Spatial Characteristics of Urban Shrinkage and Social Impact of Housing Abandonment in the Inner-city Area of Incheon, South Korea

쇠퇴도시 내 빈집 발생의 주요 경로 및 공간적 특성과 주민인식에 미치는 영향: 인천 구시가지를 대상으로

August 2020

Seoul National University

Graduate Program in Urban Design

Youngmee Jeon

Spatial Characteristics of Urban Shrinkage

and Social Impact of Housing Abandonment

in the Inner-city Area of Incheon, South Korea

Advised by Prof. Saehoon Kim

Submitting a Ph.D. Dissertation of Urban Planning
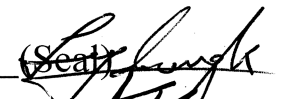
July 2020

Seoul National University
Interdisciplinary Program in Urban Design

Youngmee Jeon

Confirming the Ph.D. Dissertation written by
Youngmee Jeon
July 2020

Chair	Dong Kun Lee	(Seal)
Vice Chair	Saehoon Kim	(Seal)
Examiner	Young npel Ryu	(Seal)
Examiner	Youngkeun Song	(Seal)
Examiner	HYUNGKYOO KIM	(Seal)
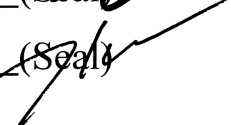
Abstract

Spatial Characteristics of Urban Shrinkage and Social Impact of Housing Abandonment in the Inner-city Area of Incheon, South Korea

Youngmee Jeon

Seoul National University
Graduate Program in Urban Design

This dissertation investigated the spatial characteristics and social impact of 'urban shrinkage' and 'housing abandonment' in four separate but related papers focusing on the following sub-themes: (1) major paths of abandonment in the East Asian context, (2) distribution pattern and characteristics in terms of socio-spatial inequalities, (3) residents' perceptions of vacant houses, and (4) neighborhood-specific clusters of vacant houses. Studies have been conducted in Incheon, one of the cities experiencing both city-wide growth and the decline of the inner city.

Paper 1_ Housing abandonment in shrinking cities of East Asia: Case study in Incheon, South Korea

Despite growing signs of urban shrinkage in countries such as Korea, Japan and China, few studies have examined the generalizable pattern of urban shrinkage and its relationship to the characteristics of housing abandonment in the East Asian context. This study explores five major paths that may explain the emergence of vacant houses in declining inner-city areas, based on empirical observations in the city of Incheon, South Korea. The paths are: (1) strong government-led new built-up area development plans (pull factor for population movement); (2) delay and cancellation of indiscriminate redevelopment projects (push factor for population movement); (3) initial poor development and concentration of substandard houses; (4) aging of the elderly population; and (5) the outflow of infrastructure and services. These paths, also found in Japan or China, are expected to be combined in a local context, leading to more serious housing abandonment. This study suggests that it is important to take appropriate countermeasures based on the identification of the paths causing vacant houses.

Paper 2_ Planned inequality of the locational pattern of housing abandonment in shrinking inner-city areas of Incheon, South Korea

Housing abandonment is one of the most distinctive features of urban shrinkage associated with depopulation and a loss of neighborhood attractiveness. Previous studies investigated the scale and the process of housing abandonment in the former industrialized cities in the United States and Europe. Yet very little

was known about the characteristics of housing abandonment in cities that have experienced rapid urbanization in terms of spatial unevenness. In the study, based on a unique parcel-level dataset of vacant houses in Incheon, South Korea, the *firth*'s logistic regression analysis revealed that the building and parcel, urban neighborhood, economic, and socio-demographic determinants might explain the spatially selective occurrence of housing abandonment at intra-urban level. The results indicated that older, smaller, and inaccessible residential buildings developed with lower quality during the rapid urbanization period were more vulnerable to abandonment. The failure of indiscriminately planned redevelopment projects under the growth-oriented policies contributed to housing abandonment in concentrated areas. With the devastation of manufacturing and commercial areas due to the out-migration of households to the new suburbs, socially unsustainable environments, such as the concentration of elderly and less-educated people in the inner city, were significantly associated with the emergence of abandoned houses.

Paper 3_ Perceptions of abandonment: Analyzing subjective perception on vacant houses using the photo-elicitation method

Vacant houses have been regarded, in terms of the broken windows theory, as one of the signs of neighborhood disorder inducing prevalent violent crimes. Previous studies, mostly in the fields of public health and criminology, have indicated that vacant houses not only pose a threat to the physical health of residents but also deteriorate their mental health. However, little is known about

the residents' experiences and interpretations of vacant houses in declining neighborhoods. In this study, the perceptions of vacant houses in shrinking inner-city neighborhoods of Incheon, South Korea, were analyzed utilizing the semi-structured questionnaire and photo-elicitation methods. The surveyed residents expressed that they had been suffering from persistent daily life problems, not from the issues caused by the simple presence of vacant houses. The survey revealed that the residents' degree of understanding and responsibility for neighborhoods and the level of experiences of and information on vacant houses affected subjective perceptions of vacant houses. Additionally, the photo-elicitation method involving both resident and non-resident groups revealed that the fear of vacant houses arose not only from the visible presence of abandonment but also from invisible wrongdoers or outsiders. The perception of how abandonment is managed also determined their feelings and responses toward vacant houses. The results suggest that suitable vacant house management and usage measures in shrinking cities should be provided for the remaining residents with pieces of broken windows.

Paper 4_ The causes and characteristics of housing abandonment in an inner-city neighborhood: Focused on the Sungui-*dong* area, Nam-*gu*, Incheon

The study aims to analyze the causes and characteristics of housing abandonment at a micro level and to draw the implications for urban design in the declining inner-city neighborhoods of Sungui-*dong*, Nam-*gu*, Incheon. This study created a theoretical frame explaining the mechanism between urban shrinkage

and housing abandonment, and identified the spatial distribution pattern, characteristics, and causality of housing abandonment, applying qualitative methods. 80 vacant houses in Sungui-*dong* were distributed intensively in the four clusters. The results indicated that the different physical conditions of each cluster acted as driving forces influencing the pattern of housing abandonment. The clusters with poor physical environments, such as narrow streets and small parcels, attracted redevelopment's cancellation and spatial concentration of socially-vulnerable populations, leading to the proliferation of vacant houses. The maintenance of public areas surrounding vacant houses played a decisive role in the occurrence of additional decline and the formation of stigmatized neighborhood images. Additionally, residents perceived the seriousness of housing abandonment differently depending on their residence locations and social characteristics. Further studies could aim to conduct an in-depth analysis of the urban spatial characteristics of housing abandonment, prepare public domain management plans, and identify residents' awareness and behavior.

Publications

Please note that Chapter 1-4 of this dissertation were written as stand-alone papers (see below). Chapter 1 and 4 were published in 2020 and 2016 respectively. Chapter 2 and 3 are under review after being submission to academic journals.

Chapter 1.

Jeon, Y., & Kim, S. (2020). Housing abandonment in shrinking cities of East Asia: Case study in Incheon, South Korea. *Urban Studies*, 57(8), 1749-1767.

Chapter 2.

Jeon, Y., & Kim, S. Planned inequality of the locational pattern of housing abandonment in shrinking inner-city areas of Incheon, South Korea.

Chapter 3.

Jeon, Y., & Kim, S. Perceptions of abandonment: Analyzing subjective perception on vacant houses using the photo-elicitation method.

Chapter 4.

Jeon, Y., & Kim, S. (2016). The causes and characteristics of housing abandonment in an inner-city neighborhood: Focused on the Sungui-*dong* area, Nam-*gu*, Incheon. *Journal of the Urban Design Institute of Korea*, 17(1), 83-100 (in Korean).

Table of Contents

List of Tables

List of Figures

Introduction

Urban shrinkage has become one of the most noticeable urban phenomena that many cities around the world have been experiencing due to various causes. Urban shrinkage is a common but differentiated global phenomenon. Shrinkage is a specific trajectory of cities following distinct logics of development in economic, social, and physical aspects, while it is a multidimensional phenomenon with different types and approaches depending on the country and city (Großmann et al., 2013; Martinez-Fernandez et al., 2012). The major pattern of shrinkage in Western cities have generally been understood as deindustrialization, suburbanization, and population decrease (Cunningham-Sabot et al., 2013; Haase et al., 2013; Martinez-Fernandez et al., 2016). Although cities in East Asian countries, including South Korea, Japan, and China, have had similar experiences in the decline process, they show different signs of shrinkage in terms of time, speed, and characteristics (Buhnik, 2010). The shrinkage patterns of these cities have been influenced by the strong growth agenda under the developmental state, growth-oriented policies that have been maintained even after the recession, land and housing development monopolized by the public sector, and the sharply increasing elderly population.

Furthermore, housing abandonment has been the most severe and apparent spatial manifestation of urban shrinkage, conversely affecting the worsening of shrinkage in a vicious circle (Jeon & Kim, 2019). Urban shrinkage leads to a

decrease in population and the collapse of industrial bases that are associated with abandonment of houses, whereas housing abandonment brings about additional shrinkage through the deterioration of physical environment, the degradation of local vitality, decreases in property values, and increases in housing management costs (Kim, 2019). South Korea, confronted with a rapidly rising elderly population, the lowest level of birth rate, and slow economic growth since the 2000s, recorded approximately 1.3 million vacant houses or 7.4% of the total housing stock in 2017, increasing by 59.3% from 0.8 million in 2010. The Korean government enacted "the Special Law on Regenerating Vacant and Small-scale Houses" in 2017. Especially, most vacant houses have encroached on inner-city areas which were deprived of their population and facilities by newly developed suburbs. Therefore, vacant houses could indicate the devastated physical environment of shrinking cities through the buildings themselves, extensively revealing the socio-spatial inequalities between inner-city areas and newly developed suburbs through their distribution patterns. Moreover, Long-term vacant houses in an irreparable state have gradually permeated the lives of residents who remain voluntarily or unwillingly in shrinking cities, becoming urban problems directly related to their life quality and are not simply one of numerous aspects of the disorder.

Against this backdrop, this four-part study, under the central theme of "housing abandonment in shrinking cities", seeks to explore the following four sub-themes: (1) the main paths; (2) distribution patterns and characteristics; (3) residents' perceptions of vacant houses; and (4) the vacant house clusters. The city of Incheon, which is the third most populated city in South Korea but has been

experiencing an ever-intensifying decline in the inner-city areas, is a suitable site for investigating the phenomenon of housing abandonment associated with urban shrinkage.

The first chapter aims to examine how the dynamic of housing abandonment works in the inner-city areas experiencing urban shrinkage. Specifically, this chapter clarifies what facilitating paths of vacant houses are and how they interact by integrating empirical evidences found in the city of Incheon. The results provide an opportunity to explore the paths of housing abandonment in East Asia, as distinct from those of the West, and suggest implications for urban planning and design required in shrinking cities.

The second chapter aims to understand what characteristics of residential buildings are vulnerable to being abandoned in the inner-city areas of Incheon, by identifying spatial imbalances occurring in increasingly smaller urban spatial units and then statistically analyzing various influencing factors on housing abandonment. The results provide opportunities to discover the mechanism of housing abandonment and its associated socio-spatial disparities. Particularly, the analysis of valuable parcel-level dataset encourages urban planners, designers, and residents to plan for the management and utilization of vacant houses based on a clear understanding of the characteristics of buildings and neighborhoods.

The third chapter aims to identify patterns in residents' perceptions and responses to vacant houses in declining neighborhoods of the inner city of Incheon. The chapter examines how residents' perceptions of vacant houses vary depending on socio-demographic characteristics, individual experiences, and

community interactions, and then analyzes the difference in the degree of and factors relating to the fear of vacant houses between residents and non-residents. This exploratory study could be used as valuable data for local authorities around the world to direct policy intervention on managing vacant houses.

Lastly, the fourth chapter aims to investigate the causes and characteristics of housing abandonment at a micro level, focusing on the four clusters of vacant houses in Sungui-*dong*, Nam-*gu*, Incheon. The chapter establishes a theoretical frame explaining the mechanism between urban shrinkage and housing abandonment, and then analyzes the process in which this mechanism is manifested in each vacant house clusters. This study has a major significance in identifying the spatial distribution patterns, causes, and characteristics of housing abandonment at a micro level in the clusters of vacant houses.

Chapter 1

Housing abandonment in shrinking cities of East Asia: Case study in Incheon, South Korea

1. Introduction

Urban shrinkage [1] is a common but differentiated global phenomenon. Shrinkage is a specific trajectory of cities that follows different logics of development in economic, social, and physical aspects (Großmann et al., 2013). Previous studies have shown that it is neither a short-term divergence from typical urban growth nor a marginal pattern of urban development processes (Cunningham-Sabot et al., 2013; Großmann et al., 2013; Hartt, 2018; Reckien and Martinez-Fernandez, 2011). Shrinkage is a multidimensional phenomenon that differs in type and approach by countries and cities (Martinez-Fernandez et al., 2012). Cities in East Asian countries including South Korea, Japan, and China also show distinctive signs of shrinkage; however, most studies have discussed this issue from the United States and European perspectives (Großmann et al., 2012; Haase et al., 2013; Haase et al., 2014; Morckel, 2014; Ryan, 2012). These

---

[1] In this study, 'urban shrinkage' means that the whole city or part of the city is deteriorating in economic, social, and physical terms over time due to various causes.

countries have different patterns of urban shrinkage in terms of time, speed, and characteristics (Buhnik, 2010), despite some similarities with Western countries in the causes and effects of shrinkage (Table 1-1).

The major pattern of shrinkage in Western cities, such as Detroit and Milwaukee of the US, Liverpool of the UK, and Leipzig and Halle of Germany, are generally understood as deindustrialization, suburbanization, and population decrease (Cunningham-Sabot et al., 2013; Haase et al., 2013; Martinez-Fernandez et al., 2016). East Asian countries have also had a similar experience in the process of shrinkage. However, the strong growth agenda under the developmental state brought about swift economic development and urbanization in these countries. They continued their growth-oriented policies even after rapid economic growth has slowed down. They are now facing significant problems associated with rapid urban shrinkage (Joo and Park, 2016). In East Asia, the public sector monopolized land and housing development, unlike market- and private sector-led development in the European-American experience (Ekers et al., 2012; Lee and Shin, 2011). State-led suburbanization promoted the relocation of the population and public institutions, aggravating the decline of inner-city areas. Moreover, the population of East Asia is aging more rapidly than any other region, as they move from aging to aged societies in just two or three decades that is much faster than 69 years of the US and 115 years of France (World Bank, 2016)[2].

---

[2] According to the UN's definitions, an "aging society" is that where the people aged 65 or older exceed 7% of the total population, in an "aged society" this figure is more than 14%, and in a "post-aged society" or "super-aged society" this figure is more than 20%.

Table 1-1. Pattern of urban shrinkage by regions and countries

Where		When	How
USA		Since the mid-20th century	• Deindustrialization — - Factory relocation / - Unemployment
EUROPE	Western	Since the mid-20th century	• (Market-led) Suburbanization — - Urban sprawl / - Residential segregation
EUROPE	Western	Since the mid-20th century	• Demographic change — - Decrease in population
EUROPE	Eastern	Since the 1990s	• Political change (post-socialist) — - Drop in birthrate / - Out-migration / - Housing vacancy
EAST ASIA	Japan	Since the early 1990s	• (In a very short period) Change of industrial structure — - Factory relocation / - Unemployment • (State-led) Construction of new towns* and new built-up areas** — - Relocation of public institutions / - Spatial disparity between inner-city areas*** and new built-up areas
EAST ASIA	Korea	Since the late 1990s	• Initial poor development — - Deterioration of substandard residential areas • Demographic transition — - Rapid aging / - Low fertility
EAST ASIA	China	Since the 2010s	• Coexistence of the rapid and massive industrialization and the slowdown of economic growth — - Decline of resource-based cities (monotonous industrial structure) • Uneven regional development — - Out-migration of rural workers from inland cities to megacities • Development of new towns as a form of suburbanization (planned and driven by the state) — - Oversupply of real estate / - Ghost cities • Demographic transition — - Aging

* 'New towns' are small and medium cities with high-rise apartment complexes outside the metropolis planned by government intervention, and in most cases have spatial connection with the metropolitan area in Korea.

** 'New built-up areas' are residential areas, smaller than new towns, primarily developed through 'housing site development projects' in Korea, which have been built as apartment complexes adjacent to inner-city areas.

*** In this study, 'inner-city areas' include not only the downtown area but also old built-up areas which are widely located between the downtown and new built-up areas.

Source : Rewritten by the author with reference to Cunningham-Sabot et al. (2013), Großmann et al. (2013), He et al. (2017), Lee et al. (2016), Martinez-Fernandez et al. (2016), Oswalt (2005), and Yang and Dunford (2018)

Housing abandonment poses one of the most serious problems in East Asia's shrinking cities, especially in their inner-city areas (Accordino and Johnson, 2000; Sternlieb et al., 1974). Urban shrinkage and housing abandonment form a vicious cycle of mutual influence: urban shrinkage leads to a decrease in population and collapse of industrial bases that are associated with abandonment of houses, whereas housing abandonment brings about additional shrinkage through the deterioration of physical environment, the degradation of local vitality, decreases in property values, and increases in housing management costs (Kim, 2019). According to Japan's Ministry of Internal Affairs and Communications, as of 2013, the number of vacant houses exceeded 8.2 million, accounting for approximately 13.5% of all houses. The Japanese government enacted "the Special Law on Vacant Houses" in 2015, authorizing municipalities to mandate the demolition of vacant houses. In Korea, as of 2015, the number of vacant houses nationwide was approximately 1.07 million, accounting for about 6.5% of all houses. This figure had increased by 30.5% over the last five years (compared with 820,000 in 2010). The Korean government enacted "the Special Law on Regenerating Vacant and Small-scale Houses" in 2017.

In Korea's shrinking cities, political-economic, institutional, physical and socio-demographic factors have acted as potential paths to housing abandonment. From a political perspective, the urban development plans, backed by strong government policies in the era of compressed growth, have negatively affected structural issues of urban decline, creating urban conditions vulnerable to housing abandonment (Choi and Kim, 2018). Houses built during the rapid urbanization were more likely to be converted into vacant houses due to their inadequate

physical characteristics in buildings and surrounding environment. The concentration of socially disadvantaged class, such as elderly people and low-income households, have correlated with the lack of maintenance, inhibiting the inflow of new residents. Moreover, the collapse of traditional commercial districts and the outflow of amenities have aggravated the living environment and eventually have had a significant impact on the decision between leaving and staying of young people.

