom was approximately twice larger than that of counterparts in Block B. Meanwhile, Block B had its second place occupied by those pursuing urban convenience facilities, the number of

whom was over twice larger than that of counterparts in Block A. Other reasons included living closer

to acquaintances, marriage, and investing in the prospect of the new town.

Table 7-4. Reason to move in Bundang New Town by Block A and Block B (multiple responses)

Reason to move in Bundang New Town	Target area		
	Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total
Moving workplace to Bundang New Town	15	20	35 (10.7%)
Good accessibility to Seoul	29	**39**	**68 (20.7%)**
For education of children	25	28	53 (16.2%)
Purchasing house (first-time)	17	10	27 (8.2%)
Purchasing house (larger house)	**38**	17	55 (16.8%)
Making extra money by selling pervious house	10	21	31 (9.5%)
Urban facilities for convenience	15	37	52 (15.9%)
Others	4	3	7 (2.1%)
Total	153	175	328 (100.0%)

As for the reasons for the initial migration to Bundang New Town by the time of migration,

the households migrating to Bundang New Town during the period of construction (1992-1997) had

principal reasons for migration, such as accessibility to Seoul and housing purchase. Accessibility to

Seoul has continuously been a frequent reason since 1998 and children education and convenience

facilities were also frequent reasons. As Bundang New Town becomes more self-contained, the

proportion of migrants to Bundang New Town due to employment is also becoming higher.

Table 7-5. Reason to move in Bundang New Town by time of migration (multiple responses)

Reason to move in Bundang New Town	Time of migration				
	Period of construction (1992-1997)	The first half of maturity (1998-2002)	The second half of maturity (2003-2007)	Period of decline (2008-2013)	Total
Moving workplace to Bundang New Town	3	7	**17**	8	35 (10.7%)
Good accessibility to Seoul	**21**	18	13	16	68 (20.7%)
For education of children	11	12	**17**	13	53 (16.2%)
Purchasing house (first-time)	**20**	4	2	1	27 (8.2%)
Purchasing house (larger house)	**22**	14	15	4	55 (16.8%)
Making extra money by selling pervious house	7	6	9	9	31 (9.5%)
Urban facilities for convenience	11	10	**17**	14	52 (15.9%)
Others	2	4	1	0	7 (2.1%)
Total	97	75	91	65	328 (100.0%)

7.1.2 Commuting area

As for the commuting area by time of initial migration to Bundan New town, consistent with the findings from the analysis of census data in the third section of Chapter 4, the proportion of the households commuting to Seoul and Gangnam 3 districts was higher in the initial stage of Bundang New Town development and more households migrated from Gyeonggi Province or within Seongnam city in more recent times.

Table 7-6. Commuting areas at the initial migration to Bundang New Town by time of migraiton

Commuting area at the initial migration to Bundang New Town		Time of initial migration to Bundang New Town					
		Period of construction (1992-1997)	The first half of maturity (1998-2002)	The second half of maturity (2003-2007)	Period of decline (2008-2013)	Total	
Seoul metropolitan area	Seoul special city*	**39**	24	22	14	99	(61.5%)
	Gangnam 3 districts	**16**	15	14	11	56	(34.8%)
	Gyeonggi province**	12	12	**17**	15	56	(34.8%)
	Seongnam city	7	8	**13**	11	39	(24.2%)
	Incheon metropolitan city	**1**	0	0	0	1	(0.6%)
Non Seoul metropolitan area		0	0	**1**	0	1	(0.6%)
Nonresponse		2	0	2	0	4	(2.5%)
Total		54	36	42	29	161	(100.0%)

Pearson Chi-Square: 21.127, p = 0.133
Note: This analysis was only given to respondents answered the time of migration in Bundang New Town.

Table 7-7. Current commuting areas by time of migration in Bundang New Town

Current commuting area		Time of initial migration to Bundang New Town					
		Period of construction (1992-1997)	The first half of maturity (1998-2002)	The second half of maturity (2003-2007)	Period of decline (2008-2013)	Total	
Seoul metropolitan area	Seoul special city*	13	17	17	13	60	(46.5%)
	Gangnam 3 districts	**10**	9	9	9	37	(28.7%)
	Gyeonggi province**	17	14	16	17	64	(49.6%)
	Seongnam city	11	7	12	**13**	43	(33.3%)
	Incheon metropolitan city	0	0	0	0	0	(0.0%)
Non Seoul metropolitan area		1	1	1	0	3	(2.3%)
Nonresponse		0	1	1	0	2	(1.6%)
Total		31	33	35	30	129	(100.0%)

Pearson Chi-Square: 7.677, p = 0.810
Note: This analysis was only given to respondents answered the time of migration in Bundang New Town.
* including Ganam 3 districts
** including Seongnam city

According to Pearson's chi-squared test, any population aging related factor (i.e., age of householder, number of household members, and household composition) has no statistical difference by commuting related factors (i.e., commuting or not, area, mode and route).

7.1.3 Duration of residence in current house

As for the age of householders by the duration of residence in current house, the longer the duration of residence, the older householders are. In particular, the average age (63.2 years) of the householders lived in current house for 16 to 21 years was older about 12 years than that of households lived for less than 5 years. Among the households who have lived in Bundang New Town since the period of construction (1991-1997), about 62% of households (31 households) of which a householder is aged 60 and over, which forms approximately 15% of the whole interview households. It is a self-evident result because the householders who migrated to Bundang New Town in the initial development stage are older and have the longer duration of residence in current house than the householder migrated in recently. However, if the proportion of these households continues to increase, it is likely that population aging pattern in these apartment complexes has the same as the initial development complexes of Tama New Town in Japan.

Table 7-8. Age of householder by duration of residence in current house

Age of householder	Duration of residence in current house					
	Below 5 years	6 to 10 years	11 to 15 years	16 to 21 years	Total	
30-34	5	0	2	1	8	(4.0%)
35-39	6	5	1	0	12	(6.0%)
40-44	**15**	10	5	0	30	(15.0%)
45-49	6	**11**	5	2	24	(12.0%)
50-54	4	10	**9**	3	26	(13.0%)
55-59	7	4	5	12	28	(14.0%)
60-64	6	1	2	9	18	(9.0%)
65+	10	10	8	**22**	50	(25.0%)
Nonresponse	3	0	0	1	4	(2.0%)
Total	62	51	37	50	200	(100.0%)
[Elderly household]	[12]	[8]	[4]	**[14]**	[38]	-
Average	51.5 years old	52.8 years old	53.9 years old	**63.2 years old**	55.2 years old	

Pearson Chi-Square: 66.897, $p = 0.000$

As for the duration of residence by household composition, two-generation households had the shortest duration of residence, and one-genaration household had the longest one. Based on this survey result, it is presumed that two-generation households reside in Bundang New Town for children's education. Meanwhile, about 38% of one-generation households (22 households) mostly composed of married couples alone has lived during the 16years or longer, which households migrated to Bundang New Town in the initial stage of development and have lived in Bundang New Town continuously. However, the results of correlation analysis between 'duration of residence' and 'household composition' had no statistical significance at the level of 5% ($p = 0.059$).

Table 7-9. Household composion by duration of residence in current house

Household composition	Duration of residence in current house				Total	Average
	Below 5 years	6 to 10 years	11 to 15 years	16 to 21 years		
One-generation household	19	12	5	**22**	58 (29.0%)	10.9 years
Two-generation household	**39**	37	29	24	129 (64.5%)	9.5 years
Three-generation household	4	2	3	4	13 (6.5%)	10.0 years
Total	62	51	37	50	200 (100.0%)	9.9 years

Pearson Chi-Square: 12.118, $p = 0.059$

Resident's opinions related on the duration of residence

One of the questions, through which current resident's future duration of residence can be estimated, is the condition of real estate transaction in current apartment complexes. 82 households, over half of the answered 156 respondents (households), answered that they did not know well. Out of 74 households, except those answered "Do not know well" and those who did not answer, about two-thirds of respondents replied that current condition of real estate transaction was difficult. The most answer for the reason of difficult real estate transaction condition was that housing and apartment complexes became deteriorated and the answer that housing unit size was big followed.

Table 7-10. Respondents' opinion on the condition of real estate transaction

Condition of real estate transaction	Target area		
	Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total [Elderly household]
There are **some difficulties** in real estate transaction (→ Concerned long duration of residence)	23 [3]	26 [4]	49 (24.5%) [7 (18.4%)]
Moderate	26 [2]	56 [16]	82 (41.0%) [18 (47.4%)]
There is **no difficulty** in real estate transaction (→ Expected not long duration of residence)	7 [1]	18 [7]	25 (12.5%) [8 (21.1%)]
Nonresponse	44 [5]*	-	44 (22.0%) [5 (13.2%)]
Total	100 [11]	100 [27]	200 (100.0%) [38 (100.0%)]

Pearson Chi-Square: 3.899, p = 0.142

Note: The figure in [ ] is the number of elderly households.

* This questionnaire was not interviewed in the some apartment complexes, Yatap 2-dong conducted in November 2012.

In addition to the above analysis, the correlation between housing unit size and respondents' opinion on the condition of real estate transaction, which is one of the questions to estimate duration of residence in current house, was measured. As in the following table, the more household whcih live in the large-sized housing unit, the more lilkey to answer that there are some difficults in real estate transaction. On the contrary, the more household whcih live in the below national housing scale, exclusive area of under 85 sq.m., the more lilkey to answer that there is no difficult in real estate transaction.

Table 7-11. Respondents' opinion on the condition of real estate transaction by housing unit size

Condition of real estate transaction	Housing unit size (sq. m.)						
Block A & B	Within 60	Over 60 and within 85	Over 85 and within 102	Over 102 and within 135	Over 135	Total [Elderly household]	
There are **some difficults** in real estate transaction (→ Concerned long duration of residence)	6 [2]	14 [-]	2 [-]	**18 [4]**	9 [1]	49 (24.5%)	[7 (18.4%)]
Moderate	34 [12]	15 [1]	7 [2]	19 [2]	7 [1]	82 (41.0%)	[18 (47.4%)]
There is **no difficulty** in real eastate transaction (→ Expected not long duration of residence)	**11 [4]**	8 [1]	2 [-]	3 [2]	1 [1]	25 (12.5%)	[8 (21.0%)]
Nonresponse	- [-]	1 [1]	16 [1]	27 [3]	- [-]	44 (22.0%)	[5 (13.2%)]
Total	51 [18]	38 [3]	27 [3]	67 [6]	17 [8]	200 (100.0%)	38(100.0%)]

Block A	-60	60-85	85-102	102-135	135+	Total [Elderly household]	
Some difficults	2 [1]	7 [-]	2 [-]	**12 [2]**	-	23 (23.0%)	[3 (27.3%)]
Moderate	2 [-]	8 [-]	7 [2]	9 [-]	-	26 (26.0%)	[2 (18.2%)]
No difficulty	-	**3 [-]**	2 [-]	2 [1]	-	7 (7.0%)	[1 (9.1%)]
Nonresponse	-	1 [1]	16 [1]	27 [3]	-	44 (44.0%)	[5 (45.4%)]
Total	4 [1]	19 [3]	27 [3]	50 [6]	-	100 (100.0%)	11(100.0%)]
Block B	-60	60-85	85-102	102-135	135+	Total [Elderly household]	
Some difficults	4 [1]	7 [-]	-	6 [2]	**9 [1]**	26 (26.0%)	[4 (14.8%)]
Moderate	32 [12]	7 [1]	-	10 [2]	7 [1]	56 (56.0%)	16 (59.2%)]
No difficulty	**11 [4]**	5 [1]	-	5 [1]	1 [1]	18 (18.0%)	[7 (26.0%)]
Nonresponse	-	-	-	-	-	- (0.0%)	[- (0.0%)]
Total	47 [17]	19 [2]	-	17 [5]	17 [3]	100 (100.0%)	27(100.0%)]

Block A and B: Pearson Chi-Square: 20.684, $p = 0.008$
Block A: Pearson Chi-Square: 4.484, $p = 0.611$
Block B: Pearson Chi-Square: 19.127, $p = 0.004$

Note: The figure in [ ] is the number of elderly households.
* This questionnaire was not interviewed in the some apartment complexes, Yatap 2-dong conducted in November 2012.

To utilize as a question to prospect the duration of residence of residents within apartment complexes, this interview survey asked respondents about an intention to reside in the future. Most respondents (173 households out of the total 200 respondent households) wanted to live in Bundang New Town continuously: the proportion in Block B was higher than in Block A, further this difference between two target area has a statistical significance with a level of 1% ($p = 0.002$). Further, 14 households said they would leave Bundang New Town, and the remaining 13 households hoped to leave Bundang New Town right now but they could not do so due to constraint conditions.

Proportion of households hope to live in Bundang New Town continuously in elderly households was slightly higher than in general households.

Table 7-12. Intention of residence in Bundang New Town

Intention of residence in Bundang New Town	Target area		
	Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total [Elderly household]
1) Hope to live continuously	78 [8]	95 [26]	173 (86.5%) [34 (89.5%)]
2) Plan to leave	12 [3]	2 [-]	14 (7.0%) [3 (7.9%)]
3) Be unable to leave Bundang New Town due to constraint conditions in spite of hoping to leave immediately	10 [-]	3 [1]	13 (6.5%) [1 (2.6%)]
Total	100 [11]	100 [27]	200(100.0%) [38 (100.0%)]

Pearson Chi-Square: 12.583, $p = 0.002$
Note: The figure in [ ] is the number of elderly households.

Looking at each three case of answers for the intention of residence in Bundang New Town, the most frequent reason to 'hope to live in Bundang New Town continuously' was 'convenient to urban facilities' (21.0%) in both Block A and B. In particular, the proportion of elderly households selected this reason is higher (31.7%) than that of general households. It means that many residents are setting the convenience of urban facilities in neighborhood above other conditions such as accessibility to Seoul and convenience of commuting, good education condition, etc.

Table 7-13. Reason to live in Bundang New Town continuously (multiple responses)

| Reason to live in Bundang New Town continuously | Target area | | |
	Block A (in Yatap 2-dong)	Block B (in Sunae 1-dong)	Total [Elderly household]
Pride of living in Bundang New Town	7 (5.2%)	10 (5.4%)	17 (5.3%) [4 (6.3%)]
Have roots in community	25 (18.5%)	20 (10.9%)	45 (14.1%) [11 (17.5%)]
Good accessibility to Seoul	17 (12.6%)	33 (17.9%)	50 (15.7%) [5 (7.9%)]
Convenient to urban facilities	**31 (23.0%)**	**36 (19.6%)**	**67 (21.0%) [20 (31.7%)]**
Convenience for commuting to workplace or school	15 (11.1%)	23 (12.5%)	38 (11.9%) [3 (4.8%)]
Good educational condition	10 (7.4%)	24 (13.0%)	34 (10.7%) [1 (1.6%)]
Open space, leisure and sports facilities	18 (13.3%)	30 (16.3%)	48 (15.0%) [17 (27.0%)]
Neighbors have a high standard of living	2 (1.5%)	8 (4.3%)	10 (3.1%) [1 (1.6%)]
Affordable housing price	4 (3.0%)	- (0.0%)	4 (1.3%) [- (0.0%)]
Others	6 (4.4%)	- (0.0%)	6 (1.9%) [1 (1.6%)]
Total	135 (100.0%)	184 (100.0%)	319 (100.0%) [63 (100.0%)]

Note: The figure in [ ] is the number of elderly households.

Second, the most frequent reason to 'have a plan to leave Bundang New Town' was their 'superannuated housing condition' (38.1%). In particular, the number of cases answered that they have a plan to leave Bundang New Town was higher in Block A of Yatap 2-dong (18 cases) than Block B of Sunae 1-dong (3 cases). Three cases of other reasons (4 cases) was 'to go back to farming', and the remaining one case is that 'the current housing unit size is too large to live in'.

Table 7-14. Reason to have a plan to leave Bundang New Town (multiple responses)

Reason to have a plan to leave Bundang New Town	Target area					
	Block A (in Yatap 2-dong)		Block B (in Sunae 1-dong)		Total [Elderly household]	
Superannuated housing	6 [-]	(33.3%)	2 [-]	(66.7%)	8 (38.1%)	[- (0.0%)]
Concern about long depression of real estate market	1 [1]	(5.6%)	-	(0.0%)	1 (4.8%)	[1 (25.0%)]
Inconvenient to the elderly	1 [1]	(5.6%)	-	(0.0%)	1 (4.8%)	[1 (25.0%)]
Improve education condition	3 [-]	(16.7%)	-	(0.0%)	3 (14.3%)	[- (0.0%)]
Inconvenient to retail (shopping, entertainment, restaurants)	1 [-]	(5.6%)	-	(0.0%)	1 (4.8%)	[- (0.0%)]
Inconvenient to work	2 [-]	(11.1%)	-	(0.0%)	2 (9.5%)	[- (0.0%)]
Not cheerful residential surroundings	1 [-]	(5.6%)	-	(0.0%)	1 (4.8%)	[- (0.0%)]
Other	3 [2]	(16.7%)	1 [-]	(33.3%)	4 (19.0%)	[2 (50.0%)
Total	18[4]	(100.0%)	3 [-]	(100.0%)	21 (100.0%)	[4 (100.0%)]

Note: The figure in [ ] is the number of elderly households.

