A STUDY ON THE CHARACTERS OF THE NEW TOWN PROJECT IN THE CONTEXT OF THE COMPACT CITY: THE CASE OF WANGSIMNI NEW TOWN PROJECT IN SEOUL

By

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To my parents and wife

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LIST OF ABBREVIATIONS

AHP	Analytic Hierarchy Process
CBD	Central Business District

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Seoul, the capital city of the Republic of Korea, implemented the ‘Gangnam, where is south of Seoul, development promoted policy’ through diverse tax benefits and support and by restricting development in Gangbuk, where is north of Seoul, city center in the 1970s and 1980s. As a result, the economic center of Seoul has been relocated to Gangnam, and an imbalance between Gangbuk and Gangnam has intensified in terms of living conditions, educational level and real estate market. Existing urban development in the old section of the city revealed its limitations, so the introduction of a new method of development was requested.

Beginning in the 2000s, Seoul has been legislating urban regeneration policies to improve the quality of life and to restore the overall regional functions in economic, social and cultural respects. Thus, a new town project is being implemented to improve the imbalance between Gangnam and Gangbuk which is relatively behind.

The aim of New town project is to build a ‘welfare residential environment of high quality’ that will create harmony in all areas of a city as a result of simple physical

improvements in the environment in residential zones that are of an optimal size. New town projects are expected to improve urban functions and produce harmony in the entire area by introducing a notion of urban regeneration that considers both physical and nonphysical factors simultaneously and that has in place systematic maintenance and management.

This research examines a new town project and develops an analysis index consisting of the main factors that help define the characteristics of compact city development. Then, this study analyzes the case of one new town project, Wangsimni New Town.

Indicators that thoroughly examine the characteristics of a compact city in terms of social, economic and environmental sustainability are selected to verify the research question. Weights are attributed to the compact city indicators by the AHP analysis. The Wangsimni New Town project is examined before and after development, and compactness is evaluated by applying the indicators.

This research chronologically documents the history and progress of new town projects and specifically the study area of Wangsimni New Town. Then, it identifies characteristics and notions that should be considered in urban regeneration and compact city development. Lastly, it develops an understanding of changes by examining the new town project before and after its development and examines the improvements in the characteristics of the urban regeneration method of compact city development.

CHAPTER 1.
INTRODUCTION

Compact city development is an alternative of urban sustainable development model of cities. The theoretical basis for compact city development as a strategic alternative for producing sustainability is relatively simple; if a city is developed compactly, distances traveled for urban activity decreases, energy consumption and gas emissions are reduced, land destroyed by development diminishes, and urban space and facilities can be used more efficiently. Even though these advantages have not been confirmed clearly in reality until now, a trend in the methods of urban development in developed societies toward high-density development slowly is slowly becoming apparent.

For example, in the Netherlands, a measure that combines land-use and transportation plans together as a category of environmental strategy has been developed at the state level. The fourth report on national land planning in the Netherlands discloses that the pressure of the development of a city can be relieved through a synthetic approach that addresses transportation policy, environment policy and a national land-use plan to induce improvements in the quality of life in a city, and to consistently reduce automobile use in a the city area. The focal points of the plan are to commute distance, and maximize the use of bicycles and public transportation by concentrating residences, work places and leisure facilities (Hall, 1997).

To acquire the advantages of compact city development, the Korean government implemented ‘The Modified 4th National Territorial Master Plan (NTMP)’ in 2011 for the following 10 years. The main idea in terms of urban planning is to create a

‘Compact City’ that corresponds with current Korea circumstances. The main purpose of the plan is to achieve sustainable and environmentally sound development. The original master plan, which was implemented in 2006, focused only on the construction of new cities, which was to be a priority in each district. Through the modified 4th NTMP, the Korean government changed the plan from the new construction of cities to urban regeneration, creating the ‘Compact City’ to control urban sprawl. There are several reasons that the government chose the compact city as a major development method. First, population outflow is occurring because of the development of suburban areas in the case of mega-cities, and the population decline diminishes the urban function of the central regions in the case of mid-size and small cities. Second, because new cities are usually developed in suburban areas, there is a disconnection between living areas and working places. The situation leads to longer trips and increases transportation costs. In the case of provincial cities, moving public institutions and business-related facilities to newly developed cities causes a decline in CBD and consequentially, leads to the deterioration of the living environment in central areas.

This research focuses on a regeneration development project in the city of Seoul in Korea. Then, it examines whether the project is aligned with the concept of compact city development in current national land-use planning in Korea.

New Town Project

Seoul implemented the ‘Gangnam policy to promoted developmet’ through diverse tax benefits and support and by restricting development in Gangbuk’s city center in the 1970s and 1980s. As a result, the economic center of Seoul has been relocated to Gangnam, and an imbalance between Gangbuk and Gangnam has

intensified in terms of living conditions, educational level and real estate market. Existing urban development in the old section of the city revealed its limitations, so the introduction of a new method of development was requested by public administrations. Previous development methods that have been implemented by the private sector have caused the congestion of Seoul and have not improved problems because they have focused on producing profit and providing housing without sufficient consideration for necessary infrastructure. In addition, the method has led to impediments in residential areas that do not have sufficient facilities and amenities. Furthermore, the public sector, which should lead efficient development by inducing participation and investment from the private sector, could not play an effective role, resulting in unplanned development of Seoul that is neither comprehensive nor systematic. Therefore, the need for a new concept of urban development has been increasing as the limitations of the existing methods of urban development become recognized.

Beginning in the 2000s, Seoul has been legislating urban regeneration policies to improve the quality of life and to restore the overall regional functions in economic, social and cultural respects. Thus, a new town project is being implemented to improve the imbalance between Gangnam which is developed and Gangbuk which is relatively behind. Recently, urban regeneration policies have been considered to be an alternative that will solve many urban problems, including the differential between regions, the deterioration of old city centers and depressed areas that need to be revitalized. In Korea, urban regeneration policies are being actively implemented in megacities. However, because most of the policies are established following the models of other countries, developing policies that are based on accurate understanding and methodical

approaches is needed. In addition, the integrated development of a city should be considered through an urban regeneration policy that reflects the identities of communities.

Several cities, including Seoul, where an urban regeneration policy has been implemented directed toward a new town project to create an ‘anthropocentricity community’ in which various generations and people of different strata live together. The aim is to build a ‘better residential environment of high quality’ that will create harmony in all areas of a city as a result of simple physical improvements in the environment in residential zones that are of an optimal size. New town projects are expected to improve urban functions and produce harmony in the entire area by introducing a notion of urban regeneration that considers both physical and nonphysical factors simultaneously and that has in place systematic maintenance and management.

This research examines a new town project and develops an analysis index consisting of the main factors that help define the characteristics of compact city development. Then, this study analyzes the case of one new town project, Wangsimni New Town.

Purpose of Research

In this study, the main research question is, ‘Is the Wangsimni New Town project developed as a compact city that aims for high-density, eco-friendly and economic improvement?’

Secondary questions are the following.

First, ‘Is economic sustainability through compact city development reflected in the Wangsimni New Town development project?’

Regarding the economy, high density could be effective because diverse activities are intensively contained. This study examines whether economic sustainability in a compact city development, including efficiency of energy consumption and efficiency of resource consumption such as emissions and recycling of domestic waste, is reflected in the Wangsimni New Town project.

Second, ‘Is environmental sustainability through compact city development reflected the Wangsimni New Town project?’

The compact city suggests various environmental benefits, including reducing gas emissions and minimizing land use in a city and the surrounding region. Thus, this research examines the effects of compact city development on environmental factors such as air quality, land use and domestic waste in the Wangsimni New Town project.

Third, ‘Is social sustainability through compact city development reflected in the Wangsimni New Town project?’

To achieve social sustainability is the main purpose of the compact city concept, although it is a sensitive matter in urban regeneration because it is controversial for residents. Accessibility to public facilities such as public offices, schools, libraries and medical centers has close relevance to the quality of life of residents. Thus, this study examines the effect of compact city development on aspects of social sustainability in the Wangsimni New Town project.

The aims of this study are as follows:

First, this research chronologically documents the history and progress of new town projects and specifically the study area of Wangsimni New Town. Second, this study identifies characteristics and notions that should be considered in urban

regeneration and compact city development. Third, it develops an understanding of changes by examining the new town project before and after its development and examines the improvements in the characteristics of the urban regeneration method of compact city development.

Chapter 2, the literature review, focuses on urban regeneration development, and compact city development, which is one method of urban regeneration. Chapter 3, the methodology, discusses the research method that includes selection of case study, and Analytic Hierarchy Process. Chapter 4 examines New town project in general and Wangsimni new town project specifically. Chapter 5, findings and analysis, examines the research findings and evaluates Wangsimni new town project to determine whether it has been developed compactly with indicators analyzed by the AHP. Chapter 6, suggests recommendation for New town project, and presents for future research and discusses the limitation of the study.

CHAPTER 2.
LITERATURE VIEW

Introduction

In this section, the notion of urban regeneration and compact city development as a method of urban regeneration through previous studies is examined. Through this examination, the type of urban regeneration method that is suitable for achieving sustainability through a transition process of urban redevelopment is explored, and the method is applied to new town projects.

Through a review of the literature on compact city development, the history, formation process, and effects and controversy of compact city development are explored. Based on the review, the major concepts of new town development are organized. With the organization of these concepts, a critical analysis of compact cities using indicators is performed. Therefore, diverse literature is examined to select the indicators that have objectivity and representativeness to measure the characteristics of a compact city in aspects of social, economic and environmental sustainability.

Urban Regeneration

Background of Urban Regeneration

Urban regeneration is a notion that was introduced in the United Kingdom in the 1980s, and its main purpose is to promote urban revival through the overall reorganization of a city center. After World War II, the development of suburban areas progressed rapidly because the industrial structure had changed, and living conditions had changed as well, mainly as a result of the proliferation of automobiles. Thus, people who had lived in the inner city area moved to outlying suburban regions, and large-scale commercial facilities also began to locate in suburban areas (Cho, 2007).

Suburbanization through urban sprawl caused many problems, such as wasted energy and resources because of long commute distances, traffic congestion and air pollution, loss of regional identity, and environmental damage. In addition, decreased urban competitiveness and the low-density use of land were amplified, together with social problems such as an increase in crime rates and unemployment rates in city centers. As a result, the urban sprawl phenomenon resulted in a decrease in population and a decline in commercial activity in city centers.

Under such situations, an urban regeneration policy was developed to combat inner city decline and to prevent the unplanned spread of the metropolis region caused by the effects of urban restructuring based on neoliberalism.

Efforts to solve urban problems by activating depressed economies and improving infrastructures have grown continuously since the 1950s. The representatives of these efforts consist of urban reconstruction in the 1950s, urban revitalization in the 1960s, urban renewal in the 1970s and urban redevelopment in the 1980s.

However, those new methods could not solve inner city problems, failing to provide lasting environmental improvements because they focused only on improving the physical environment and addressed housing, education, employment and social problems as separate issues. As a result, efforts toward urban revival have been attempted through the overall regeneration of existing city centers, an approach that is different from previous methods that focused on the physical improvement of the environment (Yeo, 2007).

Boundaries between countries of the world and competition among countries are redirected into urban competiveness over policies and strategies at the urban level that

go beyond simple physical improvement. In addition, urban renewal projects that are developed by politicians who ignore market logic in favor of politics logic, involving private companies that work to maximize profits and government officials who prefer government-sponsored development, can no longer achieve success (Oh, 2007).

Accordingly, urban regeneration is introduced as a notion based on the necessity for an integrated method that institutes a tactical plan and that develops policies on the urban level to improve depressed regions economically, socially and physically. In the process, this approach intends to satisfy the requirements of citizens by improving economic, social and environmental conditions and enhancing the competitiveness of regions.

Table 2-1. Transition process of urban regeneration

Division	1950s Reconstruction	1960s Revitalization	1970s Renewal	1980s Redevelopment	1990s Regeneration
Main strategy and trend	Reconstruction of decrepit region by master plan, growth of suburb area	Maintain trend of 1950s, growth of suburb and fringe area, early attempt of revitalization	Concern for renewal and neighborhood unit development, continuous development of fringe region	Large scale development, redevelopment plan, large scale project	Change of policy and execution to overall form, emphasis on integrated solution
Main actor and stake holder	The central and regional government, private developer and contractor	Making harmony and balance between public and private sector	Intensify role of private sector, de-centralization of regional government	Private sector and special central government, growth of partnership	Dominant of partnership
Spatial level	Emphasis on level of regional and applied land	Appearance of activity in regional level	Region and regional level in the beginning, later emphasis on regional level	Emphasis on applied land level in early 80s, later emphasis on regional level	Reintroduction of strategic view, growth of activity in regional level
Economic aspect	Investment of public sector	Growth of investment of private sector	Growth of private investment because of financial pressure of public sector	Private sector that receives selective public fund	Importance of balance between public, private and voluntary fund
Social aspect	Improvement of housing and living condition	Enhancement of social welfare	Policy for community	Self-help of community under selective support	Emphasis on the role of community

				of government	
Physical aspect	Replacement of inner area, development of fringe area	Reconstruction of existing region with maintaining 1950s' policy	Expand renewal of decrepit urban region	Large scale redevelopment, new development, Large scale development project	Preserve cultural heritage and environment. Careful development rather than 1980s
Environmental approach	Landscape work	Selective improvement	Improvement of environment by partial innovated development	Increase concern in environmental approach	Introduce broader notion called environmental sustainability

Source: Peter Roberts and Hugh Sykes, Urban Regeneration: A handbook, SAGE Publication, 2000, p.14.

The Notion of Urban Regeneration

The definition of urban regeneration varies among regions and scholars, and collaborative notions are not corrected even when animated discussion and research are in progress. However, the notion of urban regeneration has been introduced globally, and it is considered to be an alternative to prevent the detrimental expansion of metropolises; to avoid urban deterioration; to promote the revitalization of urban areas; and to promote economic growth, environment preservation and, ultimately, the recovery of regional identity.

Urban regeneration is a concrete, realizable urban development paradigm, and it represents a notion that is an enormous step forward from urban development as in the previous approaches to urban redevelopment and urban renewal. The main purpose of urban development and urban renewal was the physical improvement of the environment of undeveloped areas in a city. However, urban regeneration focuses on the physical improvement of the environment as well as on the recovery of regional and community identity with social programs such as rehabilitation for low-income groups or neglected classes of people.

The industrial structure has changed from mechanical mass production to new industries such as electronic engineering, high technology and information technology. Currently, urban regeneration is defined by the revival of an undeveloped area economically, socially and physically by creating new functions. Urban regeneration emphasizes a decision-making system intended to promote agreement between stakeholders as a processing activity to maintain and activate the urban community. Additionally, urban regeneration is defined as a renewal concept of an integrated

approaching method that considers many aspects of an area, including physical aspects to ensure the sustainable living conditions of residents, social aspects to reinvigorate social and cultural functions, and economic aspects to restore the urban economy (Korea Urban Regeneration Center, 2002).

The meaning of urban regeneration that shares physical and social characteristics is used in combination with other similar concepts (Hwnag, 2002). Related concepts that share similar purpose with urban regeneration include Local Agenda 21, Slow City, New Urbanism, Smart Growth, Urban Village, and Creating Livable City. Urban regeneration is shown to be a broader and higher concept than these other concepts (Kim, 2007).

Table 2-2. Similar types with urban regeneration

Division	Country(Year)	Characteristic
New Urbanism	The United States (late 1980s)	· Point out loss of land and community spirit by thoughtless suburbanization · Sustainable development and realization of eco-city · Physical development guideline for spatial plan
Smart Growth	The United States (late 1980s)	· Confront loss of land environmental problem by thoughtless suburbanization · High-density and mixed use development and pedestrian-oriented development · Wide approach to regulate, induce and manage urban growth · Creating broad land-use system that treats physical development
Urban Village	The United Kingdom (late 1980s)	· Prevent uniform and monotonous city that ignore regional feature and environment · Formation living area of small scale that focuses on public space · Design concept that is available to apply to physical factors of urban space · Pedestrian friendly and high-density · mixed land-use
Local Agenda 21	United Nation (1992)	·Specific practical strategies of sustainable development for preserve natural environment · Action guide that includes environment, society and economy at large · Start point of regional activity by citizen
Slow City	Italy (1998)	· Resist global standardization and rapid change that ignore adaptation velocity of human · Improvement quality of life that respect human rhythm of life, and pursuit leisurely life · Way of thinking to improve quality of life by citizen themselves · Focus on preservation and development of environment, food, culture and tradition · Action system that is available to apply by regional features
Creating Livable City	South Korea (2005)	· Switch over from quantitative growth that is monotonous and fast to qualitative growth · A city that has attachment and pride · Improvement living space, working area and playground by citizens · Systematic support of central government for fragmentary and sporadic effort to solve problems in living

Source: Lee, Samsu (2006). The meaning of change in urban paradigm, p.33

In the United Kingdom, urban regeneration is defined not as an individual solution for the deterioration of an area but as integrated efforts to improve economic, social and environmental conditions consistently on the basis of the assumption of a partnership between the public and private sectors under a strategic plan for urban development (Yang, 2006). In Japan, urban regeneration is defined as a process that establishes visions and plans to address the deterioration of an area by economic, social and environmental means; to promote sustainable development conditions in an area by preserving, recovering and improving cooperation with the administration, the community and business; and to aim for sustainability in three aspects, consisting of society, the environment and the economy (Yang, 2006).