Against this backdrop, this study examines how the dynamic of housing abandonment works in inner-city areas experiencing urban shrinkage. Specifically, this study clarifies what facilitating factors of housing abandonment are and how they interact. The study attempts to integrate empirical evidence found in the city of Incheon, South Korea. Although Incheon has grown externally, it is one of the metropolitan cities experiencing severe urban shrinkage and housing abandonment in the inner city for decades. The study can provide an opportunity to explore different paths of housing abandonment of East Asia, as distinct from those of the West, and suggest implications for urban planning and design required in shrinking cities.

2. Theoretical Framework and Research Site

2.1. Five paths leading to housing abandonment

This case study of Incheon utilizes a literature review and field survey as qualitative research methods in order to achieve the above purpose. First, we examine previous studies on urban shrinkage and housing abandonment in East Asian and Western countries. Second, we conduct empirical observations in Incheon, using field survey and the city's newly-generated GIS platform linked to vacancy data. Third, a comprehensive theoretical framework is established to explain five paths of housing abandonment in shrinking cities based on the case study's findings.
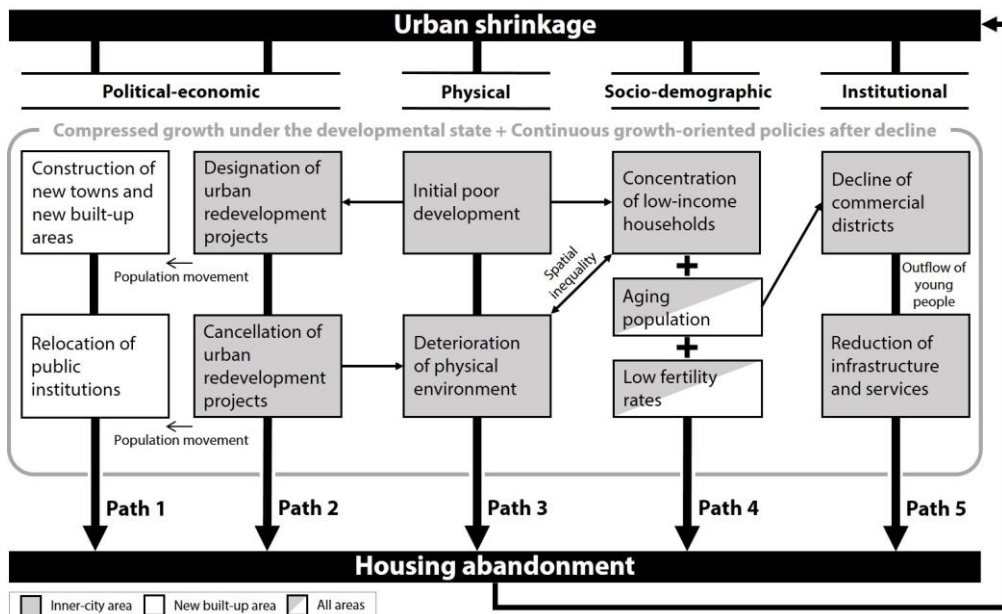
Figure 1-1. A theoretical framework for explaining five paths associated with an increase in the number of vacant houses in shrinking cities

The five paths concentrate on main factors that have impacts on housing abandonment (Figure 1-1). Path 1 relates to the state-led construction of new towns and new built-up areas with the relocation of public institutions, pulling residents out of inner-city areas. Path 2 is associated with the delay and cancellation of numerous urban redevelopment projects designated in inner-city areas, pushing residents to new built-up areas. Paths 1 and 2 have resulted from the extensive state intervention in urban planning, which is a distinctive characteristic of land and housing development in East Asia (Lee and Shin, 2011). Path 3 concerns the buildings' initially inferior construction, causing the accelerated deterioration of physical environment and the concentration of low-income group. This path is mainly due to the rapid urbanization process under compressed growth and is primarily observed in inner-city areas of Korea's metropolitan cities like Incheon and Busan. Path 4 addresses social problems involving the concentration of aged populations and their deaths, such as devastated communities. The extreme concentration of population in metropolitan areas still found in East Asian countries and severely depressed birthrate have accelerated the aging of old urban centers. Path 5 relates to the reduction of infrastructure and services in the process of deepened decline, predicting the degradation of quality of life for the remaining people as well as the desolation of inner-city areas. This phenomenon of irreversible spatial disparity is also found in the cities of Kanagawa, Saitama, and Gunma Prefecture of the Tokyo metropolitan area (Figure 1-2).

More significantly, these paths share the background of a compressed economic growth under the strong developmental regime. The adherence to

traditional growth-oriented polices lasted despite the advent of the decline phase, intensifying the problems of shrinking cities (Wiechmann and Pallagst, 2012).

Figure 1-2. Vacant houses in Incheon, Korea (1, 2) and in Saitama, Japan (3)
(*Source* : Photos taken by the author; https://www.japantimes.co.jp/)

2.2. Incheon: a seemingly growing but virtually declining inner city

Korea is a country with aging population and a low birth rate at an alarming rate in the world, according to OECD data (OECD, 2019). With this unprecedented socio-demographic change, urban shrinkage has occurred not only in local small towns but also in inner-city areas of larger cities. Incheon, one of the major metropolitan cities in Korea, is currently suffering from urban shrinkage problems, including the stagnation of its manufacturing industry, the decline of traditional commercial districts, an increase in its elderly population, housing abandonment, and a widening spatial inequality.

Incheon developed into the country's leading industrial city with the construction of industrial complexes in the 1960s and 70s under the state-led export-oriented economic development policies. Additionally, Incheon has become an international city after the establishment of an international airport in

2001 and the 2003 designation of the Free Economic Zone. However, ironically, Incheon's main inner-city areas—Jung-*gu*, Dong-*gu*, and Nam-*gu*—has gradually declined since the 1980s. Major urban development projects have primarily concentrated in the city's outskirts, and many public and commercial facilities have relocated to new urban areas. The decline of the inner city has accelerated as the urban redevelopment projects have been delayed and canceled because of a slowdown in the housing market. As in most Korean cities, this is largely because new built-up areas have been created within a short distance from inner-city areas, facilitating the movement of people who want to occupy an improved living environment. The inner city also faces problems related to the outflow of community facilities and its greater proportion of people aged 65 and over. In all, the long-term decline of the inner city has led to the emergence of about 1,200 vacant houses.

Incheon exemplifies how serious the shrinkage of inner-city areas in a large city is, which has not been noticed due to the city's overall growth. The case study of Incheon demonstrates how vacant houses are triggered in declining inner-city areas and how they lead to additional shrinkage.

3. Results

3.1. Path 1: State-led new built-up area developments outside an existing inner city

Path 1 focuses on government-led suburbanization as a means of economic stimulus in periods of compressed growth and its associated neglect of the relatively declining, existing inner-city areas.
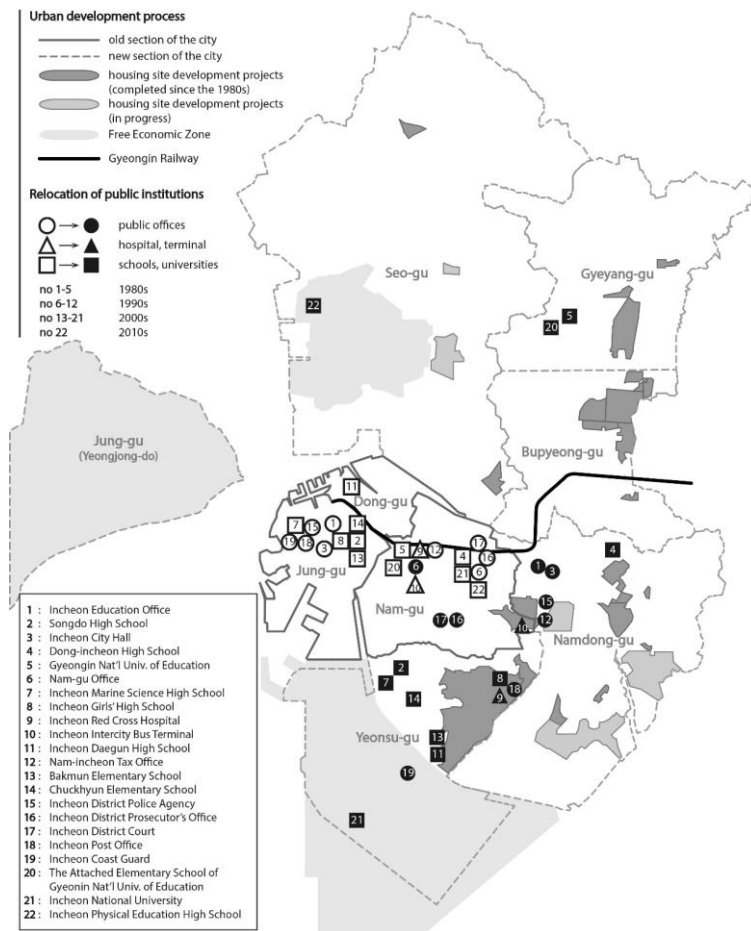
Figure 1-3. Relocation of public institutions in Incheon between 1980s and 2019

Since the 1980s, Korean central and local governments have directly led the development of extensive new urban areas through growth-oriented public policies. The central government constructed two million housing units in just three years with the creation of five large-scale new towns in the metropolitan area, after the announcement of 'the Two Million Houses Construction Plan (1988-1992)' in 1988. Moreover, numerous new built-up areas, smaller than new towns, have been constructed adjacent to existing inner-city areas in most cities, regardless of the city size (Kim, 2010). These developments have been accompanied by the inevitable relocation of major public institutions away from inner-city areas. Unlike in the US, where private developers led suburban expansions and the role of the government was indirect, such as the construction of highways and the provision of loan system to support suburban home ownership (Jackson, 1987), suburban developments in Korea have been conducted under state-led direction backed by strong government policies.

Incheon has created modernized apartment complexes on the outskirts of the city through the housing site development projects and relocated public facilities. Starting with the relocation of the city's education office in 1982, numerous public facilities, including the city hall, borough office, police agency, court, and schools, have moved from the inner-city areas to the newly developed areas. In Figure 1-3, for example, City Hall, marked with number 3, was previously located in the inner-city area, Jung-*gu* and has moved to the new built-up area, Namdong-*gu* in 1985. At that time, the city government created a large administrative town in Namdong-*gu*, including city hall, municipal council, education office, and central library. The relocation of City Hall encouraged

further development of the surrounding area in the new built-up area, while promoting the decline in the inner-city area. No. 21 also represents the movement of Incheon National University from Nam-*gu* to Yeonsu-*gu* in 2009. After the relocation, traditional commercial districts around the university have declined sharply.

Table 1-2. Population change by administrative districts (*gu*) in Incheon between 1995 and 2015

Administrative district (*gu*)			1995	2000	2005	2010	2015	Rate of change for 20 years (%)
Inner -city areas	Jung- gu	Total	68,082	66,642	86,167	83,623	112,910	+ 65.8
		Old downtown	59,679	56,880	59,463	55,090	52,734	**- 11.6**
		Yeongjong-do*	8,403	9,762	26,704	28,533	60,176	+ 616.1
	Dong-gu		100,114	72,792	74,285	72,794	69,957	**- 30.1**
	Nam-gu		425,330	408,835	412,816	411,756	397,396	**- 6.6**
New built- up areas	Yeonsu-gu		212,541	259,790	262,782	274,352	309,541	+ 45.6
	Namdong-gu		382,704	395,289	369,288	453,903	512,816	+ 34.0
	Bupyeong-gu		488,663	528,403	546,321	542,433	536,210	+ 9.7
	Gyeyang-gu		256,478	326,522	325,626	334,970	323,645	+ 26.2
	Seo-gu		293,643	335,339	371,204	389,057	484,764	+ 65.1

Source : Population Census, Population & Household, Korea National Statistics Office (KNSO)

As a result, as middle-class households left the inner city for more livable and affordable living, vacant houses emerged in the inner city while population and employment rates declined. Table 1-2 shows that the population of the new built-up areas has increased while that of the inner-city areas has decreased for the last 20 years. Dong-*gu*, one of the inner-city areas, had the largest population decline

by about 30% over 20 years. The population of Jung-*gu* decreased by about 12% except for Yeongjong-do[3], and Nam-*gu* was about 7%.

3.2. Path 2: Repeated designation and cancellation of redevelopment districts

Path 2 explores the urban redevelopment projects excessively promoted to regenerate inner-city areas under the government's persistent growth-oriented public policies. Over-designated project districts have had adverse effects on the areas due to the delay and cancellation.

The Korean government designated an enormous amount of urban redevelopment districts in inner-city areas nationwide in the mid- and late 2000s, particularly after the enactment of the Act integrating various urban redevelopment projects and the introduction of the New Town Project[4]. At that time, in accordance with the property boom, the approval requirement was relaxed, and the rise in property value was greatly expected. In the boom of the 2000s, the urban redevelopment districts in Incheon reached 212 locations. The classic formula of urban redevelopment—full demolition, compensation, and privately-driven redevelopment—was applied to the districts under the auspices of the local government (Lee et al., 2016). Excessive redevelopment plans that did not consider local, site-specific conditions have paradoxically led to urban decline.

---

[3] 'Yeongjong-do' is an island under the jurisdiction of Jung-*gu*, Incheon. The population of Yeongjong-do, where Incheon international airport is located, has increased since the late 2000s due to the construction of Yeongjong New Town as part of the Free Economic Zone project.

[4] 'New Town Project' is a large-scale redevelopment project featuring broader target area and stronger public intervention and support than typical redevelopment projects.

In Incheon, inner-city districts designated as urban redevelopment zones are associated with the most severe decline problems (Cho, 2015). First, areas designated as urban redevelopment districts already had a poor physical environment by corresponding with the requirements specified in the municipal ordinance (i.e., the number of dilapidated and unauthorized buildings, the number of buildings not abutting on a road, the number of very small and irregular-shaped parcels, and high dwelling density). Second, after the designation, development activities, such as new construction and major repair, were restricted in these areas by law along with the suspension of investment, so the districts were easily exposed to the degradation of physical environment. Third, due to the depression of the real estate market since the 2010s and the limitation of profitability-oriented development using private funds, a large number of urban redevelopment projects were delayed or canceled. Eventually, most of the buildings in the districts became dilapidated or neglected as inhabitants moved to other areas. According to the data of Incheon as of 2017, about 63% of the total vacant houses in the inner-city areas were located in the urban redevelopment districts.

Specifically in Incheon, twenty-three urban redevelopment districts were canceled between 2012 and 2013, of which ten were located in Dong-*gu* and Nam-*gu*. Between 2013 and 2015, twenty-six districts were canceled, of which sixteen were located in Jung-*gu*, Dong-*gu*, and Nam-*gu*. In most of the canceled districts, communities did not have the capacity to improve residential environment by their own efforts. The physical and economic decline accelerated over time after the cancellation.

Some indiscriminate urban redevelopment process deviating from the original purpose of improving the residential environment made a difference in terms of quantitative scale and qualitative state of vacant houses. Although vacant houses are commonly scattered in one neighborhood and mixed with buildings in good condition (Kim, 2010), in the case of the long-delayed and canceled project districts, many dilapidated vacant houses are concentrated within a confined area, becoming a "ghost district" in the middle of a neighborhood vulnerable to crime and disasters.

3.3. Path 3: Initial poor development and physical deterioration of housing districts

Path 3 refers to residential areas inadequately created in terms of density, structure, and materials in periods of rapid urbanization and industrialization.

The decline of inner-city areas due to the initial inadequate development can be observed in cities across Korea, especially in settlements that were formed between the period of liberation (in 1945) and the 1960–70s through individual land development or the land readjustment projects (Kim, 2010). Soon after the outbreak of the Korean War in 1950, refugees created areas with the concentration of unlicensed shacks throughout the cities. Since the 1960s, as the urban population soared because of a great influx of rural population, most residential areas were built in poor conditions along the hills and streams without proper urban infrastructure, creating a population of the urban poor. According to World Bank data, Korea's urbanization rate, which was only 27.7% in 1960,

reached 40.7% in 1970, 56.7% in 1980, and 73.8% in 1990. On the other hand, according to the US Bureau of Statistics, the urbanization rate of the US was 28.2% in 1880, 39.6% in 1900, 56.5% in 1940, and 73.7% in 1980. The 100-year urbanization process in the US was compressed into just 30 years in Korea.

Representative land readjustment projects by period

1930s–1940s
1: Sungui district
- The first land readjustment project after the establishment of Incheon urban district plan in 1937

1950s
2: The 1st district
- The project to create roads and public lands for restoring the inner city of Incheon after the Korean War

1960s
3: Expressway 1, 2, 3, 4, 5 districts
- The projects to prevent disorderly urbanization after the construction of industrial complexes and the opening of expressway

1970s
4: Juan 2nd district/ Ganseok district
- The projects to create residential complexes for accommodating an increasing population

1980s
5: Guwol district
- The largest land readjustment project in Incheon

1990s
6: Munhak district/ Hagik district
- The projects implemented not by Incheon city but by the public development agency

Figure 1-4. Land readjustment projects in Incheon between 1930s and 1990s
(*Source* : Redrawn by the author with reference to Incheon Development Institute (2004))

The Korean government provided a large amount of residential land in a short period through the land readjustment projects to address the severe housing shortage. In the case of Incheon, in the 1960s, large-scale land readjustment projects covering an area of 20,465,983 m^2 were carried out in the hinterland of industrial complexes and around the Gyeongin (Seoul-Incheon) Expressway (Incheon Development Institute, 2004). Figure 1-4 shows that most of the residential districts in the inner city of Incheon were formed through these projects, accounting for 46.4% of the total housing complex development area (Cho, 2015).

At that time, areas, created through the land readjustment projects, became the newly emerging residential districts for a growing urban population. However, most of these districts, developed rapidly amidst fast-paced industrialization and urbanization, have become substandard residential areas over time, with characteristically narrow streets, small-scale parcels, low-rise and high-density houses, and insufficient infrastructure. The poorly developed areas have made it difficult to repair individual houses, as well as to implement essential urban redevelopment projects (Cho, 2015). As these areas failed to cope with people's growing demands for improved physical, social, and economic conditions, they have remained low-income residential or noncompetitive commercial districts and have contributed to serious urban shrinkage (Kim, 2010). Consequently, buildings with obsolete structures such as wood or cement block that were located in blind or extremely small-scale parcels of the closed blocks easily have turned into vacant houses beyond the point where maintenance is possible.