Last, about half of cases (9 cases of total 18 cases) answered that 'they have a plan to leave Bundang New Town' were related to the real estate market condition (i.e., 'Impeded real estate transaction by long depression', 'Property depreciation of current house'). Likewise the previous intention of residence (i.e., Plan to leave Bundang New Town), the number of cases answered that 'they are not able to leave Bundang New Town due to constraint conditions in spite of hoping to leave immediately' was higher in Block A of Yatap 2-dong (19 cases) than Block B of Sunae 1-dong (5 cases).

Table 7-15. Reason to be unable to leave Bundang New Town due to constraint conditions in spite of hoping to leave immediately (multiple responses)

Reason to be unable to leave Bundang New Town immediately	Target area					
	Block A (in Yatap 2-dong)		Block B (in Sunae 1-dong)		Total [Elderly household]	
Impeded real estate transaction by long depression	5 [-]	(26.3%)	2 [1]	(40.0%)	7 (29.2%)	[1 (50.0%)]
Property depreciation	4 [-]	(21.1%)	2 [1]	(40.0%)	6 (25.0%)	[1 (50.0%)]
Completion of children's education	4 [-]	(21.1%)	-	(0.0%)	4 (16.7%)	[- (0.0%)]
Have roots in community	3 [-]	(15.8%)	-	(0.0%)	3 (12.5%)	[- (0.0%)]
Live close to family	2 [-]	(10.5%)	-	(0.0%)	2 (8.3%)	[- (0.0%)]
Other	1 [-]	(5.3%)	1 [-]	(20.0%)	2 (8.3%)	[- (0.0%)]
Total	19[-]	(100.0%)	5 [2]	(100.0%)	24 (100.0%)	[2 (100.0%)]

Note: The figure in [ ] is the number of elderly households.

By housing unit size, the proportion of answers related to the real estate market condition was higher in the relatively large-sized housing unit type than small-sized one. The case answered 'other' in the exclusive area over 102 and within 135 sq.m. was also related to the real estate sale tax.

Table 7-16. Reason to be unable to leave Bundang New Town due to constraint conditions in spite of hoping to leave immediately by housing unit size (multiple responses)

Reason to be unable to leave Bundang New Town immediately	Housing unit size (sq. m.)						
	Within 60	Over 60 and within 85	Over 85 and within 102	**Over 102 and within 135**	Over 135	Total	
Impeded real estate transaction by long depression	-	1	1	**5**	-	7	(29.2%)
Property depreciation	-	-	2	**4**	-	6	(25.0%)
Completion of children's education	-	-	2	2	-	4	(16.7%)
Have roots in community	-	1	-	2	-	3	(12.5%)
Live close to family	1	1	-	-	-	2	(8.3%)
Other	1	-	-	1	-	2	(8.3%)
Total	2	3	5	14	-	24	(100.0%)

Note: The figure in [ ] is the number of elderly households.

In view of above survey results on the intention of residence in Bundang New Town, the proportion of households unable to leave Bundang New Town due to constraint conditions in spite of hoping to leave immediately is the highest in the largest housing unit type of Block A (Yatap 2-dong), exclusive area over 102 and within 135 sq.m. and that reason is related to the real estate market condition.

Although the result that the number of cases answered that they hope to leave Bundang New Town (i.e., 14 cases answered that they plan to leave Bundang New Town and 13 cases answered that they are unable to leave Bundang New Town due to constraint conditions in spite of hoping to leave immediately) was too much smaller than that of case answered that they hope to live continuously (173 cases) is considered as no significant matters, it is worth noting at this point that this survey examined the residents' opinions on reasons to leave Bundang New Town.

7.1.4 Conclusion

The below table shows the Pearson correlation coefficients between factors related with population movement characteristics (i.e., time of initial migration to Bundang New Town, move-out area at the initial migration to Bundang New Town, commuting area, and duration of residence in current house) and population aging related factors (i.e., age of householder, number of household members, and household composition).

Table 7-17. Pearson correlations between population movement characteristics and population aging related factors

Factors related with population movement characteristics		Age of householder			Number of household members			Household composition		
		r	p	N	r	p	N	r	p	N
Time of initial **migration** to Bundang NT		**-0.280**	**0.000 ****	190	0.018	0.801	194	0.065	0.367	194
Move-out area at the initial migration to Bundang NT		**-0.162**	**0.026 ***	188	**0.148**	**0.040 ***	192	0.100	0.166	192
Commuting area	At the initial migration to Bundang NT	-0.159	0.047	155	-0.057	0.480	157	-0.034	0.676	157
	At present	0.014	0.874	130	**-0.189**	**0.030 ***	132	**-0.193**	**0.027 ***	132
Duration of residence in current house		**0.348**	**0.000 ****	196	-0.009	0.895	200	-0.075	0.288	200

*. Correlation is significant at the level of 5%.
**. Correlation is significant at the level of 1%.

Note: [Household composition]: 1= One-generation, 2= Two-generation, 3= Three-generation household.
 [Move-out area & Commuting area]: 1=Seoul special city (not Gangnam 3districs), 2=Gangnam 3disrtrics of Seoul, 3=Gyeonggi Province (not Seongnam city), 4=Seongnam city, 5=Incheon metropolitan city, 6=Non Seoul metropolitan area.

First, there is a negative correlation ($r = -0.280$) between 'time of initial migration to Bundang New Town' and 'age of householder', and a positive correlation ($r = 0.348$) between 'duration of residence in current house' and 'age of householder' with a significance level of 1%. It is a self-evident result because the householders who migrated to Bundang New Town in the initial development stage are older and have the longer duration of residence in current house than the householders migrated in recently (See Table 7-2).

Second, 'move-out area at the initial migration to Bundang New Town' has a negative correlation (r = -0.162) with 'age of householder' and a positive correlation (r = 0.148) with the 'number of household members' in a significance level of 5%. It means that the closer to Seoul, especially Gangnam 3 districts households moved from, the higher the age of householder as well as the smaller the number of household members.

Last, current 'commuting area' also has a negative correlation with 'number of household members' (r = -0.189) and 'household composition' (r = -0.193) in a significance level of 5%. It means that the closer to Seoul, especially Gangnam 3 districts housholders commute to, the bigger the size of household.

Based on the results of the interview survey with the above-mentioned items, the following aging-related characteristics of the households could be drawn: the elderly householders are more likely to move from close to Seoul (See Table 7-3) and have lived in Bundang New Town since the period of construction (1991 to 1997) continuously (See Table 7-2). This result accords with the census data analysis on the change of migration area in Bundang New Town (See Table 4-9 and Figure 4-11).

In addition to the respondent characteristics related with population aging, this section found some characteristics on the evolution of Bundang New Town in terms of population movement. First, increasing employment and self-containment of Bundang New Town is clearly seen in the proportion change of commuting area and a reason to move in Bundang New Town by migration time (See Table 7-5, 7-6 and 7-7). This results also accord with the census data analysis on the change of commuting area in Bundang New Town (See Table 4-9 and Figure 4-11). It is likely that this change has also affected the population movement pattern of Bundang New Town residents.

Second, it is fact that duration of residence and proportion of household to hope to live in current house continuously have been increased in Bundang New Town gradually. Most (86.5%) households hoped to live in current house continuously and their most frequent reason is the convenience of urban facilities (See Table 7-13). It means that most of the urban facilities have been

equipped according to their original master plan and self-containment commercials and communities have been organized within new town areas. Furthermore, it can be interpreted that many residents, especially elderly households were placing value of the urban facilities for convenience, leisure and health above other conditions (See Table 7-13).

Last, the proportion of households unable to leave Bundang New Town due to constraint conditions in spite of hoping to leave immediately is the highest in the largest housing unit type of Block A (Yatap 2-dong) and that reason was related to the real estate market condition (See Table 7-15 and 7-16).

It is likely that stabilization of population movement (See Table 5-7 to 5-10) and real estate market depression (See Table 4-24, 7-10, 7-11, 7-15 and 7-16) also contributes to increasing duration of residence in current house. If the proportion of these households, however, especially elderly households continue to increase (See Table 7-12), it excludes the possibility that population aging pattern in these apartment complexes has the same as the initial development complexes of Tama New Town in Japan.

7.2 Residential characteristics (independent variable 2) and population aging

7.2.1 Home ownership

Examining the relation between housing ownership and duration of residence in current house, the average residence period of homeowners was 11.3 years. It was about twice longer than the average residence period of rental householders, 5.2 years. It is ovious that the duration of residence in case of home owner is longer than that of rental households which have to renew lease contract every two years or below. Through the result of below table, housing ownership is one of factors to indicate the duration of residence in current house. So, in approaching the issue of population aging, it is meaningful to examine the relation between population aging related factors (i.e., age of householder, number of household members, and household composition) and home ownership.

Table 7-18. Home ownership by duration of residence in current house

Home ownership	Duration of residence in current house				Total		Average
	Below 5 years	6 to 10 years	11 to 15 years	16 to 21 years			
Home owner	37	36	31	**49**	153	(76.5%)	**11.3 years**
Rental household	**24**	14	5	1	44	(22.0%)	5.2 years
Nonresponse	1	1	1	0	3	(1.5%)	-
Total	62	51	37	50	200	(100.0%)	9.9 years

Pearson Chi-Square: 24.499, $p = 0.000$

As for the age of householder by home ownership, the older householder, the higher proportion of home owner. In particular, proportion of home owners in elderly households (89.5%) is higher than in total households (77.7%).   It is generally thought that their housing purchasing power also increased proportionally as householders grow older. According to Pearson's chi-squared test, age of householder has a statistical difference by the type of home ownership with a significance level of 5% ($p = 0.012$).

Table 7-19. Home ownership by age of householder

Age of householder	Home ownership				
Block A & B	Home owner	Rental household	Nonresponse	Total	
30-34	4	4	0	8	(4.0%)
35-39	8	4	0	12	(6.0%)
40-44	20	10	0	30	(15.0%)
45-49	14	9	1	24	(12.0%)
50-54	19	7	0	26	(13.0%)
55-59	24	3	1	28	(14.0%)
60-64	15	2	1	18	(9.0%)
65+	46	4	0	50	(25.0%)
Nonresponse	3	1	0	4	(2.0%)
Total	153	44	3	200	(100.0%)
[Elderly household]	**[34]**	[4]	[-]	[38]	-
Block A (in Yatap 2-dong)	Home owner	Rental household	Nonresponse	Total	
30-34	2	2	-	4	(4.0%)
35-39	4	2	-	6	(6.0%)
40-44	12	2	-	14	(14.0%)
45-49	7	5	1	13	(13.0%)
50-54	10	3	-	13	(13.0%)
55-59	13	3	1	17	(17.0%)
60-64	9	0	1	10	(10.0%)
65+	21	2	-	23	(23.0%)
Nonresponse	-	-	-	-	(0.0%)
Total	78	19	3	100	(100.0%)
[Elderly household]	[10]	[1]	[-]	[11]	-
Block B (in Sunae 1-dong)	Home owner	Rental household	Nonresponse	Total	
30-34	2	2	-	4	(4.0%)
35-39	4	2	-	6	(6.0%)
40-44	8	8	-	16	(16.0%)
45-49	7	4	-	11	(11.0%)
50-54	9	4	-	13	(13.0%)
55-59	11	0	-	11	(11.0%)
60-64	6	2	-	8	(8.0%)
65+	25	2	-	27	(27.0%)
Nonresponse	3	1	-	4	(4.0%)
Total	75	25	-	100	(100.0%)
[Elderly household]	**[24]**	[3]	[-]	[27]	-

Block A and B: Pearson Chi-Square: 19.510, $p = 0.012$
Block A: Pearson Chi-Square: 11.065, $p = 0.136$
Block B: Pearson Chi-Square: 16.001, $p = 0.042$

Note: The figure in [ ] is the number of elderly households.

According to Pearson's chi-squared test, home ownership type has no statistical difference by houseold size (i.e., number of household members ($p = 0.703$) and household composition ($p = 0.385$)).

Table 7-20. Home ownership by the number of household members

Home ownership	Number of household members									
Block A & B	1 person	2 persons	3 persons	4 persons	5 persons	6 persons	7 persons	Total		
Home owner	13[9]	33[25]	31	54	14	7	1	153	(76.5%)	
Rental household	3[2]	7[2]	10	19	5	-	-	44	(22.0%)	
Nonresponse	-	-	1	1	1	-	-	3	(1.5%)	
Total	16[11]	40[27]	42	74	20	7	1	200	(100.0%)	
Block A (in Yatap 2-dong)	1 person	2 persons	3 persons	4 persons	5 persons	6 persons	7 persons	Total		
Home owner	-	14[10]	18	29	11	6	-	78	(78.0%)	
Rental household	-	4[1]	3	11	1	-	-	19	(19.0%)	
Nonresponse	-	-	1	1	1	-	-	3	(3.0%)	
Total		18[11]	22	41	13	6	-	100	(100.0%)	
Block B (in Sunae 1-dong)	1 person	2 persons	3 persons	4 persons	5 persons	6 persons	7 persons	Total		
Home owner	13[9]	19[15]	13	25	3	1	1	75	(75.0%)	
Rental household	3[2]	3[1]	7	8	4	-	-	25	(25.0%)	
Nonresponse	-	-	-	-	-	-	-	-	(0.0%)	
Total	16[11]	22[16]	20	33	7	1	1	100	(100.0%)	

Block A and B: Pearson Chi-Square: 3.805, $p = 0.703$
Block A: Pearson Chi-Square: 4.471, $p = 0.346$
Block B: Pearson Chi-Square: 7.449, $p = 0.281$

Note: The figure in [ ] is the number of elderly households.

Table 7-21. Home ownership by household composition

Home ownership	Number of household members			Total	
	One-genration household	Two-generation household	Three-generation household		
Home owner	48	94	11	153	(76.5%)
Rental household	10	32	2	44	(22.0%)
Nonresponse	0	3	0	3	(1.5%)
Total	58	129	13	200	(100.0%)

Pearson Chi-Square: 1.910, $p = 0.385$

7.2.2 Housing unit size

According to Pearson's chi-squared test, age of householder has a statistical difference by housing unit size with a significance level of 1% ($p = 0.005$) (See Table 7-22). However, a certain tendency is not found in correlation between age of householder and housing unit size (See Table 7-27). In spite of that, housing unit size of the households whose householder is aged 60 and over shows a different pattern depending on the target area; they mainly resides in a small-scaled housing unit, exclusive area of within 60 sq.m. in case of Block B (Sunae 1-dong) whereas a large-scaled housing unit, exclusive area of 102 to 135 sq.m. in case of Block A (Yatap 1-dong) (See Table 7-22).

As for the number of household members by housing unit size, there is a positive correlation ($r = 0.414$) between 'number of household members' and 'housing unit size' (See Table 7-27). Not to mention the fact that household needs more residential space proportionally as the number of household members is getting increased. However, this tendency is not found in Block A (Yatap 2-dong) within a significance level of 5% ($p = 0.074$) (See Table 7-23). Further, Table 7-23 shows that the households residing in a large-scaled housing unit, exclusive area of over 102 sq.m. with one or two members consist of the elderly alone mainly.

Table 7-22. Housing unit size by age of householder

Age of householder Block A & B	Housing unit size						
	Within 60	Over 60 and within 85	Over 85 and within 102	Over 102 and within 135	Over 135	Total	
30-34	4	3	-	1	-	8	(4.0%)
35-39	5	4	2	1	-	12	(6.0%)
40-44	8	9	3	8	2	30	(15.0%)
45-49	3	7	6	8	-	24	(12.0%)
50-54	2	4	4	10	6	26	(13.0%)
55-59	4	5	6	11	2	28	(14.0%)
60-64	5	1	3	8	1	18	(9.0%)
65+	**18**	5	3	**20**	4	50	(25.0%)
Nonresponse	2	-	-	-	2	4	(2.0%)
Total	51	38	27	67	17	200	(100.0%)
[Elderly household]	**[18]**	[3]	[3]	[6]	[8]	[38]	-
Average	56.6 years old	49.0 years old	53.4 years old	58.0 years old	56.9 years old	55.2 years old	
Block A (in Yatap 2-dong)	Within 60	Over 60 and within 85	Over 85 and within 102	Over 102 and within 135	Over 135	Total	
30-34	-	3	-	1	-	4	(4.0%)
35-39	-	3	2	1	-	6	(6.0%)
40-44	2	4	3	5	-	14	(14.0%)
45-49	-	1	6	6	-	13	(13.0%)
50-54	-	2	4	7	-	13	(13.0%)
55-59	-	2	6	9	-	17	(17.0%)
60-64	-	1	3	6	-	10	(10.0%)
65+	2	3	3	**15**	-	23	(23.0%)
Nonresponse	-	-	-	-	-	-	(0.0%)
Total	4	19	27	50	-	100	(100.0%)
[Elderly household]	[1]	[1]	[3]	**[6]**	[-]	[11]	-
Block B (in Sunae 1-dong)	Within 60	Over 60 and within 85	Over 85 and within 102	Over 102 and within 135	Over 135	Total	
30-34	4	-	-	-	-	4	(4.0%)
35-39	5	1	-	-	-	6	(6.0%)
40-44	6	5	-	3	2	16	(16.0%)
45-49	3	6	-	2	-	11	(11.0%)
50-54	2	2	-	3	6	13	(13.0%)
55-59	4	3	-	2	2	11	(11.0%)
60-64	5	-	-	2	1	8	(8.0%)
65+	**16**	2	-	5	4	27	(27.0%)
Nonresponse	2	-	-	-	2	4	(4.0%)
Total	47	19	-	17	17	100	(100.0%)
[Elderly household]	**[17]**	[2]	[-]	[5]	[3]	[27]	-

Block A and B: Pearson Chi-Square: 56.700, $p = 0.005$
Block A: Pearson Chi-Square: 29.158, $p = 0.110$
Block B: Pearson Chi-Square: 39.684, $p = 0.023$

Note: The figure in [ ] is the number of elderly households.