Although there are some differences, urban regeneration has something in common with in that it is a plan on the urban level to improve deteriorating areas, it satisfies the requirements of residents by improving a region consistently, and it involves integrated efforts to enhance the competitiveness of a region.

Thus, urban regeneration is considered an integrated method to develop and organize a city. Urban regeneration creates a city considering the capacity of the environment over unilateral physical development, creates an urban community that distributes resources fairly among community members, and creates a city that pursues economic sustainability for future generations by saving energy, resources and land.

Content and Characteristics of Urban Regeneration

The characteristics of urban regeneration that have been prosecuted since the 1990s are a more synthetic conversion policy and its execution, an emphasis on integrated countermeasures, the reintroduction of a strategic view of the level of growth

management, activities to promote growth on a regional level, an emphasis on the role of the community, the preservation of cultural heritage, environmental sustainability, and reflection on the notion of sustainable development in urban regeneration policies and plans (Robert and Sykes, 2000). This approach is different from the existing approaching method, which focuses only on the physical improvement of the environment. The major aspects of planning are categorized as physical, economic, and social (Kim, 2003).

However, political and systematic regeneration methods should be supported to maintain the efficiency of urban regeneration in addition to the physical improvement of the environment, which improves facilities and the surrounding of a deteriorating region in the course of urban regeneration. To do that, an assertive role on the part of central and regional governments and residents is critical.

Thus, urban regeneration is redefined by classifying it into three aspects. First, in the physical and environmental aspect, urban regeneration reforms a city structure in a compact and well-formed manner, and it seeks a spatial and systematic method to create an ecologically healthful city. In addition, urban regeneration identifies a sustainable structure for urban space and creates vitalized and pleasant spaces in which humans coexist with the natural environment. Second, in social and economic aspect, urban regeneration secures a balance between urban capacity and development, restores regional communities, provides equal opportunities for work and leisure, and pursues social equity. Furthermore, urban regeneration plays a role in accelerating urban revitalization by constructing self-contained economic base. Third, in

political and managerial aspects, urban regeneration promotes the return of the population and industry by restoring urban function and manifests sustainable urban development by reviving a city as a livable space (Oh and Yeum, 2008).

Even though its political and managerial aspects are not apparent externally, urban regeneration is a fundamental system that is required for urban vitalization, and it can be separated into elements related to policy, finance and organization. A regeneration method related to policy refers to the policy and scheme of a city in the medium and long-term through the establishment of urban planning, and it suggests a standard direction that includes associating urban regeneration with basic urban planning, correlating between general and specific plans, and improving related laws and systems to regenerate urban functions. The main measures related to finance are expanding public financial affairs to secure funds for urban regeneration, a tax incentive to encourage residents and industry to relocate to or stay in a city, and a subsidy to revitalize urban trading areas. In other words, the purpose of urban regeneration is to improve poorly developed parts of a city and to achieve a vigorous urban economy. Regeneration related to organization refers to a public or private cooperative system that is organized around urban regeneration. Regeneration policies are actively initiated to draw residents' direct participation. In this case, the renewal of public and private organizations could be included as well as the systematization of public organizations and agreements (Park, 2004).

Classification of Urban Regeneration

Simply constructing new buildings and infrastructures to halt the vicious cycle in which buildings and infrastructures become run down and the regional economy is

depressed leads to ghettoism, which changes a decrepit region to a deteriorating region, and is limited in its ability to solve urban problems. Therefore, an integrated approach that goes beyond simple physical improvement is needed, and urban regeneration that takes an integrated approaching method can be divided into environmental regeneration, economic regeneration and living regeneration (Korea Urban Regeneration Center, 2002).

Environmental regeneration is highly related to the improvement in the physical and environmental aspects of a city. Its purpose is to enhance the efficiency of land use, organize construction and infrastructure, and reduce the environmental load. These aspects are among the most basic and essential parts of urban regeneration, along with effectiveness and the aim of upgrading existing housing.

The goal of economic regeneration sets is not only to create new industry and work in a city but also to revitalize and recreate economic activity. Restoration of an economy is achieved by improving the effects of physical development in the previous method of urban development, although urban regeneration simultaneously considers restoration of the economy at the planning level. That is, because the quality of the infrastructure of culture, society and living has been crucial, the necessity and importance of economic regeneration are expanded, not as a result but as one aspect of urban regeneration.

If environmental regeneration can be considered a hardware domain in urban regeneration, then living regeneration is a software domain. Purposes of environmental regeneration are to renovate the conditions of culture, welfare and education; to

construct a sustainable community by recovery of a regional identity; and to activate residents participation. In particular, if methods of housing redevelopment and city center redevelopment are unilaterally decided on by public officials in the process of executing policy, urban regeneration attempts to carry out policy by constructing a cooperative system that reflects the opinions of the market and residents. Residents express their requirement that their quality of life be raised, and living regeneration conducts urban improvement by reflecting their opinions. Living regeneration is differentiated from other urban improvement methods and is considered to be more important than before.

Combined the environment, economic and living regeneration can restore urban function, revive urban communities, and create energy and attraction in a city. Each aspect of urban regeneration cannot be achieved by simple policy and project alone. Drastic changes, such as improvements in the mindset of citizens and the establishment of support systems, should be pursued until a sustainable community is formed.

Compact City

The History of the Compact City

The Industrial Revolution brought rapid urbanization. It caused not only the deterioration of the urban environment but also numerous social problems. To solve those problems, social solutions were considered mainstream, and attempts were made to improve the environment of citizens by improving urban circumstances. Western cities in the 20th century that were different from cities of the 19th century aimed for a

new form of city planning, suggesting various urban forms to solve the social problems through new approaches (Hall 1998).

Two main countermeasures were offered to improve the urban environment, among which were the supplementation of systems such as those related to public hygiene and the use of zoning. Another suggestion was to build an idle city with a new social structure and environment that was totally different from existing cities. An attempt to construct an idyllic city that departed from the previous system was the 'Garden City' of E. Howard, which became a foundation of the theoretical background for a low-density, dispersed city. The concepts of the garden city included an idea of a 'planned community' that would be composed of a small regional society and that would be self-contained and a planned region in which city growth would be maintained on an appropriate scale (Hall, 1998)

In the late 1920s, related to the theory of a 'Garden City', C.A. Perry worried that a change of lifestyle through new town development would lead to weakened traditional relationships between individuals and neighborhood and regional societies and collapse of intimate human relationships. Thus, rebuilding the union of relationships was considered a method to revive human dignity and identity and to save the public welfare from an inhumane urban environment. These ideas were imposed on the notion of the residential neighborhood. The construction of the idle city is explained in terms of 'Sustainable Development,' which attempts to minimize the destruction of human relationships and the natural environment.

After World War II, the character of urban growth as the rapid development of suburban areas with a tendency toward decentralization appeared, particularly in North America, Australia and Japan. As an extreme example, the appearance of a “hundred mile city” was predicted that would expand its range through traffic networks (Sudjic, 1992). In contrast, in medium and small cities in South Korea and Europe, urbanization had a tendency to expand from the urban center, accompanied by the phenomenon that the green zone was converted to urban usage. From these types of processes, the urban environment and the landscape were destroyed, and the price of construction of substructures for urban living increased sharply.

Acceleration of green zone destruction through the development of low-density housing and increased commute distance and time by expansion of the population into the suburbs resulted in sustainability problems related to the environment and problems of inefficiency in the use of space. As an alternative, the ‘compact city model’ was suggested (de Roo and Miller, 2000). Compact city development, which aims to recentralize the population and industrial activities, could take place in various forms, such as increasing the density of the existing city center and urban regeneration or reconstruction. As an extreme example, a city model in which energy consumption could be minimized by minimizing the distance of the commute by converting verticality from horizontality was proposed in which 250 thousand people would live in a cylinder-shaped building (3 km wide with 8 floors) with the ability to modify the climate (Dantzig and Saaty, 1973). In Europe, compact city development was attempted, motivated by the formation of a self-contained city in the late 1970s, when green zones were lost on a

large scale because of intensive development of suburban areas (Elkin et al., 1991). Through these types of approaches, more concentration and various uses of urban space were attempted, and then the opportunity was presented for the evasion or revival of urban function (Beatley, 1995).

Low-density development increased the level of dependence on the automobile and decreased the efficiency of public transportation. Automobile use, especially with a single driver, offers additional legitimacy for compact city development because it addresses traffic congestion, environmental pollution, and energy consumption (Newman and Kenworthy, 1991). The concentrated and synthetic use of urban space leads to an improvement in sustainability by decreasing trip distances and making public transportation more attractive. Elkin (1991) asserted that a city should have compactness to encourage vital social relationships through walking, bicycle use, and efficient use of public transportation.

The Definition of the Compact City

There is no agreed-upon definition among scholars of a compact city, but it is usually understood as an approach involving concentrated development and the high-density use of urban space (Williams et al., 1996). Discussion about the notion of a compact city occurred as early as the 1930s. Le Corbusier, who was an authority on concentrated urban development, suggested a solution to urban congestion through intensive city development, in other words, more public spaces could be obtained with the construction of high-rise buildings (Hall, 1998). In addition, Jane Jacobs (1962) asserted that urban diversity is created in the high-density use of spaces, and these diversities of urban activities increase the opportunities for urban life.

Look (1995) described concentrated city development as a process of the full use of existing urbanized spaces before the use of green zones, and Naess (1993) explained it as a concentrated development process of regions where a technically encroachment on the environment has already occurred. Roseth (1991) stated that intensive city development is an urban integration process through the increase of population and structures within a restricted city range. The notion presented by Roseth shows that compact urban living and its connection to sustainability are associated with high-density use by populations and structures.

Therefore, optimization and integration are used as terms to explain numerous strategies to develop some regions by the use of compactness. The Ministry of Environment of the United Kingdom explains that urban concentration is divided into structures and activities (Williams et al., 1996). Concentration of structures comprises redevelopment for the intensive use of existing buildings or previously developed spaces, an extension of established structures or additions to buildings, and the development of undeveloped urban spaces. The concentration of activities means the increased use of existing structures or land, a change in use that results in an increase in activities, and the growth of the activities of residents, officials and tourists.

Politically, the primary reason that a compact city policy is adopted is the lack of requisite available land in a city and a spatial structure in which functions are spread across the rest of the region. Compound functions in a city are preferable to separated functions, and a multi-function city provides various urban stimulations and attractions that are not available in a single-function city. In addition, each function is located

nearby in a multi-function city, leading to a decline in the use of the automobile. Therefore, the characteristics of a compact city include the concentrated use of existing urban regions, combined rather than dispersed functions, complex rather than separate functions, and high-density construction (Bartelds and de Roo, 1995). The main advantages of the compact city are the economic improvement of a city, a decline in the use of the automobile, an increased use of bicycles and public transportation, and restricted development of the green zone. In addition, accessibility because of density and function effects are important standards (de Roo, 2000)

The Characteristics of the Compact City

In a city, diverse activities appear intensively, and land is densely used. Available land and space are limiting, and the environmentally acceptable capacity is limited. Note that a city is described by a form of development that is polysynthetic and concentrated in an urban environment.

The key point of the compact city theory is to achieve high-density development with compounded land, including the residential and commercial areas in the city center. Additional characteristics are the exclusion of low-rise detached houses and increased energy efficiency through concentrated, high-density development. In a compact city, the business district, the residential area, public space and personal services facilities are located nearby, which leads to increased use of eco-friendly public transportation. Consequently, a compact city not only reduces the use of transportation energy but also promotes a healthier environment, suitable public transportation, social equity, and improved quality of life (Frey, 1999).

The opposite concept to the compact city is ‘Urban Sprawl,’ which is the usual urban form with low-density and widespread diffusion in Western countries. Debate over the compact city versus urban sprawl is divided by density (high or low) and density pattern (concentration or diffusion). In addition, in the view of the city scale, the debate is mainly related to the spatial structure of megacities such as Los Angeles or New York City in America, London in England and Seoul in South Korea rather than small cities.

The compact city rejects the spread of urban space and induces relatively compacted development and mixed land-use while accommodating ordinary urban functions such as dwellings, business, commercial and services in the existing urban center. That is, the compact city aims for high-density development within a city boundary, controls new development in suburban areas, and provides diversity of urban activities.

Table 2-3. Comparison of the compact city and urban sprawl

Classify	The compact city	Urban sprawl
Characteristics	1. High residential and employment densities 2. Mixture of land uses 3. Fine grain of land uses (proximity of varied uses and small relative size of land parcels) 4. Increased social and economic interactions 5. Contiguous development (some parcels or structures may be vacant or abandoned or surface parking) 6. Contained urban development, demarcated by legible limits 7. Urban infrastructure, especially sewerage and water mains 8. Multimodal transportation 9. High degrees of accessibility: local/regional 10. High degrees of street connectivity (internal/external), including sidewalks and bicycle lanes 11. High degree of impervious surface coverage 12. Low open-space ratio 13. Unitary control of planning of land development, or closely coordinated control 14. Sufficient government fiscal capacity to finance urban facilities and infrastructure	1. Low residential density 2. Unlimited outward extension of new development 3. Spatial segregation of different types of land uses through zoning 4. Leapfrog development 5. No centralized ownership of land or planning of land development 6. All transportation dominated by privately owned motor vehicles 7. Fragmentation of governance authority of land uses among many local governments 8. Great variances in the fiscal capacity of local governments 9. Widespread commercial strip development along major roadways 10. Major reliance on a filtering process to provide housing for low-income households

Source: Neuman, M. 2005. The compact city Fallacy, Journal of Planning Education and Research 25: 11-26

Strategic Effectiveness of the Compact City

Spatial Effectiveness

The primary reason that compact development is favored is directly related to its impact on space. The development of an existing urban region relieves the pressure of development of insufficient green zones and especially promotes maximizing the effective development of unused regions or low-density spaces. This assertion is powerfully persuasive, especially for people who have an interest in protecting the environment and in urban regeneration. However, the concept cannot be persuasive with people who believe that many cities are already developed beyond their limits and that more development causes negative impacts on the environment.

These notions of overdevelopment lead to overcrowding in towns and concern about the loss of pleasant surroundings. Furthermore, these ideas create struggles to deter development in surrounding green zones or to protect preferred spaces for exercise and playgrounds. Those opposed to development criticize the greed of developers and express anger that citizen participation is neglected in the process of regional development. In many cases, these assertions concentrated on points of accumulated effectiveness by development and insist that various areas in undeveloped urban spaces should be reserved as play space or wild spaces.

However, urban conditions could be completely turned around. That is, the existence of excessive amounts of abandoned land and undeveloped spaces could cause negative effects on the entire city region. Both urban regions that remain empty spaces or are temporarily used as parking lots and discarded urban regions that are used momentarily or for unofficial activities have negative effects on citizens, not only

visually, but also psychologically. Many urban spaces are abandoned or remain undeveloped for a long period of time without the possibility of development because of relatively high land-development costs. Even though the development of urban spaces is supported strongly from a political perspective, the development of spaces where no marketing opportunities exist involves many practical challenges.

In a region in which abandoned land in a city reflects the effects of recession, an individual attempt to improve a city's circumstances is possible with the support of regional private organizations, enterprises, and government. Occasionally, activities take place that aim to return these abandoned lands to wild space, and various stimulations and inducements are proposed to encourage development. The group endeavor of local residents could be effective locally, but influence throughout the entire inventory of abandoned regions in a city remains uncertain. According to an investigation of cities in England, urban spaces of approximately 39 hectares in size are converted to abandoned land each week, and if the tendency continues, more than 200 years could be required to develop only the reconsidered spaces (Fyson, 1995).

A forward-looking approach related to these problems is to form joint agreements to determine what is considered a deteriorating region and what sites have value as public space with the active participation of residents in the process of urban planning and development. In fact, many city governments in developed countries provide various strategies to include the opinions of residents in city planning and use determination. Through the process, it is necessary to reestablish the roles of open space, green zones, and undeveloped areas from the perspective of the urban structure,

urban landscape, and protection of the environment. Furthermore, this reestablishment should be achieved based on both the latest and most complete observations about green zones and sufficient recognition of the neighborhood relationship (Kim, 2003).