For instance, near the Nam-gu office, there is a small and old urban block where fifteen houses with an average gross floor area of 22.6 m^2 are left unattended. Although new construction activities took place in the surrounding area just after Nam-*gu* office moved to its present location in 1991, this block maintains its previous physical condition without any development. The width of streets in the block is very narrow, within 3m, making the passage of vehicles impossible and restricting pedestrian use. Additionally, most of the buildings consist of deteriorated block and brick structures. As the infrastructure and buildings in the block have been in poor condition for a long time, this area has been continuously occupied by the socially vulnerable group, and now there are approximately thirty-three households receiving the national basic livelihood benefits (Jeon and Kim, 2016).

3.4. Path 4: Unattended properties left in the process of fast aging

Path 4 refers to a socio-demographic change that predicts the inevitable increase of vacant houses in the future, even threatening the existence of communities.

Aging populations in East Asian countries mainly stem from a drastic decrease in birthrates and an increase in life expectancies. Populations continue to age at an unprecedented rate. Although the starting point of aging varies, nearly all East Asian countries are moving from aging to aged societies quickly (World Bank, 2016). In Korea, the starting point of aging was relatively slower than that of Japan, which typifies a super-aged country in Asia, but the transition speed from

an aging to an aged society was much faster. Korea entered an aging society with an aging rate of 7.3% in 2000, and became an aged society by exceeding 14% in 2018. This significant increase in the elderly population has led to a long-lasting decline in inner-city areas of big cities, as well as in isolated rural towns, implying that vacant houses will continue to increase in the future after the deaths of the elderly.

Incheon's three inner-city districts—Dong-*gu*, Nam-*gu*, and Jung-*gu*—ranked a much higher percentage of aged inhabitants (older than 65) than Incheon's average of 10.8%, as of 2015, accounting for 17.2%, 13.7%, and 13.4% respectively. The distribution of the elderly population, especially the low-income elderly, is considerably associated with that of poor physical environment in the inner-city areas. Elderly people do not easily improve residential environment because of the shortage of energy to maintain buildings and the tendency to settle for the present. Additionally, many old buildings owned by the elderly are often involved in complex and sensitive relation of ownership. Ultimately, these houses occupied by the elderly are more likely to be converted into vacant houses after their deaths. In this case, the heir to each property has to be tracked down by the local government, but the local authority tends to be reluctant to do this task because of the high cost and complexity.

For instance, one dilapidated vacant house in Nam-*gu*, Incheon, which has been left without owner for many years, was originally a house where an old couple resided. As the old couple passed away, their son and his wife came to live in the house. However, as it soon became clear that a friend of the old couple

owned a part of the land, their son's family moved to another area, leaving the house abandoned. This indicates that, after the death of an aged owner, if an appropriate heir to a building is not found or if the land and property ownership problem is revealed, the building is likely to be a long-term vacant house. Unfortunately, among the vacant houses with the building register data in the inner-city areas of Incheon, approximately 41% of the owners were the age of 65 or more as of 2017. Finding the next owners for these vacant houses is expected to take a long time.

3.5. Path 5: Vicious cycle of continued stigmatization of a neighborhood

Path 5 describes how major facilities move away following demand, leaving only the vulnerable parts of both urban infrastructure and communities.

In Korea, regardless of the city size, as the population of inner-city areas has decreased in the process of urban shrinkage, commercial districts have stagnated. As the outflow of infrastructure and services combines with rapid aging and low fertility, more severe and biased urban decline problems are being observed. For example, as the number of school-age children continued to dwindle, the Ministry of Education stated in 2015 that no new schools were to be established in new towns until small schools in rural areas or inner-city areas were integrated or closed. In inner-city areas, facilities for the young, such as kindergartens and schools, are being reduced according to skewed demand condition and replaced by facilities for the elderly, such as senior care centers.

In Incheon, the number of students in Dong-*gu* and Nam-*gu* decreased

significantly between 2000 and 2015, with the exception of Jung-*gu* where Yeongjong-do belongs to. In the last fifteen years, the number of students in Dong-*gu* and Nam-*gu* decreased by about 32% and 42%, respectively. Incheon has discussed the consolidation and dissolution of schools in the inner-city areas since the early 2010s. However, short-sighted alternatives, including school closures, conversely have the potential to trigger the hollowing-out of the inner city as well as the emergence of vacant houses. On the one hand, if facilities for children and teenagers are removed from the inner city, some of the existing residents move to other places to meet their needs for a better educational environment. As a result, the influx of young adults will not be expected, resulting in a limited age range of residents in the inner city. On the other hand, the outflow of population and facilities raises the issue of the quality of life for people remaining in declining areas. The most vulnerable communities that remain in the blighted neighborhoods are negatively influenced by policy decisions regarding the downsizing of public services and infrastructure, intensifying the downfall of the undesirable areas.

4. Discussion

4.1. Combination of the paths

We have examined the five major paths affecting housing abandonment in the declining inner-city areas of Incheon. Although the paths were separated to clearly identify triggers for vacant houses, in reality, they are closely inter-related and simultaneously exercise their influence. As a result, the condition of housing abandonment reveals different aspects according to the combination of the paths.

If a poorly developed area is designated as an urban redevelopment district, the project is more likely to become stagnant due to difficulty in achieving a consensus among impoverished residents. The sluggish project exacerbates the area's already inferior physical and economic conditions, resulting in the increasing number and worsening quality of vacant houses after resident's flight to other areas. For instance, in one district of Nam-*gu*, Incheon, two urban blocks with different physical conditions were designated as the same urban redevelopment district. After the cancellation of the project, in the one urban block with brick buildings in relatively good condition, the surrounding environment of vacant houses was kept somewhat clean. In the other block with decaying wooden or cement buildings, vacant houses accelerated the decline of the entire block.

In addition, if the outflow of facilities such as schools, hospitals, and stores occurs in an area with rapid aging, like the shrinking suburbs of Japan, a large number of vacant houses are generated without additional inflow of population. Aging residents are relatively hard to keep their houses in good order, so

buildings are more likely to turn into vacant houses soon (Yui et al., 2017).

4.2. Housing abandonment in other East Asian countries

Some of the paths found in the inner-city areas of Incheon are observed not only in other Korean cities but also in Japan and China. They share similar experiences of rapid economic growth driven by state-led urban developments under the developmental state. This process has affected the pace and pattern of urban shrinkage. Additionally, the collapse of traditional Confucian values, including family integration and filial piety, has exacerbated the situation of shrinkage.

4.2.1. Japan as a front-runner

• *Same type of dwellings supplied in a short time with similar household composition (Path 1)*

Under the rapid urbanization from the 1950s to the 1970s, the Japanese government promoted suburban homeownership. The Japan Housing Corporation, established in 1955 as a public developer, began to create new suburbs outside the metropolitan cities like Tokyo, Osaka and Nagoya from the 1960s to solve the housing shortage problem. The taxation system, including a reduction and exemption on the municipal tax for property, was established with the estimation that demands for newly built houses would continue according to a traditional urban growth model (Yui et al., 2017). For example, as a great number of people in central area of Tokyo moved to adjacent suburbs such as Kanagawa, Saitama

and Chiba since the early 1960s, the total population of these three prefectures tripled from 6.8 million in 1950 to 20.8 million in 1995 (Sorensen, 2001).

However, the large-scale suburban housing areas, which were once dream destinations for all Japanese families, have declined since the late 1990s because of the aging of the baby boomers who were major householders of these areas in the 1960s and 1970s, and the independence of their children. As the price of real estate declined in metropolitan centers after the collapse of the bubble economy and the supply of new housing increased due to urban renewal projects, re-urbanization has emerged among young people who were reluctant to long commuting times to city centers. Above all, the mass supply of the same type of housing in a short period at the town planning stage have also played an important role in the decline of suburban new cities (Yui et al., 2017). In the areas where almost all the buildings and people became old at the same time, vacant houses have increased sharply, showing the hollowing-out phenomenon.

• *Poorly developed housing districts vulnerable to obsolescence (Path 3)*

In Japan, many residential areas with dense and substandard houses were developed in metropolitan industrial cities during a period of urban immigration, such as Higashiosaka in Osaka Prefecture and Amagasaki in Hyogo Prefecture (Oswalt, 2005). In the midst of the rapid reconstruction and industrialization of the severely damaged cities after World War II, Japanese homebuilders constructed many low-priced and low-quality wooden frame houses without thermal insulation or earthquake reinforcement. Then, in 1981, there was a major

change to Japan's earthquake-resistant construction code, so previously built buildings (*kyu-taishin*) had very low market value due to their poor quality compared to buildings built later (*Shin-taishin*). Moreover, buildings built before the 1980s had a much shorter lifespan, an average of 30 years, than the US and Europe, which have led people to regard the investment and maintenance of these buildings as unproductive work.

Ultimately, obsolete buildings with very low property value have a greater risk of becoming vacant houses. According to a survey by the Ministry of Land, Infrastructure, Transport and Tourism, approximately two-thirds (68.9%) of Japan's vacant houses are buildings built before 1980; among them, 44.5% were built before 1970 and 24.4% in 1971–1980 (The Nikkei Shimbun, 2015).

• Unprecedented aging rate and difficulty finding out new owners (Path 4)

In Japan, the neglect and disinvestment for houses after the deaths of the rising elderly population is the main cause of housing abandonment. According to Japan National Statistics Office, as of 2015, the proportion of people under 15 years old was the lowest, while that of people aged 65 and over was the highest in the world. As the proportion of the population aged 65 and older was 7.1% in 1970, 14.5% in 1995, and 20.1% in 2005, Japan became an aged society from an aging society in twenty-five years and a super-aged society from an aged society in ten years. Japan became a super-aged society in less than half the time it took to reach an aged society.

As a result, a considerable number of houses have been left unattended since

the elderly owners died, when the proper heirs to the properties could not be found. Since vacant houses due to the deaths of the elderly owners were mostly located away from the central parts of the major cities, their children had little desire to inherit them. Unfortunately, as the ratio of householders aged 65 and over was 31.2% in 2010 and is expected to reach 40.8% in 2035, vacant houses due to aging will continue to increase.

• *Outflow of infrastructure and services from the stigmatized areas (Path 5)*

In Japan's vulnerable areas with rising elderly people and poor physical environment, food retail stores are being closed or relocated to other areas because of their low profitability and efficiency. Citizens who have difficulty in purchasing goods due to the shortage of facilities are referred to as "shopping refugees (*kaimononanmin*)", and most of them are the elderly with movement difficulties. Furthermore, schools built in suburban new towns in the 1960s are being consolidated and closed, as the number of students has dropped rapidly due to population decrease, aging, and a low birthrate.

In the end, as the older generation increases and the younger generation decreases, the facilities for the young are reduced in declining neighborhoods, which in turn draws the young out of the areas, leading to a lack of tax revenue, vulnerability to disasters and crime, and housing abandonment (Cha, 2006).

4.2.2. China as a latecomer

• *Government-led urban developments and rural spatial expansion (Path 1 & 3)*

In China, new towns have been constructed on the fringe areas of metropolises by semipublic new town development corporations, which is comprised of local governments, districts' planning authorities, and state-owned developers. This construction has led to extensive suburbanization as a new economic growth pole (Wang et al., 2010). However, some new towns have turned into ghost cities that remains largely unoccupied due to the state-controlled over-supply based on not direct demand but speculation.

State-led urbanization has also absorbed rural inhabitants into urban areas, resulting in the decline of rural villages. The rural population is estimated to have decreased by approximately 241 million between 1995 and 2014 (Gao et al., 2017). On the other hand, the rigid household registration system between an urban and a rural area, called *hukou*, has prevented most of them from fully integrating into the urban communities (Liu et al., 2010). Rural inhabitants returning from cities have constructed new houses at village fringes since the 1980s. While houses built earlier with low quality did not satisfy the upgraded housing needs of farmers, the approval for a new house could be obtained from the village head with minimum restrictions (Gao et al., 2017; Liu et al., 2010). Over time, old houses in the inner villages which were excluded from the rapid urbanization and the lateral expansion of rural dwellings have been abandoned, causing the "village hollowing" phenomenon.

• A high number of elderly people living alone (Path 4)

China became an aging society in 2001 with an aging rate of more than 7%. China is aging rapidly because of the retirement of the baby-boomer generation born under the childbirth encouragement policy after the foundation of New China in 1949, as well as the workforce reduction resulting from the birth control policy since 1979 (Yang and Dunford, 2018). One notable feature of aging in China is not the proportion but the absolute number of elderly people. As of 2000, China had about 87.4 million people aged 65 and older, more than any other developing country, and the number is expected to reach about 331.6 million by 2050 (UN, 2002). In addition, China entered an aging society before becoming a developed country. According to the World Bank, in 2000, per capita GDP in Korea was $11,948 with an aging rate of 7.3%, while China was $959 with 6.9%.

Thus, in China, the number of elderly people suffering from poverty, illness, and depression without children at home, called "empty nesters", is soaring. A great number of empty nesters in rural areas whose children migrated to cities now live by themselves in tumbledown houses without contact with anyone from the outside. Consequently, the number of vacant houses is predicted to increase soon due to the deaths of many solitary elderly people.

• Disappearing schools in deprived areas (Path 5)

In China, where rapid urbanization and aging are taking place, small rural schools—once lively village institutions—have become gradually empty buildings as children move out to the cities with their parents (Koetse, 2017). In

2001, Chinese government launched a campaign to close remote village schools and pool resources in centralized county or town schools in response to a decreasing number of students. As rural schools began to shut down at an alarming rate in the following years, nearly three-quarters of all rural primary schools were closed forever between 2000 and 2015. Some students had to walk for hours to reach the nearest school, and even students who were unable to go on foot had to quit school. Eventually, the government stopped the plans to shut down small village schools in 2012 after thousands of schools had already closed.

During the huge rush to cities with better physical and economic opportunities, declining rural areas have experienced a decrease in the number of students, a lack of qualified teachers and the closure of school facilities. The reduction of resources without adequate alternatives in marginalized areas are leading to serious isolation and hollowing-out.

Korea, Japan, and China show similarities in the paths of vacant houses in declining areas within the East Asian frame. However, they also reveal differences in the timing of shrinkage and the pattern of abandonment according to what laws and policies relating to urban planning were applied and when and how urban development proceeded, based on the multidimensional nature of shrinkage.

Taking Path 1 as an example, most Korean cities large and small have experienced the decline of inner city areas because of adjoining new built-up areas developed by government-led suburbanization since the 1980s. In Japan,

large-scale suburban new towns, constructed adjacent to metropolitan cities since the 1960s, have revealed the problem of aging and housing abandonment after the signs of re-urbanization appeared. This is different from Korea, which is still developing new towns, absorbing many people from the surrounding area. In China, where urbanization is still in progress, the decline has been mainly seen in the countryside in opposition to the city, and ironically, some new towns, built on the periphery of metropolises under top-down planning since the 1990s, remain unoccupied because people have not moved in yet.

Path 2, on the other hand, can be said to be a characteristic of housing abandonment observed distinctively in the Korean context compared with other paths. In Japan and China, urban redevelopment projects have also been carried out to regenerate old downtowns. In Korea, however, urban redevelopment projects in declining inner-city areas have been remarkably delayed or canceled after the economic downturn of the late 2000s, resulting in massive vacant house clusters. These are largely attributed to over-designation of project districts, profitability-oriented development, and conflicts among project participants.

5. Conclusion

The exploration of the five major paths indicates that the features of vacant houses may vary depending on the main causes of occurrence. For example, the initially poorly developed vacant houses are usually located in extremely small and inaccessible parcels, and consist of physically severely damaged wooden, cement block, and brick structures. Vacant houses in the planned or canceled districts of urban redevelopment project have a high-density distribution pattern, negatively influencing the safety of communities. This means going beyond a simple dichotomy of whether it is a vacant house or not. Ultimately, it is important to identify the causes of housing abandonment and their interrelationship in order to select the priority management areas, to take appropriate countermeasures, and to prevent the proliferation of vacant houses.

The above results can lead to the following implications. First, since housing abandonment is directly or indirectly affected by the construction of adjacent new built-up areas, vacant house related policies need to be considered in connection with comprehensive urban growth management policies. Projects related to the supply of apartment-based new and large-scale housing districts should be scrutinized in urban decline phase. Second, the designation of excessive urban redevelopment districts that can mass-produce vacant houses in declining inner cities, especially in Korea, should be avoided. For the canceled districts, more systematic maintenance plans for vacant houses are advised to prevent additional shrinkage. Third, it is proposed to establish a system that can keep track of buildings with a high possibility of conversion to vacant houses, such as the

poorest quality housing where elderly owners live alone. Lastly, in respect of the downsizing of public facilities and services in disadvantaged areas, a long-term perspective and concrete plans are required to prevent the vicious cycle.

Although this study mainly focuses on empirically building the theoretical framework for the paths leading to housing abandonment in shrinking cities, the results would be helpful to show an undiscovered part in the complex spectrum of urban shrinkage and to provide important implications for urban design and planning related to housing abandonment. Future studies may include detailed case studies on the characteristics of vacant houses in block or parcel-level spatial unit.

Chapter 2

Planned inequality of the locational pattern of housing abandonment in shrinking inner-city areas of Incheon, South Korea

1. Introduction

Urban shrinkage has become one of the most striking urban phenomena that many cities around the world have been experiencing due to various causes and aspects. Shrinkage-related urban problems such as the collapse of local economies, unemployment, aging, poverty concentration, and dilapidated buildings have occurred not only in some well-known former industrial cities of the West but also in East Asia including Japan, South Korea, and China where shrinkage was never expected in the era of their high-degree economic growth just a few decades ago (Joo & Seo, 2018; Kim, 2019). Especially, housing abandonment has been the most severe and apparent spatial manifestation of shrinkage, conversely affecting the worsening of shrinkage in a vicious circle (Jeon & Kim, 2019). The number of vacant houses in Japan, which has suffered from a decade-long economic recession, population decrease, and aging since the 1990s, reached about 8.2 million in 2013, accounting for 13.5% of the total

housing stock (Hattori et al., 2017). Additionally, South Korea, confronted with a rapidly rising elderly population, the lowest level of birth rate, and slow economic growth since the 2000s, recorded approximately 1.3 million vacant houses or 7.4% of the total housing stock in 2017, increasing by 59.3% from 0.8 million in 2010.