Table 7-23. Housing unit size by the number of household members

Housing unit size (sq. m.)	Number of household members								
Block A & B	1 person	2 persons	3 persons	4 persons	5 persons	6 persons	7 persons	Total	
Within 60	14 [10]	12 [8]	12	12	1	-	-	51	(25.5%)
Over 60 and within 85	2 [1]	6 [2]	13	16	-	1	-	38	(19.0%)
Over 85 and within 102	-	5 [3]	7	13	2	-	-	27	(13.5%)
Over 102 and within 135	-	**12 [11*]**	9	27	13	6	-	67	(33.5%)
Over 135	-	**5 [3*]**	1	6	4	-	1	17	(8.5%)
Total	16 [11]	40 [27]	42	74	20	7	1	200	(100.0%)
Block A (in Yatap 2-dong)	1 person	2 persons	3 persons	4 persons	5 persons	6 persons	7 persons	Total	
Within 60	-	2 [1]	0	2	-	-	-	4	(4.0%)
Over 60 and within 85	-	4 [1]	8	6	-	1	-	19	(19.0%)
Over 85 and within 102	-	5 [3]	7	13	2	0	-	27	(27.0%)
Over 102 and within 135	-	**7 [6*]**	7	20	11	5	-	50	(50.0%)
Over 135	-	-	-	-	-	-	-	0	(0.0%)
Total	-	18[11]	22	41	13	6		100	(100.0%)
Block B (in Sunae 1-dong)	1 person	2 persons	3 persons	4 persons	5 persons	6 persons	7 persons	Total	
Within 60	14 [10]	10 [7]	12	10	1	-	-	47	(47.0%)
Over 60 and within 85	2 [1]	2 [1]	5	10	-	-	-	19	(19.0%)
Over 85 and within 102	-	-	-	-	-	-	-	0	(0.0%)
Over 102 and within 135	-	**5 [5*]**	2	7	2	1	-	17	(17.0%)
Over 135	-	**5 [3*]**	1	6	4	-	1	17	(17.0%)
Total	16 [11]	22 [16]	20	33	7	1	1	100	(100.0%)

Block A and B: Pearson Chi-Square: 82.308, $p = 0.000$
Block A: Pearson Chi-Square: 19.642, $p = 0.074$
Block B: Pearson Chi-Square: 41.169, $p = 0.001$

* means the household living elderly couple alone in the comparatively large-scaled housing unit.
Note: The figure in [ ] is the number of elderly households.

In addition to the correlation analysis with population aging-related factors (i.e., 'age of householder' and 'number of household members'), the correlation between 'duration of residence in current house' and 'housing unit size' was also measured. According to the result of simple correlation analysis, mainly the larger the housing unit size is, the longer the duration of residence in current house. For example, the average duration of residence in the housing unit type larger than the Scale of National Housing in Korea (exclusive area of 85 sq.m.) was longer than that of the whole survey households, 9.9 years whereas the average duration of residence in the housing unit type within the Scale of National Housing in Korea was shorter than that of the whole survey households.

Table 7-24. Housing unit size by duration of residence in current house

Housing unit size (sq. m.)	Duration of residence in current house				Total		Average
	Below 5 years	6 to 10 years	11 to 15 years	16 to 21 years			
Within 60	**SS** 28	9	6	**LS** 8	51	(25.5%)	7.5 years
Over 60 and within 85	14	10	7	7	38	(19.0%)	8.7 years
Over 85 and within 102	6	9	7	5	27	(13.5%)	10.3 years
Over 102 and within 135	6	14	17	23	60	(30.0%)	11.9 years
Over 135	**SL** 8	9	-	**LL** 7	24	(12.0%)	11.8 years
Total	62	51	37	50	200	(100.0%)	9.9 years

Pearson Chi-Square: 32.816, $p = 0.001$

For a more concrete analysis of characteristics related with duration of residence, this additional analysis classified whole respondent households except households located in the middle of Table 7-24 (i.e., 101 households lived in the housing unit size of over 85 and within 102 sq.m. during the 6 to 21 years) into four groups by both 'duration of residence' and 'housing unit size' (See Table 7-25), and then analyzed the population aging-related characteristics by each group (See Figure 7-1).

Table 7-25. Classification of household by housing unit size and duration of residence

Group name	Attribute of household	Number of households
Group **SS**	**Short** duration of residence (below 5years) in **Small**-sized housing unit (within 85 sq.m.)	42
Group **LS**	**Long** duration of residence (above 16 years) in **Small**-sized housing unit (within 85 sq.m.)	15
Group **SL**	**Short** duration of residence (below 5years) in **Large**-sized housing unit (over 102 sq.m.)	14
Group **LL**	**Long** duration of residence (above 16 years) in **Large**-sized housing unit (over 102 sq.m.)	30

As previously demonstrated, age of householder is higher and size of household is smaller (i.e., the number of household members is small and household composition is near to the one-generation household rather than four-generation household) in the groups with a long duration of residence, over 16 years (i.e., Group LL and LS) than the group with a comparatively short duration of residence, below 5 years (i.e., Group SL and SS) regardless of living in housing unit size, and the groups with a long duration of residence (i.e., Group LL and LS) mainly own their homes.

Figure 7-1. Population aging-related characteristics of households by each group

Group SL	Large-sized housing unit (Over 102 sq.m.)	Group LL
(14 households/5:9)		**(30 households/17:13)**
(a) 54.7 years old		(a) 63.8 years old
(b) 4.2 persons		(b) 3.5 persons
(c) 21.4% / 50.0% / 28.6%		(c) 36.7% / 50.0% / 13.3%
(d) 85.7% / 14.3%		(d) 100% / 0%
(e) 28.6%		(e) 47.6%
(f) 85.7%		(f) 96.7%

Total
(200 households/100:100)
(a) 55.2 years old
(b) 3.3 persons
(c) 29.0%/64.5%/6.5%
(d) 77.7% vs 22.3%
(e) 24.5%
(f) 89.5%

Short duration of residence (Below 5 years) — **Long** duration of residence (Over 16 years)

Group SS	Small-sized housing unit (Within 85 sq.m.)	Group LS
(42 households/11:31)		**(15 households/5:10)**
(a) 49.6 years old		(a) 63.5 years old
(b) 2.8 persons		(b) 2.6 persons
(c) 35.7% / 64.3% / 0.0%		(c) 60.0% / 40.0% / 0.0%
(d) 54.8% / 45.2%		(d) 93.3% / 6.7%
(e) 23.8%		(e) 21.4%
(f) 85.7%		(f) 86.7%

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Group name
(Number of respondent households/Block A: Block B)
(a) Age of householder (average)
(b) Number of household members (average)
(c) Housing composion (One/Two/Three-generation, %)
(d) Home ownership (Home owner /Rental household)
(e) Difficult in real estate transaction *(opinion)* (%)
(f) Hope to live continuously *(opinion)* (%)

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Householders of the Group LL and LS were relatively young as well as the household size of the Group LL and LS was bigger at the time to move into current house in Bundang New Town than present likewise with the Group SL or SS. As time goes by, however, these households have such a demographic characteristics by a separation of generation.

To demonstrate this, the below tables analyzed the change of 'number of household members' and 'household composition' between the time to move into current house in Bundang New Town and present (See Table 7-26 and 7-27). By and large, size of household has been decreased in the groups with a long duration of residence, over 16 years (i.e., Group LL and LS) rather than the group with a comparatively short duration of residence, below 5 years (i.e., Group SL and SS). In particular, this change was more seriously occurred in a small-sized housing unit due to such as a separation of generation. Moreover, the size of household with a long duration of residence is much more likely to be dwindled even in a large-sized housing unit which can accommodate growing the size of household if there is no influx of households in these trends such as downsizing of household, population aging and decline.

Table 7-26. Change in the number of household members by each group

Change in the number of household members (First occupancy – Current)	Group				
	Long duration of residence		Short duration of residence		Total
	Large-sized housing unit (LL)	Small-sized housing unit (LS)	Large-sized housing unit (SL)	Small-sized housing unit (SS)	
Increased	4 (13.3%)	1 (6.7%)	4 (28.6%)	4 (28.6%)	16 (15.8%)
No change	13 (43.3%)	6 (40.0%)	9 (64.3%)	9 (64.3%)	52 (51.1%)
Decreased	13 (43.3%)	**8 (53.3%)**	1 (7.1%)	1 (7.1%)	33 (32.7%)
Total	30 (100.0%)	15 (100.0%)	14 (100.0%)	14 (100.0%)	101(100.0%)

Pearson Chi-Square: 10.181, p = 0.117

Table 7-27. Change in the household composition by each group

Change in the household composition (First occupancy – Current)	Group				
	Long duration of residence		Short duration of residence		Total
	Large-sized housing unit (LL)	Small-sized housing unit (LS)	Large-sized housing unit (SL)	Small-sized housing unit (SS)	
Increased	4 (13.3%)	- (0.0%)	3 (21.4%)	6 (14.3%)	13 (12.9%)
No change	18 (60.0%)	9 (60.0%)	10 (71.4%)	31 (73.8%)	68 (67.3%)
Decreased	8 (26.7%)	**6 (40.0%)**	1 (7.1%)	5 (11.9%)	20 (19.8%)
Total	30 (100.0%)	15 (100.0%)	14 (100.0%)	42 (100.0%)	101(100.0%)

Pearson Chi-Square: 9.713, p = 0.137

As for the housing unit size and the home ownership type, the highest proportion of home onwers had exclusive area of 102 to 135sq.m. and the highest proportion of rental houses had exclusive area of within 60sq.m.. The result of cross correlation anlaysis between two factors implies that housing unit size of home owners is larger than that of rental households (See Table 7-28).

Table 7-28. Home ownership by housing unit size

Home ownership	Housing unit size (sq. m.)						
	Within 60	Over 60 and within 85	Over 85 and within 102	Over 102 and within 135	Over 135	Total	
Home owner	33	29	17	**45**	29	153	(76.5%)
Rental household	**18**	9	8	5	4	44	(22.0%)
Nonresponse	0	0	2	1	0	3	(1.5%)
Total	51	38	27	51	33	200	(100.0%)

Pearson Chi-Square: 12.653, $p = 0.013$

Furthermore, 'duration of residence in current house' and 'home as ownership' have a negative correlation ($r = -0.391$) and this correlation is significant at the level of 1%. It means that home owners' duration of residence in current house is longer than rental householders' one. 'Duration of residence in current house' and ' housing unit size' also have a positive correlation ($r = 0.281$) and this correlation is significant at the level of 1%. It means that the larger the housing unit size, the longer the duration of residence in current house.

Table 7-29. Pearson correlations between three factors; duration of residence in current house, home ownership and housing unit size

Pearson Correlation Coefficient (Significance (2-tailed))	Duration of residence in current house	Home ownership***	Housing unit size
Duration of residence in current house	1	-0.391** (0.000)	0.281** (0.000)
Home ownership	-0.391** (0.000)	1	-0.224* (0.002)
Housing unit size	0.281** (0.000)	-0.224* (0.002)	1

*. Correlation is significant at the level of 5%.
**. Correlation is significant at the level of 1%.
***. 1= Home owner, 2= Rental household.

Meanwhile, according to Pearson's chi-squared test, any population aging related factor (i.e., age of householder (p = 0.137), number of household members (p = 0.684), and household composition (p = 0.119)) has no statistical difference by satisfaction with housing unit size.

7.2.3 Conclusion

The below table shows the Pearson correlation coefficients between factors related with residential characteristics (i.e., home ownership, housing unit size and it's satisfaction) and population aging related factors (i.e., age of householder, number of household members, and household composition). By and large, results of Pearson correlation analysis are consistent with results of Pearson's chi-squared test previously.

Table 7-30. Pearson correlations between residential characteristics and population aging related factors

Factors related with residential chracteristics	Age of householder			Number of household members			Household composition		
	r	p	N	r	p	N	r	p	N
Home ownership	**-0.269**	**0.000** **	193	0.017	0.818	197	0.045	0.530	197
Housing unit size	0.098	0.171	196	**0.414**	**0.000** **	200	**0.262**	**0.000** **	200
(only Block A)	**(0.210)**	**(0.036**)*	(100)	**(0.302)**	**(0.002**)**	(100)	(0.170)	(0.091)	(100)
(only Block B)	(0.063)	(0.540)	(96)	**(0.379)**	**(0.000**)**	(100)	**(0.198)**	**(0.048**)*	(100)
Satisfaction with housing unit size	**-0.211**	**0.009** **	152	0.064	0.424	156	0.069	0.393	156

*. Correlation is significant at the level of 5%.
**. Correlation is significant at the level of 1%.
Note: [Household composition]: 1= One-generation, 2= Two-generation, 3= Three-generation household.
    [Home ownership]: 1= Home owner, 2= Rental household.
    [Satisfaction with housing unit size]: 1= Satisfactory, 5= Unsatisfactory.

First, there is a negative correlation (r = -0.269) between 'home ownership' and 'age of householder' with a significance level of 1%. In view of this result, it is quite likely that the householders living in their own house is older than householders in rental house. It is considered that their housing purchasing power also increased proportionally as householders grow older.

Second, 'housing unit size' has a positive correlation with the 'number of household members' (r = 0.414) and 'household composition' (r = 0.262) in a significance level of 1%. It is

evident that household needs more residential space proportionally as the household size (e.g., number of household member, household composition, etc.) is getting bigger. Meanwhile, 'housing unit size' has no statistical correlation with 'age of householder' ($p = 0.171 > 0.05$) in terms of total target area (i.e., Block A + Block B), but has a positive correlation with a significance level 5% ($p = 0.036 < 0.05$) only in Block A. Based on the results of the interview survey with the above-mentioned items, it is interesting to note that 'housing unit size' has a correlation with 'age of householder' but no correlation with 'household composition' in terms of only in Block A. It can be seen that proportion of elderly household living in the large-sized housing unit regardless of household consumption demand is higher in Block A (Yatap 2-dong) than in Block B (Sunae 1-dong). On the contrary, the proportion of elderly household in a small-sized housing unit, suitable for the small size household is higher in Block B (Sunae 1-dong) than Block A (Yatap 2-dong). The elderly households living in a small-sized housing unit can easily move other residences which accommodate a suitable residential area for themselves and their price are also affordable than households living in a large-sized housing unit. Therefore, population aging is less likely to be accelerated by external causes such as depression of the real estate market, fertility decline and deterioration of complexes.

Last, 'satisfaction with housing unit size' has a statistical correlation with 'age of householder' with Pearson correlation analysis ($p = 0.009$). Meanwhile, according to Pearson's chi-squared test, 'age of householder' has no statistical difference by 'satisfaction with housing unit size' ($p = 0.137$) with a significance level of 5%.

In addition to the correlation with aging related factors, residential characteristics factors (i.e., home ownership, housing unit size and it's satisfaction) also have a correlation with 'duration of residence'. 'Duration of residence' tends to become longer in case of large-sized home owners than small-sized rental households (See Table 7-24, 7-28 and 7-29). For a more concrete analysis of characteristics related with duration of residence, the additional analysis classified respondent households into four group by both 'duration of residence' and 'housing unit size', and then analyzed the change of population aging-related characteristics by each group (See Table 7-25 and Figure 7-1).

As for the change on the household size (i.e., 'number of household members' and 'household composition') between two times (i.e., the time to move into current house in Bundang New Town and at present), the size of household has been decreased in the groups with a long duration of residence, over 16 years rather than the group with a comparatively short duration of residence, below 5 years. In particular, this change was more seriously occurred in a small-sized housing unit due to such as a separation of generation. Moreover, the size of household with a long duration of residence is much more likely to dwindle than to grow even in a large-sized housing unit which can accommodate growing the size of household. Meanwhile, the size of household with a short duration of residence is much more likely to grow than to dwindle (See Table 7-26 and 7-27).

7.3 Living environment (independent variable 3) and population aging

7.3.1 Satisfaction with living environment at the initial migration to Bundang New Town

According to the survey results on the degree of satisfaction with living environment by the time of initial migration to Bundang New Town, the proportion of respondents answered unsatisfaction with living environment at that time was the highest in the Period of construction (1992 to 1997), whereas there were few respondents in other period. In particular, the proportion of unsatisfaction for transportation and medical service & welfare conditions is approximately equal to the proportion of satisfaction, further the proportion of unsatisfaction for leisure & culture condition is higher than that of satisfaction (See Table 7-31).

This survey results show that most of the urban facilities have been equipped according to their original master plan and self-containment commercials and then degree of satisfaction for living environment is getting higher as time has gone on.