Psychological Effectiveness

The other advantage of a compact city is that it brings about qualitative improvement by providing new design and promoting vitality in a city. When residents move into buildings, it promotes the cohesiveness of urban compactness, and the reuse of existing buildings and structures positively affects the urban image. By extension, many people moving into a city make it more vigorous and provide motivation for the development of cultural activities and facilities. Thus, a compact city provides a more attractive and animated urban image to both residents and visitors.

However, citizens sometimes have a critical view of the quality and design of modern buildings. The tendency is especially strong in a historic city with numerous cultural heritage aspects or a conservation area and established residential areas. Particularly, citizens who live in large apartment buildings in a commercial region that was constructed between the 1980s and the 1990s recognize that the compact city cannot offer any improvement in regional identity (Seo, 1995). In practice, functional, aesthetic and social failure associated with buildings that were constructed between the 1960s and the 1970s induced broad mistrust of experts who are entrusted with the responsibility of providing a high-quality built environment (Braton et al., 1995).

Fortunately, there are other opinions about the compact city. In the 1990s, esoteric and sophisticated development ventures were observed in some megacities in developed countries. According to Swanwick (1995), sophisticated urban development

attracts people to return to a city. The ‘Dockland’ development in London is a good example of this and demonstrates that high-density development does not cause a decline in the quality of life. In addition, the redevelopment of Harlem in New York City shows how the complex use of space and vitality through the approach of a compact city functions to raise the urban image.

The success or failure of urban development is determined by conditions that include location, design, and quality. Thus, the design and development method should be favorable to the citizens who are living in the city and who hope to move to a new development. Therefore, planners need to have the ability to understand in depth the public demands, desires and hope. The communications barrier between experts and citizens should be removed, and active citizen participation should be guaranteed from the beginning of a project (Kim, 2003). In this sense, the built environment does not consist of immovable assets but changes continuously. Moreover, each point of development comprises a part of the legacy that will be inherited by the generations to follow (Barton, 1995). Certainly, the most desirable goal is that current city development remains a sustainable inheritance for future generations.

Social Effectiveness

Generally, a compact city has higher social solidarity and a greater sense of community. Compared with a low-density city, a compact city is considered safer because mutual surveillance and vigilance are easy. In addition, the most important aspect is that because services and facilities are provided nearby, there is higher social equity. Social equity is created in high-density housing in a compact city based on the

logic that simple accessibility to urban services induces a fair distribution of urban resources (Burton, 2000).

However, this assertion is sometimes denied. Urban compactness could induce a “bad neighbor effect” and congestion in public areas. There is a possibility that newcomers who cannot create a new community or unite with the existing community through urban integration will go into the city. In addition, the quality of life could decline because the range of services is overextended or does not adapt suitably to population growth (Light, 1992).

High-density housing causes the bad neighbor effect because conflicts could emerge between people who have different lifestyles in adjacent regions. Noise pollution and parking problems are examples of such conflicts. As owning an automobile becomes more common and sound technology is developed, conflicts among citizens such as those over secure parking, noise pollution from automobile mufflers and stereos, and the noise of immobilizers have become trends rapidly (Dynes, 1994).

Furthermore, assertions about improvement of urban services in the compact city are still not fully confirmed. Studies of the relationship between city integration and supply of services have found only limited empirical evidence about the social costs and benefits that have been derived from integration (Urban Policy Research, 1991). In contrast, Pinfield (1995) asserted that urban integration serves to satisfy the demands of local residents and sustainability. He found that the problem is based on the procedure of creating urban integration and services. Pinfield insisted that urban

integration, which can solve regional problems and conflicts, is induced when citizens are involved at every level, from establishing priorities to evaluation and circulation in the distribution of urban resources.

Effect on Transportation

The effect on transportation of the compact city is clearly organized: the compact city decreases commute distances, reduces energy consumption in commuting by encouraging walking and bicycling, reduces opportunities for automobile use, and promotes the use of public transportation. These benefits are clearly observed in the compact city, but problems are also observed. Traffic congestion and dangers do not improve the walking environment, and what is worse, public transportation creates delays and congestion on crowded roads, citizens suffer from crowded buses and subways during commuting times, and parking becomes more difficult than ever. These problems have an impact on the function and quality of urban roads.

One solution to these problems is to use eco-friendly public transportation such as bicycles, buses and the subway and abandon the use of automobiles. However, statistical data have not shown this to be the case in reality. Studies of developed cities show that even citizens who live in the most complicated cities buy many more automobiles rather than give them up (Balcombe and York, 1993). Regarding the situation, Mynors (1995) insisted that strong business activities in the automobile market and citizens' views give weight on favoring the automobile. Automobiles provide convenient travel, an easy means for transporting purchases, a secure seat from door to door, and recognition as symbols of status.

Appleyard explained well the broad effects of transportation in a city (Engwicht, 1992). The research examined three residential areas with similar characteristics but with a different volume of traffic in San Francisco. Local residents who lived where traffic had the smallest volume had friends three times more often than people who lived where there was the largest volume of traffic. Moreover, in recognition of the research on residential areas, residents who lived in areas with the smallest volume of traffic think of their road as part of their residential area, but people who live in areas with the largest volume of traffic thought of the road and their house disjunctively. Residents who lived in areas with the largest volume of traffic omitted the street from their social space because of alienation effects including traffic congestion, noise, exhaust gas, and vibration.

In many cities, “car-pool” policies are coming into wide use to reduce automobile driving or to use automobiles more efficiently. In addition, various social movements such as a day of no cars, a bicycle day, and green traffic week are gradually expanding. Even in Edinburgh, a city in the United Kingdom, a “community without a car” movement was successfully implemented, with the rule that if a resident wants to move into the city, he or she has to promise not to own a car (Planning Week, 1995)

CHAPTER 3.
METHODOLOGY

Introduction

Urban regeneration in a deteriorating region is a detailed and cautious development process compared with constructing new city. The type of urban regeneration method that is applied is determined by an understanding of the regional, social, economic, and cultural characteristics of the target region. This study focuses on new town projects that are actively being implemented throughout Seoul. New town projects are divided into three types: downtown-centered, residential-centered and new section–centered. Most new town projects in Seoul are residential-centered regeneration development. Even though three downtown-centered developments are in progress in Seoul, they are actively in progress throughout the country because a downtown-centered development method is expected not only to make the deteriorated city center more vital but also to revive the regional economy and play a central role in the city, including the surrounding region. Therefore, downtown-centered new town projects are being conducted in regions that have the possibility of vitalization with improvement, not only of the residential region, but also of the commercial and business environments. In this study, the researcher examines the Wangsimni New Town project, which is a downtown-centered regeneration development that follows current national land planning concepts focusing on compact city development, and the degree of compactness is evaluated by creating the compact city index.

Selection of the Case Study

The Wangsimni New Town project is selected as a case study for three reasons. First, the Wangsimni New Town project was one of three demonstration districts when Seoul began to construct new towns, and its type is a downtown-centered regeneration development with high-density, high-rise buildings. The Wangsimni region was in poor condition in that low-rise and high-density buildings were concentrated, green space was insufficient, and there was severe traffic congestion. Solving these problems was urgent. In addition, the area has a large transient population, and it is located within a 4-km radius of the center of Seoul. For these reasons, the Wangsimni region was selected as the first new town project. Because it was the first, and because development had been completed, comprehensive analysis is possible of a downtown-centered new town project, and it is relatively easy to access related data and materials. Second, the Wangsimni New Town region is smaller than other new town regions. The total gross area is 332,400 m^2, 550 m in width and 660 m in length. The intention of the main agency is shown clearly because investigation and analysis of small area experience few effects from other unrelated factors compared with large areas. Moreover, a detailed analysis for each development factor is possible, making it easy to understand the efficiency and the effects of the Wangsimni New Town project. Third, because Wangsimni New Town was developed as a downtown-centered development, residential, commercial and business areas are mixed. The residential area is divided into three types: residences for upper-middle income households, residences for low-income households, and residences for unmarried people. The commercial area is developed by dividing it into a large commercial area and small commercial areas

according to the characteristics of residential blocks. A residential-centered new town development region focuses only on the physical improvement of the residential environment, and thus, the purpose and effect of the development are limited. In contrast, a downtown-centered new town is an overall development method that considers social, economic and environmental effects and thus is considered a proper example for formulating a high-density, eco-friendly and economical city center, which is a major aim of a compact city development.

Case Study

Indicators that thoroughly examine the characteristics of a compact city in terms of social, economic and environmental sustainability are selected to verify the research question. Weights are attributed to the compact city indicators by the AHP analysis. The Wangsimni New Town project is examined before and after development, and compactness is evaluated by applying the indicators. A substantiate analysis is performed by collecting statistic data. The selected index comprises a statistical annual, a census of business, a census of the population and housing, a City of the Republic of Korea annual, national land planning data from 2011, urban planning statistical data, and CO^2 emissions calculated by a Korean research institute for human settlements. Based on the investigated data, the compact city development of Wangsimni is evaluated.

Analytic Hierarchy Process

AHP is good method to determine urban compactness in the view of compact city development. Actually, there is no standard to evaluate urban compactness. Also, most existing studies only focused on density to examine achievement of compact city development. Researcher needs standard and evaluation method for compact city development to match with current situation of South Korea.

The Definition of AHP (Analytic Hierarchy Process)

AHP that was developed by T.L. Saaty in the 1970s as a decision-making method to rate the knowledge, experience and intuition of an assessor through judgments in pairwise comparisons among factors that are components of a hierarchy structure (Cho, 2003). Because the AHP method can exclude subjectivity through reasonable decision making in estimating status, it has advantages in that it is able to estimate not only quantitative and tangible standards but also qualitative and intangible standards by a ratio scale (Hwang, 2003). In this way, the method is used extensively in making decisions, particularly in the field of personnel management and in the choice of new businesses in the field of business administration.

Application Process of AHP

Setup decision-making hierarchy

At the first level of AHP, various decision-making factors that are interrelated are hierarchized. The highest generic object is put in the highest level of the hierarchy, and the next hierarchies are composed of various factors that affect decision making. These factors become more detailed as the factors are put lower in the hierarchy.

Pairwise comparison and weight calculation

A matrix is created to help achieve the aim of factors in the upper hierarchy by analyzing the lineal factors of the hierarchy through a pairwise comparison. Pairwise comparison is a comparison form in which a pair of factors is combined one at a time. Generally, to determine the relative importance or weight of decision-making standards (the number of standards is n), first, a pairwise comparison is performed of n(n-1)/2, and then, the results are convert into a form of matrix. Through pairwise comparison, contributing degrees of the upper hierarchy are given relative importance by a ratio scale of 9 points (Hwang, 1989). Through the process, values are expressed by the matrix; moreover, if the number of decision-making factors is n, it could be expressed as a pairwise comparison matrix of n*n. All diagonal values are 1 and satisfy the reciprocal property that is $A_{ij} = 1/A_{ij}$.

Qualifying consistency and drawing an eigen-value matrix

When the relative importance of determinants is expressed, the importance of each determinant is decided by an eigen-value method (Saaty, 1986). The sum of calculated importance values of standards is 1. Then, an estimating method is provided for a consistency index of pairwise comparison activity. Next, the consistency ratio is calculated on the numerical value, and then, the consistency of the judgment of the decision maker is estimated through the ratio.

Hypotheses and test statistics for consistency are the following.

· Null hypothesis (H_0): Evaluation of a decision maker is accomplished randomly.

· Alternative hypothesis (H_1): Evaluation of a decision maker is not accomplished randomly.

Here, if the value of the consistency index (CR) is less than 0.10, H_0 is dismissed. If the CR value is 0.00, it means that responders maintain complete consistency, and a pairwise comparison is performed. In contrast, if the CR value is more than 0.10, it means that consistency is insufficient and needs to be reconsidered (Cho, 2003)

Integrating a hierarchy structure

The last process of AHP is to determine the synthetic order of priority and weight of factors by synthesis of the hierarchy structure. That is, the order of the priority is suggested for the direction in urban management policy by synthesizing the relative importance and relative preference of all decision-making factors that constitute the hierarchy structure.

Analysis Process and Variable Selection.

Analysis process

First, an urban compactness evaluation index is selected based on the urban planning factors of environmental sustainability that are similar to the aim of the compact city and urban planning factors on which supporters of compact city planning insist. Four high standards and twenty low standards are selected from the index.

Urban planning factors of environmental sustainability

Various variables could explain the main characteristics of the compact city. Burton (2000) analyzed the relationships between various aspects of social sustainability and space structure and suggested the following three main variables for the compact city: density, mixed land-use, and urbanized intensification.

Table 3-1 Urban planning factors of environmental sustainability

Main factor	Variable	Indicator
Density	Population Density	Persons or Households per hectare
	Development Area Density	Persons or Households per hectare in built-up area
	Subcenter Density	Density of most-dense ward
		Average and variation density of four most-dense wards
	Housing Density	Percentage of total housing stock made up of higher and lower density dwellings
Mixed land-use	Supply of Amenities	Number of main facilities
		Rate of residential and built-up area
	Horizontal Land-use	Number and rate of main facilities in the same zip code
	Vertical Land-use	Frequency of commercial and residential mixed faceilites
urbanized intensification	Population Growth	Rate of influx population (for 10years)
	Development Growth	Percentage change in dwellings (for 10years)
	Density Growth by New Development	Change of population density (for 10years)
	Density Growth of Subcenter	Percentage change in density of most dense ward (for 10years)

Source: Burton, E. 2000. The compact city: just or just compact? A preliminary analysis. Urban Studies, 37(11): 1969-2001

Urban planning factors of environmental sustainability are selected based on studies of the Urban Village Group (1992), Breheny and Rockwood (1993), Congress for the New Urbanism (2000), Kim (2001), and Kwon (2004).

Table 3-2. Previous researches for urban planning factors of environmental sustainability

Research	Main clause	Planning factors
Urban Village Group (1992)	Land use	·Mixed land-use ·Location of facilities within walking range ·High-density development at surrounding of public transportation and exiting infrastructure ·Optimal development density
	Transportation	·Priority development for walker and bicycle ·Use of public transportation districts
	Environment and Energy	·Construction environment for energy efficient and informatization
Breheny and Rockwood (1993),	Land use	·Minimize walking range ·Self-provide for necessities ·Concentrated development based on public transportation
	Transportation	·Encourage use of public transportation ·Transportation that can minimize fossil fuel
Congress for the New Urbanism (2000)	Land use	·High-density development near subway station ·Mixed-use development ·Daily life within walking range ·Concentrate amenities and public facilities
	Transportation	·Network of road for walker ·Development based on public transportation
	Environment and Energy	·Expansion and connection of open space such as park and green zone
Younghwan Kim (2001)	Land use	·Mixed land-use ·High-density development
	Transportation	·Establish link system of public transportation ·Build bus stop within walking range ·Street network for walker and bicycle
	Environment and Energy	·Reduce gross area of road and ribbed pavement · Expansion and connection of green space ·Use of waste heat: cogeneration local heating ·Minimize environmental pollution and reuse of scrapped materials
Youngsil Kwon	Land use	·Optimal density ·Minimize walking distance

(2004)		·Connection public transportation system
	Transportation	·Walking-friendly street
		·Bicycle road
	Environment	·Green zone and open space
	and Energy	·Save materials and energy

Source: Youngsil Kwon (2004): An Evaluation of Sanbon New Town in the Aspect of Compact City indicators, Urban Design Institute of Korea: p 63.

Urban planning factors that compact city support

Urban planning factors that compact city supporters insist on are based on the study of Williams, K Burton, E. and Jenks, M. (1996).

Table 3-3. Previous research for urban planning factors of compact city supporter

Research	Main clause	Planning factors
Williams, K Burton, E. and Jenks, M. (1996)	Land use	·Conservation farmland by high population density and self-sufficiency
		·Activate mixed land-use
		·Activate migration length
	Transportation	·Encourage public transportation system
		·Use of Walking and bicycle
	Environment and Energy	·Minimize air pollution by traffic volume reduction
		·Reduction of gas emission and fossil fuel
		·Heating cost reduction
	Cultural and Welfare	·Expand welfare facilities with saved transportation expense
		·Concentrated placement of local activities for the neighborhood and community

Source: Williams, K Burton, E. and Jenks, M., The Compact City: A Sustainable Urban Form? E&FN Spon, London. 1996: p 36-44.