Vacant houses display the devastating physical environment of shrinking cities through the buildings themselves, extensively revealing the socio-spatial inequalities between inner-city areas and newly developed suburbs through their distribution patterns. Typically, deindustrialization, suburban development, and out-migration have made new suburbs grow at the expense of old inner cities (Accordino & Johnson, 2000; Beauregard, 2006; Martinez-Fernandez et al., 2016; Van Allsburg, 1974; Wilson et al., 1994). In the United States, since the mid-20th century, many suburbs have experienced urban sprawl while inner cities have suffered from urban shrinkage and housing abandonment, due to the flight of white middle-class populations, the federally subsidized housing and highway construction programs, and the rising automobile-dependency (Martinez-Fernandez et al., 2012). In the case of metropolitan Detroit, the ratio of vacant houses differed between inner cities and new suburban cities, indicating that there were regional inequalities in economic, physical, and particularly social factors affecting the residential vacancy severity (Xie et al., 2018).

South Korea, where most of the declining inner cities and growing suburbs are closely juxtaposed, is witnessing exacerbating spatial polarization. Particularly, the spatially uneven distribution of vacant houses between the two regions

reflects the policy imbalance and indiscriminate implementation of urban development. In South Korea, state-led developments of new built-up areas on the outskirts of major cities, backed by strong government policies, have continued since the 1980s, while older inner cities have experienced a long-lasting urban decline (Jeon & Kim, 2019). Vacant houses have encroached on inner-city areas which were deprived of their population and facilities by newly developed suburbs. Moreover, many local governments have been engrossed in extensively designating 'redevelopment districts' in the planning stage since the 2000s with the intent to revitalize inner cities and to practically stimulate the economy in the short term. However, a considerable number of the over-designated districts have been hit by the relentless decline since the 2010s due to the economic depression and lack of financial resources. Even in the case of the urban regeneration projects related to housing abandonment, short-term palliative measures have only been carried out, while placing little importance on the identification of the underlying causes and conditions of vacant houses. Additionally, the issue of housing abandonment in inner-city areas of big cities in South Korea has not attracted much attention from policy-makers and local authorities, because of the population increase and economic growth of the whole city. These large cities, specifically regarding their inner cities, have been less likely to receive the adequate resources needed to address urban decline within the framework of equity in resource allocation, compared to small cities and rural areas.

The city of Incheon, which is the third most populated city in South Korea but has been experiencing an ever-intensifying decline in the inner-city areas, is an

appropriate area to study the phenomenon of housing abandonment with the spatial disparity. Through an empirical study on Incheon, the study aims to understand what characteristics of residential buildings are vulnerable to being abandoned in the inner-city areas by identifying spatial imbalances occurring in increasingly smaller urban spatial units, and then statistically analyzing various influencing factors on housing abandonment. The detailed research questions are as follows. How do the endogenous drivers of the shrinking inner city, such as buildings, parcels, communities, and historical contexts, correlate with the spatially selective occurrence of vacant houses? Does the exogenous impetus, including urban development policies and related projects, trigger a distinctive distribution pattern of vacant houses? How are the spatial inequalities manifested at intra-urban and even intra-downtown levels through the characteristics of housing abandonment? This study provides opportunities to discover the dynamics of housing abandonment and its associated socio-spatial disparities while contributing to the diversity of local experiences of urban shrinkage in an East Asian urban setting with South Korea as a case (Großmann et al., 2013). Microscopic analysis of housing abandonment encourages urban planners, designers, and residents to plan for the management and utilization of vacant houses based on a clear understanding of the characteristics of buildings and neighborhood, and offers insights into urban regeneration to improve the living environment and quality of life in shrinking inner cities.

2. Literature Review

2.1. Shrinking cities in terms of intra-urban spatial inequalities

Urban shrinkage is associated with the process of spatial restructuring of a city. In terms of political-economic attributes, major urban functions and transportation hubs are transferred from inner-city areas to newly built-up areas, changing the location of the urban center. The socio-demographic and physical structures of the city are also affected, leading to population decrease, rapid aging, plummeting fertility rates, out-migration to suburbs, and housing abandonment.

In this process, shrinkage generates the dynamics of spatial inequalities because it evolves in a spatially selective manner and affects particular areas of the city more than others (Grossmann et al., 2013). Socio-spatial inequalities have been typically found in growing cities, but in shrinking cities, they become more polarized and fixed with no input of new populations or resources. In the context of population decline and housing surplus, spatial fragmentation is reinforced by both the mobility of high-income households with a wide range of choices for residential locations and the mobility of less privileged groups with restricted access to the housing market. The latter group tends to be clustered in inner-city areas, while the former creates gated communities in the suburbs (Kilroy, 2009). Specifically, vacant houses directly revealing the gravity of urban shrinkage are concentrated in certain areas of inner cities and show patterns of spatial fixation over time (Grossmann et al., 2013; Morckel, 2014; Silverman et al., 2013; Wilson et al., 1994). Furthermore, in shrinking cities, local contexts, including the failures of short-term urban regeneration programs, inadequate policy directions

for redevelopment, the stigmatized image of neighborhoods, and psychological factors influencing residents' decisions, contribute to deepening spatial inequalities (Grossmann et al., 2013; Kim, 2019).

Particularly noteworthy, the spatial selectiveness of inequality increasingly extends to small-scale spatial units, from urban-rural and inter-urban to intra-urban, neighborhood, and even block and street levels (Grossmann et al., 2013). In South Korea, the residential development projects in the form of gated communities of large apartment complexes for the middle and higher classes have emerged near the oldest parts of inner cities, accentuating the decline of specific neighborhoods. Especially, the concentration of vacant houses in the most deprived areas of inner cities clearly demonstrates the occurrence of discrimination in micro-spatial units. This makes it possible to suppose that certain areas where vacant houses appear have distinguishable attributes compared to other parts of the city, in terms of urban contexts, buildings, parcels, and socioeconomic factors. The exploration for the mechanism of housing abandonment—how vacant houses are distributed and what characteristics they have—can help to understand the spatial fragmentation on a finer scale in shrinking cities and to devise appropriate measures in terms of urban planning (Petsimeris, 1998).

2.2. Housing abandonment in Incheon

Incheon is one of the cities simultaneously experiencing both the growth of the city as a whole and the decline of the inner city. The shrinking inner-city areas

that have been suffering from the decline of traditional manufacturing, the decrease and aging of the population, the deterioration of urban facilities, and especially housing abandonment expose two faces of Incheon (Cho, 2015). In fact, this polarized spatial pattern reflects multiple pairs of conflicting characteristics of Incheon.

First, geographically, Incheon exposes the parallel existence of centrality and marginality. Located in the capital area to the west of Seoul, Incheon is a coastal metropolitan city acting as a gateway to South Korea through Incheon International Airport.[5] Incheon has long served as a gateway city since it became the first city to be transformed into a modern city in Korea after the opening of its port in 1883. Incheon also acquired the locational advantages of easy accessibility to Seoul through the completion of Gyeongin (Seoul-Incheon) Railroad in 1899, which is Korea's first modern infrastructure, and the opening of Gyeongin Expressway, Korea's first highway, in 1968. However, Incheon has mainly imported resources from the outside and transported them to neighboring areas, while Seoul has absorbed and consumed them. The proximity and connectivity of these two cities rather turned Incheon into a passage point for going to Seoul, a major destination. Second, Incheon made its early mark as a historical, cultural, and industrial city, but now it is striving to transfigure itself into an international city. Known as the country's leading industrial city, Incheon developed with the state-led export-oriented economic development policies in the 1960-70s. Given the geographical advantages of being the port city adjacent to Seoul, the

---

[5] The capital area in South Korea refers to Seoul and its surrounding regions, Gyeonggi Province and Incheon Metropolitan City.

government created massive industrial complexes in Incheon's inner city. Incheon, which experienced rapid industrialization and metropolitanization, has maintained its ranking as the third largest city in South Korea in terms of the population since 2001, following Seoul and Busan, while its population exceeded 3 million in 2016. Nevertheless, the continued decline of manufacturing has left the inner-city areas with deteriorated factories, a desolate landscape, and a stigmatized image. Eventually, Incheon has been creating yet another image of the city through the designation of the Free Economic Zone and the construction of skyscrapers in the International Business District since the 2000s. Third, as a result of the contradiction between the desperate need of the redevelopment projects in the dilapidated inner city and the low profitability and feasibility of such projects, a multitude of plans for the redevelopment districts that had been over-designated in the 2000s were canceled in the 2010s without alternative measures. In the 2000s, with the central government's policy direction to maintain the economic upswing, the local government's political scheme for balanced urban development and the residents' soaring expectations for development gains were matched. Resultantly, the relentlessly planned redevelopment projects served as political and economic ladders for citizens as well as officials. However, the downturn in the real estate market, conflicts in communities, and the low economic capacity of residents for the allotted charges for redevelopment thwarted the projects, conversely leading to the demise of the areas as the most damaged in the inner city after a few years of their designations (Cho, 2015).

Currently, Incheon is divided into two urban areas: the old inner city with three administrative districts of Jung-*gu*, Dong-*gu*, and Nam-*gu* which have been

experiencing urban shrinkage; and the newly built-up areas which are serving as new urban centers, spatially encompassing the inner-city areas (Figure 2-1). Jung-*gu* and Dong-*gu* originally functioned as the political, administrative, and economic center of Incheon since the 1883 opening of the port. Nam-*gu*—a vast hinterland of industrial activities—became the city's main residential and commercial area after the establishment of industrial complexes in the economic growth period. However, the three districts have been recognized as major shrinking areas in Incheon due to the development of new suburbs and relocation of public institutions since the 1980s, and the unsuccessful urban redevelopment projects (Lee et al., 2016). The total population of Incheon increased by 25.2% during the 20 years between 1995 and 2015, while the population of the inner city decreased by 9.6% except for Yeongjong-do.[6]

Especially, it is a significant problem that vacant houses gradually have been eroding the inner city. As of July 2017, more than 1,600 vacant houses were located in Incheon, and 73.6% of them were distributed in the inner-city areas. The housing abandonment pattern was compelling evidence of the wide gap in the residential environment between the inner city and the suburbs. The growing polarization made it more challenging for residents in the blighted neighborhoods to escape from the vicious cycle of decline. To improve this situation, the city of Incheon began to implement projects to utilize vacant houses as neighborhood gardens and parking lots even before the enactment of the "Act on Special Cases Concerning Unoccupied House or Small-scale Housing Improvement" in 2017.

---

[6] Yeongjong-do is an island under the jurisdiction of Jung-gu, yet has been developed along with the creation of Incheon International Airport and new towns since the 2000s.

Incheon is also pursuing a project to transform the cluster of vacant houses into a residential complex including rental housing. However, most of the efforts to extricate the inner city from shrinkage have been concentrated in the main commercial districts or the surrounding areas of railway stations in the form of large-scale development projects, neglecting the rest of the neighborhoods which constitute the majority of the city (Xie et al., 2018). In addition, some projects related to vacant houses have been carried out in a myopic and sporadic manner, while overlooking the grasp for housing abandonment such as location, causes, and characteristics. Therefore, this study aims to analyze the dynamics of vacant houses in terms of urban shrinkage and spatial inequality in Incheon's inner city using an appropriate statistical approach, and to probe the issues to be considered for sustainable urban planning.
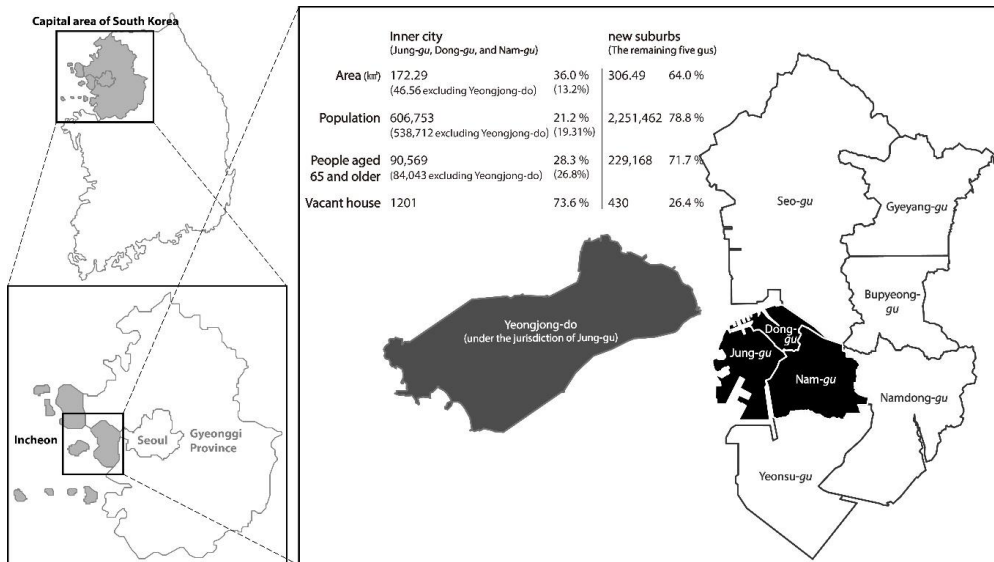
Figure 2-3. The shrinking inner-city areas of Incheon, South Korea

3. Data and Methods

3.1. Data

This study focuses on the spatial selectiveness of housing abandonment in Incheon, especially in the inner-city areas which have been stigmatized as typical shrinking areas in contrast with the new suburbs. The original data on vacant houses of three districts in 2017 could be obtained from each *gu* office, which had been collected through field surveys by *dong* (administrative subdivision of *gu*) of each *gu*. This valuable parcel-based data, or VHD, provided detailed building information including parcel ID, location, the type of use and structure, the number of floors, and total floor area (Table 2-1). Particularly, vacant houses were classified into two groups in VHD according to whether they were located in the urban redevelopment districts. This classification proved that the local government's policy decisions on planning and cancellation of redevelopment projects were closely linked to the causes, aspects, and management of vacant houses in South Korea. The building register data supplemented missing information of VHD and added new information such as the year of construction. In addition, the data related to buildings and urban characteristics for all the parcels of Incheon's inner city was collected through the National Spatial Data Infrastructure portal, then combined with VHD. *Dong*-level data was also acquired from the Korean Statistical Information System portal to discover the socio-demographic and economic factors of neighborhoods related to housing abandonment.

Table 2-1. Data and sources

	Data	Contents	Sources
Vacant houses	Vacant house data (VHD)	• location; the type of use; building structure; the number of floors; total floor area; urban redevelopment districts	The related departments of Incheon's Jung-*gu*, Dong-*gu*, and Nam-*gu* offices
	Building register data	• location; the type of use; building structure; the number of floors; total floor area; the year of construction; owner's age and current residence	Architecture Information System (www.eais.go.kr)
Inner city	Building and parcel data	• location; the type of use; building structure; the number of floors; total floor area; the year of construction; urban redevelopment districts; land parcel area; land slope; parcel shape; access roads; individual land price; owner's age and current residence	National Spatial Data Infrastructure (www.nsdi.go.kr)
	Socio-demographic and economic data	• population; household; education; business	Korean Statistical Information System (kosis.kr)

Based on the integrated vacant house data, some missing information such as the number of floors was filled using on-site and aerial photographs from the online map. Samples with redundancy or outliers were removed. Additionally, among the housing types, apartments were excluded from the collected data, because most apartments in South Korea temporarily experience periods of 'vacancy' as unsold houses or during the sale and rental process without losing market value. The data with low-rise houses of less than four floors, including detached and multi-household housing, was georeferenced in ArcGIS, then matched with multiple explanatory variables based on the location of each building, making it possible to extract necessary geospatial information. Finally, samples missing essential information related to the abandonment decision, e.g.,

building structure, total floor areas, and the year of construction, were eliminated. Most of the removed samples were unauthorized buildings with no building register data, which were constructed during the era of rapid urbanization in the 1950-70s after the Korean War. Thus, the final data for statistical analysis, called HADS here, included 30,593 housing units in the inner city, of which 560 were vacant.

3.2. Methods

The analysis of housing abandonment in terms of spatial inequality was conducted in two stages through a quantitative research method. First, we examined the basic statistics and distribution pattern of vacant houses, identifying potential variables related to housing abandonment. Second, we applied a Penalized Maximum Likelihood Estimation in logistic regression, referred to as *firthlogit* as STATA 14.1 program's command, to investigate the determinants of housing abandonment. In fact, despite the destructive influences of vacant houses, the probability of vacant house occurrences in the inner city of Incheon was statistically very low at around 1.1% as of 2017, revealing that housing abandonment was a rare event. If the number of cases on the rarer of the two outcomes is very small, the above *firth* method, named after its inventor, can be a proper approach to reduce small-sample bias in maximum likelihood estimates in generalized linear models. Especially in the case of logistic regression, this can produce finite and consistent estimates of the regression parameter when the maximum likelihood estimates do not even exist because of complete or quasi-

complete separation (Allison, 2012; Williams, 2018).

The dependent variable is dichotomous: 1 if the house was vacant, 0 if occupied as of 2017. The twenty explanatory variables were selected at the scale of the parcel and *dong* according to the literature review and local context, then classified into four categories: (1) building and parcel characteristics, (2) urban neighborhood characteristics, (3) economic factors, and (4) socio-demographic factors (Table 2-2). All of the variables were tested for multicollinearity using the variance inflation factor (VIF) test.