Table 7-31. Satisfaction with living environment at the initial migration to Bundang New Town by time of migraiton

Satisfaction with current living environment		Time of initial migration to Bundang New Town					
		Period of construction (1992-1997)	The first half of maturity (1998-2002)	The second half of maturity (2003-2007)	Period of decline (2008-2013)	Non response	Total
Transportation	Satisfactory	20	28	35	29	-	112 (56.0%)
	Moderate	9	6	5	7	-	27 (13.5%)
	Unsatisfactory	19	2	2	-	-	23 (11.5%)
	Nonresponse	12	9	11	-	6	38 (19.0%)
	Total	60	45	53	36	6	200 (100.0%)
Education	Satisfactory	22	25	34	29	-	110 (55.0%)
	Moderate	14	9	7	7	-	37 (18.5%)
	Unsatisfactory	9	-	-	-	-	9 (4.5%)
	Nonresponse	15	11	12	-	6	44 (22.0%)
	Total	60	45	53	36	6	200 (100.0%)
Shopping	Satisfactory	22	27	33	33	-	115 (57.5%)
	Moderate	12	10	8	3	-	33 (16.5%)
	Unsatisfactory	13	-	1	-	-	14 (7.0%)
	Nonresponse	13	8	11	-	6	38 (19.0%)
	Total	60	45	53	36	6	200 (100.0%)
Leisure and Culture	Satisfactory	16	24	33	27	-	100 (50.0%)
	Moderate	13	12	11	9	-	45 (22.5%)
	Unsatisfactory	19	1	-	-	-	20 (10.0%)
	Nonresponse	12	8	9	-	6	35 (17.5%)
	Total	60	45	53	36	6	200 (100.0%)
Medical service and welfare	Satisfactory	16	22	30	30	-	98 (49.0%)
	Moderate	16	13	11	6	-	46 (23.0%)
	Unsatisfactory	15	-	-	-	-	15 (7.5%)
	Nonresponse	13	10	12	-	6	41 (20.5%)
	Total	60	45	53	36	6	200 (100.0%)

[Transportation] Pearson Chi-Square: 53.316, p = 0.000
[Education] Pearson Chi-Square: 45.203, p = 0.000
[Shopping] Pearson Chi-Square: 49.704, p = 0.000
[Leisure and Culture] Pearson Chi-Square: 59.635, p = 0.000
[Medical service and welfare] Pearson Chi-Square: 49.704, p = 0.000

7.3.2 Satisfaction with current residential condition

According to the survey results of satisfaction on transportation, education environment, shopping, leisure and culture, medical service and welfare, the respondents were satisfied with current surrounding conditions in general. However, households in some complexes in Block A were not surveyed, either, like in the survey of satisfaction on housing unit size. Despite that, it is meaningless task to analyze the correlation between living environment and population aging related factors because most of respondents answered that the current living environment satisfied them (See Table 6-24).

7.3.3 Reason to select a complex

The most frequent answer to the question why you selected the current apartment complex in Bundang New Town was 'Good accessibility to Seoul' (19.9%). The following frequent answers were 'Urban facilities for convenience' (16.2%), 'Good educational condition' (13.9%), 'Convenience for commuting to workplace or school' (13.4%) in order. Beyond that, four households answered 'To live with acquaintance or family in same community or house'. Even so, there was no difference between Block A and Block B (See Table 7-32) and by duration of residence in current house (See Table 7-30) in terms of reason to select the current apartment complex.

However, the most frequent answer of 38 elderly households was not 'Good educational condition' (15.4%) but 'Urban facilities for convenience' (27.7%). The following is 'Open space, leisure and sports facilities (18.5%).

Table 7-32. Reason to select the current apartment complex by target area (multiple responses)

Reason to select the current apartment complex	Target area							
	Block A (in Yatap 2-dong)		Block B (in Sunae 1-dong)		Total [Elderly household]			
Selected regardless of personal preference	19	(11.1%)	13	(7.2%)	32	(8.9%)	[4	(6.2%)]
Near to the previous residence	11	(6.4%)	20	(10.5%)	30	(8.6%)	[8	(12.3%)]
Good accessibility to Seoul	31	(18.1%)	41	(21.5%)	**72**	**(20.0%)**	[10	(15.4%)]
Urban facilities for convenience	25	(15.2%)	33	(17.1%)	58	(16.1%)	**[18**	**(27.7%)]**
Convenience for commuting to workplace or school	26	(15.2%)	20	(11.6%)	46	(12.8%)	[4	(6.2%)]
Good educational condition	26	(14.6%)	26	(13.3%)	52	(14.4%)	[2	(3.1%)]
Open space, leisure and sports facilities	10	(5.8%)	22	(11.6%)	32	(8.9%)	[12	(18.5%)]
Neighbors have a high standard of living	4	(2.3%)	6	(3.3%)	10	(2.8%)	[3	(4.6%)]
Affordable housing price	14	(8.2%)	5	(2.8%)	19	(5.3%)	[3	(4.6%)]
Others	5	(2.9%)	3	(1.1%)	8	(2.2%)	[1	(1.5%)]
Total	171	(100.0%)	189	(100.0%)	360	(100.0%)	[65	(100.0%)]

Note: The figure in [ ] is the number of elderly households.

Table 7-33. Reason to select the current apartment complex by duration of residence in current house (multiple responses)

Reason to select the current apartment complex	Duration of residence in current house					
	Below 5 years	6 to 10 years	11 to 15 years	16 to 21 years	Total	
Selected regardless of personal preference	6	2	5	**19**	32	(8.9%)
Near to the previous residence	17	6	5	3	31	(8.6%)
Good accessibility to Seoul	**21**	18	**17**	16	72	(20.0%)
Urban facilities for convenience	18	**21**	8	11	58	(16.1%)
Convenient for commuting to workplace or school	12	17	12	5	46	(12.8%)
Good educational condition	18	14	10	10	52	(14.4%)
Openspace, leisure and sports facilities	9	9	6	8	32	(8.9%)
Neighbors have a high standard of living	2	3	1	4	10	(2.8%)
Affordable housing price	6	4	5	4	19	(5.3%)
Others	4	2	0	2	8	(2.2%)
Total	113	96	69	82	360	(100.0%)

Based on the survey results, it is generally thought that residents, especially retired elderly people place a high value on the satisfaction of living environment condition rather than housing price or occupation in such a situation that real estimate market has been stabilized and preference for good residential condition is regarded as an important factor.

7.3.4 Conclusion

The below table shows the Pearson correlation coefficients between factors related with living environment (i.e., satisfaction with transportation, education, shopping, leisure & culture, and medical service & welfare condition) and population aging related factors (i.e., age of householder, number of household members, and household composition). By and large, all living environment factors have no statistical correlation with population aging related factors except for correlation between 'education condition' and 'age of householder', which have a correlation with a significance level of 5% ($p = 0.047 < 0.05$).

Table 7-34. Pearson correlations between living environment and population aging-related factors

Factors		Age of householder			Number of household members			Household composition		
		r	p	N	r	p	N	r	p	N
Satisfaction with current living environment	Transportation	0.058	0.481	152	-0.091	0.257	156	0.061	0.452	156
	Education	**0.161**	**0.047** *	152	-0.129	0.109	156	-0.012	0.884	156
	Shopping	0.031	0.707	152	-0.009	0.910	156	0.077	0.337	156
	Leisure and Culture	0.062	0.450	152	0.008	0.918	156	0.068	0.399	156
	Medical service and Welfare	-0.015	0.855	152	-0.034	0.672	156	0.040	0.620	156

*. Correlation is significant at the level of 5%.
**. Correlation is significant at the level of 1%.
Note: [Household composition]: 1= One-generation, 2= Two-generation, 3= Three-generation household.
     [Satisfaction with current living environment]: 1= Satisfactory, 5= Unsatisfactory.

Therefore, this section found some characteristics on the evolution of Bundang New Town in terms of population movement instead of the respondent characteristics related with population aging. First, as most of the urban facilities have been equipped according to their original master plan and self-containment commercials, degree of satisfaction for living environment is getting higher gradually. Second, it is generally thought that residents, especially retired elderly people place a high value on the satisfaction of living environment condition rather than housing price or occupation in such a situation that real estimate market has been stabilized and preference for good residential condition is regarded as an important factor (See Table 7-32). However, there is the potential that a

good living environment such as the convenience of urban facilities, open space with good amenity, will impede population movement and then accelerate population aging of residents.

7.4 Conclusion

This chapter analyzed the factors affecting the aging trend of residents in Bundang New Town, Seoul metropolitan area, Korea based on the results of interview survey. To find the affecting factors on the population aging, this chapter analyzed the correlations between population aging-related factors (i.e., age of householder, number of household members, and household composition) and three categories of affecting factors; 1) population movement characteristics (i.e., migration, commuting, and duration of residence in current house), 2) residential characteristics (i.e., home ownership, housing unit size), and 3) living environment (i.e., satisfaction in current residential environment, and reason to select a complex) in Bundang New Town, Korea.

Table 7-35. Pearson correlations between factors related with three independent variables and population aging related factors

Factors related with variables		Age of householder			Number of household members			Household composition		
		r	p	N	r	p	N	r	p	N
Age of householder		1	-	196	**-0.409**	**0.000 ****	196	**-0.402**	**0.000 ****	196
Number of household members		**-0.409**	**0.000 ****	196	1	-	200	**0.795**	**0.000 ****	200
Household composition		**-0.402**	**0.000 ****	196	**0.795**	**0.000 ****	200	1	-	200
Time of initial migration to Bundang NT		**-0.280**	**0.000 ****	190	0.018	0.801	194	0.065	0.367	194
Move-out area at the initial migration to Bundang NT		**-0.162**	**0.026 ***	188	**0.148**	**0.040 ***	192	0.100	0.166	192
Commuting area	At the initial migration to Bundang NT	-0.159	0.047	155	-0.057	0.480	157	-0.034	0.676	157
	At present	0.014	0.874	130	**-0.189**	**0.030 ***	132	**-0.193**	**0.027 ***	132
Duration of residence in current house		**0.348**	**0.000 ****	196	-0.009	0.895	200	-0.075	0.288	200
Home ownership		**-0.269**	**0.000 ****	193	0.017	0.818	197	0.045	0.530	197
Housing unit size		0.098	0.171	196	**0.414**	**0.000 ****	200	**0.262**	**0.000 ****	200
Satisfaction with housing unit size		**-0.211**	**0.009 ****	152	0.064	0.424	156	0.069	0.393	156
Satisfaction with current living environment	Transportation	0.058	0.481	152	-0.091	0.257	156	0.061	0.452	156
	Education	**0.161**	**0.047 ***	152	-0.129	0.109	156	-0.012	0.884	156
	Shopping	0.031	0.707	152	-0.009	0.910	156	0.077	0.337	156
	Leisure and Culture	0.062	0.450	152	0.008	0.918	156	0.068	0.399	156
	Medical service and Welfare	-0.015	0.855	152	-0.034	0.672	156	0.040	0.620	156

Education level of householder	-0.414	0.000 **	152	0.484	0.000 **	156	0.313	0.000 **	156
Household income	-0.439	0.000 **	151	0.553	0.000 **	155	0.398	0.000 **	155

*. Correlation is significant at the level of 5%.
**. Correlation is significant at the level of 1%.

Note: [Household composition]: 1= One-generation, 2= Two-generation, 3= Three-generation household.
    [Move-out area & Commuting area]: 1=Seoul special city (not Gangnam 3districs), 2=Gangnam 3disrtrics of Seoul, 3=Gyeonggi Province (not Seongnam city), 4=Seongnam city, 5=Incheon metropolitan city, 6=Non Seoul metropolitan area.
    [Home ownership]: 1= Home owner, 2= Rental household.
    [Satisfaction]: 1= Satisfactory, 5= Unsatisfactory.

Population movement characteristics

Based on the results of the interview survey with the population movement characteristics, the following aging-related characteristics of the households could be drawn:

- It is a self-evident result that the householders who migrated to Bundang New Town in the initial development stage are older and have the longer duration of residence in current house than the householders migrated in recently (See Table 7-2).
- The elderly householders are more likely to move from close to Seoul (See Table 7-3) and have lived in Bundang New Town since the period of construction (1991 to 1997) continuously (See Table 7-2). This result accords with the census data analysis on the change of migration area in Bundang New Town (See Table 4-8 and Figure 4-10).

In addition to the respondent characteristics related with population aging, this section found some characteristics on the evolution of Bundang New Town in terms of population movement.

First, increasing employment and self-containment of Bundang New Town is clearly seen in the proportion change of commuting area and a reason to move in Bundang New Town by migration time (See Table 7-5, 7-6 and 7-7).

Second, it is fact that duration of residence and proportion of household to hope to live in current house continuously have been increased in Bundang New Town gradually. According to the survey result, most (86.5%) households hoped to live in current house continuously and their most frequent reason was the 'convenience of urban facilities'. It can be interpreted that many residents, especially elderly households were placing value of the urban facilities for convenience, leisure and health above other conditions (See Table 7-13 and 7-32).

Last, the proportion of households unable to leave Bundang New Town due to constraint conditions in spite of hoping to leave immediately was the highest in the largest housing unit type of Block A (Yatap 2-dong) and that reason was related to the real estate market condition (See Table 7-15 and 7-16).

It is likely that stabilization of population movement (See Table 5-7 to 5-10) and real estate market depression (See Figure 4-23, Table 7-10, 7-11, 7-15 and 7-16) also contributes to increasing duration of residence in current house. If the proportion of these households, however, especially elderly households continue to increase (See Table 7-12), it excludes the possibility that population aging pattern in these apartment complexes has the same as the initial development complexes of Tama New Town in Japan.

Residential characteristics

Based on the results of the interview survey with the residential characteristics, the following aging-related characteristics of the households could be drawn:

- It is quite likely that the householders living in their own house is older than householders in rental house. It is considered that their housing purchasing power also increased proportionally as householders grow older.
- It is evident that household needs more residential space proportionally as the household size (e.g., number of household member, household composition, etc.) is getting bigger.

However, the proportion of elderly household living in the large-sized housing unit regardless of household consumption demand was higher in Block A (Yatap 2-dong) than in Block B (Sunae 1-dong). On the contrary, the proportion of elderly household in a small-sized housing unit, suitable for the small size household was higher in Block B (Sunae 1-dong) than Block A (Yatap 2-dong). The elderly households living in a small-sized housing unit can easily move other residences which accommodate a suitable residential area for themselves and their price are also affordable than households living in a large-sized housing unit.

'Duration of residence' tends to become longer in case of large-sized home owners than small-sized rental households (See Table 7-24, 7-28 and 7-29). As for the change on the household size between two times (i.e., the time to move into current house in Bundang New Town and at present), the size of household has been decreased in the groups with a long duration of residence, over 16 years rather than the group with a comparatively short duration of residence, below 5 years. In particular, this change was more seriously occurred in a small-sized housing unit due to such as a separation of generation. Moreover, the size of household with a long duration of residence is much more likely to dwindle than to grow even in a large-sized housing unit which can accommodate growing the size of household. Meanwhile, the size of household with a short duration of residence is much more likely to grow than to dwindle (See Table 7-26 and 7-27).

Living environment

By and large, all living environment factors have no statistical correlation with population aging related factors. Therefore, this section found some characteristics on the evolution of Bundang New Town in terms of population movement instead of the respondent characteristics related with population aging.

- First, as most of the urban facilities have been equipped according to their original master plan and self-containment commercials, degree of satisfaction for living environment is getting higher gradually (See Table 7-32).
- Second, it is generally thought that residents, especially retired elderly people place a high value on the satisfaction of living environment condition rather than housing price or occupation in such a situation that real estimate market has been stabilized and preference for good residential condition is regarded as an important factor (See Table 7-32).

However, there is the potential that a good living environment such as the convenience of urban facilities, open space with good amenity, will impede population movement and then accelerate population aging of residents.

Chapter 8   Conclusion and Discussion

8.1   Major findings and contributions

Characteristics and issues of metropolitan new towns developed during the rapid growth era

Japanese metropolitan new towns developed during the rapid growth era have the following problems in the population decline and aging era. The neighborhood units that had been occupied since the initial stage of the development in the 1960s to 70s show a tendency to be aged more rapidly than the national average and have a population structure that cannot avoid rapid progression of aging over time. In terms of metropolitan new town's characteristics, one reason for population aging in these communities is that a lot of homogeneous residents had moved in the housing units supplied by a master plan during the short period at the initial stage of new town development. Considered from the residents' migration pattern, another reason for population aging is that young generations are less likely to migrate in these neighborhood units whereas the initial occupants who have lived continuously in these neighborhood units belong to the age group as time goes on.

Furthermore, as massive housing units and construction of infrastructures were implemented in a short period, physical update of these facilities will be concentrated on a certain period of time. This leads to the continuous increase of maintenance and management expenditure on public facilities. With the increase of the aged population, demand of housing and urban facilities for the elderly has been also increased. These new towns also have the lack of urban facilities for the elderly people in the face of population aging because housing and urban facilities for the elderly people (e.g., the elevator in building, the elderly nursing center, etc.) were not considered in the initial master plan from the beginning. What is worse, there is no space to install them practically due to the rigidity of land use plan by a master plan.

Korean metropolitan new towns planned during the rapid growth era have similar characteristics with Japanese ones as follows: 1) construction under the leadership of the central

government, 2) a massive migration of homogeneous people and households at the same time by a massive uniform housing supply method, and 3) urban infrastructure and facilities supplied by the inflexible master plan based on the Clarence A. Perry's neighborhood unit theory.