CHAPTER 4.
NEW TOWN PROJECT

Overview of the New Town Project

Background of the New Town Project

A new town is not a notion that is based on detailed and overt regulations but one urban development plan type that is based on an ‘ordinance to support regional balance development.’ The concept was formulated in October 2002, when a ‘promotion plan for regional balance development’ was announced.

From the 1970s to the 1980s, controlling of the Gangbuk region and promoting development for Gangnam region policies that had been continuously implemented by the government and Seoul had resulted in severe imbalances in the living environment, educational conditions and real estate market between the regions. Even though redevelopment projects had been initiated to achieve a balanced development of the two regions, they brought about the congestion of Seoul rather than solving problems because the plans consisted only of making profit and supplying housing, without considering urban infrastructure. In addition, development of the residential area had been impeded because there were no infrastructure and amenities in the urban residential zone.

Moreover, the private sector, which was the main agent of the plan, pushed forward small-scale development that concentrated on individual housing, and the public sector did not play an effective role, even though its role is to induce and control investment and to encourage citizen participation. These conditions led to improper urban development.

The need for a new approach to urban development increased because of regret about previous approaches, and the new town concept was presented as an alternate solution. That is, the concept was considered a new ‘redevelopment method for an existing section of a city’ to solve problems derived from improper development led by the private sector without considering the urban infrastructure. If previous housing redevelopment had been small-scale development that placed emphasis on the value of individual housing that was conducted for the convenience of the private sector, the new town concept is a comprehensive urban planning project that considers the optimal size of urban residential zones and the expansion of the urban infrastructure by the private sector motivated by public preferences.

Table 4-1. Comparison previous redevelopment work with the New town project

Division	Previous redevelopment work	New town project
Scale of development	Small scale units	Planned development in urban zone of life
Main agent of development	Private sector	Increase role of the public sector
Method of development	Housing redevelopment	Use various urban development methods

Source: Young-min Moon, Hyung-wu Kim (2004). A study on the architectural planning of an urban renewal through Gangbuk, Seoul New town project, p 247.

In the new town projects, planning that connects fringe areas and a well-organized infrastructure becomes practicable because it expands existing renewal projects through units of urban residential zones, establishes plans at the public level, and intentionally secures the installation of infrastructure and public structures. This could be achieved because predictability and reliability were determined regarding new

town projects by the public sector development of the first plan and the removal of obstacles of reorganizing projects and political support was possible.

Moreover, urban regeneration appeared to be a better comprehensive and integrated development notion. The new town concept is considered an overall urban regeneration strategy in the physical improvement of housing, betterment of the living environment, and expansion of infrastructure within the urban life zone of optimal size as a new redevelopment method for existing sections of a city.

In particular, the Ministry of Land established the ‘Korea urban regeneration center’ in 2006, and the center actively conducts urban regeneration projects on a political and business level. Urban regeneration projects led by Seoul include the promotion of balanced development, reorganization, and new town projects, which aim to fill the gap among regions and reorganize living conditions. Another goal is urban recreation projects for urban vitalization.

The purpose of the urban recreation project is that it connects the Cheonggye Creek restoration project with renewal of the neighboring area to revive central Seoul as a center of economy and tourism. The recreation project is based on the ‘development plan of the city center’ and the ‘renewal plan of the urban environment’ through restoration of Cheonggye Creek. In other words, the new town project was adopted as a solution for problems such as the improper development of previous redevelopment projects, and it was fulfilled as an urban regeneration project.

Features of the New Town Project

Privately led redevelopment methods had been performed without sufficient consideration of the urban infrastructure. As a result, the development was

accomplished by focusing on profitability and the housing supply rather than solving problems of old residential areas with poor conditions. Thus, redevelopment created effects such as the congestion of the city and the demolition of housing communities. In particularly, development was practiced on areas of small scale, so it was impossible to build an urban living zone that was connected with areas outside of the zone.

The new town project is a comprehensive development method that was established by the public sector to solve problems of the existing redevelopment method regarding the targeting of identical urban living zones that include a concentration of areas such as old and poor people residential areas. Moreover, it is an urban regeneration strategy to induce sustainable urban development through diverse environment improvement projects by targeting sub-districts where many residential areas are combined in an existing section of a city.

However, the project is not an urban improvement plan to secure urban infrastructure in an existing area. Rather, it is a development plan to secure infrastructure such as roads, schools and parks in target areas of the new town project with investment by the public sector, and to create a high-quality welfare residential environment where harmony is established with the neighboring area through the simultaneous development of various regional community centers, such as public and welfare facilities.

Seoul established three principles for starting the new town project for systematic urban renewal: urban renewal through social-integrated development and

organization, function-integrated development and organization, and eco-friendly development.

First, the project expands infrastructure such as roads, schools and parks quantitatively as well as qualitatively. In addition, it seeks urban organization that is faithful to principles by providing diverse collective housing areas and types of urban housing.

Second, the project should focus on the composition of a community in which different generations and people of every class live together. In addition, it enhances the regional community spirit by creating spaces where traditional culture can thrive. It also provides a physical foundation to reinforce sociocultural aspects including alleviation of the social gap through improvement of educational conditions and a residential environment where welfare and safety are guaranteed. This leads to social integration.

Third, the project supports the creation of a community for different generations and people of every class through combining business, commerce, housing and leisure functions for efficient land use. In particular, it is a principle of the project to combine public facilities.

Finally, the project secures green space by providing enough parks and green businesses that consider regional conditions, along with the principle of pedestrians first in a region where the natural environment and humans coexist. In addition, the project promotes environmentally sound development by using eco-friendly materials and integrating green space in facilities and buildings.

Types of New Town Projects

A new town project is organized by the characteristics of each zone as residential-centered, downtown-centered, and new section–centered. A residential-centered new town improves the overall urban infrastructure by providing a concentration of old-poor residential areas. The public sector is in charge of the urban infrastructure, and in the case of housing redevelopment, residents develop it directly under the overall development plan, although development by the public is possible if residents choose that approach. Many new town districts would be developed as residential centered. A new section–centered new town is a self-contained town that has residential, commercial, ecological and cultural functions targeting a large-scale undeveloped area. This type of new town is similar to the notion of new city development. A downtown-centered new town consists of mixed-use development of residential, commercial and business functions in a city center or nearby region that includes a large shopping center, cultural facilities, public offices, commercial buildings, apartments and multipurpose buildings, along with an urban community with a main street and proximity.

Table 4-2. Precondition and designated condition by type of the New town project

Type	Precondition	Designated condition	Content
Residential-centered	· Redevelopment is needed because of concentration of old-poor housing · Renewal work is pushed forward under regulation of city and residential environment renewal	· Worring region where function of a city is weaken by partial development because of vulnerable infrastructure	· Renewal work of total urban infrastructure toward neighboring region centrically housing redevelopment area
Downtown-centered	· Existing city section of urban and neighboring region is formed disorderedly	· Region where needs compound development for urban function such as residential commercial and business.	· Construct urban community with a straight track and proximity · Mixed-use development of residential, commercial and business function in a city center or nearby region
New section-centered	· Undeveloped region · Region of low development density	· Region where total section development is needed.	· Construct new section of a city where is equipped with residential, commercial, ecological and cultural function in undeveloped large scale region · A similar case with new urban development

Source: Goo, Young-hyun (2007), Comparison on urban satisfaction between a native people and an immigrant in Gil-um New town

Current State of the New Town Project

The new town concept is a new community renewal model to systematically organize decrepit housing structures to achieve a level of balanced regional development. In total, twenty-six projects are ongoing: three demonstration projects in 2002, twelve projects in 2003, ten projects in 2005, and Chang-shin and Sung-in New Town projects in 2007. The main development approaches are housing redevelopment and reconstruction projects under a district units plan.

'Promotion work for balanced development' to improve living conveniences of residents by the systematic multi-centralization of urban space fostered by central Seoul is ongoing in eight districts: five in 2003 and three in 2005.

The new town concept and encouraging balanced development have been promoted based on the 'ordinance to support regional balanced development (2003),' which includes the installation of infrastructure, support for working expenses, reduction in local taxes and deregulation of urban planning. However, the legal basis was established concretely after the 'special regulation to promote urban reorganization' was enacted. Based on this special regulation, in 2006, Seoul simplified sixteen districts that are part of new town districts (twenty-five districts) and balanced development promoted districts (eight districts) as urban reorganization districts.

Subsequently, Seoul designated twenty-two 'urban reorganization promoted districts,' including four districts in December 2006 and Chang-shin, Sung-in, and Seun shopping districts in 2007.

Development of 'urban reorganization promoted districts' imposed a notion of de-urban regeneration over renewal of the physical environment. The expected results

were the restoration of the urban function, consideration of physical requirements in the overall harmony, and systematic maintenance and management. However, there are several limitations involved in this approach.

First, this approach produces new unplanned development that simply creates changes without solving previous problems caused by the urban structure. In all boroughs, with the exception of Gangnam gu and Secho-gu, more than one project is progressing. The projects to achieve the balanced development of the inner city have been changed to redevelopment throughout a city.

In addition, even though the organization of the residential environment by redevelopment projects is primarily achieved, connection with the neighboring region and community spirit weaken the rise in housing prices. This leads to segregation and rupture between communities rather than creating harmony.

These problems do not align with the purpose of the new town project and urban reorganization projects that are promoted as the new alternatives.
projects in 2003, ten third projects in 2005, and Chang-shin and Sung-in New town projects in 2007 were designated. The main development method is using housing redevelopment, and reconstruction work with district units plan.

‘Promotion work for balanced development’ to improve living convenience of residents by multi-centralization of urban space structure with fostering center of Seoul systematically is progressing in eight districts; five districts in 2003 and three districts in 2005.

The New town project and the Promotion work for balanced development has been promoted based on ‘ordinance to support regional balance development (2003)’ that includes installation infrastructure, support working expenses, reduction local taxes and deregulation urban planning. However, legal basis was arranged concretely after ‘Special regulation to promote urban reorganization’ was enacted. Based on the special regulation, Seoul simplified sixteen districts that are parts of New town districts (twenty five districts) and Balanced development promoted districts (eight districts) as urban reorganization promoted districts in 2006.

After that, Seoul progresses twenty two ‘Urban reorganization promoted district’ that includes four districts that were designated on December 2006, and Chang-shin, Sung-in, and Seun shopping districts that were designated in 2007.

‘Urban reorganization promoted districts’ development work imposed a notion of de-urban regeneration over physical environment renewal. It expected results that restoration urban function, consideration physical requisite in overall harmony, and sustain systematic maintenance and management. However, there are several uppermost limits.

First of all, it produces new thoughtless development that just changes proceeding and form without solving previous problems because of urban structural problem. In all boroughs with the exception of Gangnam gu and Secho-gu, more than one of projects are progressing. The projects to achieve balanced development of inner city have been changed to redevelopment work in all around of a city.

In addition, even though organizing residential environment by redevelopment work is achieved mostly, connection with neighboring region and community spirit weaken by rise of housing price. It leads to segregation and rupture between communities rather than making harmony.

Those problems do not accord with purpose of the New town project and Urban reorganization promoted work that are promoted as new alternative.

Wangsimni New Town

Overview of Wangsimni

Location

The district of Wangsimni is located at 440 Sangwangsimni dong Seoungdong-gu, and its gross area is 337,200 m^2. When the new town project was announced, its gross area was 324,000 m^2, but the commercial region near Cheonggye Creek was included in the process of establishing the development plan. The region is within a 4-km radius to the east from the center of Seoul and is located on an axis that connects the city center with the sub-center of Wangsimni and is located northward from the restoration planning district.

Figure 4-1. Satellite picture of Wangsimni(Source: Google earth)

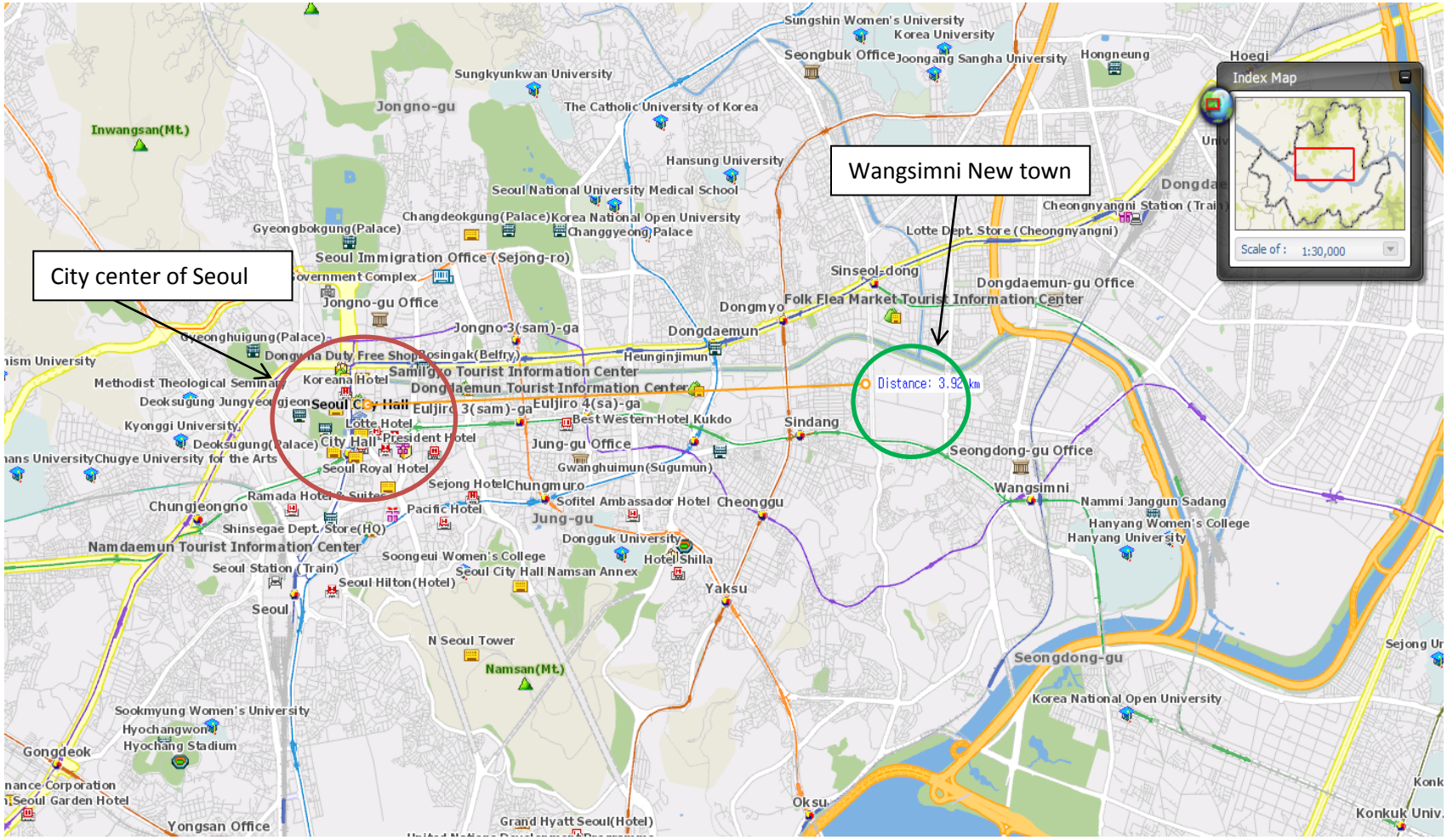

Figure 4-2. The location of Wangsimni new town (Source: http://gis.seoul.go.kr/SeoulGis/EnglishMap.html)

Population and industry in 2002

There were total of 4,275 households (788 owner households and 3,487 tenant households), with a total population of 11,846 (2,326 owners and 9,520 tenants) in the district. The gross density of the region was 336 people per hectare, the net density was 449 people per hectare, and the housing density was 132 households per hectare. Sites comprised 81.34% of the overall region; streets, 17.09%; and 1.57%, miscellaneous land category. In addition, private land comprised 78.1% of the area, and national and public lands comprised 21.9%. Single- and multi-family housing comprised 80.9%, row houses and apartments comprised 9.1% by type of residence, and there were many deteriorated buildings. However, 64.7% of the residents had lived there for more than five years, which is indicative of a relatively stable residential area. Rate of home ownership was 55.0%, and the share of tenants was 45.0%. The average gross area of houses was 87.5 m^2, with the majority being between 66 m^2 and 99 m^2. The residential area comprised 72.7%, neighborhood commerce comprised 22.9%, industry comprised 2.2%, business comprised 1.2%, and 1.0% were a miscellaneous usage category. In addition, diverse industrial and commercial facilities were randomly located. The total number of these facilities was 1,494, with manufacturing comprising the majority, at 44.4%, followed by neighborhood commerce, at 32.6%