Table 2-2. Descriptive statistics of variables

Variables	Categories or units	Mean (Min/ Max)	Std. Dev.	Hypothesized relationships
Building/parcel characteristics				
Construction year	(1) before 1980 (2) 1980–1999 (3) 2000–2017	1.747	0.677	older/ vacant ↑
Building structure	(1) wood (2) cement-brick, block, stone (3) reinforced concrete, steel	2.266	0.539	wooden/ vacant ↑
Number of floors	$x \leq 4$	1.906	0.898	single-storied/ vacant ↑
Total floor area	1: $x \leq 85$ m^2 0: $x > 85$ m^2	0.354	0.478	small scale/ vacant ↑
Land parcel area	1: $x < 90$ m^2 0: $x \geq 90$ m^2	0.191	0.393	small scale/ vacant ↑
Land slopes	1: slope 0: flat	0.224	0.417	slope/ vacant ↑
Parcel shapes	1: non-rectangular 0: rectangular	0.162	0.368	non-rectangular/ vacant ↑

Access roads	1: no vehicles allowed 0: accessible by vehicles	0.209	0.407	inaccessible/ vacant ↑
Urban neighborhood characteristics				
Urban redevelopment districts (including the canceled districts)	1: designated 0: no designated	0.295	0.456	in district/ vacant ↑
Number of vacant houses within a radius of 75 m	number	1.612	4.860	greater/ vacant ↑
Number of vacant houses within a radius of 75−150 m	number	3.815	10.049	greater/ vacant ↑
Ln of individual land price per square meter	Ln of KRW	13.900	0.334	lower/ vacant ↑
Economic factors				
Ratio of households receiving the national basic livelihood benefits	% of *dong*s	6.188 (2.84/ 14.62)	2.681	ratio ↑ / vacant ↑
Rate of change in the number of manufacturing companies	% of *dong*s	9.179 (-21.05/ 104.76)	15.868	rate of change ↑ / vacant ↑
Rate of change in the number of retail businesses	% of *dong*s	2.915 (-21.11/ 146.52)	21.287	rate of change ↓ / vacant ↑
Socio-demographic factors				
Rate of change in total number of population	% of *dong*s	−0.769 (-11.86/ 29.84)	7.112	rate of change ↓ / vacant ↑
Rate of change in the number of the elderly (≥ 65 years old)	% of *dong*s	24.399 (12.31/ 46.88)	7.242	rate of change ↑ / vacant ↑
Rate of change in the number of the youth (5−14 years old)	% of *dong*s	−21.977 (-42.68/ 18.08)	9.709	rate of change ↓ / vacant ↑
Ratio of persons with at least a 4-year college degree	% of *dong*s	17.609 (11.07/ 29.63)	4.036	ratio ↓ / vacant ↑
Ratio of persons 20 + years old not having a high school diploma	% of *dong*s	20.992 (9.68/ 35.19)	4.596	ratio ↑ / vacant ↑

3.2.1. Building/parcel characteristics

Conventional economic concepts such as the supply and demand approach, life-cycle model, and stage theories have elucidated that the time-varying physical environment, i.e., the intensified obsolescence of buildings, leads to the decline in investment and maintenance, and eventually to the physical abandonment of structures (Sternlieb et al., 1974). Ryan (2012) pointed out that Flint's small-size, wooden single-family houses, which were rapidly developed at a low cost, quickly deteriorated and were abandoned, and their relative disposability accelerated the process of demolition, exposing the influence of buildings' initially inferior construction. Numerous Korean cities also have inadequate residential areas without proper urban infrastructure, which were built amidst fast-paced urbanization under compressed growth. Thus, to verify the relationship between the physical characteristics of the inner city and housing abandonment, this study included building and parcel-related independent variables.

We used categorical predictors for the year of construction and building structure to examine the contributions of various categories of each variable to the dependent variable (Xie et al., 2018). The construction year of each building was categorized into three periods, indicating the age of buildings as well as the urban development methods and prevalent building types for each period: (1) before 1980; (2) 1980–1999; and (3) 2000–2017. For instance, before the 1980s, residential areas were mainly created through land readjustment projects, and numerous small-scale multi-household houses were built in the 1980–1990s to deal with the housing shortage. The building structure variable was divided into

three categories according to the main building materials: (1) wood; (2) cement-brick, block, and stone; and (3) reinforced concrete and steel. According to prior studies as reviewed above, it was predicted that older buildings with old materials would be more likely to be converted into vacant houses.

The variable of the number of floors was limited to four floors under the legal standards of multi-household housing in South Korea and included in the model to investigate the relationship between building scale and housing abandonment. Additionally, the total floor area was divided into two categories depending on the standard of 85 m^2 of national housing that has been constructed by the government as affordable housing. The land parcel area variable was classified into two categories according to the criterion of the extremely small parcel (90 m^2), which is one of the requirements for judging dilapidated dwellings by the ordinance. Small-scale buildings far below the aforementioned limits might be easily abandoned because they discourage the decisions of owners and developers to individually conduct new construction or redevelopment (Kwon et al., 2014).

Considering that many substandard buildings were constructed on the hills by individual land development in the inner city of Incheon after rapid urbanization, land slopes and parcel shapes were included in the model. The 'slope' category included not only steep and gentle slopes but also high and lowlands. The category 'non-rectangular' consisted of parcels with triangular, inverted triangular, irregular shapes, and flag lots. Moreover, a discrete variable for the access roads had two categories based on whether each building was accessible by vehicles or not. The above three variables showed that the poorer the building accessibility,

the lower the usefulness of the buildings.

3.2.2. Urban neighborhood characteristics

Urban redevelopment projects, specifically in South Korea, have critical impacts on the decline of inner cities and the occurrence of vacant houses. The project districts excessively designated in the mid to late 2000s under the government's persistent growth-oriented public policies were delayed and canceled in the 2010s after the depression of the real estate market. Most of these districts experienced relatively rapid shrinkage compared to the surrounding areas, distinctively producing clusters of vacant houses. Thus, whether a house was located within the redevelopment districts, additionally including the thirteen districts canceled in the last two years as of 2017, was considered as one of the key independent variables.

The overall downturn in the real estate market of neighborhoods that share a similar physical environment frustrates residents' proper maintenance of individual buildings and often results in abandoned houses and even devastated areas (Sternlieb et al., 1974). Unlike apartment complexes that are continuously in demand in South Korea, single or multi-family residential areas have a relatively low possibility of recovery after experiencing economic recession and physical deterioration. Therefore, in this study, the natural logarithm of individual land price per square meter was calculated to verify the influence of investment in the neighborhood environments.

Based on previous research supporting the fact that vacant houses affect the

depreciation of nearby properties in a vicious circle and spread to surrounding areas, we calculated the number of vacant houses within 75 m and 75–150 m radii from each building (Accordino & Johnson, 2000; Han, 2014; Morckel, 2014; Wilson et al., 1994). The inner ring within 75 meters can be considered to include vacant houses located in the same urban block as the subject building or in adjacent blocks, which is similar to the behavioral radius in the daily life of the subject building's residents. The outer ring can be regarded as containing vacant houses that are visible but not easily reachable from the subject building, encompassing urban blocks beyond four-lane roads.

3.2.3. Economic factors

The persistent concentration of poverty in inner-city areas has a mutual influence on the poor neighborhood environment such as the dilapidated but affordable houses, promoting the spatial heterogeneity of urban shrinkage (Xie et al., 2018). Therefore, we included the ratio of households receiving the national basic livelihood benefits at the *dong* level in the model. It was assumed that buildings in economically vulnerable areas would be easily converted into vacant houses due to the relative lack of communities' capacity to maintain or improve substandard houses.

Each rate of change in the number of manufacturing companies and retail businesses between 2010 and 2015 was also examined, as the changes in industrial structure and commercial districts had a significant impact on the inflow and outflow of population. We supposed that small manufactures

representing the decline of the manufacturing industry in Incheon would be positively correlated with the occurrence of housing abandonment, while retailers indicating the vitality of neighborhoods, such as restaurants and grocery stores, would be negatively correlated. The rate of change in the total number of businesses was dropped from the model because of its high VIF value.

3.2.4. Socio-demographic factors

Rapid socio-demographic changes in East Asian countries are the leading causes of urban shrinkage and housing abandonment. In South Korea, the aging population has become prominent not only in rural areas but also in inner cities of metropolises, and the fertility rate has been the lowest among the OECD countries since the 2000s (OECD, 2019a). South Korea, the country with the highest elderly poverty rate in the world as of 2017, indicated that when the elderly reached over their 60s, they tended to slip into the vulnerable class in the society, while neighborhoods with an increasingly aging population were linked to spatial inequality in terms of physical and economic aspects. Thus, this study included the following three variables: the rate of changes between 2010 and 2015 in the total number of the population, the number of the elderly ($\geq$ 65 years old), and the number of the youth (5–14 years old), respectively.

The quality of educational opportunities such as decent facilities, renowned school districts, and the concentration of highly educated people is one of the most important factors in determining not only the image of an area but also whether or not residents with school-aged children leave the area (Batchis, 2010).

We included the ratio of persons with at least a four-year college degree and the ratio of persons aged 20 and above not having a high school diploma as independent variables to examine the influence of educational inequality. Amidst the high enthusiasm for education of the Koreans, in some shrinking inner cities, elementary schools are being closed and transferred to new built-up areas due to the continued decrease in school-aged children, implying the possibility of vacant house occurrence induced by the acceleration of the outflow of young adults and the interruption of their possible influx.

4. Results

4.1. The spatial inequality between inner city and new suburbs and its observation at finer spatial scales

According to VHD, there were 1631 vacant houses across Incheon, of which 1201 vacant houses (73.6%) were located in the inner-city areas of Jung-*gu*, Dong-*gu*, and Nam-*gu*. Given that three *gu*s (including Yeongjong-do) occupied only 36.0% of the total area and 21.2% of the total population among the eight *gu*s of Incheon, the distribution pattern of vacant houses revealed a remarkable spatial imbalance between the inner city and the new suburbs (Incheon City, 2018). This dichotomized spatial pattern of Incheon has mainly resulted from poorly constructed infrastructure, a concentrated elderly population, and residents and facilities escaping from these stigmatized images. As of 2017, the inner city consisted of nearly 28.3% of entire population aged 65 or older. Especially, Jung-*gu*, which not only contains the old towns but also the new towns within the jurisdiction, displayed a distorted distribution of socio-demographic factors as well as vacant houses at an intra-*gu* level. As of 2015, the old towns of Jung-*gu* contained 10.4% of the population under the age of 15 and 18.5% of the population aged 65 or older, while the new towns had 19.8% and 9.1%, respectively; the new towns, compared to the old towns of Jung-*gu*, had about twice the youth and half the seniors in terms of percentage. In Yeongjong-do, where the new towns are located within Jung-*gu*, unlike the old towns, no vacant houses were observed.

Figure 2-2. Distribution pattern of vacant houses in Incheon's inner city
(Of the 1120 georeferenced vacant houses, 706 were located in the redevelopment districts)

More microscale observations also revealed that vacant houses were concentrated in residential areas with similar building types and neighborhood environments in the inner city, such as the redevelopment districts (Figure 2-2). As of July 2017, there were five planned redevelopment districts in Jung-*gu*, 14 in Dong-*gu*, and as many as 27 in Nam-*gu* except for apartment reconstructions. Of the above 1,201 vacant houses in the inner-city areas, 761 (64.4%) were located in the districts. The indiscriminate designations of the districts led to delays and cancellations of the projects, resulting in the vacant house clusters amid the degradation of the physical environment and the disintegration of community relationships.

4.2. The spatial selectiveness of housing abandonment within the inner city

The results of *firthlogit* regression analysis with HADS show the major trends of the four categories explaining the spatially selective occurrence of vacant houses in the inner city of Incheon (Table 2-3). Data that missed any information about each variable were excluded, leaving a total number of 30,593 samples.

Table 2-3. *Firthlogit* regression results: Significant factors associated with the occurrence of vacant houses (N=30,593)

Dependent variable: The occurrence of vacant house (= 1 if vacant)	Coefficients	Standard errors	$p > |z|$
Building/parcel characteristics			
Construction year (1)			
Construction year (2)	−1.444 ***	0.121	0.000
Construction year (3)	−2.819 ***	0.662	0.000
Building structure (1)			
Building structure (2)	−1.531 ***	0.128	0.000
Building structure (3)	−1.371 ***	0.280	0.000
Number of floors	−0.400 ***	0.139	0.004
Total floor area	0.450 ***	0.168	0.007
Land parcel area	0.583 ***	0.113	0.000
Parcel shapes	0.525 ***	0.121	0.000
Access roads	0.443 ***	0.112	0.000
Urban neighborhood characteristics			
Urban redevelopment districts	0.210 *	0.121	0.083
Number of vacant houses within a radius of 75 m	0.113 ***	0.007	0.000
Number of vacant houses within a radius of 75−150 m	−0.007 *	0.004	0.084
Ln of individual land price per square meter	−0.419 *	0.252	0.097
Economic factors			
Rate of change in the number of manufacturing companies	0.017 ***	0.004	0.000
Rate of change in the number of retail businesses	−0.020 **	0.009	0.018
Socio-demographic factors			
Rate of change in total number of population	−0.053 ***	0.013	0.000

Rate of change in the number of the elderly	−0.048 ***	0.010	0.000
Ratio of persons with at least a 4-year college degree	0.092 ***	0.033	0.005
Ratio of persons 20 + years old not having a high school diploma	0.128 ***	0.032	0.000

Notes: The regression model was statistically significant, N = 30,593, Wald chi2 = 1387.05, prob>chi2 = 0.0000. The significance level is as follows: $*p < 0.10$, $**p < 0.05$, $***p < 0.01$.

First, low-cost and low-quality buildings led residents to consider their investment and maintenance of these buildings as unproductive and abandon them easily. Although physically well-built houses were often abandoned, most have gained opportunities for reuse and repair relatively quickly by owners or municipalities prior to becoming long-term vacant houses. In the regression model, all variables of the building and parcel characteristics, except for the land slopes, were significant at a 1% significance level. The categorical independent variables—construction year and building structure—indicated that relatively old buildings built of fragile materials might be more vulnerable to conversion into vacant houses. Buildings built in 1979 and earlier accounted for 38.2% of occupied houses, but 70.7% of vacant houses (Table 2-4). 4.1% of the non-vacant houses were made of wood, while 39.8% of the vacant houses were wooden. In Korea, before the rapid increase of single and multi-family houses built of bricks in the 1980s, most buildings were made of wood requiring steady maintenance to prevent their relatively fast obsolescence. Many of these structurally unsound buildings were left unattended instead of being repaired and reused. These findings were consistent with previous studies on housing abandonment in shrinking cities (Ryan, 2012; Silverman et al., 2013; Xie et al., 2018). For instance, Xie et al. (2018) reported that the odds of becoming vacant were 3.94

times higher for the census tracts with 84.1% or more buildings built more than 30 years ago, compared to that of the census tracts with 56.0% or less.

Furthermore, the results suggested that the smaller the scale of the buildings and parcels, the higher the probability of becoming vacant. The dichotomous variables—total floor area and land parcel area—showed the high possibility of buildings being vacant when their respective area was smaller than 85 m^2 and 90 m^2; also, the number of floors had a negative correlation with the dependent variable. Small, low-rise buildings have typically served as affordable homes. Nevertheless, in the shrinking areas with an ever-dwindling population, the poorly-maintained and overly crowded buildings could not meet the upward needs of the remaining residents and impeded the necessary redevelopment projects due to complicated ownership relations and low feasibility (Kwon et al., 2014). Particularly in the inner city of Incheon, urban blocks with extremely small houses that could not even satisfy the minimum standard of living space were observed, demonstrating that the average and minimum values of the total floor area of vacant houses were 64.7 m^2 and 9.4 m^2, respectively.

Physical inaccessibility also presented a positive coefficient associated with housing abandonment. Parcels with very narrow entranceways restricting pedestrian movement, e.g., inverted triangular shapes, or parcels facing narrow roads that did not allow vehicles increased the likelihood of vacant houses. Buildings located inside the blocks or at the end of alleyways that were not visually exposed to the neighborhood streets discouraged residents' decisions to maintain their houses because of poor security and sanitation, and falling property

prices. Difficult-to-reach buildings, after being converted to vacant houses, increasingly decayed in the blind spots instead of drawing attention from the local officials as eyesores (Figure 2-3). As for land slopes such as the case in Yokosuka city of Japan, buildings located on slopes tend to be easily abandoned due to inaccessibility, especially by the elderly with movement restrictions. However, in Incheon where low hills spread continuously in the urban area between the three mountains, whether the buildings were located on the slopes seemed to have no clear influence on the dependent variable.

Figure 2-3. (1) A block with a very narrow entranceway where vacant houses are located inside; (2) a collapsed vacant house and piles of garbage dumped inside; and (3) a weedy, litter-strewn street around vacant houses

Second, the designation, delay, and cancellation of the urban redevelopment projects had crucial influences on the distribution characteristics as well as the occurrence of vacant houses. The redevelopment districts characteristically generating highly dense areas of vacant houses demonstrated a positive correlation with the dependent variable. As of 2017, 46 planned redevelopment districts were located in Jung-*gu*, Dong-*gu*, and Nam-*gu*, accounting for an area

of 2.6 km^2 or approximately 5.6% of the total area of Incheon's inner city except for Yeongjong-do. Contrary to the original purpose of the projects to improve deteriorated houses and underserved communities through the local government's planning intervention, many vacant houses have appeared during the exacerbation of decline in those districts as indiscriminately planned projects were delayed and canceled (Jeon & Kim, 2016). The variable of the number of vacant houses within a radius of 75 m was significant and positive at a 1% significance level, illustrating not only the spatial dependence of housing abandonment but also the clustering of vacant houses in the redevelopment districts (Morckel, 2014). The maximum value of this variable was 59. The negative coefficient of the variable within a radius of 75–150 m could be interpreted as a distance threshold for the ripple effect of the group of vacant houses, such as the specific urban blocks with a similar built environment or the boundary of a redevelopment district. Moreover, according to Table 2-4, the planned or canceled redevelopment districts displayed a more blighted physical environment compared to the non-redevelopment districts, containing a relatively large proportion of small single-storied buildings of old wooden structure and sloped parcels abutting on narrow access roads. The physically deteriorated environment of the districts affected the decline in land values during the project delays, which in turn led to housing abandonment. In fact, the nation's five regions with the lowest average rate of annual change in the individual land price included Jung-*gu*, Dong-*gu*, and Nam-*gu* in 2012, Jung-*gu* in 2013 and 2014, and Dong-*gu* in 2017. Our result showed that the variable of the natural logarithm of individual land price had a negative correlation with the dependent variable; this supported the above relationship between the factors

including redevelopment districts, land prices, and housing abandonment.