Moreover, Korean metropolitan new towns are confronted with such as following issues in the era of population aging and decline: 1) vulnerability of population structure, 2) probability of the collapse in real estate values (bubble burst), 3) decrepit housing complex and infrastructure, 4) massive supply of housing units and residential sites within Seoul metropolitan area (e.g., readjustment of Green Belt area), and 5) reduction of housing demand in Seoul metropolitan area (e.g., public agency relocation from the capital region). As one of the solution to escape from these situations, the Korean government inevitably announced to repeal the special act, 'Residential Land Development Promotion Act' that have led to the development of large-scaled residential new towns since 1980 in September 2014.

Demographic characteristics and aging phenomenon of the first generation new towns in Seoul Metropolitan Area, Korea

In terms of the ratio of population aged 65 and over and its growing trend, the possibilities of urban emptiness and deterioration of vitality caused by the age profile imbalance are relatively low in current condition of these five new towns just judging from only the statistics. Even though showing the highest ratio of population aged 65 and over among the first generation new towns in Seoul metropolitan area (SMA), Bundang and Ilsan New Towns still maintained the lower rate than that of Seoul special city and even SMA in 2010. Moreover, Pyeongchon and Jungdong New Towns maintained 6% level even in 2010 by virtue of the influx of the population from their vicinity (See Figure 4-9, Table 4-7 and 5-11).

However, the total population of four new towns among the first generation new towns except Jungdong New Town started to decrease in 2010 (See Table 4-7). In addition, the proportion of the residents who had experienced migration has decreased from about 90% in the early stage of new town development, 1995, to about 50% in 2010, namely, population migration in these first

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generation new towns has been stabilized gradually (See Table 4-8). If these situations continue, it cannot exclude the possibility that these metropolitan new towns experience the rapid population decline and aging due to the similar internal and external factors like the case of Tama New Town. Therefore, it must not be overlooked to monitor the changes of the age profile and the population aging trend consistently in case of metropolitan new towns.

In physical point of view, it is too early to promote the remodeling or reconstruction projects of apartment buildings or complexes through the method to demolish whole structure and build it again even though some apartment buildings of the first generation new towns in SMA have factors related with the structural safety concerns the construction process and the central government reduced the minimum requirement period of implementing the housing reconstruction project as an institutional measure to stimulate the country's real estate market. Actually, it has not been reported that the apartment buildings need to be reconstructed or remodeled due to the structural problems yet and there is no case to implement the remodeling or reconstruction projects in the first generation new towns of SMA, Korea. Recently, some apartment resident committee in the first generation new towns have promoted resident's own activities to maintain and improve housing conditions by replaced decrepit facilities partially instead of a method to demolish whole structure and build it again.

Demographic change characteristics in Bundang New Town and comparison with Tama New Town

Although developed in the similar background and method, Bundang New town in Korea has some differences between Tama New Town in Japan in terms of development process, housing unit type and supply method.

From development process aspect, Bundang New Town took only 2 years and 5 months from development plan announcement to the initial occupancy of the Model Complex whereas Tama New Town was developed for 40 years of long term. Also, entire new town development project was finished within 7 years of short period, compared to Tama New Town. Such a fast policy decision-making and implementation not only met the objectives of new town development, but also was quite

effective to control real estate price hike, arising from the lack of housing supply those days in Seoul metropolitan area.

In case of Tama New Town, the public sector supplied housing, centered on small-sized rental housing with 3DK or less in the 1970s, the initial stages of development. From the housing unit type, one of the reasons for the higher ratio of population aged 65 and over is that the housing units in the initial development areas could not accommodate residential space for the households with growing children, and then this lacking of residential space in a housing unit encouraged the separation of generation. Housing supply centered on the small-sized rental housing accelerated the quick household separation of child generation, which functioned as one of the cause of population aging. In case of Bundang New Town, on the other hand, various sized housing units had been supplied within a single complex in a short period and the rental housing units were supplied with low proportion comparatively.

According to the comparison of the supplied housing unit type and housing supply method in both new towns, the population aging process like Tama New Town may not occur in Bundang New Town, Korea in current situation. However, the demographic structural vulnerability caused by the impeded migration has been also increased in some communities of Bundang New Town since the mid-2000s (See Figure 5-4). This impeded migration is mainly related with living condition, housing unit size and diversity of housing unit type within own complex according to the household survey. As occupancy in adjacent Pangyo New Town has started in earnest since 2008, the size of out-migration from Bundang New Town exceeded the size of in-migration into Bundang New Town (See Table 5-10). This migration pattern of Bundang New Town will be accelerated and maintained until Pangyo New Town's development comes to the final stage of completion.

Factors affecting demographic structure and population aging-related characteristics of Bundang New Town residents

This thesis conducted a household interview survey to analyze the population aging-related characteristics of Bundang New Town, a typical metropolitan new town in SMA, Korea. The

interview survey was conducted at two specific neighborhood units that consisted in some apartment complexes in 'Yatap 2-dong' (Block A) where population structure has been more vulnerable to population aging since 2005, and 'Sunae 1-dong' (Block B) where the ratio of household with school age children has been maintained unlike Yatap 2-dong.

One of the causes of the difference in population structure between two blocks is that migration of household, especially with school age children has occurred more frequently in Block B (Sunae 1-dong) than Block A (Yatap 2-dong). This frequent migration of household has served to alleviate the demographic structural vulnerability and maintained the stable population structure in Block B, Sunae 1-dong (See Table 6-1, 6-2 and Table 7-2). Furthermore, Block B's relatively high proportion of the small-sized housing units (See Table 6-4 and 6-22) eases the migration of household triggered by the specific events in the life course such as a change in marital status or job, the birth of a child, entering or attending upper school (Clark and Huang, 2003; Green et al, 1997; Clark and Dieleman, 1996). In the survey result, it is found that duration of residence in a small-sized housing unit was below average for whole survey household (See Table 7-24).

According to the result of asking the resident's opinion on the cause of population aging, most of respondents thought that 'education condition for children' was the most important cause of differences between population cohorts of two communities (See Table 6-30). Good educational condition is also a help to maintain the low-vulnerable population structure in the era of population aging and decline by encouraging the influx of relatively large-sized households pursuing children's education. Besides the educational condition in the current living environment, transportation and shopping conditions were also considered as causes of differences in population cohorts between two blocks (See Table 6-32).

This thesis also examined the respondents' characteristics related with population aging, and then analyzed correlation between factors on the demographic characteristics of household (i.e., 'age of householder', 'number of householder members', and 'household composition') (See Table 6-29). According to the correlation analysis, it is also very likely that one-generation households consist of

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only the elderly as well as a small-sized household has an older householder than a large-sized household (The size of household declines with age of householder).

Affecting factors on the population aging trend in Bundang New Town

Based on the results of the interview survey with the residential characteristics, the obvious aging-related characteristics of the households could be drawn: 1) householders living in their own house is older than householders in rental house because householders' housing purchasing power is also increased proportionally as householders grow older. 2) household needs more residential space proportionally as the household size is getting bigger.

It is fact that duration of residence and proportion of household to hope to live in current house continuously have been increased in Bundang New Town gradually. According to the survey result, most (86.5%) households hoped to live in current house continuously and their most frequent reason was the 'convenience of urban facilities'. It can be interpreted that many residents, especially elderly households were placing value of the urban facilities for convenience, leisure and health above other conditions (See Table 7-13 and 7-32).

Meanwhile, the proportion of households unable to leave Bundang New Town due to constraint conditions in spite of hoping to leave immediately was the highest in the largest housing unit type of Block A of Yatap 2-dong with vulnerable population structure, and that reason was related to the real estate market condition (See Table 7-15 and 7-16). Actually, not a few households bought their large-sized house regardless of housing consumption demand to seek after much more profit through the real estate when there was a boom of real estate speculation nationwide. Real estate market depression (See Figure 4-23, Table 7-10, 7-11, 7-15 and 7-16) not only aggravates economic burden but also contributes to increasing duration of residence on these households. According to the survey result, about 30% of respondents thought that the most likely population scenario in their own apartment complex had relevance to the reduced demand for a large-sized housing unit, and worried

about increasing the average aging of residents caused by the current real estate transaction condition mainly in the apartment complex composed of large-sized housing units (See Table 6-31).

As for the change on the household size, the size of household has been decreased in the groups with a long duration of residence rather than the group with a comparatively short duration of residence. In particular, the change on the household size was more seriously occurred in a small-sized housing unit due to such as a separation of generation. In the same way as the initial development complexes in Tama New Town, it was highly likely that these small-size housing units could not accommodate residential space for the households with growing children, and then this lacking of residential space in a housing unit encouraged the separation of generation. Moreover, the size of household with a long duration of residence is much more likely to be dwindled even in a large-sized housing unit which can accommodate growing the size of household (See Table 7-26 and 7-27) if there is no influx of households which need more residential space for the growing children in these trends such as downsizing of household, population aging and decline.

In addition, this thesis found some characteristics on the evolution of Bundang New Town in terms of population movement instead of the respondent characteristics related with population aging (See Table 7-32). First, as most of the urban facilities have been equipped according to their original master plan and self-containment commercials, degree of satisfaction for living environment is getting higher gradually. Second, it is generally thought that residents, especially retired elderly people place a high value on the satisfaction of living environment condition rather than housing price or occupation in such a situation that real estimate market has been stabilized and preference for good residential condition is regarded as an important factor. However, there is the potential that a good living environment such as the convenience of urban facilities, open space with good amenity, might impede population movement and then accelerate population aging of residents.

Demographic prospects for Korean metropolitan new towns developed during the rapid growth period

About 20 years have passed since the development of the first generation new towns in Seoul metropolitan area, Korea. Just considering the statistical analysis results on the whole area of new towns, it might be said that these first generation new towns have maintained the relatively stable demographic structure rather than a nationwide trend. In addition, comparing with the initial development housing complexes of Tama New Town in terms of development process, housing unit type and supply method, it is not likely that the first generation new towns in Seoul metropolitan area experience the same process of population aging as Tama New Town.

Looking at the community level of these new towns, however, it has been found that some communities or housing complexes have the vulnerable population structure in the ear of population aging and decline depending on their own residential characteristics, living environment or characteristics of residents. It is a complicated question to clearly find out the affecting factors on demographic characteristics or population aging trend in each community of metropolitan new town. Therefore, it must not be overlooked to monitor the changes of the age profile and the population aging trend consistently at the community level of metropolitan new towns.

8.2   Policy implications

The policies to renew new towns in Korea primarily give weight to improving physical environment, for example, through remodeling and reconstruction projects. While such physical improvement could be implemented without policy-based support in the rapid growth era, these policies focusing on physical renewal have limitations in recent times with economic downturn and low population growth. The first generation new towns in SMA, Korea are not experiencing the phenomenon of serious aging like the development area of initial stage in Tama New Town or Senri New Town of Japan. However, stagnated real estate transaction is gradually making it difficult to see migration around the complexes primarily composed of high-priced, large-sized housing units.

While Korea has constructed new towns with the same background and methods as Japan, it is rather difficult to make an approach to the problems with new towns from the same perspective since the two countries differ in density of residential areas, the spatial structure of metropolitan areas, housing type preference, and the public transportation system, etc.

Figure 8-1. Spatial structure of two metropolitan areas

| Tokyo metropolitan area | Seoul metropolitan area |
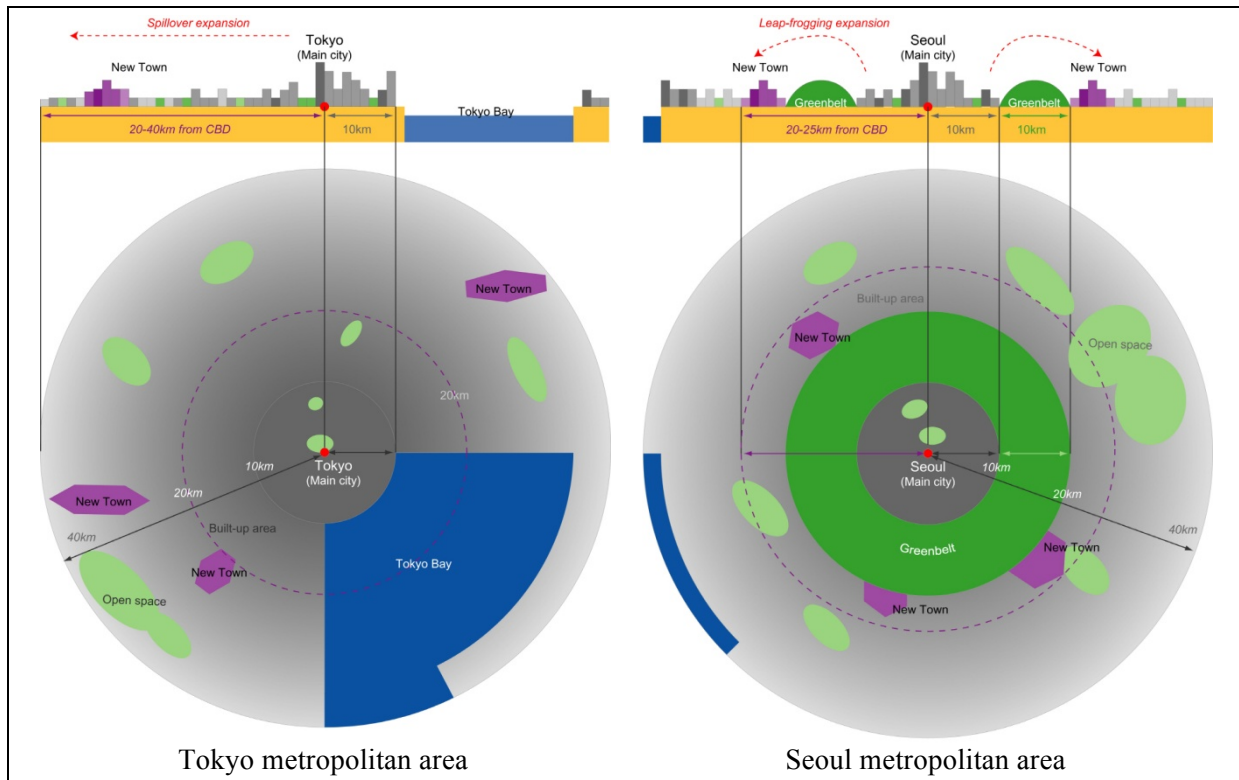
Notwithstanding that, it is meaningful that this thesis suguest some policy implications based on the previous analysis results and Japanese policy trend in a situation that only simple economic logics cannot solve the problem of renewing aging metropolitan new towns.

Securing base facilities to serve the elderly population by the remodeling project

For large-sized suburban housing complexes, including Tama New Town, which were constructed in the rapid growth era, it is difficult to secure and improve city infrastructures for the elderly population in the aging society since almost no consideration has been given to population

aging since the time of new town planning by a master plan. Japan is implementing a plan to ease construction behavior publicly in a reconstruction project for these infrastructures.

In the process of implementing the Tama New Town Suwa reconstruction project, Tama City presented some conditions for easing restrictions on the maximum height of buildings concerned: 1) to secure base facilities to serve the elderly population, 2) to secure facilities to support parenting, 3) to make a design in consideration of environment, 4) to take a disaster prevention measure that could contribute to the community, 5) to remove and improve areas having crime prevention problems, and 6) to specially recognize a barrier-free site (Tama city, 2011; Kim, J.E., 2012).

On September 1, 2014, Korean government announced a set of measures aimed at stimulating the real estate market that include reducing the minimum requirement period of housing units subject to reconstruction by up to 10 years. Even though the current law on reconstruction allows redevelopment or reconstruction projects of any apartment building if they are over 20 years old, most regional governments currently require a minimum 40-year use of apartment buildings before they can be rebuilt. Therefore, central government not only reduce the minimum requirement to 30 years but also ease other requirements for reconstruction to allow development of old housing units with inconvenient living conditions (e.g., a lack of parking spaces, excessive floor noise and facilities for the elderly) regardless of minimum requirement age of housing units. This policy will be useful to secure the space to install facilities for the elderly practically in the metropolitan new towns with the rigidity of land use plan by a master plan (Yonhap News Agency, 2014; MOLIT, 2014).

Inducing citizens' participation to solve financial problems

Tama City, about 60% of whose administrative district is the development area of initial stage for Tama New Town, had tax revenues amounting to 47.8 billion Yens in 2004; the tax yields formed 56% of the amount in this city and the personal municipal taxes among the city taxes have been decreased since 1992. While the Japanese Baby Boomers migrating to Tama New Town at the initial stage of its development had a higher ratio of wage earners, the personal municipal taxes have

been decreased for more than 30 years with their retirement and Tokyo Metropolitan Government is giving lower levels of subsidies according to the development of Tama New Town. Livelihood expenditure forms the highest rate of expenditure items, 33%, as of 2004 and is expected to increase with the larger amount of expenditure on social security due to population aging. In contrast, educational expenses should be cut down due to fertility decline; however, it is not the case. Since maintenance expenses for aged infrastructures are expected to increase, it is obvious that Tama City will suffer more financial problems.

Tama City is actively inducing citizens to participate in the project to solve these financial problems; however, since this attempt has limitations, the city is actively pursuing cooperation with citizens, for example, by using NPO to improve park facilities. After Tama City drew up basic plans concerning cooperation with non-profit organizations in 1999, as many as 22 NPO corporations and 18 voluntary associations have established partnership with the city, which was estimated to have the largest number of per capita certified organizations in Tokyo Metropolitan Government (Miyazawa, 2006).