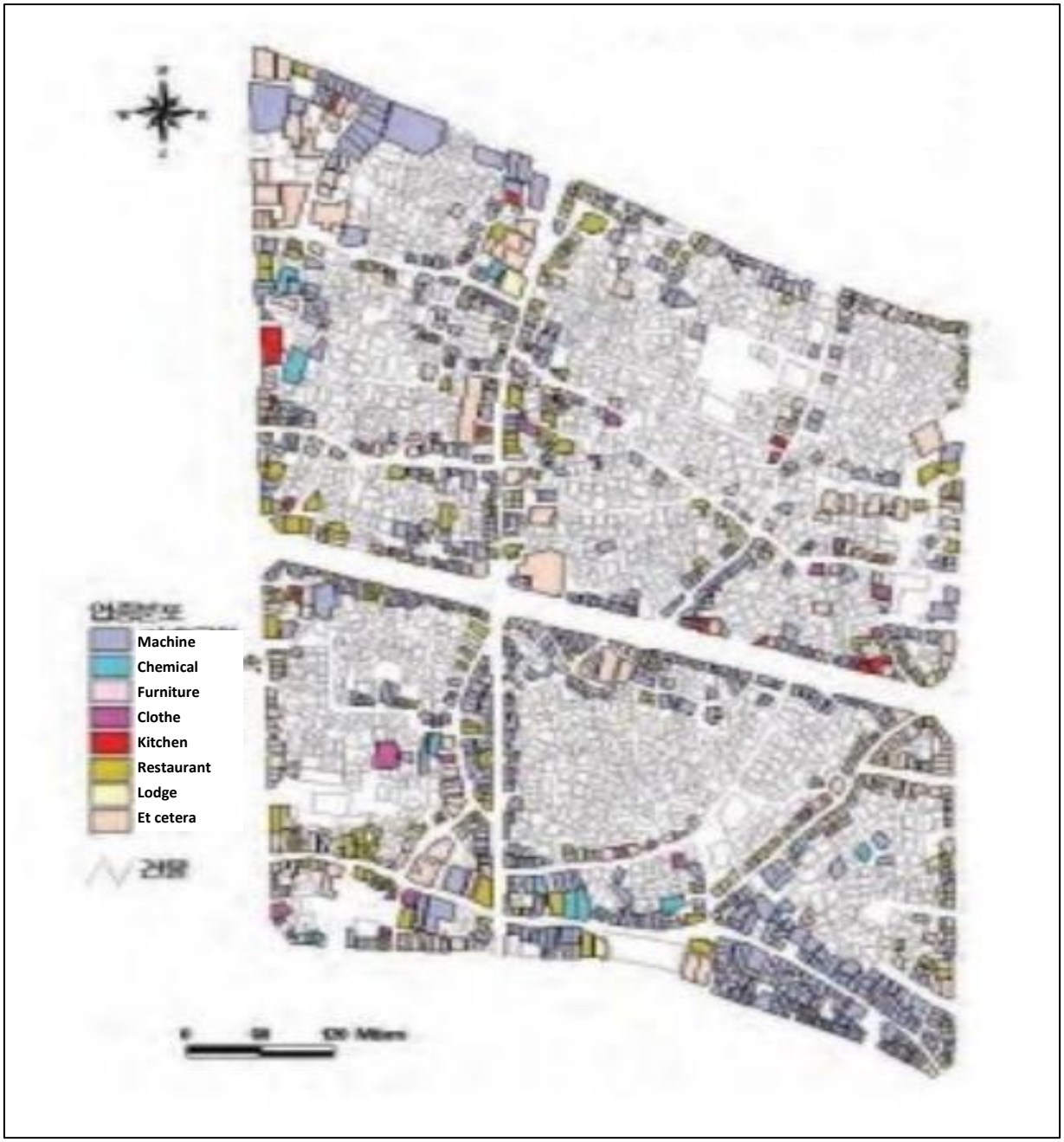

Figure 4-3. Business distribution of Wangsimni(Source: The Process Record of Creating New Town: Wangsimni, Gilum, Eunpyung New Town p. 85.)

Transportation and education facility

Connecting roads from east and west and from north and south are well established and form a satisfactory street network system. The no. 2 subway line operates alongside the southern road of the district, and transportation connectivity with the peripheral areas is good because of the Snagwangsimni subway station, which is located in the southeast. The total number of bus stations located in the district is seventeen.

Korea University is located in the northwest of the area, and Hanyang University is located in the southeast. However, there are no elementary, middle or high schools, indicating that basic educational facilities are insufficient. The Cheonggye Creek business district and fashion center are located in the west.

Current Conditions

Wangsimni was designated as redevelopment district in 1984 and subsequently removed from redevelopment plan by the mandate of the residents in 1989. The urban general plan of Seoungdong-gu in 1995 contained the Wangsimni region. Its purposes were to intensify regional function and renew the infrastructure, the surrounding environment and squatter settlements. As a part of the housing redevelopment general plan in 1998, Wangsimni was within the redevelopment district plan, the overall development plan where demolishment was to occur, and the housing environment renewal plan, and it was a part of the housing supply district. The housing redevelopment district of Seongdong-gu was announced in 2001. The sixth and eighth zones of Hawang fell short of the redevelopment standard, and the seventh zone was applied to the standard, but public planning was halted in December 2001. In 2003,

Wangsimni was selected as a new town as part of the process through which residents were trying to make the Wangsimni region a redevelopment district. The district was the seventh new town district, in which is the first new town today.

The Start of the New Town Project

Selection of Wangsimni new town

Seoul announced that the entire region of 440 Sangwangsimni was to be a downtown-centered new town in 2002. In a downtown-centered new town, the city center or the nearby surrounding area is defined as a feature of the development, which can be defined according to diverse characteristics such as regional features, function and form. Its main purpose is to develop an urban community by combining residential, commercial and business functions. Its other aims are to build a mixed community for diverse generations and for every stratum of society, in terms of commute to work and environmentally friendly development.

Wangsimni was designated as a demonstration new town project because of its population related to the geographical situation. Wangsimni New Town, which is located 4 km from the city center, is on the axis line that connects the city center with a sub-center, and new eco-friendly development is required in the form of a downtown-centered residential area together with restoration work of Cheonggye Creek. Moreover, as it has been a residential area for six hundred years since the Joseon dynasty, the area has streets with photogenic geographical features and multiple housing and squatter settlements that are low rise and of high density. Thus, the region needs renewal work directed toward housing. In addition, there are no school facilities, such as elementary and middle schools, considering the number of residents and the size of the

area, and green space, such as park, occupies only 1,884 m^2, amounting to 0.6% of the total area of 330,579 m^2. Furthermore, only 37% of the houses abut a lane larger than 6 m, which means that low-rise and high-density residential areas are located in extremely bad conditions. In particular, there are 660 non-urban-type industries, such as molding and machine factories, which are mixed with residences, resulting in poor living conditions.

By designating Wangsimni as a demonstration new town project region, Seoul attempted to overcome the problems that were created when the urban infrastructure changed to poor conditions through previous small-scale housing redevelopment projects. Its purposes are the following. First, the project aims to improve residents' quality of life by creating an optimal expansion of infrastructure and housing development by establishing a plan for units designated as an urban life zone. Second, the project aims to create a sustainable and eco-friendly urban development by executing a development plan that connects with the restoration work of Chenggye Creek. Third, the project aims to expand commercial and business activities to intensify the function of the sub-center. Fourth, the project aims to support commute-to-work development to prevent a doughnut pattern of growth. Finally the project includes construction of a downtown-centered mixed community by systematically organizing planned residential, commercial and business facilities.

Plan of Operation and Development of Wangsimni New Town

Establishment of development plan

The Wangsimni development plan was designed by research called the 'urban growth management plan for regional balanced development,' which was conducted in

2002, and by consultation and discussion among the related divisions. A summary of the project, announced on October 24', was the result of this consultation and discussion. The outline for the development announced at that time was changed, partially in the process of establishing a development schedule after appointing a firm to be in charge of fundamental investigation to establish the development plan. Because all types of indices form the basis for a development plan through investigation, the details of the initial plan were changed, while maintaining the basic principles of the design.

The characteristics of the development plan are the following. First, Seoul, Seoungdong-gu and the SH public corporation managed matters of support and systems. Second, the direction of the development and fundamental strategies were arranged by investigation of a design service company composed of a consortium. Finally, the systematic and dimensional development plan of the architecture was established by adopting an MA (Master Architect) system.

After going through this process, the basic development plan was presented to Seoul in April 2003 and was confirmed and announced to the public on October 2003, and district unit planning for each block were determined and the units were notified in April 2004. Finally, the overall framework of the plan for the Wangsimni New Town project was completed after receiving the approval of the Mayor of Seoul for basic plan in November 2004.

Table 4-3. Summary of the project

Division	Content
Location	· The whole region of 440 Sangwangsimni-dong, Seoungdong-gu
Gross area	· 324,000 m^2
Expected construction	· 6,000 houses, 21,000 population (Previous 4,275 houses, 11,800 population)
Regional feature	· General residential area, general commercial area, center aesthetic Zone - Located roadside shopping quarters and factories - Housing and small scale manufacturing industry are mixed
Development method	· Urban development work based on regulation of urban development · Redevelopment work based on Built environment renewal development act
Development direction	· Mixed development that achieves harmony of residential, commercial and business function - Cheonggye creek road and Wangsimni street: Commercial and business function - Subway adjacent area in Sangwangsimni: High-rise multipurpose building - Side of arterial road: Service facility - Inner block: Residential area
Operation plan	· Step-by-step development by dividing whole region into three zone
First operation zone	· First zone: 83,000m^2, 1,300 houses, 4,500 population ·Second and third zone: Induce private development with construction infrastructure by public sector
Effectiveness	· Increase effectiveness near the Cheonggye creek with restoration development of the Cheonggye creek ·Prevent urban sprawl by journey-to-work type development

Source: Department of reorganization in Housing center of Seoul (2003)

Table 4-4. Development plan

Division	Content
Fundamental strategy	· Create downtown-centered new town · Improve surrounding environment to satisfy development desire of residents by planning method · Harmonious mixed development for residential, commercial and business function
Fundamental direction	· Paradigm change of new urban development · Maintain historic meaning of a city and context with neighboring region · Induce development for low-income bracket by sensible role performance of public · Induce sustainable, eco-friendly and pleasant environment · Establish development plan with collecting resident's opinion sufficiently
Set-up characteristic and function of a city	· Characteristic of a city - Locate on axis line that connects a city center and a subcenter - Accumulate of residential, commercial and industrial region in uniform region - Locate on connected axis with near development plan · Set-up function - Adopt journey-to-work development in residential area - Induce mixed development of residential, commercial and industrial
Set-up planning index	· Population index - Increase density of rental house partly to accommodate tenant - Achieve pleasant residential environment by reducing inner population density - Consider increase of population by rental house at the current level of population · Housing index - Set-up housing gross area of owner-occupation in 105m^2, and rental house in 60m^2~105m^2
Principle of fundamental plan	· Fundamental principle - Improvement of regional living environment by expansion of infrastructure - Establishment of development plan by agreement with resident - Accept and maintain existing framework such as current land-use and sociality as most as possible · Design land use - Build high-rise and high-density commercial and business facilities at side of arterial road - Build low-rise and high-density housing at hidden side - Set-up 400~700% floor area ratio at side of arterial road, and

150~200% floor area ratio at inner residential area

· Network system of roads
- Reflect traffic management plan by restoration project of Cheonggye creek
- Maintain existing network of road frame mostly

· Design public facility planning
- Plan of insufficient school in the region (approximately 11,000m^2)
- Design green space that could connect with the Cheonggye creek, and liner park at a side of arterial road and main pedestrian passage.
- Consider retention about religious facilities, and provide land when the facilities should be moved.

· Design system for urban management facilities such as utilization
- Plan rationally and economically in consideration with upper planning and related facilities

Source: Department of reorganization in Housing center of Seoul (2003)

Development method

Urban development was discussed as an initial method for Wangsimni New Town. When Seoul designed Wangsimni New Town, the belief was that it is possible to change to a new urban region with various urban functions by synthesizing the development with the urban development act. However, the urban development act is a law that combines the creation of projects in residential areas with a land readjustment project. That is, the act is not intended for building development such as a new town project, and it is applied to construction areas. In the case that the act is applied to existing sections of a city, it is impossible to follow because the portion of fallow land is assumed to be more than 50% in the target area.

Because Wangsimni is located outside the district of the urban redevelopment basic plan, and the region is contained in the housing redevelopment basic plan, development to match the status of a new town is difficult. Thus, it is necessary to introduce a diverse development method by applying the urban development act. In

addition, opinions were expressed that the urban planning act should be applied to the existing section of a city according to the guidelines set by Seoul, and according to the features of the project, modification is needed for different access within the related regulations. Seoul presented these concerns to the Ministry of Construction and Transportation because Seoul considered them to be important legal issues. The Ministry of Construction and Transportation gave an authoritative interpretation that it is impossible to apply an urban development plan by the urban development act to an existing section of a city such as Wangsimni.

According to the official interpretation, an opinion was expressed that it is desirable to apply the built environment renewal development act. Other opinions also suggested that because the designation requirement for a redevelopment zone would be alleviated, executing housing redevelopment projects is desirable in the case of inner residential blocks and to induce gradual development in commercial areas in the form of the developing district units and retaining some of the existing structures.

However, the current built environment renewal development act is focused mainly on overall demolishment and joint redevelopment projects, and there is no legal method to enable a recovery type of development. If a recovery type of development is initiated, it could be accomplished as a built environment renewal project, although building an apartment building that is higher than five floors is not permitted under the terms of built environment renewal. Thus, an opinion is often expressed that redevelopment involving overall demolishment is practical. Finally, the notion of built

environment renewal that has been a major subject until now has collapsed, and there has been a return to the previous method, overall demolishment redevelopment.

Regarding the principal agent of development, publicly manageable development through expropriation is determined to be impossible because both land price has increased since the new town project was announced, and the resistance of residents who focus on indemnification against market price and floor area ratio would be expected. Problems surrounding measures for emigration and rental houses occurred in cases of other redevelopment projects, but the excessive increase in the cost of land acquisition is a concern in the case of Wangsimni because residential areas, small factories and shopping areas are densely mixed. In addition, because the agreement of more than 50% of land owners and building owners is needed to conduct publicly manageable development in the current housing redevelopment methods, real publicly manageable development is impossible. Thus, redevelopment by residents is considered a desirable development method, and finally, residents become the principal agents to carry out the project by means of a divided redevelopment zone.

CHAPTER 5.
FINDINGS AND ANALYSIS

Analytic Hierarchy Process

An index of the evaluation of urban compactness is organized by synthesizing the urban planning factors that are related to the compact city. The common point of the studies is that they do not suggest a detailed calculating method but only include qualitative urban planning factors. In this study, first, the urban planning factors of Western countries are compiled to match them with the current situation in Korea. Second, this study focuses on accessibility. Third, a detailed calculation method is suggested, the results of which are shown in the following table.

Table 5-1. Urban compactness evaluation index

High standard	Low standard	Evaluation standard	Calculating method	Unit
Land use	Optimal density	Population density	Total population / section (residential, commercial, industrial) gross area of a city	people / ha
		Dwelling density	The number of dwellings / gross area of residential area	dwellings / ha
		Rate of high-rise building	The number of high-rise apartments / section (residential, commercial, industrial) gross area of a city * 100	%
	Minimize migration length	Utility rate of mixed-land	Gross area of industrial area / section (residential, commercial, industrial) gross area of a city	%
Transportation and communication	Accessibility for public transportation	Connection of public transportation	The number of public transportation lines / section (residential, commercial, industrial) of a city	Number
	Information function	Rate of population in the Internet use	The number of the Internet users / total population * 100 (Total population = economically active population that is from 15 years to 65 years old)	%
Ecological environ	Accessibility for green	Connection of green	The number of parks / section (residential, commercial,	Number

ment and saving energy	space	spaces	industrial) of a city * 100	
	Secure green space	Rate of park in a city	Total gross area of parks / section (residential, commercial, industrial) gross area of a city * 100 (Park = childhood park + neighborhood park)	%
		Neighborhood parks per person	Total gross area of neighborhood parks / total population	m^2 / people
	Minimize environmental pollution	Rate of natural gas buses	The number of natural gas buses / total number of buses * 100	%
	Reduce use of energy resources	Recycling rate of domestic waste	Total amount of recycled domestic wastes / total amount of domestic wastes * 100	%
		Rate of high-efficiency heating and cooling system	The number of apartments (central heating + district heating) / total number of apartments * 100	%
Education, culture and welfare service	Accessibility for schools	Connection of schools	The number of schools / section (residential, commercial, industrial) of a city	Number
	Accessibility for cultural facilities	Connection of cultural facilities	The number of cultural facilities (Centers for inhabitants, students and welfare) / section (residential, commercial, industrial) of a city	Number
	Accessibility for public offices	Connection of public offices	The number of public offices (dong office + police substation + fire station + post office) / section (residential, commercial, industrial) of a city	Number
	Accessibility for shopping centers	Connection of markets	The number of markets (open market + periodic market) / section (residential, commercial, industrial) of a city	Number
	Accessibility for medical facilities	Connection of medical facilities	The number of medical facilities (pharmacy + clinic + hospital) / section (residential, commercial, industrial) of a city	Number

Creating a Stratum Structure

A stratum structure is composed of an object and a hierarchical structure. The object is the evaluation of urban compactness. High standards of the hierarchical structure include land use; transportation and communication; the environment and energy efficiency; and education, culture and welfare service. The standards are organized including the low standards. Land use is consists of optimal density and minimal commute distance; transportation and communication consist of the accessibility to public transportation and information function, the environment and energy efficiency consist of accessibility to green space, secure green space, minimal environmental pollution and reduced use of energy resources; education, culture and welfare services consist of accessibility to schools, cultural facilities, public offices, shopping centers and medical facilities.