Table 2-4. Comparison of the physical characteristics between vacant and non-vacant houses, and between redevelopment and non-redevelopment districts

	Total houses	Vacant	Not vacant	Redevelopment districts	Not redevelopment districts
Old house (before 1979)	38.8 %	70.7 %	38.2 %	43.4 %	36.8 %
Wooden structure	4.8 %	39.8 %	4.1 %	8.3 %	3.3 %
One-storied house	39.2 %	82.3 %	38.4 %	47.9 %	35.6 %
Small-scale total floor area (≤ 85 m^2)	35.4 %	84.3 %	34.4 %	48.9 %	29.7 %
Small-scale land parcel area (< 90 m^2)	19.1 %	52.5%	18.5 %	28.2 %	15.3 %
Sloping land	22.4 %	53.8 %	21.8 %	32.7 %	18.1 %
Non-rectangular parcel	16.2 %	24.5 %	16.0 %	13.2 %	17.4 %
Narrow access roads	20.9 %	54.3 %	20.3 %	27.2 %	18.3 %

Third, the declining but representative manufacturing industry and the dysfunctional commercial districts contributed to diminishing the vitality of communities as well as local economic activities, and spurring the abandonment of houses. The rate of change in the number of manufacturing companies was positively correlated with the occurrence of vacant houses, and that of retail businesses was negatively correlated. The results were consistent with previous studies considering deindustrialization and suburbanization as major factors of urban shrinkage (Haase et al., 2013, 2014; Martinez-Fernandez et al., 2012, 2016). Incheon's industrial structure has been focused on low-value-added manufacturing in spite of the country's overall trend of deindustrialization. Manufacturers in the inner city became worse off and smaller in size, indicating

that the areas where the related companies were concentrated did not function as pleasant residential districts. In Incheon, businesses with fewer than five employees accounted for 80.1% of all businesses as of 2017; and the number of workers in the manufacturing sector ranked first, making up for 24.7% of all workers. Moreover, as new commercial centers were created in the new suburbs, traditional markets as well as retailers around the Gyeongin Railroad Line in the inner city have been declining for decades. The decreasing vitality of major commercial districts ultimately caused the outflow of population from neighboring residential areas, further affecting people's decision to abandon their depreciated houses. The ratio of households receiving the national basic livelihood benefits was not a significant determinant for explaining the probability of housing abandonment within the inner-city areas.

Fourth, socially disadvantaged areas, such as those with a sharply decreasing population or a high proportion of low-educated people, formed the stigmatized neighborhood images, allowing residents to feel less guilty about neglecting their houses. In these collapsed communities with helpless inhabitants, vacant houses have also been associated with violent crimes as well as disorder. The rate of change in the total number of population was negatively correlated with the probability of abandoned houses at a 1% significance level. This result indicated that while Incheon's total population has increased, the inner city has experienced a persistent population decline with the associated vacant houses, supporting previous studies that described the socio-spatial inequality between inner-city areas and new suburbs (Martinez-Fernandez et al., 2012; Xie et al., 2018). Between 2010 and 2015, 32 out of 42 *dong*s of the inner-city areas—Jung-*gu*,

Dong-*gu*, and Nam-*gu*—witnessed a declining population, with a peak of -11.9%. Meanwhile, the area (*dong*) with the highest population growth rate of 29.8% was included in Yeongjong-do, Jung-*gu* where the new towns were developed. This suggested that even within the boundary of the inner city, the distribution of population and the density of vacant houses might show differences depending on various development plans including the construction of new apartment complexes.

Regarding the changes in the population structure, the coefficient of the change rate in the number of the elderly was significant but negative at a 1% significance level, and that of the young was not significant at a 10% significance level. These findings were consistent with a previous study in which the proportion of the elderly population was inversely correlated with the incidence of vacant houses (Park & Oh, 2018). These results of Incheon could be attributed to the increase in the elderly and the decrease in the young in almost all areas of the inner city (Figure 2-4). During the past five years, all but 1 of 42 *dong*s witnessed a sharp rise in the aging population, up to 46.9%. Additionally, 38 out of 42 *dong*s were affected by a precipitously falling youth population, with a drop of up to 42.7%. These changes have considerable relevance to the issues of socio-spatial inequality such as the controversial subject of school relocation from the inner-city areas to the new suburban areas in Incheon and the highest poverty and suicide rates of the elderly in South Korea among OECD countries, eventually contributing to the creation of socially unsustainable cities (OECD, 2019b).

Figure 2-4. The proportion of people aged 65 and older by *dong*s in Incheon and
their spatially uneven distribution between the inner-city areas and the new suburbs

In terms of educational attainment, the proportion of persons without a high
school diploma among those aged 20 and over was significant and positively
associated with the dependent variable. This result exposed the problem of brain
drain and the concentration of the underprivileged in shrinking areas (Kim, 2019).
The average percentage of the population who did not graduate from high school
in *dong*s of the inner city was 21.0%, which was higher than Incheon's overall

average of 15.4%, and the highest among them was 35.2%. In fact, the labor market in Incheon has attracted workers with the academic ability equal to that of a high school graduate, not college-educated workers, because the manufacturing sector has accounted for a large part of the local industry despite the lack of funds and micro-scale companies. On the contrary, the result in which the population ratio with at least a four-year college degree unexpectedly had a positive correlation with the dependent variable might indicate that while the workforce has become highly educated, there was no industrial ecosystem capable of absorbing the well-educated young population, thus, facilitating the out-migration of the said population into the well-established suburban cities. As of 2016, six out of ten college graduates in Incheon moved to its surrounding regions, including Seoul and Gyeonggi Province. Given that the enthusiasm for education in South Korea has been relatively high compared to other countries, the unfavorable educational environment of Incheon's inner city acted as a driving force for the flight of highly educated inhabitants and triggered a vicious cycle, further preventing an inflow of young adults (Xie et al., 2018).

5. Discussion

The growing spatial polarization between the inner city and the new suburbs caused the concentration of vacant houses in the inner-city areas, and housing abandonment also occurred in a spatially selective manner even within the inner city (Figure 2-5). The older, smaller detached houses with wooden structures located in inaccessible parcels, which were mostly built with substandard physical conditions through individual land development or land readjustment projects, were more susceptible to the conversion to vacant houses. Disadvantaged neighborhoods, including the areas designated as redevelopment districts with many adjacent vacant houses and falling land prices, were also significantly associated with the occurrence of housing abandonment. In addition, the distorted socio-demographic attributes such as the soaring number of single elderly households and the concentration of the poor and low-educated population were found to have important correlations with the dependent variable, along with the effects of major local industrial and commercial vitality. Based on the above findings, the following three issues can be further discussed in terms of urban design and planning: (1) noticeable spatial inequalities were manifested within smaller spatial units, such as intra-urban, intra-downtown, neighborhood, and even urban block scales; (2) within the inner city, the delayed or canceled redevelopment districts that clearly revealed unavailing policies related to urban revitalization became breeding grounds for the densely concentrated vacant houses; and (3) in addition to the already well-known economic inequalities and associated residential segregation, the skewed demographic structure created an intensified spatial polarization threatening social sustainability.
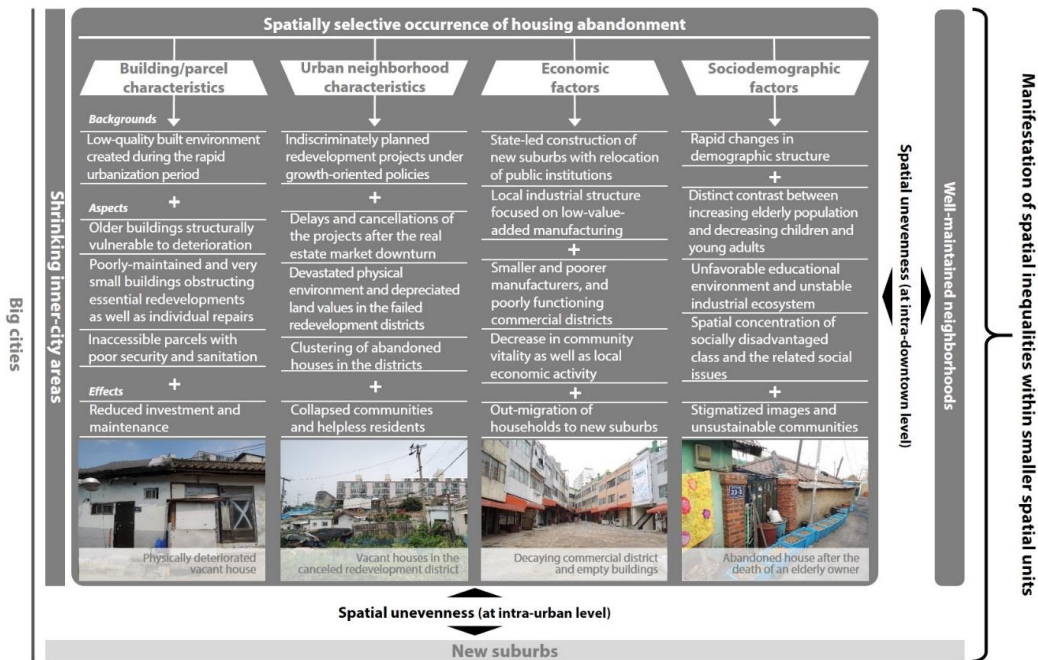
Figure 2-5. Four categories describing the spatially selective occurrence
of vacant houses in Incheon's inner city

Spatial unevenness has been expressed in multiple scales and patterns in line with various development policies of central and local governments, which is noticeable even within the city limits (Kilroy, 2009). As with most of the fast-growing cities in developing countries, urbanization and industrialization, based on South Korea's rapid economic development since the 1960s, have resulted with regional imbalances between urban and rural areas (Wei et al., 2017). Amid the expansion of the capital area, many municipalities, including Incheon, have formed new suburbs outside the existing inner-city areas since the 1980s and have relocated major institutions. Inner-city areas with deteriorated single and multi-family houses were in stark contrast to newly developed areas with up-to-date apartment complexes, while the middle class who wanted a better living

environment migrated to new suburbs. Along with the widening polarization between the old and new towns, the inner city of Incheon held about three-quarters of the total vacant houses, despite its much smaller area and population compared to the new suburbs. Meanwhile, most of the regeneration policies of the inner-city areas focused on revitalizing subway station areas or central commercial areas, thus excluding the general residential areas—which occupies most of the inner city—from the benefits of development plans. As even the planned redevelopment projects were canceled due to the economic downturn, lack of finance, and low profitability, the neighborhoods that had already experienced a decline in the inner city became even more devastated, and urban blocks filled with vacant houses emerged. Furthermore, as seen in inner cities of major cities such as Incheon and Busan in South Korea, some older neighborhoods were redeveloped into luxurious gated apartment blocks, demonstrating the evident physical and economic disparities in small urban spatial scales.

Characteristically, the redevelopment districts were typical of the most vulnerable areas in the shrinking inner city of Incheon, containing about two-thirds of the total vacant houses of the inner city (Jeon & Kim, 2019). Many inner cities in South Korea that had undergone the cruel process of redevelopment failure—designation, delay, and cancellation—witnessed the emergence of the clustered vacant houses (Figure 2-6). First, with the enactment of redevelopment-related law and the relaxation of district designation requirements in the 2000s, local governments indiscriminately assigned planned redevelopment districts under their growth-oriented public policies. During the real estate boom,

residents' expectations for the development profits were also amplified. Meanwhile, those districts, which already had poor physical conditions enough to meet the specified requirements, became susceptible to a gradual decline due to the legal restrictions on any development activities such as new constructions and major repairs after the designation. Second, as a result of the recession in the 2010s and the limitations of profit-oriented redevelopment projects, numerous projects were postponed indefinitely, and the sharp physical and economic decline forced residents to move to other areas with their homes sold or abandoned. Third, after the cancellation of the projects because of the loss of profitability, conflicting interests among residents, and changes in the urban development system, only collapsed communities, marginalized residents, and vacant house clusters were left without appropriate follow-up measures. Ironically, unlike some shrinking cities in Japan or Europe where the value of vacant houses dropped to almost zero, in South Korea, the strong expectations of residents for future implementations of redevelopment prevented serious price declines in vacant houses. However, as many residents who had left their houses persistently retained their ownerships, local governments were unable to promote the maintenance of vacant houses. The negative aspects of indiscriminate redevelopment plans that had been fully anticipated in the planning stage—but not avoided—ultimately resulted in the decaying urban islands full of vacant houses in the inner-city areas.
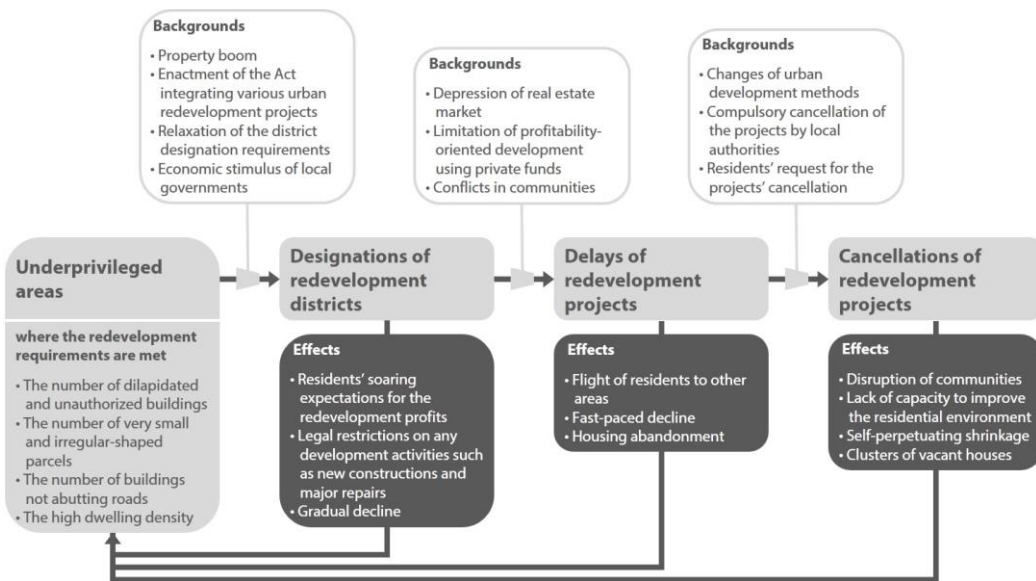
Figure 2-6. Influences of delays and cancellations of the over-designated redevelopment projects on housing abandonment in shrinking inner-city areas

Furthermore, social structural changes concentrated the socially marginalized classes into physically deteriorated areas, eventually exacerbating the spatial disparity. According to the Hoyt sector model, a representative classical model of the internal urban structure, the economic class is a decisive factor in the residential separation, which has been proven by the predominant clustering of residences by income in many cities in East Asia as well as in the United States and Europe (Kilroy, 2009). In Incheon, the filtering process also led the middle class to move away to the new suburbs and the economically disadvantaged groups to remain in the inner city. However, through the persistent and spreading urban shrinkage over a long period, the spatial differentiation by social determinants has become more conspicuous beyond merely economic factors (Xie et al., 2018). Especially, in South Korea that entered an aged society with a

ratio of the elderly surpassing 14% in 2018, the young population has moved to the new suburban areas to enjoy pleasant and convenient residential spaces, well-established educational environments, and trendy cultural and commercial facilities. Meanwhile, the elderly population with the physical and economic inability to move has remained in the inner-city areas with a high concentration of abandoned houses. The decline of the inner city accelerated since the elderly who had little capacity to improve the residential environment were unable to break the vicious cycle, while the educational and cultural facilities sought out by the young population were leached away from the inner city to the suburbs. Eventually, the inner city was labeled as an inconvenient and unattractive place for highly educated young people. This depicted the severe spatial confrontation between generations, with the elderly experiencing a greater level of deprivation. In fact, the total population of Incheon's inner city (excluding Yeongjong-do) decreased by 2.8%, while its elderly population increased by 23.5% between 2010 and 2015, exhibiting a deepening social polarization. In Japan, where the graying of the population and their isolation from society became a national issue, out of a total of 8.46 million vacant houses in 2018, 3.47 million were vacant for other reasons other than not finding tenants, many of which were attributed to the deaths of the elderly or their admission to nursing homes (The Japan Times, 2019).

6. Conclusion

In spite of the heightened worldwide attention to housing abandonment in shrinking cities, little was known about its causes and dynamics in East Asia, particularly in South Korea, due to the lack of awareness and limited data availability. In this study, valuable parcel-level spatial data on vacant houses enabled the identification of the influential determinants of housing abandonment in terms of spatial inequality. The results derived from the *firth*'s logistic regression analysis indicated that the conversion to vacant houses was significantly associated with the initially inferior construction of infrastructure and buildings in the inner city, the indiscriminately designated urban redevelopment districts under growth-oriented public policies, the regressing industrial and commercial sectors compared to the new suburbs, and the biased population structure and spatial concentration of the socio-economically underprivileged groups. This inevitable occurrence of vacant houses provides some planning and policy implications to improve the issues related to urban shrinkage and spatial polarization. First, regular surveys on vacant houses in smaller spatial units such as neighborhoods are essential, and relevant management and utilization plans tailored to neighborhood and community characteristics should be developed for sustainable urban regeneration. Second, to cope with the potential occurrence of the vacant house clusters such as Incheon's redevelopment districts, it is necessary to clearly define an area with a high concentration of vacant houses and devise a related maintenance system distinct from simply managing individually scattered vacant houses. Third, a deeper understanding of the changing population structure of the inner city, such as the

soaring elderly population, is crucial for effectively preventing the vicious circle between housing abandonment and urban shrinkage. Buildings vulnerable to the conversion to vacant houses, such as deteriorated houses owned by the elderly living alone, can be managed separately to enable proactive responses to long-term vacant houses. Lastly, a further elaboration of vacant house data, the establishment of time-series data, and acquisition of owners' information could provide the means for a multidimensional analysis of the characteristics of housing abandonment that is much needed at the moment.

Chapter 3

Perceptions of abandonment: Analyzing subjective perception on vacant houses using the photo-elicitation method

1. Introduction

Vacant houses have been treated as among the aspects representing neighborhood disorder in public health and criminological terms. According to the "broken windows" proposition, disregarding the signs of physical disorder leads not only to the spread of disorder but also to the occurrence of violent crime (Branas et al., 2012; Johansen et al.,2015; Kelling and Wilson, 1982; Skogan, 1992). Disordered physical environments, which can be interpreted as the weakening or absence of social control in the neighborhood, negatively affect the residents' satisfaction, place attachment, and participation decisions, resulting in a stigmatized neighborhood image, helplessness, weakened social ties, and community collapse (Hipp, 2010; Hur & Nasar, 2014; Jaśkiewicz & Wiwatowska, 2018; Perkins et al., 1992; Ross, 2000). Other studies have revealed that vacant houses or lands pose a threat to the physical health of residents through devastated landscapes, poor sanitary conditions, and the risk of fire and collapse.

In addition, they deteriorate mental health through negative emotions such as stress, fear, anxiety, and a sense of shame (Garvin et al., 2013; Schachterle et al., 2012; South et al., 2015).