Making the 'housing environment management' system for spontaneous participation by residents

To solve the problem of population aging in metropolitan new towns with such characteristics and implement reconstruction and redevelopment of deteriorated housing units, it is most of all necessary to induce young generations into new towns and draw a good agreement for reconstruction and redevelopment project among residents. To achieve these ends, it must take precedence to improve the values of housing complexes through the constant activities to maintain and improve housing conditions of the district. These activities are called '*The housing environment management*' 住環境マネジメント[29] in Japan.

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[29] This '*The housing environment management*' contains some activities as follows; 1) to establish and observe more detailed principles, which are applicable to the district, in addition to general regulations in pursuit of maintenance and improvement of housing conditions; 2) to plan and implement a redevelopment or repair

Recently, it is realistically difficult to promote the remodeling or reconstruction project of apartment complexes due to economic recession or opposition from some residents in the first generation new towns, Seoul metropolitan area, Korea. Under this unfavorable condition for the remodeling or reconstruction project, some resident committee 居住者代表会議 of apartment complex have tried to replace decrepit facilities (e.g., elevator, pipeline, playground) partially by receiving a subsidy from local government. These resident's own activities to maintain and improve housing conditions help to resolve inconvenience of residents by decrepit facilities and enhance the economic value of housing complex even though these activities are limited to the physical aspect. Therefore, 'the housing environment management' of Japan can play a key role in handling the problem concerned with metropolitan new town in Korean metropolitan new towns.

Figure 8-2. PR banner for notifying the replacement elevator by resident committee

Note: Photographed at 'Hyangchon 5th apartment complex' in Pyeongchon New Town on September 28, 2014.

project in pursuit of maintenance and improvement of housing conditions; 3) to perform maintenance of public space contributing to maintaining and improving the housing conditions of the district or cooperative activities; 4) to monitor individuals' behavior that can affect the housing conditions of the district in general and discuss any problem; and 5) to perform common real estate management related to maintaining and improving the housing conditions, which is not included in the before-mentioned items (Asami, 2008).

8.3   Limitation and future study

This study analyzed data through the interview survey regarding household, housing, and migration that were hard to be identified by census data. Limitations of this study, however, are as follows; samples were not enough to be representative because the survey was not specific enough and the residents' participation level was not high; the survey was conducted in only some complexes in first generation new towns in Seoul metropolitan area. We hope that further studies in future would be conducted to broaden the scope of analysis targets into all of first generation new towns in Seoul metropolitan area and to analyze residents' tendency and its effect on aging so that this research would contribute to regeneration of first generation new towns in Seoul metropolitan area.

Also, more consideration needs to be given to the Pangyo 板橋 New Town which has been constructed adjacent to the west of Bundang New Town since 2003 (See Table 4-2 and Figure 4-3). The whole construction of Pangyo New Town will be completed at the end of 2014. Therefore, it is possible that further studies analyze the demographic characteristics (e.g., population structure, household composition, migration from Bundang New Town, etc.) of Pangyo New Town and then compare with those of Bundang New Town using the 2015 population and housing census, beyond the temporal range of this thesis.

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Appendix 1. Origin of the Modern New Town Development and New Town Policy in UK

The idea of the modern new town was first proposed by the Ebenezer Howard, who advocated the concept of a 'Garden City', described in his famous book, Tomorrow: A Peaceful Path to Real Reform, published in 1898. He saw a 'Garden City' as a town designed for healthy living and industry; of a size that makes possible the full measure of social life, but not larger; surrounded by a rural belt; the whole of the land being in public ownership of held in trust for the community (Clapp, 1971 quoted from Huxtable, 1964).

Figure A-1. The concept of the Garden City
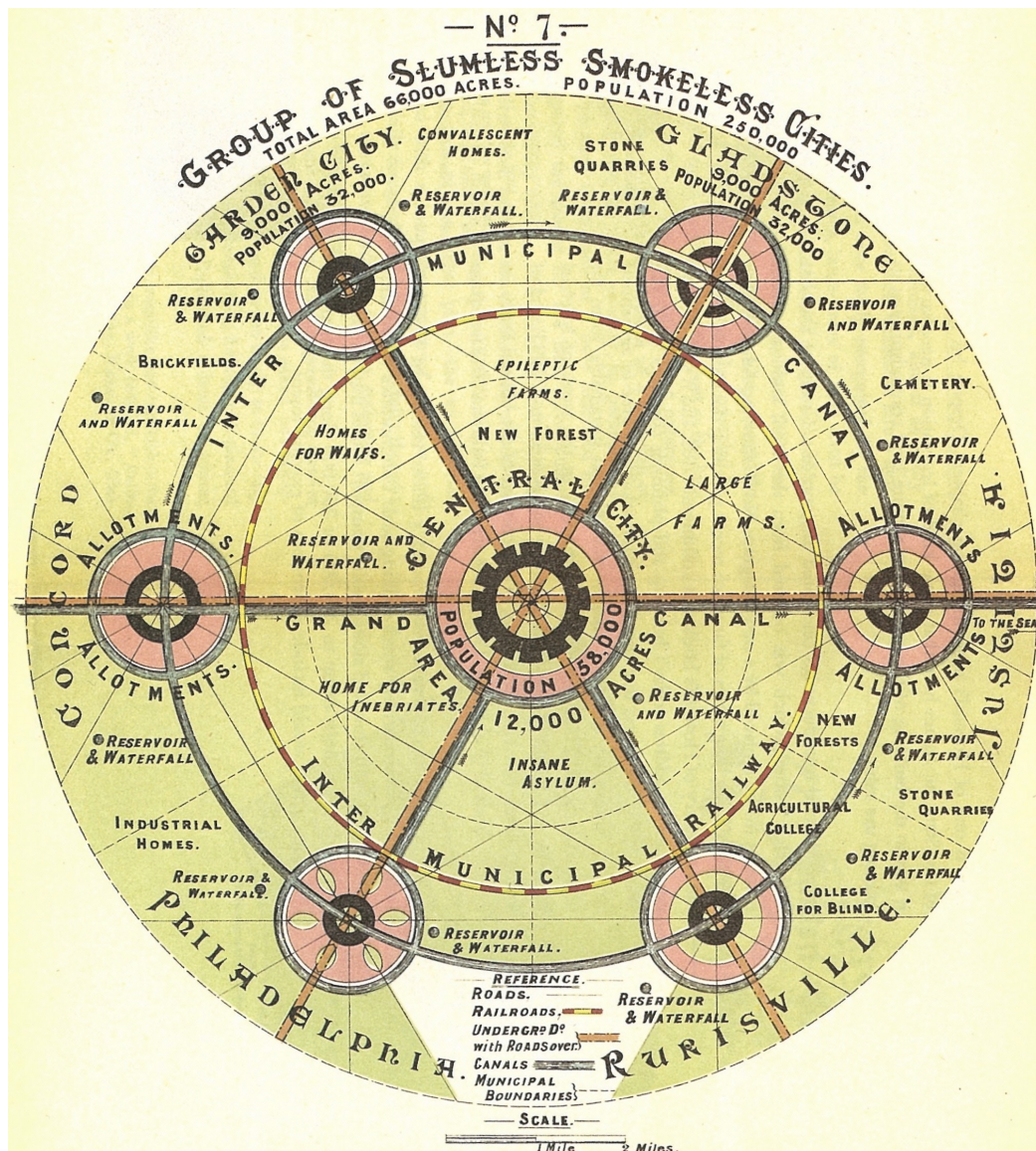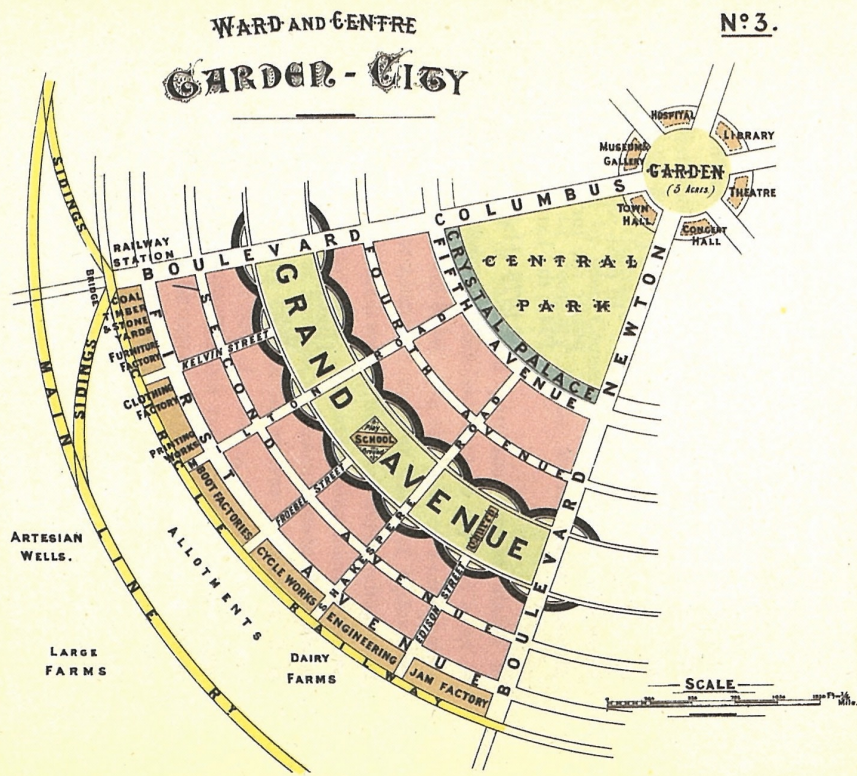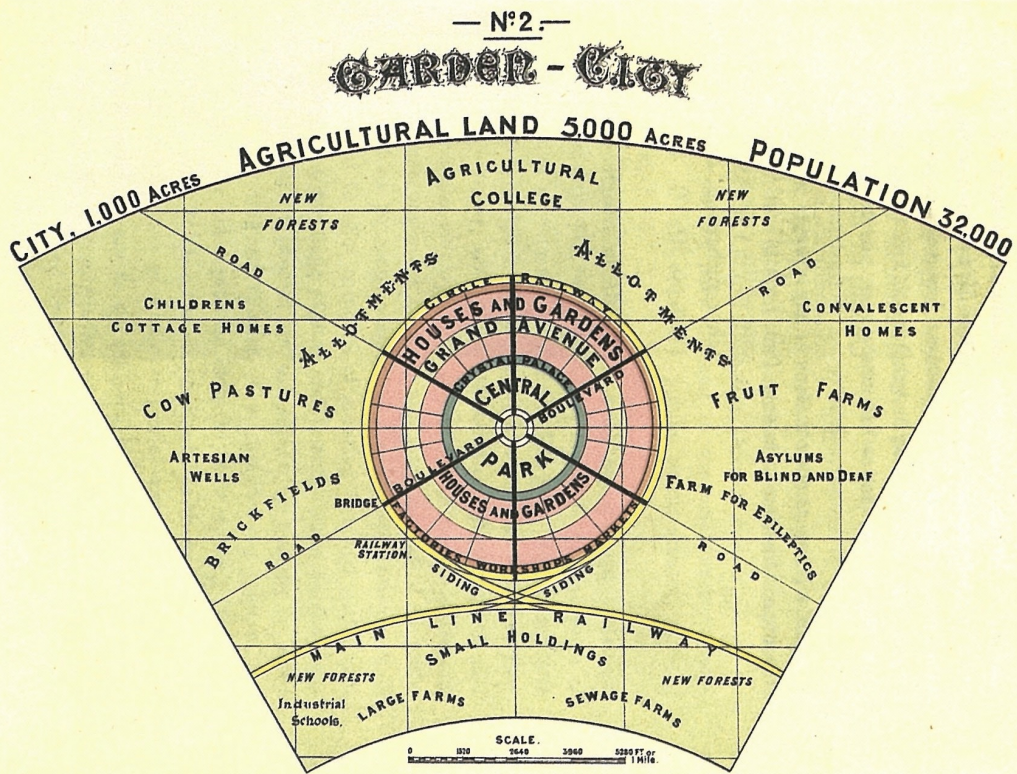
Source: Howard, 2003.

His idea was actually demonstrated as Letchworth in 1902 and Welwyn Garden City in 1920. After that, although several official reports to suggest construction of new towns were submitted to government, these reports never got off the ground. The approach at the government level had begun in earnest after World War II with New Town Act of 1946.

The New Towns movement was response to the housing shortage and poor housing conditions prevalent in urban area after World War II. During the war, almost a quarter of stock of 12.5 million homes had been damaged throughout the country (Bennett, 2005 quoted from Nuttgens, 1989). The population was growing and there were significant shortages of both materials and labor for building. The New Towns Program was a major government plan to build new homes to address the shortage (Bennett, 2005).

In 1944, 'the Greater London Plan' by Professor Patrick Abercrombie recommended the building of ten satellite new towns as an important strategic instrument to solve the housing shortage by which the further growth of London could be limited, a greenbelt established, the best agricultural land protected, and area of special scenic beauty preserved. These new towns beyond the greenbelt, with their own industry and social buildings, would be the most satisfactory and most economic way of dealing with this overspill of population in the London metropolitan area (Schaffer, 1978).

Table A-1. Key recommendations of the New Towns Committee Report (1945)

- *New Towns should be located sufficiently far from their mother city at least 40km from London and 20km from other metropolises.*
- *They should target a population of 20,000 to 60,000 inhabitants.*
- *They should feature predominately single-family housing, at low densities.*
- *They should be built, as far as possible, on quality greenfield sites, but outside areas of exceptional natural beauty, which had to be preserved.*
- *A green belt should be created around the New Towns.*
- *Housing should be organized in neighborhood units around a primary and nursery school, a pub and shops selling staple goods, and a meeting-room for clubs and voluntary groups to meet.*
- *The New Towns should seek to attract a balance of all socio-economic groups.*
- *In order to be self-contained, the development corporation must offer every business moving into the new town one housing unit for each job created.*

Source: Bennett, 2005.

In 1945, the New Towns Committee created government-sponsored corporations financed by the Exchequer. They were given power to acquire land within a defined, designated area, to establish new towns. This committee's recommendation was adopted and became the basis of the new town legislation. The New Towns Act 1946 provided the government with the power to implement these plans. The success factor of the British new town movement is none other than the statutory powers and machinery of the New Towns Act 1946. This act has four main features. First, the act enables the minister, on behalf of the government, to make the initial decision to establish a new town and to propose an area of land that he considers suitable for the purpose. Second, the act requires the minister to appoint a development corporation to plan and build the new town. The corporation is not a political body. Third, the effect of the minister's designation order is to bring into operation all the powers of the New Towns Act. The last feature of the act is that it places on the government the responsibility for providing all the funds needed by the development corporations (Schaffer, 1978).

Based on the New Towns Act, 14 new towns (so-called 'the first generation new towns') were designated and constructed throughout the country - Eight (Stevenage, Halrow, Crawley, Hemel Hempstead, Hatfield, Welwyn Garden City, Basildon and Bracknell) were around the London metropolitan area and a further six in local area (Newton Aycliffe, Corby, Cwmbran, East Kilbride, Glenrothes and Peterlee) - between 1946 and 1950.

Figure A-2. Harlow New town
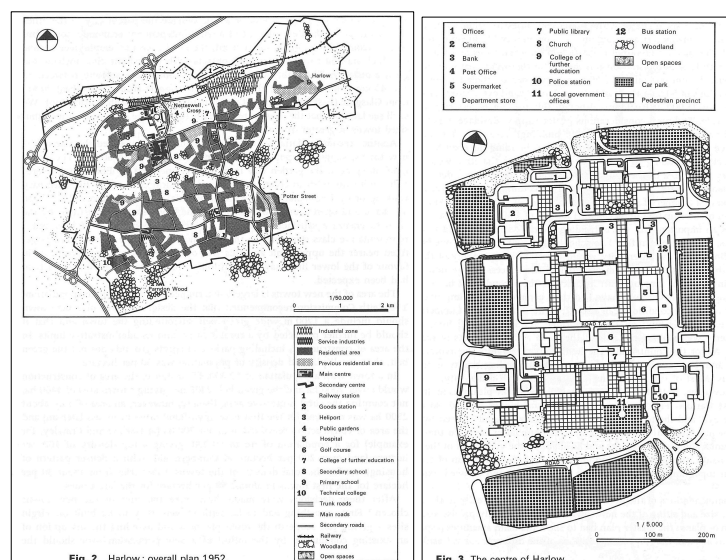
Source: Merlin, 1971.

Figure A-3. Location of the British new towns

Source: Schaffer, 1978.