Pairwise Comparison

A matrix table of pairwise comparisons is based on the results of a survey, which was conducted by twenty six experts of urban and regional planning in South Korea, conducted by Yoo (2004). Researcher uses the geometric average of the sum of values, then units for an overall pairwise comparison matrix are found. Based on the results, importance is determined. The related importance of land use is evaluated by use of the highest of the high standards. For the results of the low standards, optimal density is relatively higher than minimal commute distance in the case of land use. In the case of transportation and communication, accessibility to public transportation is much higher than information. In the case of the environment and energy efficiency, accessibility to green space is more highly rated rather than the other three evaluation

factors. Finally, accessibility to schools is rated higher than the other factors for evaluation of education, cultural aspects and welfare services.

Regarding the results of the evaluation standards, density of dwellings is higher than other factors in an optimal density case. The importance of neighborhood parks per person is rated higher than the number of parks in a city in the case of secured green space. Finally, a high-efficiency heating and cooling system rather than the recycling rate of domestic waste is highly evaluated in the case of reducing the use of energy resources.

Table 5-2. Overall pairwise comparison matrix

Division		Land use	Transportation and communication	Ecological environment and saving energy	Education, culture and welfare service
High standard	Land use	1	3	3	4
	Transportation and communication	1/3	1	3	2
	Ecological environment and saving energy	1/3	1/3	1	2
	Education, culture and welfare service	1/4	1/2	1/2	1

Low Standard	Division		Optimal density	Minimize migration length
	Land use	Optimal density	1	2
		Minimize migration length	1/2	1

	Division		Accessibility for public transportation	Information function
	Transportation and communication	Accessibility for public transportation	1	4
		Information function	1/4	1

	Division		Accessibility for green space	Secure green space	Minimize environmental pollution	Reduce use of energy resources
	Ecological environment and saving energy	Accessibility for green space	1	3	1	3
		Secure green space	1/3	1	1	2
		Minimize environmental pollution	1	1	1	2

		Reduce use of energy resources	1/3	1/2	1/2	1	
	Division		Accessibility for schools	Accessibility for cultural facilities	Accessibility for public offices	Accessibility for shopping centers	Accessibility for medical facilities
	Education, culture and welfare service	Accessibility for schools	1	3	3	3	3
		Accessibility for cultural facilities	1/3	1	2	2	1
		Accessibility for public offices	1/3	1/2	1	2	1
		Accessibility for shopping centers	1/3	1/2	1/2	1	1
		Accessibility for medical facilities	1/3	1	1	1	1
Evaluation standard	Division		Population density	Dwelling density	Rate of high-rise building		
	Optimal density	Population density	1	1/2	2		
		Dwelling density	2	1	2		
		Rate of high-rise building	1/2	1/2	1		
	Division		Rate of park in a city	Neighborhood parks per person			
	Secure green space	Rate of park in a city	1	1/2			
		Neighborhood parks per person	2	1			
	Division		Recycling rate of domestic waste	Rate of high-efficiency heating and cooling system			
	Reduce use of energy resources	Recycling rate of domestic waste	1	1/3			
		Rate of high-efficiency heating and cooling systems	3	1			

Examination the Weight of the Index and a Consistency Index by the AHP Model

Researcher used Expert Choice 2000, which was designed use exclusive with AHP, to determine the total weight value and consistency index. According to the results of the high standards, the weight of land use is more than 50%, overwhelming the weight of the other standards. According to the results of the low standards, optimal density is relatively higher than minimal commute distance in the case of land use. Accessibility to public transportation is much higher than information function in the case of transportation and communication. In the case of the environment and energy efficiency, the weight of accessibility for green space is over 40%, which is much higher than the other three standards. In the case of education, cultural aspects and welfare services, accessibility to schools is 42%, which is higher than the other four standards. Regarding evaluation standards, the weight of dwelling density is 49.3%, which is the highest among the three standards in the case of optimal density. In the case of secured green space, the number of neighborhood parks per person is rated relatively higher than the number of parks in a city. In the case of energy resources, the weight of high efficiency heating and cooling systems is 75%, which is much higher than the recycling rate of domestic waste. Hypotheses for consistency and test statistics are the following:

· Null hypothesis (H_0): Evaluation of a decision maker is accomplished randomly.

· Alternative hypothesis (H_1): Evaluation of a decision maker is not accomplished randomly.

The value of the consistency rate (CR) of all standards is less than 0.10 in the total weight and consistency index. Thus, the null hypothesis (H_0) that evaluation of a

decision maker is accomplished randomly is rejected at the consistency rate, meaning that the evaluation of decision makers is not accomplished randomly.

Table 5-3. Total weight and consistency index

Division			Weight	Consistency
High standard	Land use		0.502	0.07
	Transportation and communication		0.252	
	Ecological environment and saving energy		0.143	
	Education, culture and welfare service		0.102	
Low Standard	Land use	Optimal density	0.667	0.00
		Minimize migration length	0.333	
	Transportation and communication	Accessibility for public transportation	0.800	0.00
		Information function	0.200	
	Ecological environment and saving energy	Accessibility for green space	0.401	0.04
		Secure green space	0.207	
		Minimize environmental pollution	0.272	
		Reduce use of energy resources	0.120	
	Education, culture and welfare service	Accessibility for schools	0.420	0.03
		Accessibility for cultural facilities	0.189	
		Accessibility for public offices	0.143	
		Accessibility for shopping centers	0.108	
		Accessibility for medical facilities	0.140	
Evaluation standard	Optimal density	Population density	0.311	0.05
		Dwelling density	0.493	
		Rate of high-rise building	0.196	
	Secure green space	Rate of park in a city	0.333	0.00
		Neighborhood parks per person	0.667	
	Reduce use of energy resources	Recycling rate of domestic waste	0.250	0.00
		Rate of high-efficiency heating and cooling	0.750	

Creating the AHP Model

Researcher created the AHP model. The weight of each variable forms a distinct matrix that is partially arranged by the importance of each variable made by the AHP model. Here, the sum of each weight of the higher hierarchy is one, and the sum of each weight of the lower hierarchy is also one. Thus, the weight of each standard for the evaluated importance of urban compactness that is an object is determined by each standard multiplication.

Table 5-4 Importance of each variable by AHP model

High standard	Low standard	Evaluation standard	Total weight	Rank
Land use (0.502)	Optimal density (0.667)	Population density (0.311)	0.104	4
		Dwelling density (0.493)	0.165	3
		Rate of high-rise building (0.196)	0.066	5
	Minimize migration length (0.333)	#	0.167	2
Transportation and communication (0.252)	Accessibility for public transportation (0.800)	#	0.202	1
	Information function (0.200)	#	0.050	7
Ecological environment and saving energy (0.143)	Accessibility for green space (0.401)	#	0.057	6
	Secure green space (0.207)	Rate of park in a city (0.333)	0.009	16
		Neighborhood parks per person (0.667)	0.020	10
	Minimize environmental pollution (0.272)	#	0.030	9
	Reduce use of energy resources	Recycling rate of domestic waste	0.004	17

	(0.120)	(0.250)		
		Rate of high-efficiency heating and cooling systems (0.750)	0.013	14
Education, culture and welfare service (0.102)	Accessibility for schools (0.420)	#	0.043	8
	Accessibility for cultural facilities (0.189)	#	0.019	11
	Accessibility for public offices (0.143)	#	0.015	12
	Accessibility for shopping centers (0.108)	#	0.011	15
	Accessibility for medical facilities (0.140)	#	0.014	13

In sum, the most important standard in urban compactness is ‘accessibility of public transportation’ in the case of transportation and communication, which is 20% of the total model. The second most important standard is land use by the standard ‘minimal commute distance,’ which shows a weight of 0.167. Thus, as a city developed with restrictions, the flow of urban living decreases, and both energy consumption and reduction of gas emissions should be considered first priority values over maximizing the use of public transportation within the living space. The third most important standard is optimal density according to ‘dwelling density,’ which has a weight of 0.165. In particular, the number of dwellings in residential areas is more important than the total population in a section of a city when compared with the optimal density by ‘population density,’ which has a weight of 0.104. The other standards show a weight of less than 0.10.

The Wangsimni New Town Project

Analysis of the Improved Conditions of the Wangsimni New Town Project

The Wnagsimni New Town project was announced in 2002, and it began to become reality in 2003. In this section, improved conditions that resulted from the Wangsimni New Town project are analyzed according to urban compactness factors from the perspectives of land use; transportation and communication; the environment and energy efficiency; and education, cultural aspects and welfare services.

Aspects of Land Use

The aspect of urban compactness factors of land use is analyzed by examining detailed indicators about population density, dwelling density, number of high-rise buildings, and commute distance. The indicators show extreme changes in the Wangsimni region, and it is found that positive improvements are made in most of the factors.

Examining each factor, first, the population density increased from 336/ha to 510/ha. This is a result of the high settlement rate of existing residents and the influx of population. High-rise (higher than 20 floors) multipurpose buildings and advanced rental housing draws the neighboring upper-middle classes. Commercial facilities are located in front of the buildings, and residential spaces are located in back of the buildings. To provide a high-quality residential environment, which the upper-middle classes prefer, the size of housing units is increased from 100 m^2 to 265 m^2. Advanced rental housing consists of residential space that has a theme similar to a theater or palace. Because unique characteristics are assigned to high-rise multipurpose buildings and advanced

rental houses, they appeal to residents from other places, which is shown by the influx of population.

Mid-rise (few than 20 floors) and high-density inner residential areas are developed for ordinary people to increase the settlement rate of existing residents. The house size of inner residential areas is on average 66 m^2, and the residential region creates a favorable settlement environment by its mid-rise and high-density development. In addition, these conditions prevent the dilution of regional characteristics through a high rate of settlement of existing residents.

Studio-type rental housing is located near the Sangwangsimni subway station. The rental residences are as a high-rise studio type, and they are intended for unmarried people, of which the number is increasing rapidly. Many companies, in addition to Korea University and Hanyang University, are located near Wangsimni, so unmarried people, including office workers and university students, live in the area. These rental residences are developed in high-rise buildings that are similar to high-rise multipurpose buildings, and this type of construction is considered a landmark of the region. The average unit size is 50 m^2, and commercial facilities such as small restaurants and supermarkets that patronize to single people are located on the lower floors.

The gross area that residences and rental housing occupy is 148,068 m^2, which is 45.7% of total gross area. The other part of the area is a commercial and business region, which occupies 20.8% of total gross area. The venture and business area is developed in a high density to induce activities that make the region vital and for

accumulation of activities. At the surrounding Sangwangsimni station, commercial facilities are developed as mid-rise and high-density structures. The facilities contain large department stores and markets, for the convenience of residents who commute between home and work through the station.

In sum, the total household increase from 4,275 to 4,621 is an 8% increase, and the dwelling density of the Wangsimni region increased from 132 dwelling/ha to 143 dwelling/ha. Moreover, the proportion of high-rise buildings, including multipurpose buildings, venture and business facilities, advanced rental housing, commercial building near the subway station and studio-type rental housing, increased extremely from 8% to 52% of the region.

Figure 5-1. Land use pattern (Source: Seongdong-gu public office, SH public cooperatoin)

Aspects of Transportation and Communication

Regarding transportation, the basic notions are to mostly maintain the existing main street network, expand a portion of the existing streets or construct a new street network if needed, and use the inner street network as pedestrians-first roads with controlled accessibility to automobiles.

The Wangsimni New Town project divided streets into five categories: 8-m-wide roads, 6-m-wide roads, 4-m-wide streets, pedestrian ways, and inner streets. The 8-m-wide roads in located near commercial and business areas, and service roads are managed by expanding the existing roads. There was only one blue bus, which served a wide area, station but this was increases to four blue bus stations. As a result, travel to the city centers of Gangnam and Gangbuk is easier than before, and people who live other regions are able to approach the Wangsimni region more easily. This led to improvements in the economy of the region. The 6-m-wide roads are constructed as pedestrian-first ways by improving the existing roads. The 4-m-wide streets are planned as pedestrian-first streets and are located between small blocks. On the 6-m-wide and 4-m-wide roads, five town shuttle buses are operated, with a total number of twenty-nine shuttle bus stops. Town shuttle buses are small buses with a capacity of less than fifteen people, and they are intended for inner-city residents who have difficult access to the subway stations and blue bus stations. This makes it easy for people to travel outside and inside of the region. On the pedestrian passageways and inner streets, entry of automobiles is controlled according to the time, and the sidewalk can be expanded sufficiently to promote safety at night as pedestrian-first streets.

Regarding the aspect information function, the total number of economically active residents between 15 years and 65 years of age was 5,127, which was 43% of the total population, and 79.6% of the people used the Internet. Since the new town development project, the total number of economically active residents is 15,647, which is 74% of total population. The rate of Internet users including smartphone users is 92.6%. Thus, the influx of an economically active population is larger than for other strata of the population, and most of them are Internet users.

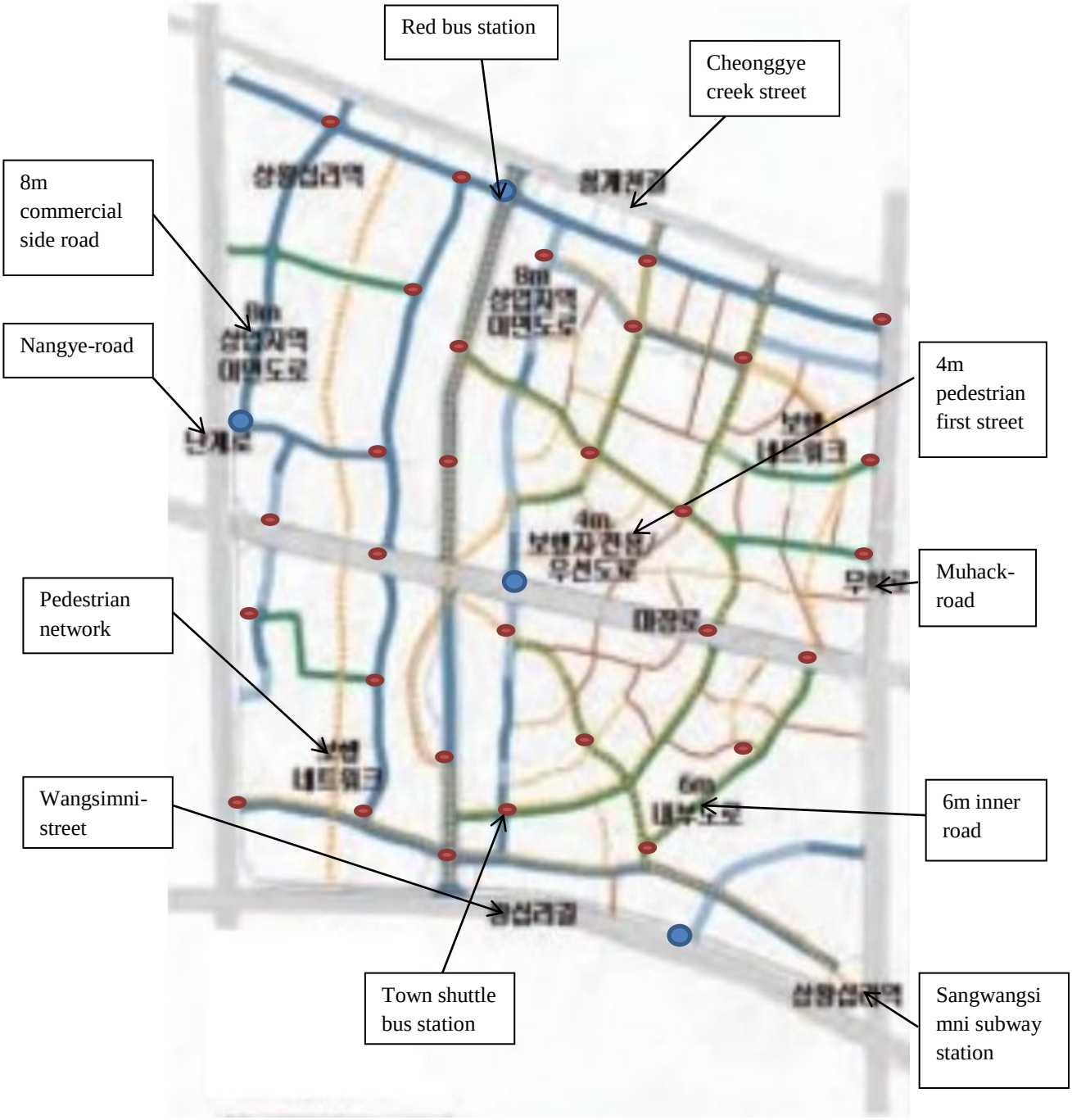

Figure 4-2. Transportation pattern (Source: Seongdong-gu public office, SH public cooperatoin)

Aspects of Ecological Environment and Saving Energy

Regarding the aspect of the environment, basic concepts are considered to provide a wide green axis that includes Dondaemoon stadium park and Ducksum park, to consider the restoration of Chenggye Creek, to create an open space network by connecting special open spaces to a linear open space, and to construct an open space system considering pedestrian flow.