If a house is abandoned in a city in decline, what do vacant houses mean in neighborhoods and how do they affect residents? Houses that have been vacant in the long-term and are irreparable gradually permeate the lives of residents who remain voluntarily or unwillingly in shrinking cities, becoming urban problems directly related to their life quality and are not simply one of numerous aspects of the disorder. Vacant houses are spatially clustered and fixed in neighborhoods that are more vulnerable causing a vicious cycle involving the residents' helplessness and the community's inadequate capacity to improve its living environment. Neighborhoods that are stigmatized as undesirable areas are exposed to greater physical and social disorder, resulting in reproduction of socio-spatial inequalities (Wallace & Louton, 2018). Consequently, a clear understanding of how the remaining residents perceive a disorderly neighborhood environment, especially one comprising vacant houses, is essential to break the vicious circle from the perspective of the long-range dynamics of declining neighborhoods (Garvin et al., 2013).

Furthermore, recent studies have indicated a bias in how people perceive disorder (Hipp, 2010; Wallace, 2015; Wallace et al., 2015). Residents have exposed differences in what cues are recognized as problems in a distressed neighborhood and how sensitively they address them. Residents' perceptions of neighborhood disorder are formed not only based on the type and severity of the

disorder being experienced in neighborhoods but also on the neighborhoods' socio-economic structure and individual characteristics. Researchers have used several theories and perspectives to explain why residents perceive disorder differently (Franzini et al., 2008; Hipp, 2010; Wallace et al., 2015). First, economic investment or length of residence in the neighborhood, in terms of the community's limited liability, might increase its awareness of the surroundings, making homeowners or long-term residents sensitive to physical disorder. Second, the socio-economic status of a household might influence how residents assess the neighborhood. High-income and high-education residents have higher expectations of the neighborhood's quality and a lower tolerance for disorder, raising their awareness of neighborhood problems. Third, residents' experiences and current lifestyles or routine activities might affect how they perceive disorder. Residents' backgrounds of living in neighborhoods that are more disadvantaged form a higher threshold for recognizing disorder, and older residents spending more time indoors because of physical constraints perceive less disorder. Fourth, from the perspective of indirect experiences, social ties and familiarity with neighbors might increase information about disorder. Residents who have family or friends in the neighborhood or who regularly interact with neighbors report greater levels of disorder. Fifth, specific residents might have a greater awareness of their surroundings for reasons of personal safety and altruistic fear. Women pay greater attention to their neighborhoods because of the threat of disorder, and the presence of children arouses greater concern and fears about disorder. Additionally, Sampson and Raudenbush (2004, 2005) have found that Black people reported lower levels of disorder than White people did in a disordered

Chicago neighborhood.

Therefore, how will the heterogeneity of experiences and interpretations of vacant houses be revealed among residents in shrinking areas and compared to outside groups? Studies of disorder perception have been conducted primarily in the fields of criminology, sociology, psychology, and public health (Franzini et al., 2008; Garvin et al., 2013; Johansen et al.,2015; Sampson et al., 2017; Sampson & Raudenbush, 2004, 2005). However, considering that vacant houses in shrinking cities are emerging as the most influential urban problem among researchers, policy makers, and residents, research on the perceptions of residents focusing on vacant houses is required (Benediktsson, 2014; Wallace & Schalliol, 2015). Moreover, attempts to consider the perception of vacant houses through the lens of urban design and planning are necessary to comprehensively understand the relationship between the built environment and residents' perceptions, connecting to appropriate management and use of vacant houses. Therefore, in this study, patterns in residents' perceptions and responses to vacant houses in a declining neighborhood of the inner city of Incheon, South Korea are identified. The metropolitan city of Incheon has been suffering from urban shrinkage and vacant houses in the inner-city areas, in contrast to the overall growth of the city. First, in this study, we examine how residents' perceptions of vacant houses vary depending on individual socio-economic characteristics, experiences of vacant houses, and interactions among neighbors. Second, we analyze the difference in the degree of and factors relating to the fear of vacant houses between residents and non-residents to grasp the possibility of residents' collective identity formation and the influence of external groups on the future improvement of the

residential environment (Benediktsson, 2014; Wallace & Louton, 2018). This exploratory study could be used as valuable data for local authorities around the world to direct policy intervention on managing vacant houses.

2. Literature Review

2.1. Unconventional views on broken windows theory

Broken windows theory, originally introduced by Kelling and Wilson (1982), implies a process of neighborhood change from unrepaired signs of disorder to a ruined built environment through the increase in the number of fearful but apathetic residents, the collapse of community control, and pervasive violent crimes. This theory has garnered considerable attention among policy makers and law enforcement agencies in the United States because it forms the basis of the most manageable policing strategy to prevent violent crimes (Teixeira, 2016). In addition, it is applied to other academic fields because the sequential deterioration process in the neighborhood can be widely interpreted, and it is used as a policy and institutional intervention to address social issues in different national contexts. However, to recontextualize this theory in Korea's shrinking cities that have distinct physical and socio-demographic characteristics, several issues need to be carefully scrutinized.

The first issue concerns the possibility of conversion from disorder to crime. Scholars have excluded from the theoretical interpretation the first two stages of broken windows theory, indicating the process by which vacant houses appear and their surroundings are disturbed (Klinenberg, 2018). Instead, the subsequent stages in which the windows of vacant houses are broken and crimes are triggered have been highlighted. Along with the image of broken windows that has dominated the core of the theory, policy interventions related to disorder have been conducted in a manner that enforces a zero-tolerance approach and blight

eradication to prevent violent crimes (Garvin et al., 2013; Klinenberg, 2018). However, the threat of crime has long been imbedded in declining cities. Vacant houses that have been exposed to neighbors for a long period without reaching the crime threshold lead to quality-of-life problems, such as uncomfortable living, landscape deterioration, disaster risk, and falling housing prices, consequently affecting the physical and mental health of residents. Recent studies have reported that no consistent evidence was found that neighborhood disorder directly causes misbehavior or higher levels of aggression (O'Brien et al., 2018, 2019). Accordingly, understanding the influence of vacant houses in shrinking cities where disorder itself is more prevalent than crime becomes necessary.

The second issue involves considering the major socio-demographic characteristics of disordered areas. Numerous studies examining disorder in US cities have addressed racial and ethnic traits as indispensable factors in relation to broken windows theory (Franzini et al., 2008; Hipp, 2010; Sampson & Raudenbush, 2004, 2005; Skoan, 1992; Wallace & Louton, 2018; Wallace et al., 2015). In the midst of implicit cultural stereotypes in American society, Black people and other underprivileged minorities have been used as explicit statistical indicators in related studies (Sampson & Raudenbush, 2005; Wallace & Louton, 2018). However, in East Asia, including Korea and Japan, where the composition of race and ethnicity is relatively homogeneous, the disproportionate demographic structure and generational separation, such as the rapid increase of the elderly population and their poverty and suicide rates, have become a striking social phenomenon. Korea became an aged society in 2018, with the proportion of the elderly population exceeding 14% and had the highest elderly poverty and

suicide rates among the OECD countries (OECD, 2019). Researchers have also shared the common view that older people are physically and mentally incapacitated and that the urban areas where they are concentrated are vulnerable to crime and disorder. In Korea and Japan, aging has been recognized as one of the principal causes of urban shrinkage and housing abandonment, making it an essential indicator in related studies (Baba & Hino, 2019; Jeon & Kim, 2016; Jeon & Kim, 2020; Park & Oh, 2018). Therefore, we can assume that how residents perceive vacant houses depends on the prominent socio-demographic characteristics of the neighborhood.

The third issue correlates with the built environment in areas where disorder is witnessed. Other studies have indicated that the physical characteristics of neighborhood environments, including population density, are related to the perception of disorder (Benediktsson, 2014; Jiang et al., 2018; Perkins et al., 1992; Taylor et al., 1984; Wallace & Schalliol, 2015). In Korea, under the rapid industrialization and urbanization conditions that have occurred since the 1960s, low-rise residential areas in metropolitan areas were created for short periods, aided by relaxed construction regulations through the housing supply promotion policy. Residential density has steadily increased without infrastructure being added or maintained, such as parks, roads, and parking lots, which were planned based on housing size and household density at that time. Furthermore, numerous low-rise residential areas, including unlicensed houses, were formed through individual land development outside of plans, such as land readjustment projects. Extremely small, old buildings were located on narrow alleys or on parcels not abutting roads, making themselves vulnerable to transitioning to vacant houses.

The characteristics of the built environment, such as low-rise, high-density neighborhoods, could affect the patterns of daily activities of residents, and, resultantly, the frequency of exposure to disordered space and behavior (Benediktsson, 2014; Wallace, 2015; Wickes et al., 2013).

In this study, we seek to clarify how residents form perceptions of prolonged and repetitive disorder by expandingly interpreting the broken windows theory in the context of the shrinking inner city of Incheon, Korea.

2.2. Individual perceptions of disorder and related factors

Considering the inevitable coexistence between vacant houses and residents left in shrinking neighborhoods, residents' perceptions of vacant houses are critical in understanding the long-term trajectory of neighborhoods and in seeking improvements. Residents' perceptions can be interpreted not only as awareness of vacant houses and as its related emotional expression but also, broadly, as behavioral reactions, such as changing route, considering migration, and not participating in community activities (Garvin et al., 2013; Hipp, 2010). However, bias has been found in how people recognize disorder based on various characteristics at the individual, household, and neighborhood levels (Benediktsson, 2014; Franzini et al., 2008; Hipp, 2010; Sampson & Raudenbush, 2004, 2005).

First, the individual- and household-related socio-demographic factors are involved in the process by which residents perceive neighborhood disorder. Hipp (2010) analyzed the systematic bias of perceptions of disorder by examining

theories and literature on the influences of factors such as age, gender, racial and ethnic background, home ownership, length of residence, education level, and the presence of children. Several studies have used factors including employment status and the number of house moves as indicators of disorder perception (Franzini et al., 2008; Sampson & Raudenbush, 2004). Second, how residents experience disorder in the neighborhood affects how their perceptions form. In terms of the built environment, building and population density is linked to the degree of exposure to disorder and possible informal monitoring by residents, thereby affecting how knowledge and awareness of disorder vary (Benediktsson, 2014; Sampson & Raudenbush, 2005; Wickes et al., 2013). Moreover, in terms of activity patterns, how often disordered environments are encountered in the neighborhood and whether they are within the scope of sight and behavior in daily life can influence residents' sensitivity or insensitivity to disorder based on the frequency of contact (Wallace, 2015). Third, social interaction with neighbors changes individual perceptions and attitudes toward disorder. Social exchange influences the perception of disorder through access to information (Franzini et al., 2008). Social ties are also related to community spirit and a sense of security, affecting behavioral responses such as the residents' decision of whether to stay or leave (Jaśkiewicz & Wiwatowska, 2018; Permentier et al., 2009).

2.3. Group characteristics and fear of vacant houses

Feelings of fear are the most intuitive emotional responses to potential threats associated with disorder perception. Other studies have primarily focused on

social and demographic factors to explain a sense of fear. However, to comprehensively grasp residents' perceptions of disorder, the characteristics of the object causing fear through physical or visual factors must be analyzed (Crosby & Hermens, 2019; Foster et al., 2010). Some researchers have highlighted the physical environment and neighborhood design as pivotal triggers of fear, including vacant houses and lands, back laneways, litter, and negative visual cues such as graffiti (Crosby & Hermens, 2019; Doran & Lees, 2005; Foster et al., 2010; Lorenc et al., 2012; Painter, 1996; Vrij & Winkel, 1991). According to Crosby and Hermens (2019), who analyzed the visual aspects of fear of crime using eye-tracking tests, subjects focused on cues indicating the presence of people, including buildings, vehicles, and bright windows, when judging images in terms of safety paired with fear. Consequently, exploring fear-inducing visual aspects of vacant houses enabled them to identify which of their elements caused a specific degree of fear, with implications for managing neighborhood decline from an urban design and planning perspective. Policymakers and practitioners could improve the health, quality of life, and well-being of depressed communities by addressing fear through interventions in the built environment (Lorenc et al., 2012).

Regarding fear of vacant houses in neighborhoods experiencing long-term decline, the residents' shared group identity among deserves consideration. Given the spatial stigma, shared helpless emotions, and frequent contact with vacant houses in shrinking neighborhoods, group differences between residents and outsiders can be predicted in evaluating fear of disorder (Crosby & Hermens, 2019; Wallace & Louton, 2018). Neighborhood stigma or negative reputation

resulting from urban decline can substantially affect how residents feel about their immediate environment, neighbors, and themselves (Gourlay, 2007). Familiarity with the neighborhood environment can also reduce the fear of disorder in assessing the degree of safety (Crosby & Hermens, 2019). According to Wallace and Louton (2018), who examined non-residents' perceptions of disorder using photographic stimuli, non-residents adhered to the commonly held disorder theory while frequently employing views of social categories, stigma, and bias. They also demonstrated that non-residents' stereotypes surrounding poverty and stratification could lead to reproducing urban imbalances by affecting the flow of money and resources to disadvantaged neighborhoods. Hofmann et al. (2012) investigated how perceptions of and preferences for parks and derelict urban lands differed between landscape planners and residents by using photographic presentation and suggested considering these differences when designing green spaces. In this research, we compare the fear of vacant houses between residents and non-residents through visual tools; its results could be used to elicit positive urban changes in declining neighborhoods.

3. Methods

3.1. Design

We analyzed perceptions of disordered neighborhoods that comprise vacant houses in two stages by using a questionnaire and the photo-elicitation method. First, we surveyed residents living in the inner city of Incheon to grasp their socio-demographic characteristics and perceptions of disorder. Specifically, in the first step, we aimed to answer how perceptions of vacant houses vary depending on socio-demographic characteristics, experiences of vacant houses, and interactions with neighbors. The old inner-city areas of Incheon, Jung-*gu*, Dong-*gu*, and Nam-*gu*, have suffered from decades of urban shrinkage resulting from deindustrialization, development of new suburbs, relocation of public institutions, unsuccessful urban redevelopment projects, decreasing population and aging, and a deteriorated built environment, in contrast to the overall growth of Incheon itself, Korea's third most populous city (Jeon & Kim, 2020). Particularly, as of 2017, approximately 1,200 vacant houses, accounting for three fourths of all vacant houses in Incheon, eroded the inner-city areas corresponding to three out of eight *gu*s (administrative districts). The vicious cycle between urban shrinkage and vacant houses had caused the built environment to become vulnerable to concentrations of the disadvantaged, a degraded quality of life, and a stigmatized neighborhood image. Therefore, we recruited 93 residents from Nam-*gu*, one of three districts in Incheon's inner city, to investigate the perception of vacant houses in shrinking cities. At the beginning of the recruitment, we conducted a preliminary investigation of residents through field surveys and street interviews; successively, several representatives of residents by *dong* (administrative

subdivision of *gu*) were introduced by officials in community service centers. Subsequently, questionnaires were completed at two regular meetings with neighborhood leaders, and additional neighborhood-based information related to vacant houses was collected. Moreover, we expanded the number of interviewees through snowball sampling with the representatives of the residents.

Table 3-2. Socio-demographic characteristics of survey participants

Characteristics	Categories	Residents		Characteristics	Categories	Residents	
Gender	Female	68	(74.7 %)	Home ownership	Owner	69	(75.0 %)
(n = 91)	Male	23	(25.3 %)	(n = 92)	Renter	23	(25.0 %)
Age	Between 23 and 87 years			Building type	Detached	30	(32.3 %)
(n = 89)	(an average of 57.5 years)			(n = 93)	Multi-family	32	(34.4 %)
Length of	Less than 1years	5	(5.4 %)		Apartment	27	(29.0 %)
residence	1 – 2 years	7	(7.6 %)		Others	4	(4.3 %)
(n = 92)	3 – 10 years	18	(19.6 %)	Avg. annual	0 – 9.99 mil. won	21	(23.6 %)
	11 – 19 years	22	(23.9 %)	household income	10 – 19.99	11	(12.4 %)
	20 or more years	40	(43.5 %)	(n = 89)	20 – 39.99	26	(29.2 %)
Household size	Between one and six people				40 – 59.99	17	(19.1 %)
(n = 89)	(an average of 2.9 people)				60 or more	14	(15.7 %)
Children under	With	21	(22.6 %)	Education level	High school or below	60	(65.9 %)
20 years old	Without	72	(77.4 %)	(n = 91)	College or above	31	(34.1 %)
(n = 93)							

These surveys made it possible to comprehend the socio-demographic characteristics at the individual and household levels in Incheon's inner-city areas (Table 3-1). Of the participants, 68 were females (74.7%) and 23 male (25.3%), with women accounting for approximately three times as many as men; their ages ranged from 23 to 87 years, with an average of 57.5 years. Regarding their period of residence, 87.0% of the participants had been residents for three years or more, half of which had been residents for 20 years or more. The number of household members in the participants' families ranged from one to six people, with an average of 2.9 people; 77.4% of the respondents stated that their families did not comprise children aged under 20 years. Concerning home ownership, 75% of the

participants were homeowners; as for building type, 66.7% of the participants lived in detached and multi-family houses. The lower-middle income groups accounted for 65.2% of the average household income of less than 40 million won; concerning their educational level, 65.9% of the respondents had an academic ability equal to that of a high school graduate or below.

Second, we conducted in-depth interviews by using photo-elicitation involving vacant houses to analyze the degree of fear and its triggers for residents and non-residents. The second step was to answer the questions, "how much fear do residents feel about vacant houses with different physical conditions?" and "what signs of vacant houses are more or less visible and important to residents?" Photo-elicitation is a social research tool, whereby research participants discuss photographs with a researcher and evoke their experiences and comments (Alexander, 2013). Considering that participants respond differently in visual research compared to verbal or written research when constructing views on the built environment, research methods using photographs could help explore the residents' hidden emotions or opinions about disordered neighborhood environments (Jamme et al., 2018; Jiang et al., 2018; Sampson et al., 2017). We recruited 10 residents for photo-elicitation interviews in Sungui-*dong* where vacant houses were concentrated especially in Nam-*gu*, Incheon. Ten additional non-residents who were aware of the social problems associated with vacant houses but had not directly experienced them were included. We provided each participant with 13 photos of vacant houses arranged randomly and asked them to rate their perceived fear for each scene on a 7-point Likert scale, ranging from "not fearful at all" to "very fearful". They were also requested to write in the

questionnaire or tell the researcher about the factors or reasons in the photos affecting their fear. The interviews, only with the participants' consent, were recorded and later transcribed.