Table A-2. Summary of the British new towns

Type	New Town	Location	Year of Designation	Population Proposed (in thousands)
London's new towns designated between 1946 and 1950	Basildon	Essex	1949	134
	Bracknell	Berkshire	1949	60
	Crawley	Sussex	1947	78
	Harlow	Essex	1947	Undecided
	Hatfield	Hertfordshire	1948	29
	Hemel Hempstead	Hertfordshire	1947	84
	Stevenage	Hertfordshire	1946	105
	Welwyn Garden City	Hertfordshire	1948	50
Other new towns designated between 1946 and 1950	Newton Aycliffe	County Durham	1947	45
	Corby	Northamptonshire	1950	83
	Cwmbran	Wales	1949	55
	East Kilbride	Scotland	1947	90
	Glenrothes	Scotland	1948	70
	Peterlee	County Durham	1948	30
Towns designated since 1951	Cumbernauld	Scotland	1955 (Extended in1973)	100
	Skelmersdale	Lancashire	1961	80
	Livingston	Scotland	1962	100
	Redditch	Worcestershire	1964	90
	Runcorn	Cheshire	1964	100
	Washington	Tyne and Wear	1964	80
	Irvine	Scotland	1966	120
	Milton Keynes	Buckinghamshire	1967	250
	Peterborough	Cambridgeshire	1967	180
	Newtown	Wales	1967	13
	Northampton	Northamptonshire	1968	240
	Warrington	Cheshire	1968	202
	Telford	Shropshire	1968	250
	Central Lancashire	Lancashire	1970	420
Total				3250

Note: Totals for proposed population are estimated on the assumption that the proposed population of Harlow is 110,000.
Source: Thomas, 1978.

In 1960s, government policies to help curb population and office in London metropolitan area suggested in Barlow Report (1940) had been defeated. To address this situation, Ministry of Housing and Local Government (MHLG) suggested establishing the self-contained large scale new towns in the area, 100 to 150km from London through the reports - 'London: employment, housing, land' in 1963 and 'The South East Study' in 1964 (Takahashi and Hayakawa, 1993).

In this policy transition, the second generation new towns, designated since 1961 (e.g. Milton Keynes, Peterborough and Northampton) have had more consistent economic performance, through a combination of being larger than the earlier new towns, attracting employers from sectors that have

achieved sustained growth, such as electronics, IT and financial services, and achieving the more balanced approach to new housing development, with a proportion of homeownership as well as rented housing. Although the later new towns took a careful approach to managing the balance of jobs and housing supply as they developed, the rigid approach of their predecessors had been abandoned as unworkable and too exclusionary following the new towns white paper (Bennett, 2005).

Since the late 1960s, population and industry had begun to decline and faced to the revitalization of the inner cities in London. In 1974, the Labor Party won at the general election against the Conservative Party. These situations triggered off less calling for comprehensive dispersal policies and served as a momentum to curb the rate of further new town designations. This weakening of the political base for new towns switched its attention towards the inner city and cut back on plans for existing and previously proposed new towns (Hardy, 1991). It was not until the New Towns program had been reviewed by the Commons Expenditure Committee in 1974 that priorities within the allocations policies of New Towns were amended to give greater priority to inner urban area in London metropolitan area (Takahashi and Hayakawa, 1993).

Figure A-4. The South East Study (1964): development proposals
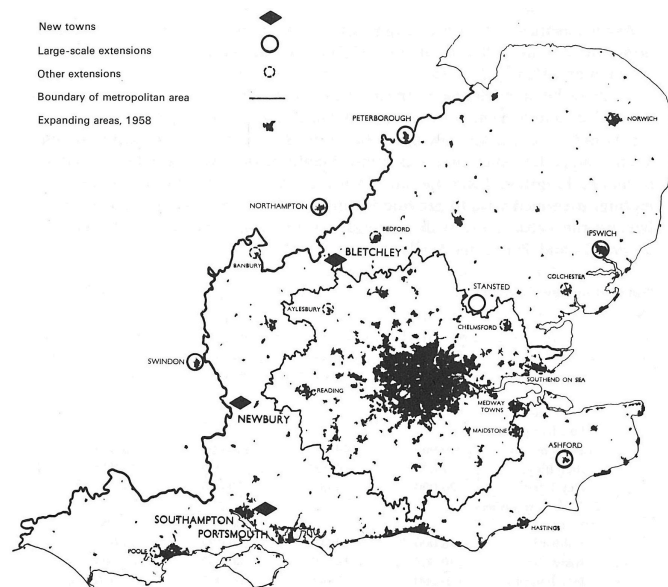
Source: Merlin, 1971.

Appendix 2. Pilot interview

Summary

a) Date: April 19 to 27, 2012 (9 days)

b) The number of interviewees: 39 persons (contained 8 urban planning specialists)

c) Sampling method: snowball sampling

d) Criteria of sampling interviewees: Persons who live or have lived in the new town by neighborhood, move in time

Interview questions

e) **Current** information (name of apartment complex, age, household composition and sex)

f) Information at the **time of in or out migration** (household composition, housing conditions, moving area, reasons of migration)

g) **Intension to live** in new towns continuously

h) **Advantages and disadvantages** of living in the new town

i) **Problems** of metropolitan new towns (*only specialists*)

Time / Items		1 Present	2 In-migration	3 Migration within New Town	4-1 Out-migration (Non residents)	4-2 Intension to live in future (Residents)
Demographic Characteristics	Age/Sex (by 5years)					
	Time to move	-				
	Household composition					
	Reason to move					
	Moving area					
	Commuting area					
Settlement Environment	Residence Environment					
	Educational condition					
	Shopping condition					
	Transportation condition					
	Good point					-
	Bad point					-

Key findings

j) Residents of Bundang New Town commonly take a lot of **pride** in living in the Bundang New Town (elitism, 選民意識). (Buzzword: 天堂[*Cheondang*]下の盆唐[*Bundang*]).

k) Many people **moved from Seoul**, especially so-called '**Gangnam 3 districts** (江南３区)', the **highest level of residential area** in Korea) in the **initial stage**.

l) There are different characteristics each neighborhood unit (dong).

m) They show a **high level of satisfaction** for a **residential environment,** especially for the riverside pedestrian space in the case of the senior citizens.

n) They satisfy the **good accessibility** to **Seoul** CBD.

o) **Real estate recession** has caused a serious **aging population problem**, especially in **large-sized housing units**.

p) The portion of residents who **move to the adjacent areas** has been increased **since the mid-2000s**.

q) Most of residents point out the **deterioration of apartment** building as **the only complaint**.

r) The advantage of the **education environment** for children has been **reduced** since the early 2000s due to the 'leveling off' **education policy**.

Figure A-5. Distribution of pilot survey interviewees
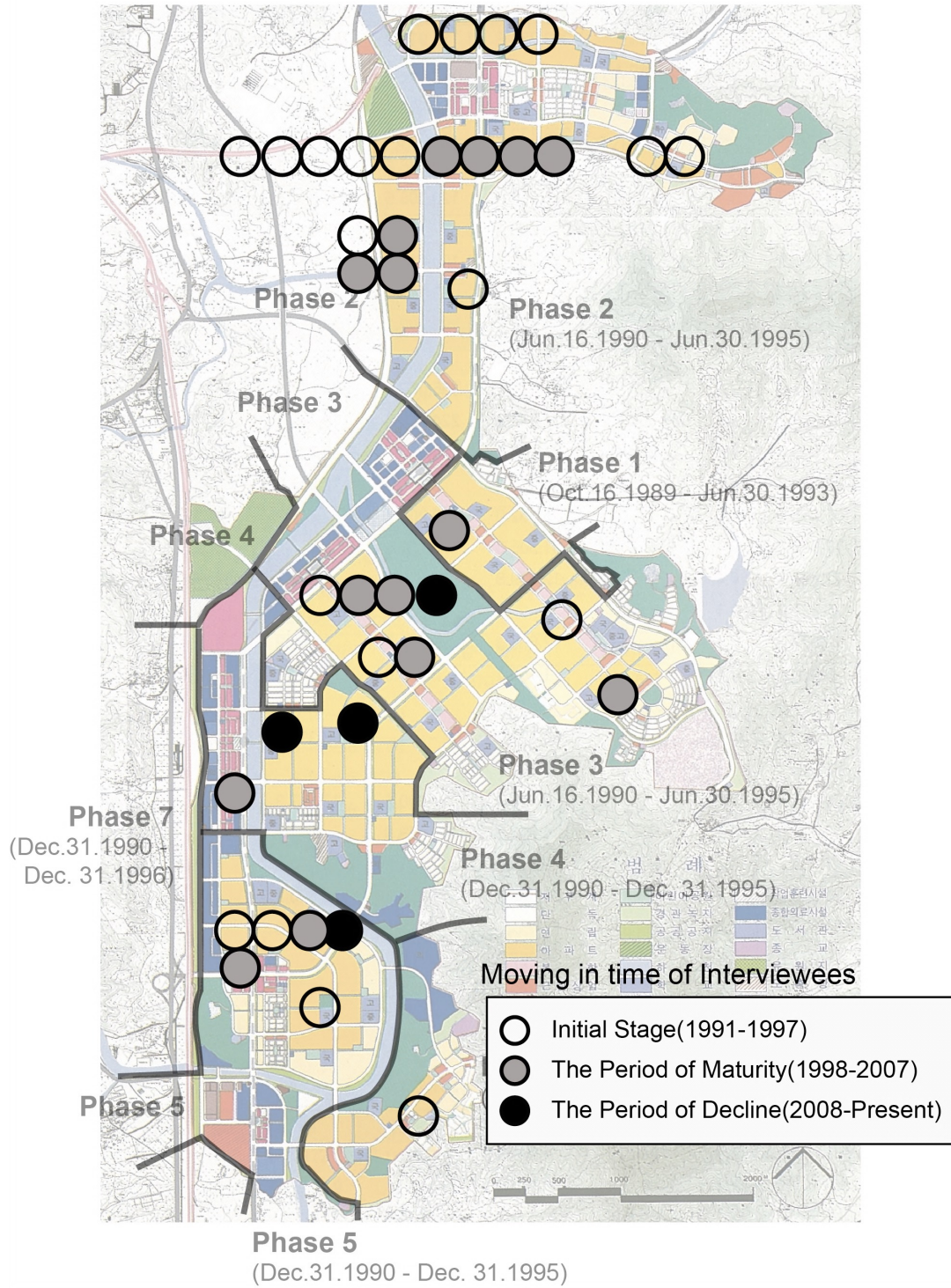
Appendix 3. Questionnaires

BUNDANG NEW TOWN HOUSEHOLD INTERVIEW SURVEY

CURRENT INFORMATION OF HOUSEHOLD

Q0-1. Please tell me name of the apartment complex you live in.
  (   ) complex

Q0-2. Please tell me your building number in the apartment complex.
  No. |___|___|___|

Q0-3. Please tell me when you (respondent) were born.
  In |_1_|_9_|___|___|

Q0-4. Please tell me your (respondent) gender.
    1. Male 2. Female

Q0-5. Please tell me when your householder was born.
  In |_1_|_9_|___|___|

Q0-6. Please tell me your householder's gender.
    1. Male 2. Female

Q0-7. How are you related to your householder?
    1. Respondent
    2. Spouse
    3. Parents
    4. Grandparents
    5. Child
    6. Grandchild
    7. Brother/Sister
    8. Other

Q0-8. Please check all household members on householder's view.
    1. Householder
    2. Spouse
    3. Child
    4. Parents of householder
    5. Parents of householder's spouse
    6. Grandparents of householder
    7. Grandparents of householder's spouse
    8. Brother/Sister of householder
    9. Brother/Sister of householder's spouse
    10. Other relative
    11. Non-relative

Q0-9. How many people live in your household?

|___|___|

Q0-10. How many people aged 65 and over live in your household?

|___|___|

Part I
INFORMATION AT THE TIME OF MIAGRATION
IN BUNDANG NEW TOWN FIRSTLY

Now I have a few questions about your <u>household when you moved in Bundang New Town firstly.</u>

Q1-1. When did you move in Bundang New Town?

In |___|___|___|___|

Q1-2. How were you related to your householder at the time?

1. Respondent
2. Spouse
3. Parents
4. Grandparents
5. Child
6. Grandchild
7. Brother/Sister
8. Other

Q1-3. Please check all household members in householder's view when you moved in Bundang New Town firstly.

1. Householder
2. Spouse
3. Child
4. Parents of householder
5. Parents of householder's spouse
6. Grandparents of householder
7. Grandparents of householder's spouse
8. Brother/Sister of householder
9. Brother/Sister of householder's spouse
10. Other relative
11. Non-relative

Q1-4. How many people lived in your household at the time?

|___|___|

And

How many people aged 65 and over lived in your household at the time?

|___|___|

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Q1-5. Where did you live before moving in Bundang New Town?

   1. In the case of outside of Seongnam City:
     (   ) City/County/District, (   ) City/Province

   2. In the case of migration within Seongnam City:
     (   ) town(dong), Seongnam City

   3. Overseas

Q1-6. Where was your first move-in area of Bundang New Town?

   1. Current house

   2. Other residences in Bundang New Town:
     (   ) town(dong), Bundang District

Q1-7. Please tell me the most important reason to move in Bundang New Town. (Up to 2 answers)

   1. Moving workplace to Bundang New Town
   2. Good accessibility to Seoul
   3. For education of children
   4. Purchasing house (first-time)
   5. Purchasing house (larger house)
   6. Making extra money by selling pervious house
   7. Convenient to urban facilities
   8. Other (   )

Now I have a few questions about your apartment house and complex when you moved in Bundang New Town firstly.

Q2-1. Was your home owned or rented before you moved in Bundang New Town?

   1. Owned
   2. Rented (the lease of a house on a deposit basis)
   3. Rented (monthly)
   4. Company housing
   5. Other (   )

Q2-2. What was your housing unit size before moving in Bundang New Town? (Based on the exclusive area)

   |___|___|Pyeong

Q2-3. Was your home owned or rented when you moved in Bundang New Town firstly?

   1. Owned
   2. Rented (the lease of a house on a deposit basis)
   3. Rented (monthly)
   4. Company housing
   5. Other (   )

Q2-4. What was your housing unit size at your initial migration to Bundang New Town? (Based on the exclusive area)

|___|___|Pyeong

Q2-5. What is the most important reason to choose that apartment complex at your initial migration to Bundang New Town? (Up to 2 answers)

1. Selected regardless of personal preference
2. Close to previous residence
3. Good accessibility to Seoul
4. Urban facilities for convenience
5. Convenience for commuting to workplace or school
6. Good educational condition
7. Open space, leisure and sports facilities
8. Neighbors have a high standard of living
9. Affordable housing price
10. Other (   )

Q2-6. How satisfied were you with conditions of your apartment complex at your initial migration to Bundang New Town?

	Very satisfactory	Satisfactory	Moderate	Unsatisfactory	Very unsatisfactory
(1)Transportation	1	2	3	4	5
(2)Education	1	2	3	4	5
(3)Shopping	1	2	3	4	5
(4)Leisure and culture	1	2	3	4	5
(5)Medical service and welfare	1	2	3	4	5

Q2-7. How did you think about your apartment housing unit size at the time?

1. Too large
2. Large
3. Satisfactory
4. Small
5. Too small

Now I have a few questions about trip for daily life of your household when you moved in Bundang New Town firstly.

Q3-1. Did your householder commute when you moved in Bundang New Town firstly?

1. Yes (GO TO Q3-2)
2. No (GO TO Q3-5)

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Q3-2. Where was your householder's workplace at the time?

    1. In the case of commuting to the outside of Seongnam City:
        (   ) City/County/District, (   )City/Province
    2. In the case of commuting within Seongnam City:
        (   ) town(dong), Seongnam City

Q3-3. How did your householder usually get to work at the time?

    1. Car
    2. Bus
    3. Transit
    4. Walk
    5. Other (   )

Q3-4. What routes did your householder use for commuting? Please check all relevant routes.

    1. Gyeongbu(Seoul to Busan) Expressway
    2. Bundang-Suseo Expressway
    3. Bundang-Naegok Expressway
    4. Bundnag subway line
    5. New Bundnag subway line
    6. Local streets
    7. Other (   )

Q3-5. Please tell me the shopping areas and name of retails you often visited at the time.

    1. Yatap subway station (Name of retail store:)
    2. Imae subway station (Name of retail store:)
    3. Seohyeon subway station (Name of retail store:)
    4. Sunae subway station (Name of retail store:)
    5. Jeongja subway station (Name of retail store:)
    6. Migeum subway station (Name of retail store:)
    7. Ori subway station (Name of retail store:)
    8. Seongnam city built-up area (Name of retail store:)
    9. (   )District of Seoul (Name of retail store:)
    10.Other:(   )City (Name of retail store:)

Q3-6. Please check all relevant reasons that you often visited the shopping areas and retails at the time.

    1. Near to home
    2. Close to public transportation
    3. Variety and high-quality of goods
    4. No suitable retails near to home
    5. Other (   )

Q3-7. How many students did your household have when you moved in Bundang New Town firstly? Please check all relevant cases.

    1. |___|___| elementary school student(s) (GO TO Q3-8)
    2. |___|___| middle school student(s) (GO TO Q3-8)
    3. |___|___| high school student(s) (GO TO Q3-8)
    4. |___|___| college student(s) (GO TO Q3-8)
    5. None (GO TO 4)

Q3-8. Did students of your household live together or apart at the time?

    1. One more students lived apart from household. (GO TO Q3-9)
    2. All students lived together. (GO TO Q4)

Q3-9. Which students lived apart from household? Please write the number of students each case.

    1. |___|___| elementary school student(s)
    2. |___|___| middle school student(s)
    3. |___|___| high school student(s)
    4. |___|___| college student(s)

Q3-10. Where did students live in apart?