Since the Wangsimni New Town project, linear green spaces are secured on Wangsimni street by a wide green space system. In the case of connection with the restored Chenggye Creek, the use of water and green space becomes possible. In addition, the project secures open spaces in an anchor role for the flow of Chenggye Creek. In addition, open spaces are constructed that connect Chenggye Creek with Wangsimni Street. Small parks are constructed near block units, and Ssamji Park is located along pedestrian streets.

The total number of parks increased from two to twenty, including one central square, seven small parks in the blocks, one large park, four anchors, and seven Ssamji parks. The total area of the parks increased from 1,994 m^2 to approximately 60,000 m^2, which is an increase is from 0.6% to 18% of the total area. The gross area of parks per resident increased from 0.16 m^2 to 2.86 m^2. In particular, small parks that are constructed in the blocks are located near residential areas, so the coefficient of use increases sharply. Furthermore, the entry of automobiles is blocked, leading to a high level of improvement of air quality in the parks. In addition, each park plays a role as a channel of the regional community; thus, they draw continuous interest to regional development and improve the quality of life by expanding the green spaces.

Regarding the aspect of minimizing environment pollution, eight blue buses pass through the study area. The blue buses are operated by Seoul, and all of them were converted to natural gas buses ten years ago. However, town shuttle buses are operated by small-scale companies that acquire permission from the borough office. There were no natural gas buses before the new town project, but all town shuttle buses were converted to natural gas after the completion of the project.

Regarding reduced use of energy resources, there has been no change in the rate of recycling. However, costs decreased rapidly for collecting recyclable materials. The collecting time of recyclable materials required by sanitation workers was long because of the concentration of small single houses where residents put out their waste in front of their houses. Places where recyclable materials are put out are designated as high-rise apartments and high-density middle-rise housing. Moreover, this approach reduces the pollution of the surroundings by trash. As a result, time and money to collect recyclable materials are saved, and social costs are also reduced by the cleaner surroundings.

Most of the deteriorating single residences that were located on the right side of the study area were demolished for the new town development. Mid-rise apartments and high-rise multipurpose buildings were built in previously residential areas, and most of the structures have a central heating and cooling system. Through constructing new housing, energy consumption for heating and cooling was reduced to 37.6% of total energy use. The total number of apartments is 6,348.

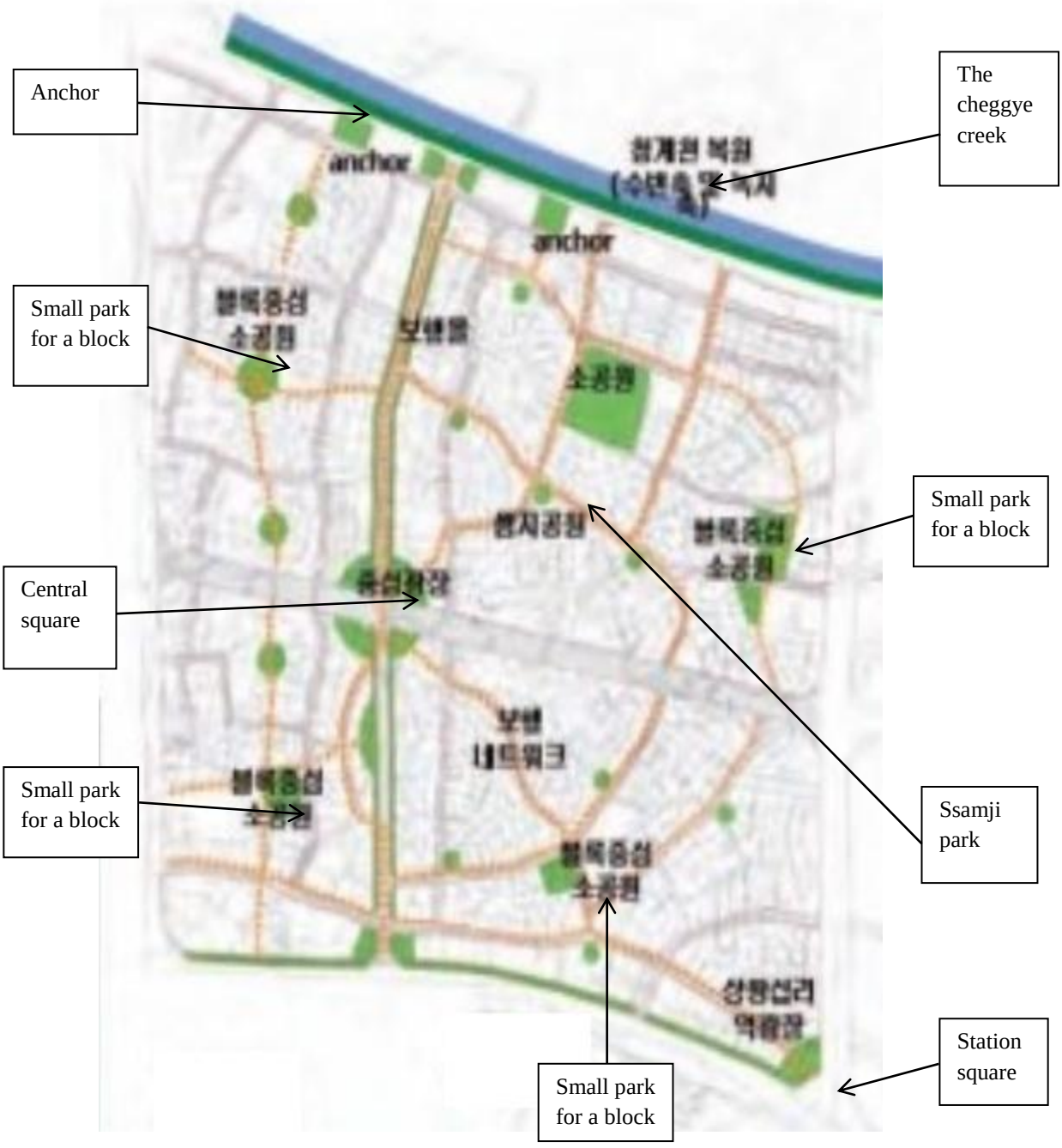

Figure 5-3. Green space pattern (Source: Seongdong-gu public office, SH public cooperatoin)

Aspects of Education, Culture and Welfare Services

Regarding the aspects of education, culture and welfare services, the concepts include a plan with a central block with the consideration of green spaces and a pedestrian system, an arrangement of public facilities that utilize open space in the center of each block, and the placement of schools and parks to be shares with the neighboring region. The project constructed one elementary school and one middle school. The schools use the parks as playground by changing their form to urban style schools. Religious facilities were retained. Moreover, a children's library, an elderly welfare facility and a dong office, which is administration office for small area, are located in the center of each block. Existing traditional houses are used as public facilities and are not demolished.

Public facilities are divided into administration offices and educational facilities. In the case of administration facilities, there were only two in the region, which was insufficient. Therefore, six multi-purpose facilities were constructed that each includes a dong office, an elderly welfare center, a police substation, a police precinct office, a children's library, an administration center and a public health center. However, even though there were no schools in the region, only two schools have been constructed since the new town project. Considering the increase in population and that more than 75% of the influx population is considered economically active, the number of schools remains insufficient. In the case of a shopping center, a large department store and a megamarket are located near the Sangwangshimni subway station. In addition, many small supermarkets are located in multi-use buildings. This makes it easy for residents to buy daily necessities.

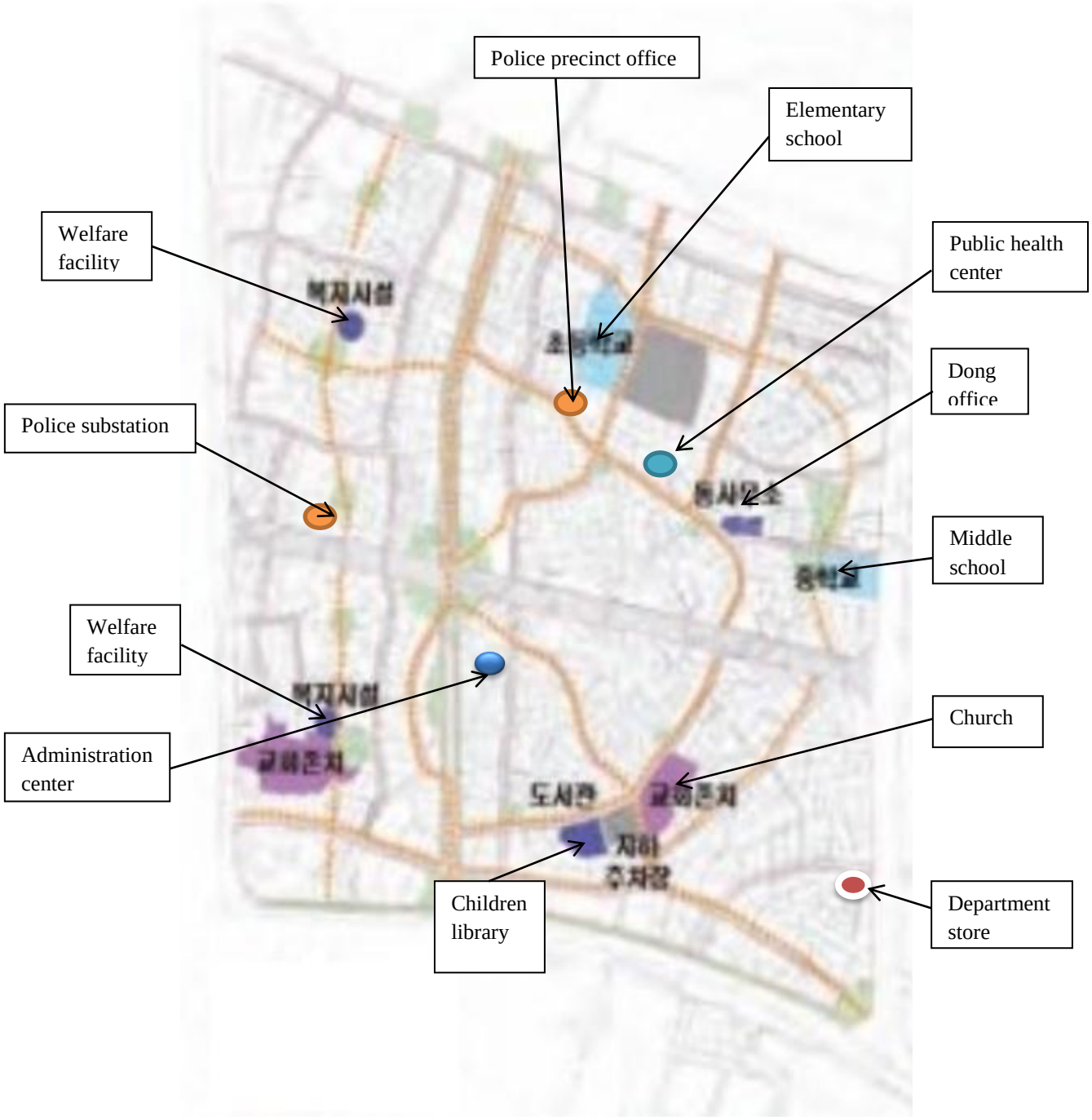

Figure 5-4. Public facilities pattern (Source: Seongdong-gu public office, SH public cooperatoin)

Urban Compactness

The top rank of compactness is ‘Accessibility for public transportation’. It means ‘Accessibility for public transportation’ is the most important factor to examine compactness of a city. The calculated urban compactness is shown at Table 5-5. The compactness is formulized like that.

(After-Before)/Before x Total weight x 100= Urban Compactness

The highest top three values of compactness are ‘Accessibility for green space (its value is 51.3)’, ‘Rate of high-rise building (its value is 36.3)’, and ‘Neighborhood parks per person (its value is 33.75)’. It means Wangsimni new town project have a great achievement in those aspect. On the contrary, mostly the values of education, culture and welfare service is lower than 1.00 that means there are a few changes in the field in the view of compact city development.

Table 5-5. Comparison before and after Wangsimni new town project

High standard	Low standard	Evaluation standard	Before	After	Unit	Rank	Compactness
Land use	Optimal density	Population density	336	510	people / ha	4	5.36
		Dwelling density	132	143	dwellings / ha	3	1.36
		Rate of high-rise building	8	52	%	5	36.3
	Minimize migration length	#	21.3	20.8	%	2	-0.39
Transportation and communication	Accessibility for public transportation	#	6	10	Number	1	13.92
	Information function	#	79.6	92.6	%	7	0.81

Ecological environment and saving energy	Accessibility for green space	#	2	20	Number	6	51.3
	Secure green space	Rate of park in a city	0.6	18	%	16	26.1
		Neighborhood parks per person	0.16	2.86	m^2 / people	10	33.75
	Minimize environmental pollution	#	80	100	%	9	0.75
	Reduce use of energy resources	Recycling rate of domestic waste	79	80	%	17	0.01
		Rate of high-efficiency heating and cooling systems	42	93	%	14	1.58
Education, culture and welfare service	Accessibility for schools	#	0	2	Number	8	0.86
	Accessibility for cultural facilities	#	1	5	Number	11	0.76
	Accessibility for public offices	#	1	3	Number	12	0.3
	Accessibility for shopping centers	#	5	9	Number	15	0.88
	Accessibility for medical facilities	#	5	11	Number	13	1.68

Comparison Wangsimni New Town with Other New Town Case

Gilem new town project, which was designated as demonstration new town project in 2003, has 95m^2 width. The region is divided into nine redevelopment areas. The region was expected that it is difficult to improve residential environment due to previous redevelopment method, so new town projected was implemented.

The total cost of Gilem new town project is $1,712,000,000, and Wangsimni new town project is $456,000,000. Gilem new town spent almost four times more than Wangsimnni new town though its width is just three times wider than Wangsimni region. In addition, in the view of compact city development, compactness of Gilem new town is not much lower than Wangsimni new town, except in the field of education, culture and welfare service. That is why Gilem new town project is developed as residential-centered region. In other word, Gilem emphasized its effort to improve social equity for residents, contrary to Wangsimni that tried to improve overall fileds as a downtown-centered developed region. However, in the aspect of cost performance, achievement of Gilem new town project is not effective in regarding with considering of its regeneration method. In the fields of land use, transportation and communication, Ecological environment and saving energy, Wangsimni new town is more successful redevelopment project than Gilem new town project. These are shown in following table.

Table 5-6. The comparison between Gilem new town and Wangsimni new town

			Gilem		Wangsimni			
High standard	Low standard	Evaluation standard	Before	After	Before	After	Unit	Rank
Land use	Optimal density	Population density	969	560	336	510	people / ha	4
		Dwelling density	349	200	132	143	dwellings / ha	3
		Rate of high-rise building	23	39	8	52	%	5
	Minimize migration length	#	10.7	15.9	21.3	20.8	%	2
Transportation and communication	Accessibility for public transportation	#	23	43	6	10	Number	1
	Information function	#	82.1	90.4	79.6	92.6	%	7
Ecological environment and saving energy	Accessibility for green space	#	5	8	2	20	Number	6
	Secure green space	Rate of park in a city	3.92	10.2	0.6	18	%	16
		Neighborhood parks per person	0.38	1.17	0.16	2.86	m^2 / people	10
	Minimize environmental pollution	#	68	100	80	100	%	9

	Reduce use of energy resources	Recycling rate of domestic waste	49.5	84.4	79	80	%	17
		Rate of high-efficiency heating and cooling systems	74	97	42	93	%	14
Education, culture and welfare service	Accessibility for schools	#	8	47	0	2	Number	8
	Accessibility for cultural facilities	#	4	33	1	5	Number	11
	Accessibility for public offices	#	2	2	1	3	Number	12
	Accessibility for shopping centers	#	3	5	5	9	Number	15
	Accessibility for medical facilities	#	0	19	5	11	Number	13

Analysis by Category

Residence

With the Wangsimni New Town project, most of the changes are shown in the residential environment. The change in the residential environment is a basis of the project, and it is apparent in a visible outcome. Approximately 1,800 houses were provided, and 10,000 people have moved in. Before the project, the floor area ratio, which was less than 100%, was 74.7%, which means that many buildings were low rise, buildings of less than 4 floors occupied more than 95%, and 83.4% of the buildings were constructed before 1980s. High-rise buildings with more than 200% floor area ratio have been constructed since the Wangsimni New Town project, and most of the decrepit houses were demolished during the project. That is, in the Wangsmnni New Town region, numerous low-rise and high-density buildings were replaced with mid-density and high-rise building blocks.

From the perspective of urban regeneration, these changes in the residential environment would be considered a foundation to restore the region. Housing types changed from single-family housing and row houses to high- and mid-rise apartments, but the real supply of houses increased by only 1,800 households. That is, the effect by the improvement in residential surroundings is greater than that by expanding the housing supply.

The change of the residential environment of the Wangsimni New Town project is considered to be very successful. Housing size and form are improved, the housing supply is increased, and decrepit and undeveloped regions are reformed by the creation of new residential blocks. However, these physical changes in the environment are the

same result as with previous redevelopment and reconstruction methods. It cannot be said that the changes are a characteristic of the urban regeneration method. When considering the non-physical context, including housing a subdivision environment that connects with the residential environment, the characteristics of urban regeneration by changes in the residential environment could be apparent.

Transportation

The Wangsimni New Town region had severe traffic congestion because of its narrow roads. Therefore, an effort to relieve traffic congestion by raising the number of roads and increasing public transportation lines was made with the new town project. The street system of Wangsimni New Town divides pedestrian passages and vehicle passages. Divided pedestrian and vehicle passages consist of a circulation system that comprises an open linear green road system that connects each block; commuting roads that connects schools, subway stations and bus stops; and a pedestrians-first green street system. In practice, when people walk on the pedestrian passages, the connection between the open space and each block is constructed naturally. Furthermore, the green streets are well constructed, so planning guidelines that designate a region of the center for pedestrians is successfully achieved.

Parks and Green Space

Before the Wangsimni New Town project, parks and green space were a small portion of the study area. The region is supplied with parks and green space simply because it is located near Chenggye Creek and the Seoul forest park, but eco-friendly factors were latent. As residences increased and the population became concentrated, green space diminished between 1995 and 2001, and the character of the existing

natural environment was destroyed by unplanned development. Therefore, the Wangsimni New Town development had a goal to provide eco-friendly development for the restoration of the lost natural environment.

In fact, the total gross area of parks per person increased eighteen times from 0.16 m^2 to 2.86 m^2 after the project. However, the result is judged as very unsatisfactory compared with the standards of Seoul. The city of Seoul intended to create 16.6m^2 gross area of parks per people and 10.4 m^2 gross area of green space in residential areas, but the current situation of parks and green space in Wangsimni New Town is in short supply. However, the portion of green space in the entire region is 18%, which is close to the legal requirement of 20%, and it could be estimated that the project has successfully increased park and green space ratios.

That is, even though the project created green space to match the standard of Seoul by constructing high-rise buildings from green areas diminished by concentrated low-rise housing, it cannot be ignored that the provision of green space is token, from the perspective of gross area of green space per person. However, Wangsimni New Town tried to enhance the ratio of green space and its connection between complexes by providing diverse open spaces. Central squares and small parks in each block are planned, and the project attempted reforestation in Samji parks in some places. Furthermore, it creates an image of eco-friendliness in the region by increasing the frequency that residents contact with green zones through the connection system between park and park.

Creating eco-friendly residential areas would contribute to enhancing the identity of the Wangsimni region. In additional, it would have an effect on the establishment of its identity as the basis of a life that coexists with the natural environment, and not based only on the construction of apartment blocks. Moreover, creating eco-friendly residential areas would be an important starting point for creating a community for residents.

Life Zones

Life zone changes in Wangsimni New Town are consistent with public facilities and distribution centers such as education facilities, administration offices and markets. Those facilities play a role of the central point to connect with neighboring new towns across life zones in housing subdivisions. That is, the locations of public facilities are decided by the scope of the life zone, and the life zone is developed based on the characteristics of public facilities. Currently, the public facilities that residents use are the dong offices, elderly welfare centers, administration centers, public clinics and children's libraries. Along with public facilities, a starting point for bringing about changes in life zones is distribution centers such as markets, department stores and a megamarket. The locations of distribution center form an atmosphere of a regional society and determine the practical range of the regional society. However, a large department store and a megamarket are located near the Sangwangsimni subway station, which is the southeast point of Wangsimni New Town. Actually, it is a problem that residents go to these stores from work, so they do not recognize that the market is the same life zone where they live.

Regarding education, the population of a mid-sized life zone is between 10,000 and 30,000, and educational facilities such as elementary, middle and high schools should be located in the regional society by law. However, there was no school before the project was built, and students went to neighboring schools by bus or other transportation. Because of the lack of schools, residents expressed continuous dissatisfaction, and in response, one elementary school and one middle school were constructed to address the problem. With those changes, activities to construct educational faculties such as private educational institutes were observed in the Wangsimni New Town region. Since the new town project was completed, the number of private educational institutes increased from two to twelve. The location of educational facilities has a direct relationship with changes in a regional society. In addition, the range of the life zones of residents is changed by the educational environment. In the case of Wangsimni New Town, the life zone was expanded unnecessarily because of the absence of schools.

The change of life zone enables residents to create a community that has various characteristics and that enables the creation of a rich regional society by the formation of a mixed community. The Wagnsimni New Town project changes the range of the life zone and expands the community through the location of public facilities, which is a positive phenomenon from the perspective of urban regeneration

CHAPTER 6.
RECOMMENDATIONS AND CONCLUSION

Compact city development is implemented at many cities in the world as an urban regeneration method to achieve economic development, environmental improvement and enhancing social equity. Especially, European countries, its land area is relatively smaller than other countries, applied compact city development to protect natural environment, enhance quality of life of residents, impede urban sprawl through redeveloping existing city center.

Wangsimni new town project is an urban regeneration project based on the notion of compact city development. Using AHP method, researcher creates standards to measure urban compactness that matches with current situation of South Korea, then examine compactness of Wangsimni new town development. Through the results of AHP, it is useful to determine whether a city is compactly developed or not.

Wangsimni redeveloped region achieved high level of compact city development in most fields except education, culture and welfare service, and accomplished high rate of replacement of existing residents. However, the project could not consider convenience of residents due to low compactness of education, culture and welfare service. It could be a limitation that Wangsimni region is developed as downtown-centered method, but consideration is needed in respect of high rate of replacement of existing residents and population density that is similar with other region of Seoul.

Recommendation

The recommendations mentioned below address aspects that the New Town project ignored in the process of developing the project. These apply not only to the Wangsimni New Town project but also to new town projects in general that have been and will be developed by Seoul and that are important matters that are widely discussed.

Establishment of a Detailed Improvement Plan for Integrated Development

The Wangsimni New Town development project is composed of physical infrastructures that include residences, housing subdivisions, public facilities, and social amenities. However, the urban environment is not regenerated only through physical improvement. Regeneration should be developed not only with physical facilities but also with intangible elements that include the economy and society of regions. In addition, the understanding, support, and participation of residents are needed. Therefore, comprehensive planning should include the establishment of clear standards, beginning with the selection of the target area. In addition, sufficient review and examination by residents, public officials and experts from various fields is needed from the early stages of establishing the plan. A planning and development plan should be created by examining the problems involved, and it should be based on opinion polls of residents and include the fields of housing, environment, economy, culture and society, in a process that suggests alternatives policies by analyzing the causes of problems.

A plan that considers the opinions of residents should be established, and it is necessary to address residents' perceptions of the plan. It is true that a developing new town project focuses only on increases in property values and that the consideration of the role of the regional community and level of urban development is insufficient.

Residents should have a participatory mindset for real improvement of the region and not for their own profit. First, through the process of development, changing residents' perceptions to bring them satisfaction involves more than offering them physical abundance and comfort, such as with a change in the floor area ratio and the ratio of green space. The integrated improvements of a new town project involve carrying out the development with the participation of the residents from the planning level, and changes in the perceptions of residents should precede the actual development.

Introduction of an Appropriate Organizing Method for Regional Characteristics

The main purpose of a new town project is to advance the undeveloped Gangbuk region to the level of Gangnam. Its context includes reducing the gap between Gangbuk and Gangnam and creating plentiful living conditions. However, the limitations of a development method involving the complete demolition of existing structures were shown in developing the project. The same development methods could affect residents' acceptance in the short term and regarding physical improvement, but they result in the reconstitution of regional spaces that exclude the residents themselves.

Therefore, it was considered urgent to identify measures that could maintain and establish the identity of Gangbuk, where people settle for a long time. The establishment of an identity encourages residents to take ownership and enhances the independence of region. To achieve this independence, resident-centered development is more important than owner-centered development. In particular, not only the residents but also the history and characteristics of the region should be taken into account. A regional community is achieved when initiating a resident-centered development based on the features of the region.

Institutional Support to Maintain and Restore the Regional Community

The regional community is a range to formulate a community by residents who have ownership in a region and is considered a type of self-sufficiency. However, a regional community is destroyed by a progressing new town project. Even though the settlement rate of existing residents is relatively high in Wangsimni New Town, citizens who were living in target regions moved to other regions, and a new regional society was formed by the influx of new people. Burdens related to allotted charges and maintenance fees imposed by redevelopment created a situation in which existing residents chose to leave.

To overcome the problem, aggressive institutional support is necessary. Absolutely reasonable investment and retention of residents is necessary because of the economic value and added value increases created by new buildings and an improved environment. However, support policies should be implemented to protect the common people in the process.

The representative support policy is a rental residence. The public office designates a consistent ratio of rental houses, which residents are forced to follow. Moreover, they use a strategy of contradiction through the benefits of floor area ratios or rental fees. However, homeowners oppose the support because of the decline of housing prices and the images of rental houses. Therefore, improvement for residents is a priority. Even though the new town project is not only for ordinary residents, the project is built to improve the living conditions of existing residents, including tenants. Institutional support should be provided to improve the quality of life of regional citizens

by improving the environment in a decrepit region and to encourage ownership in the region by applying the requirements of residents in the process.

Strategic Development on the Level of the Broader Area

Broad development could formulate one life zone by embracing community facilities, a childcare center, an elderly welfare center and production facilities. The life zone is not limited by a simple subdivision. It could expand its range through connection with neighboring life zones and become diminished by conditions. In the case of the Wangsimni New Town project, there were conflicts between residents and public officers about the use of public facilities, such as community buildings and public clinics, that were under constructed. A use that was suggested at the planning stage was changed during the course of the project, and residents expressed opinions regarding those changes. This is a result of the gap between the public facilities that residents want and those that the government wants to provide.

To solve the problem, it is necessary to secure space to decide the use of public facilities with the opinions of residents beginning in the planning stage. Collecting the opinions of residents is an indispensable process in the planning stage of a new town project but is usually ignored in process of implementation. Basic standards of creating a plan within the possible range through reasonable agreement with the government should be established, not by simply refusing to formally investigate the requirement. In addition, management attempts to create essential facilities by collecting the opinions of residents regularly in the process of implementation enables the broad development of a new town project.

Development that cannot bring change in the life zone of residents is not broad development. The life zone of residents should be expanded by constructing diverse facilities and should be reduced to a wide range of life zones as the occasion demands. Therefore, the establishment of an appropriate social infrastructure is necessary.

Creating a System for Sustainable Maintenance and Management

A new town project has a tendency to focus on the visible and fragmentary development. Urban development and improvement are achieved from a long-term and gradual view by preventing this tendency. The improvement of the long-term view is impossible with simple implementation of the project. Agreement among regional members, the government that leads the project and stakeholders should be reached.

In process of implementing a new town project, the opinions of residents are collected through brief sessions with residents, but primarily it is a token gesture. Moreover, there is a high possibility of alliance or corruption with construction companies involved in the process. That is, a system that controls or tunes all stakeholders is not established, so each stakeholder participates in the project only for their own profit.

In the case of ‘La Defense’ development in France, direct stakeholders that include each head of the local government and leaders of the operating companies consult through an implementation process by making a temporary community. When a project ends, all authority is entrusted to the local government to manage. Sustainable maintenance and management through a consultative group that is similar to ‘La Defense’ development is necessary at new town projects.

Seoul announced a general system of organization of new town projects by suggesting the ‘public manager system’ in 2009. The main idea of the ‘public manager system’ is to assign a role to public manager to tune and manage each stakeholder from the early stages of development of the project. Through this system, Seoul expects that the housing welfare standards of citizens will be raised. The system that Seoul suggested could be applied as an alternative for stage before construction. However, creation of a community in a region after completed is also important, so measures to maintain the organization should be considered.

Conclusion

In 2002, Seoul implemented new town projects as an alternative to previous unplanned development with connections to decrepit areas and to create balanced development by improving the broad range. New town projects were implemented by accepting the notion of urban regeneration as an integrated method of development.

The Wangsimni New Town region is a downtown-centered development among three development types. The project was planned in 2002, and construction began in 2003 and ended in 2008. Conditions in the new town project were extremely low because of unplanned development before the new town project; severe traffic congestion, poor quality of life because of the concentration of row-rise and high-density housing, lack of green space, and a low level of welfare because of a lack of public facilities. Seoul incorporated the Wangsimni region in the new town project to address those problems. Through the new town project, decrepit residences were totally demolished, high-rise buildings were built, green spaces increased rapidly, and the quality of life of residents improved with the development of public facilities. Even

though there was an influx of people, and the number of houses increased, the gross area of open space increased, and accessibility to other regions was improved by reconfiguring the streets. That is, the visible quality of life was improved through the physical improvement of the environment. Based on the compactness index as formulated by AHP analysis, the Wangsimni New Town project was confirmed as the region of the compact city development that is the current thinking in national land-use planning in Korea. It was judged that sustainability, which is a main aim of compact city development, has been applied.

Limitations of Research

This study analyzed the Wangsimni New Town project based on a compactness index to determine whether the region has been developed compactly. In the case of research analysis, present conditions for each indicator are analyzed based on the compactness index, and various statistical data and reports are used. However, there is controversy about whether the compactness index is representative for understanding compact city development. Urban compactness should be identified with more specific standards for compactness indicators.

Even though the Wangsimni New Town region was developed as a compact city, it is not possible to generalize the method to other regions. For example, the gross area of the Wangsimni New Town region is relatively small. Comprehensive consideration of various factors that could affect the development process is necessary for the application to a broader region. Compact city development is being implemented in mid-size and small cities as an urban regeneration method. Many problems would be caused by considering the economic gap between Seoul and the other provinces in

Korea. Therefore, modification of the development method to correspond with each province is essential, based on precise investigation of the Wangsimni New Town project, and it is necessary to direct research toward that issue.

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BIOGRAPHICAL SKETCH

Taehwan Hyeon was born in Cheonan-si the Republic of Korea in 1980. He is the eldest boy in the family of two boys. In 2006, He earned his bachelor's degree in civil engineering from the Chung-Ang University in Seoul, the capital city of the Republic of Korea. After graduating the Chung-Ang University, he gained admission to the University of Florida in 2009 to the College of Design, Construction and Planning, School of Architecture. He was awarded a master degree in Urban and Regional Planning here in 2011.

Taehwan's specific planning interests include urban regeneration, compact city development, gentrification, urban economy and community revitalization, all of which are illustrated in his research work. During his graduate school years, he was inspired to explore economic, environmental improvement of dying cities, which eventually influenced his decision to study the urban regeneration. Taehwan enjoys skiing, climbing, and traveling to beautiful places in his free time. He married with his lovely wife Ki-soo Lee and has a wonderful time nowadays.