    1. |___|___| student(s) lived in below area(s).
     1) (   ) City /County/District, (   )City/Province
     2) (   ) City /County/District, (   )City/Province
     3) (   ) City /County/District, (   )City/Province

    2. |___|___| student(s) lived in overseas.

Q3-11. Why did the students live apart from household? Please check all relevant reasons.

    1. To improve students' academic performance
    2. To go to previous school continuously
    3. Education condition of residence didn't reach the standard level.
    4. Other (   )

Part II
INFORMATION AT THE TIME OF MOVING IN CURRENT HOUSE
(If experienced)

Now I have a few questions about <u>your household when you moved in current house.</u>

Q4. Have you lived in the same house since your initial migration to Bundang New Town?

    1. Yes, I have lived in the same house since I moved in Bundang New Town. (GO TO Q4-1)
    2. No, I have moved into other areas inside of Bundang New Town. (GO TO Q5-1)

Q4-1. When did you move in current house?

    In |___|___|___|___|

Q4-2. How were you related to your householder at the time of moving in current house?

1. Respondent
2. Spouse
3. Parents
4. Grandparents
5. Child
6. Grandchild
7. Brother/Sister
8. Other

Q4-3. Please check all household members in householder's view when you moved in current house.

1. Householder
2. Spouse
3. Child
4. Parents of householder
5. Parents of householder's spouse
6. Grandparents of householder
7. Grandparents of householder's spouse
8. Brother/Sister of householder
9. Brother/Sister of householder's spouse
10. Other relative
11. Non-relative

Q4-4. How many people lived in your household at the time?

|___|___|

And

How many people aged 65 and over lived in your household at the time?

|___|___|

Q4-5. Where did you live before moving in current house?

1. In the case of outside of Seongnam city:
   (   ) City /County/District, (   )City/Province

2. In the case of migration within Seongnam city:
   (   ) town(dong), Seongnam City

3. Overseas

Q4-6. Please tell me the most important reason to move not to other area but within Bundang New Town? (Up to 2 answers)

1. Convenient to work
2. Good accessibility to Seoul
3. Good educational condition
4. Have roots in community
5. Purchase house (larger house)
6. Make extra money by selling pervious house
7. Convenient to urban facilities
8. Other (   )

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Now I have a few questions about <u>your apartment house and complex when you moved in current house.</u>

Q4-7. Was your home owned or rented before moving in current house?

    1. Owned
    2. Rented (the lease of a house on a deposit basis)
    3. Rented (monthly)
    4. Company housing
    5. Other (   )

Q4-8. What was your housing unit size before moving in current house? (Based on the exclusive area)

    |___|___|Pyeong

Q4-7. Is your home owned or rented?

    1. Owned
    2. Rented (the lease of a house on a deposit basis)
    3. Rented (monthly)
    4. Company housing
    5. Other (   )

Q4-10. What is your housing unit? (Based on the exclusive area)

    |___|___|Pyeong

Q4-11. What was the most important reason you chose a current apartment complex? (Up to 2 answers)

    1. Selected regardless of personal preference
    2. Near to the previous residence
    3. Good accessibility to Seoul
    4. Urban facilities for convenience
    5. Convenience for commuting to workplace or school
    6. Good educational condition
    7. Open space, leisure and sports facilities
    8. Neighbors have a high standard of living
    9. Affordable housing price
    10. Other (   )

Part III
OPINION ON THE CURRENT RESIDENCE
AND PERSPECTS FOR RESIDENT AGING

Now I have a few questions about <u>trip for daily life of your household.</u>

Q5-1. Is your householder commuting?

    1. Yes (GO TO Q5-2)
    2. No (GO TO Q5-5)

Q5-2. Where is your householder's workplace?

   1. In the case of commuting to the outside of Seongnam City:
     (   ) City/County/District, (   )City/Province

   2. In the case of commuting within Seongnam City:
     (   ) town(dong), Seongnam City

Q5-3. How does your householder usually get to work?

   1. Car
   2. Bus
   3. Transit
   4. Walk
   5. Other (   )

Q5-4. What routes does your householder use for commuting? Please check all relevant routes.

   1. Gyeongbu(Seoul to Busan) Expressway
   2. Bundang-Suseo Expressway
   3. Bundang-Naegok Expressway
   4. Bundnag subway line
   5. New Bundnag subway line
   6. Local streets
   7. Other (   )

Q5-5. Please tell me the shopping areas and name of retails you often visit.

   1. Yatap subway station (Name of retail store:)
   2. Imae subway station (Name of retail store:)
   3. Seohyeon subway station (Name of retail store:)
   4. Sunae subway station (Name of retail store:)
   5. Jeongja subway station (Name of retail store:)
   6. Migeum subway station (Name of retail store:)
   7. Ori subway station (Name of retail store:)
   8. Seongnam city built-up area (Name of retail store:)
   9. (   )District of Seoul (Name of retail store:)
  10.Other:(   )City (Name of retail store:)

Q5-6. Please check all relevant reasons that you often visit the shopping areas and retails.

   1. Near to home
   2. Close to public transportation
   3. Variety and high-quality of goods
   4. No suitable retails near to home
   5. Other (   )

Q5-7. How many students do your household have? Please write the number of students each case.

   1. |___|___| elementary school student(s) (GO TO Q5-8)
   2. |___|___| middle school student(s) (GO TO Q5-8)
   3. |___|___| high school student(s) (GO TO Q5-8)
   4. |___|___| college student(s) (GO TO Q5-8)
   5. None (GO TO 5-12)

Q5-8. Do students of your household live together or apart?

    1. One more students lived apart from household. (GO TO Q5-9)
    2. All students lived together. (GO TO Q5-12)

Q5-9. Which students live apart from household? Please write the number of students each case.

    1. |___|___| elementary school student(s)
    2. |___|___| middle school student(s)
    3. |___|___| high school student(s)
    4. |___|___| college student(s)

Q5-10. Where do students live in apart?

    1. |___|___| student(s) live in below area(s).
     1) (   ) City /County/District, (   )City/Province
     2) (   ) City /County/District, (   )City/Province
     3) (   ) City /County/District, (   )City/Province

    2. |___|___| student(s) live in overseas.

Q5-11. Why do the students live apart from household? Please check all relevant reasons.

    1. To improve students' academic performance
    2. To go to previous school continuously
    3. Education condition of residence doesn't reach the standard level.
    4. Other (   )

Now I have a few questions about <u>your opinion on the current residence and prospects for resident aging.</u>

Q5-12. How satisfied are you with conditions of current apartment complex?

	Very satisfactory	Satisfactory	Moderate	Unsatisfactory	Very unsatisfactory
(1)Transportation	1	2	3	4	5
(2)Education	1	2	3	4	5
(3)Shopping	1	2	3	4	5
(4)Leisure and culture	1	2	3	4	5
(5)Medical service and welfare	1	2	3	4	5

Q5-13. How about your apartment housing unit size?

    1. Too large (GO TO Q5-13-1)
    2. Large (GO TO Q5-13-1)
    3. Satisfactory (GO TO Q5-14)
    4. Small (GO TO Q5-13-2)
    5. Too small (GO TO Q5-13-2)

Q5-13-1. Please tell me why you think your housing unit is large.

    Reason (   )

Q5-13-2. Please tell me why you think your housing unit is small.

    Reason (   )

Q5-14. How about the condition of real estate transaction in your apartment complex?

    1. Some difficulties in real estate transaction (GO TO Q5-14-1)
    2. No difficulty in real estate transaction (GO TO Q5-15)
    3. Don't know (GO TO Q5-15)

Q5-14-1. Please tell me all relevant reasons that the condition of real estate transaction in your apartment complex is not good.
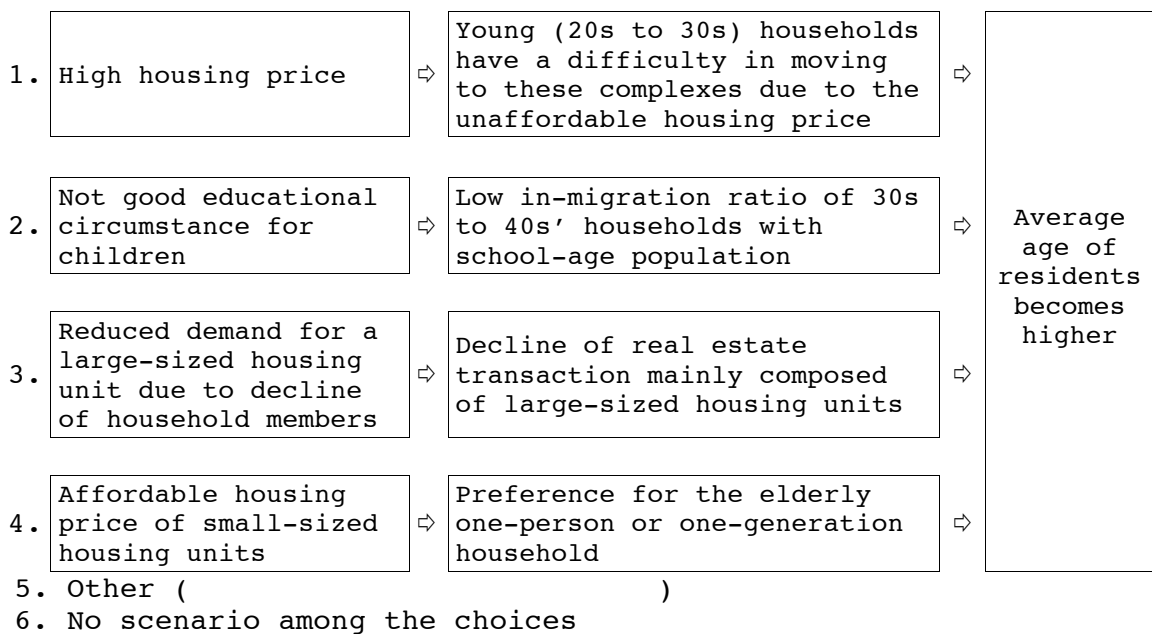
    1. Middle- and large-sized housing units
    2. Superannuated housing units and complexes
    3. Not a good education condition
    4. Many small-sized or rental housing units nearby
    5. Massive supply of new apartment housing units nearby
    6. High housing sale or rental price
    7. Other (   )

Q5-15. The table below shows population pyramid graphs of Yatap 2-dong and Sunae 1-dong in 2000 and 2010. Population cohorts of two town(dong)s had a similarity in 2000. However, You can find a marked difference in the proportion of households which have school age children in 2010. Please tell me the most important fact that such a difference has been occurred. (Up to 2 answers)

    1. Difference of traffic convenience for moving to Seoul by car, bus or subway
    2. Difference of educational condition for children (e.g., school district, supplementary educational institute, etc.)
    3. High population mobility of Sunae 1-dong
    4. Convenience of using the good leisure spaces (e.g., Central park, Tan river, etc.)
    5. Difference of commercial supremacy between Yatap and Sunae subway station sphere of influence
    6. Other (   )

2000	Town	2010
	Yatap 2-dong ▶ ▶	
	Sunae 1-dong ▶ ▶	
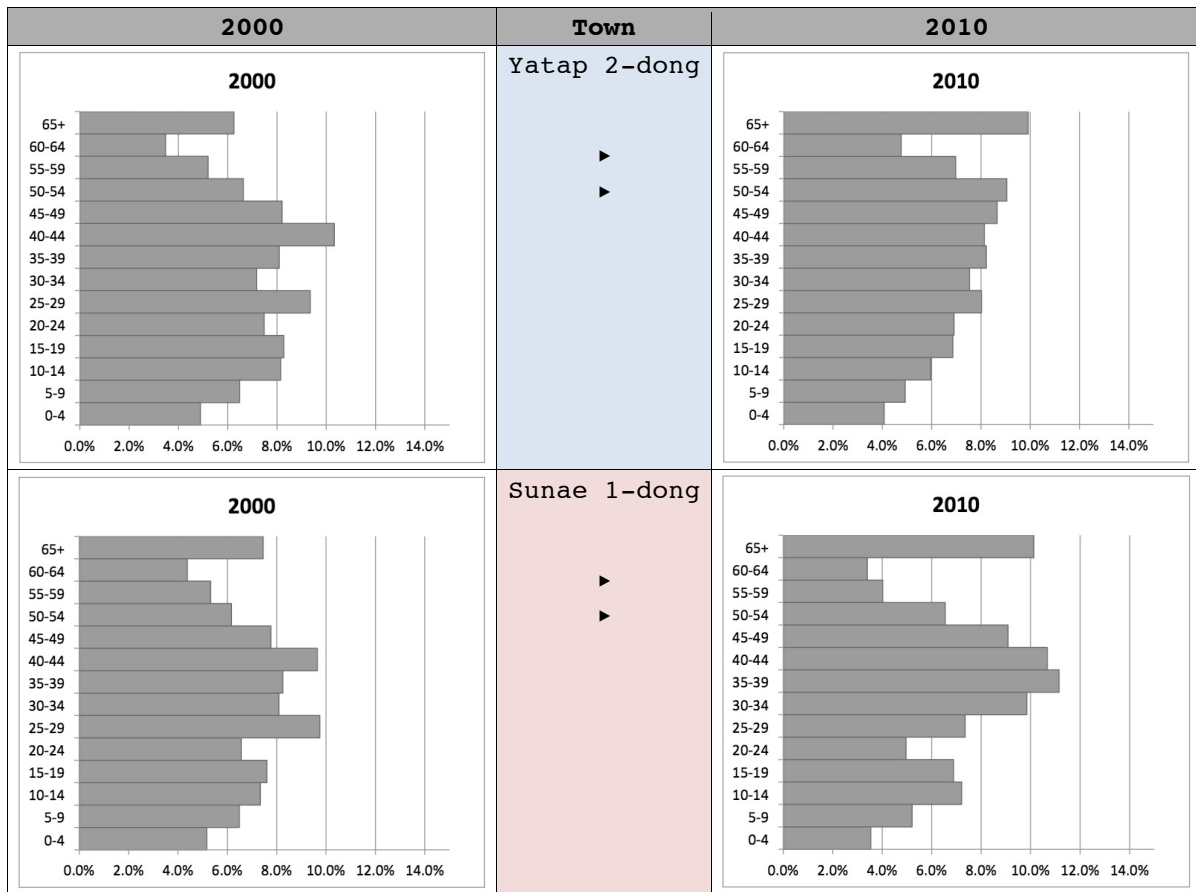
Q5-16 Follows are population aging (the average age of residents becomes higher) scenarios which may occur in your current apartment complexes under the situations of population decease and real estate recession. Which scenario has the highest possibility?

1. High housing price	⇨	Young (20s to 30s) households have a difficulty in moving to these complexes due to the unaffordable housing price	⇨	
2. Not good educational circumstance for children	⇨	Low in-migration ratio of 30s to 40s' households with school-age population	⇨	Average age of residents becomes higher
3. Reduced demand for a large-sized housing unit due to decline of household members	⇨	Decline of real estate transaction mainly composed of large-sized housing units	⇨	
4. Affordable housing price of small-sized housing units	⇨	Preference for the elderly one-person or one-generation household	⇨	

5. Other (   )

6. No scenario among the choices

Q5-17. Do you have an intention to reside in current residence in the future?

    1. Hope to live continuously (GO TO Q5-17-1)
    2. Plan to leave (GO TO Q5-17-2)
    3. Unable to leave Bundang New Town due to constraint conditions in spite of hoping to leave immediately (GO TO Q5-17-3)

Q5-17-1. Please tell me the most important reason to hope to live continuously. (Up to 2 answers) (GO TO BQ1)

    1. Pride of living in Bundang New Town
    2. Have roots in community
    3. Good accessibility to Seoul
    4. Convenient to urban facilities
    5. Convenience for commuting to workplace or school
    6. Good educational condition
    7. Open space, leisure and sports facilities
    8. Neighbors have a high standard of living
    9. Affordable housing price
    10. Other (   )

Q5-17-2. Please tell me the most important reason to plan to leave a current residence. (Up to 2 answers) (GO TO BQ1)

    1. Superannuated housing
    2. Concern about long depression of real estate market
    3. Inconvenient to the elderly
    4. Improve education condition
    5. Inconvenient to retail (shopping, entertainment, restaurants)
    6. Inconvenient to work
    7. Not cheerful residential surroundings
    8. Other(   )

Q5-17-3. Please tell me the most important reason that you are not able to leave Bundang New Town in spite of hoping to leave immediately. (Up to 2 answers) (GO TO BQ1)

    1. Impeded real estate transaction by long depression
    2. Property depreciation
    3. Completion of children's education
    4. Have roots in community
    5. Live close to family
    6. Other(   )

BQ1. Which one is your householder's job?

1. Farming, Forest farming or Fishing
2. Retail
3. Sales, Marketing or Services
4. Manufacturing, Construction or Simple labor
5. Clerical, Managerial or Professional
6. Housewife
7. Student
8. Unemployed/Retired/Other

BQ2. Which is the highest grade your householder has completed?

1. Less than middle school graduate
2. High school graduate
3. College degree more

BQ3. Please check your total household income, before taxes, in the last month.

1. Below 1,000 USD
2. 1,000 to 2,000 USD
3. 2,000 to 3,000 USD
4. 3,000 to 4,000 USD
5. 4,000 to 5,000 USD
6. 5,000 to 7,000 USD
7. 7,000 to 10,000 USD
8. More than 10,000 USD

Thank you very much for your cooperation.
Your assistance has been very helpful.