3.2. Stimulus material

Thirteen pictures of vacant houses were used as the stimuli for the photo-elicitation investigation (Figure 3-1). They were selected from the photos taken with handheld digital cameras by the researchers at field trips to the inner city of Incheon between 2014 and 2019. The photographs for the experiment had a resolution of 3456 x 4608 pixels or 2832 x 4240 pixels; they all were printed on 4 x 6 inch gloss paper. Pictures of vacant houses taken during the day and at night depicted not only the buildings themselves but also some surrounding streets and neighborhood landscapes. The photographs covered the range of variation in building and street conditions, revealing differences of the extent to which the buildings had deteriorated, whether the entrances were closed, and whether the streets were managed. A photo of vacant land was also included to obtain residents' opinions about demolishing vacant houses. However, people were excluded from the scenes in all pictures because people in images tend to draw the viewer's attention strongly (Crosby & Hermens, 2019; Hofmann et al., 2012). Furthermore, the address of a house in a photograph was covered by semitransparent tape to protect the privacy of the homeowner and prevent bias stemming from the observer's familiarity with the buildings. Lastly, Korean consonants were randomly assigned to the lower right of the back of pictures for

identification and, in this paper, were replaced with the alphabet letters A to M.

[A] Building and street in good condition, but spray-painted markings on the wall (d)

[B] Building in relatively good condition, but second floor window removed (d)

[C] Laundry and flower pots placed on the street in front of vacant house (d)

[F] Wall with peeling paint, and broken windows (d)

[H] Wall with peeling paint, and windows taped with X (n)

[D] Relatively large building in good condition, but street with piles of garbage (d)

[E] Wall with peeling paint, and lighting at the entrance (n)

[G] Exterior wall eroded, broken windows, and litter-strewn street (d)

[I] Dilapidated building, and creeping vines on the door and wall (d)

[J] Tumbledown building, and waste piled up inside and outside vacant house (d)

[K] Unclosed entrance, and garbage in the yard (d)

[L] Deteriorated building, and construction waste piled up on the street (n)

[M] Weeds and vines grown on vacant land (d)

Figure 3-1. Stimuli used in the photo-elicitation survey:
Vacant house photos representing a range of signs of disorder
with different physical conditions of buildings and streets, and varying time of day
(A brief description of visual characteristics was given below each photo; d=day and n=night)

3.3. Data analysis

The questionnaire data on perceptions acquired from 93 participants in the first

stage were coded using the Microsoft Excel program. Based on the coded data, descriptive statistics were derived for responses to 27 questions in the questionnaire. A pivot table was used to analyze the correlation between variables related to perceptions and variables in three categories, including individual and household characteristics, experiences of vacant houses, and community activities. Written or audio-recorded data collected through the photo-elicitation experiment with 20 participants in the second stage were also coded. As for the degree of fear assessed through a 7-point Likert scale, the average scores the participants gave to the photos and the highest and lowest scores among them were drawn for both groups of residents and non-residents. Regarding the factor of fear, key words were extracted from the narrative arranged by the participants and from the photos, and could be classified into two categories, the built environment and social milieu, each having positive or negative elements (Jamme et al., 2018). The principal drivers in how vacant houses were perceived and interpreted were compared between the two groups.

4. Results

4.1. Residents remaining in declining neighborhoods and their awareness of vacant houses

The questionnaire survey, based on the responses of 93 participants, revealed the degree to which residents understood vacant houses (Table 3-2). Their responses to the existence and number of vacant houses and duration of their vacancy indicated differences in perceptions based on neighborhood environments and socio-demographic characteristics. Questions related to the causes, problems, and utilization of vacant houses also revealed that vacant houses fixed in shrinking neighborhoods were recognized as factors causing daily life problems.

Three-quarters of the respondents stated they were aware of the existence of vacant houses in their neighborhoods. The average number of vacant houses that residents could discern in their respective neighborhoods was 7.9, but the range was extremely wide, ranging from zero to 60. These responses demonstrated that disorder patterns, including vacant houses, varied between or within neighborhoods, and that perceptions of disorder were formed at a local scale, such as micro-neighborhoods (Benediktsson, 2014; Hipp, 2010). Approximately half of the respondents answered "long-term" when asked about how long vacant houses had been neglected in their neighborhoods, confirming that urban shrinkage and housing abandonment were becoming fixed. Approximately 35% of the respondents did not know how long vacant houses had been left unattended (nearly 80% of those respondents were long-term residents over three years). The

researchers presumed that this result is the product of the respondents' inexperience of vacant houses, because these were unevenly distributed, or of their familiarity and insensibility resulting from their long-term residence.

Residents' opinions on the principal causes and problems of vacant houses reflected the vicious cycle between urban shrinkage and housing abandonment. The leading causes of vacant houses, according to the respondents, were the deterioration of buildings and urban infrastructure, followed by the delays and cancellations of urban redevelopment projects. Numerous respondents considered poorly constructed buildings as vulnerable to becoming vacant houses and unmanaged buildings as having become long-term vacant houses after residents left because of delayed inner city redevelopment projects that had been indiscriminately planned (Jeon & Kim, 2020). Additionally, regarding the principal problems of vacant houses, daily nuisances such as garbage, odor, and dust were highlighted most frequently. This result demonstrates that although some vacant houses intermittently posed a potential threat to the health and safety of residents, most vacant houses in declining neighborhoods were persistently irritating residents through daily life problems, unlike the broken windows theory. Lastly, residents mentioned substituting vacant houses, following their demolition, with community facilities the most among the ways in which residents expected them to be utilized. This finding revealed that residents desired not only to eradicate vacant houses but also to supplement the insufficient infrastructure in the neighborhoods.

Table 3-2. Awareness of vacant houses by residents in shrinking inner-city areas of Incheon

Characteristics	Categories	Residents	
Are there vacant houses in the neighborhood? (n = 93)	Yes	70	(75.3 %)
	No	23	(24.7 %)
How many vacant houses are you aware of? (n = 89)	Between 0 and 60 houses (an average of 7.9 houses)		
How long have vacant houses been neglected? (n = 86)	Long-term (more than one year)	42	(48.8 %)
	Middle-term (six months or more but less than one year)	12	(14.0 %)
	Short-term (Less than six months)	2	(2.3 %)
	Unknown	30	(34.9 %)
What do you think are the main causes of vacant houses? * (n = 91)	Delays and cancellations of urban redevelopment projects	31	
	Expectations for rising real estate prices	15	
	Economic difficulties (e.g. arrears and foreclosures)	11	
	Deaths of elderly owners and complex ownership relations	5	
	Deterioration of buildings and urban infrastructure	42	
	Other	6	
What do you think are the main problems of vacant houses? * (n = 93)	Damages to daily life (e.g. litter, odor, and dust)	41	
	Degradation of urban landscape	30	
	Disaster risk (e.g. fire and collapse)	34	
	Safety threats (e.g. homeless people, juvenile delinquents, and crimes)	36	
	Falling house prices and declining neighborhood reputation	17	
	Other	4	
What do you think are the desirable ways to use vacant houses? * (n = 93)	Repair of vacant houses	17	
	Vacant land after demolition	16	
	Public space for residents after demolition (e.g. parking lots)	42	
	New construction	32	
	Other	3	

* As a multiple-selection question, the value of each category means the sum of the number of times checked.

4.2. What factors affect the heterogeneity of residents' perceptions of vacant houses?

The questionnaire survey of 93 inner city residents identified their perceptions of vacant houses through physical and mental health, behavioral reactions, and participation in community activities (Figure 3-2). Variables related to socio-demographic characteristics, individual experiences, and community interactions shaped differences in perception (Table 3-3).
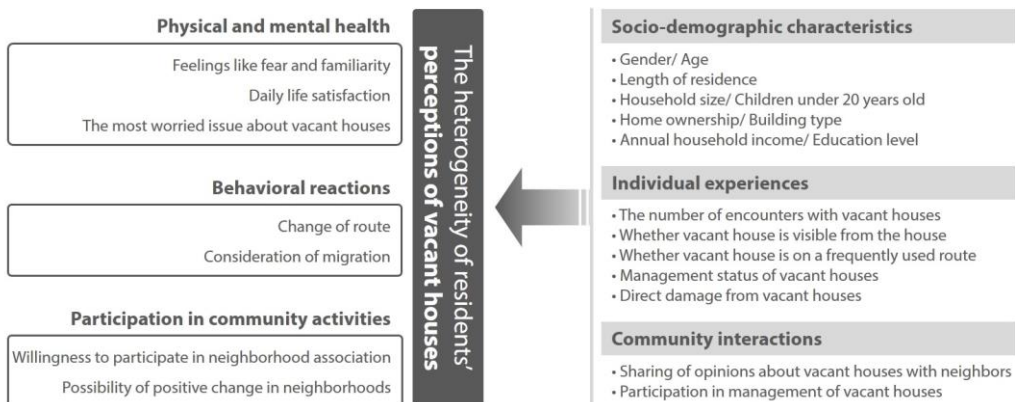
Figure 3-2. Conceptual framework of variables
related to the perceptions of vacant houses

In relation to the question, "how do you feel about vacant houses?", the residents' answers fell in one of three categories: "negative", "get used to", and "no feeling". The question "do vacant houses affect your daily life satisfaction?" presented five options ranging from "entirely influenced" to "entirely uninfluenced". Female residents in their 20 – 50s who had been residents for three years or more in households of three or more members with children under 20 years of age were more sensitive to the emotions and satisfaction stemming from vacant houses (Figure 3-3). Compared to 9.3% of residents in their 20 – 50s, 26.1% of elderly people aged in their 60 – 80s answered that they felt familiar with vacant houses. Homeowners living in detached houses, whose education level was equivalent to high school or below and who had a household annual income of 39.99 million won or less, were easily affected by vacant houses in terms of emotions and satisfaction. Additionally, residents who had encountered vacant houses at least once a week and had frequently used streets where they were located viewed vacant houses more negatively and were substantially

affected by them in relation to satisfaction than those who had not. Three-quarters of the residents who could see vacant houses from the front doors or windows of their own home responded that vacant houses affected their sense of satisfaction. When the physical condition of vacant houses experienced by residents was poor, a greater percentage of residents evaluated vacant houses as objects conveying negative feelings and dropping satisfaction. Particularly, 91.7% of residents who had suffered direct damage from vacant houses replied that their sense of satisfaction was affected by vacant houses. Moreover, residents who had talked frequently or occasionally with neighbors about vacant houses or had participated in managing them more sensitively responded to the feelings and sense of satisfaction associated with vacant houses.

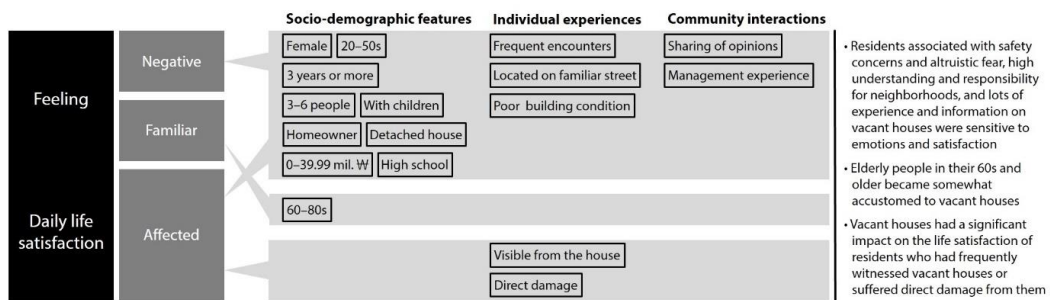**Figure 3-3**. Perceptual characteristics of feeling and daily life satisfaction related to vacant houses

The question, "what is the most worrying issue about vacant houses?" involved asking residents to choose one of three answer options: "dilapidated vacant buildings themselves", "unmanaged doorways and streets around vacant houses", and "negative behaviors occurring in vacant houses". This questionnaire item

made it possible to confirm whether the broken windows theory focusing on the spread from unrepaired signs of disorder to social deviance or crime equally applied to cities experiencing long-term decline (Figure 3-4). A higher percentage of female residents under the age of 60 with children who had experience sharing opinions with neighbors about vacant houses responded that negative behaviors by juvenile delinquents and homeless people were most concerning, compared to residents having opposite characteristics. However, the largest proportion of residents who were long-term residents (38.0%), lived in detached houses (39.3%), and were owner-occupiers (39.3%) regarded vacant house themselves as the most problematic. Residents, who had often encountered vacant houses in neighborhoods (40.7%), who could see them from their home (61.9%), or who had mainly used the street where they were located (41.7%), considered vacant houses themselves as the primary concern. A total of 52.6% of residents who had managed vacant houses also chose vacant houses themselves as the most worrying issue. However, 71.4% of residents who had checked the "very good" or "good" answer options in the survey for the question relating to the physical management status of vacant houses responded that unmanaged doorways and streets caused the greatest worry. Consequently, residents who had frequent contact opportunities with vacant houses in declining neighborhoods, we propose, were consistently affected by the problems of daily life arising from neglected vacant houses rather than from vague fears of crime.
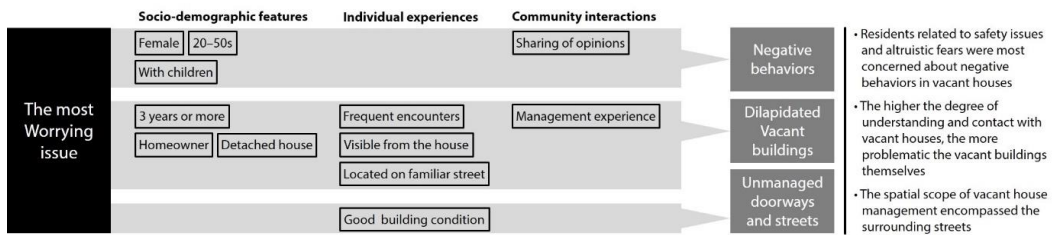
Figure 3-4. Perceptual characteristics of the most worrying issue related to vacant houses

Responding to the question, "what would you do if vacant houses are located on the shortcut to the destination place?", residents selected one of three options: "take a shortcut regardless of vacant houses", "chose another route at night", and "chose another route regardless of the time of day". For all related variables, the category of "chose another route at night" constituted the largest proportion. Additionally, the question, "have you ever considered moving to another area because of vacant houses?" included the answer options of "yes" and "no". Although residents who had never considered migrating accounted for a high percentage in most variables, over 50% of residents who resided in a detached house, could see vacant houses from their home, had been directly, negatively affected by vacant houses, and had managed vacant houses answered that they thought about migrating. Residents in the 20 – 50 age group who resided in households of three or more members responded sensitively to both route change at nighttime and migration consideration, leading us to conclude that single and couple elderly households were relatively indifferent to vacant houses and passive to behavioral responses (Figure 3-5). However, female residents who lived as tenants in buildings other than detached houses for a short period were more sensitive to route changes at night, whereas male residents who resided in

detached houses they owned for over three years were more inclined to consider migrating. This result led us to assume that residents who had a superior understanding of and a greater responsibility for neighborhoods held the contradictory view that they were accustomed to vacant houses, but wanted to avoid them. A higher proportion of residents with children under 20 years of age than those without them also considered migrating. Furthermore, residents' responses to nighttime route changes and migration consideration revealed differences based on individual experiences of vacant houses and community interactions. Residents who had infrequently encountered vacant houses, who could not see and interact with vacant houses, and who had not been directly, negatively affected by vacant houses were disposed to nighttime route change, whereas residents with the opposite characteristics were relatively inclined to consider migrating. Similarly, residents who had never shared opinions about vacant houses with neighbors and had never participated in management activities were susceptible to changing nighttime routes, whereas residents of the opposite characteristics were susceptible to consider migrating. We argue that vacant houses have served as familiar objects in neighborhoods in the short term for residents with extensive experience of and information on them, but have aroused their desire to flee from neighborhoods in the long term. However, in the case of the management status of vacant houses, a higher percentage of residents who had experienced vacant houses in poor physical conditions chose "another route at night" and "yes", respectively, as responses regarding nighttime route change and migration consideration.
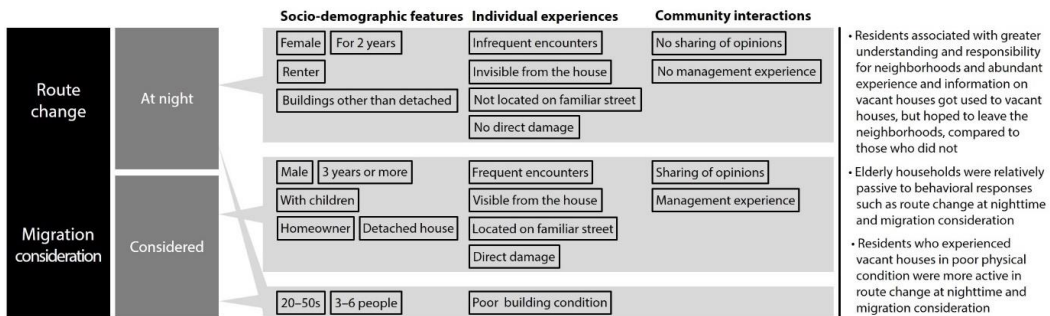
Figure 3-5. Perceptual characteristics of route change and migration consideration related to vacant houses

Both questions of "if there were community meetings to clean and manage vacant houses and streets in the neighborhood, would be you interested in participating?' and "do you think the efforts of residents can have an impact in making your neighborhood a better place to live?" could be answered using five options ranging from "strongly agree" to "strongly disagree". The percentage of positive responses to both questions, which included "strongly agree" and "agree", was high for the latter question, except for one attribute. The positive responses to the former question did not exceed 50% for most attributes, but the latter question mostly exceeded 50%. Particularly, the rate of 77.3% of residents with experience in vacant house management constituted the highest rate in the willingness to participate in resident associations, suggesting that who had already experienced trying to manage vacant houses could lead to additional involvement in management. Residents whose socio-demographic characteristics included being part of 3 – 6-member households with children, being men in their 60 – 80s residing for more than three years, and being owners residing in detached houses, demonstrated greater interest and willingness to participate in vacant-housing-

related associations. Conversely, residents with the opposite characteristics expressed greater agreement on the potential for positive change of neighborhoods (Figure 3-6). The rate of respondents demonstrating a willingness to participate in resident associations was high among residents who had frequently encountered vacant houses and principally used the streets where vacant houses were located. However, the rate of respondents answering that residents' efforts could make the neighborhood a better place to live was high among residents having the opposite characteristics. Similarly, high proportion of residents who shared opinions about vacant houses and participated in management responded positively to participation in the resident associations. Conversely, a high proportion of residents with the opposite characteristics responded positively to the possibility of desirable neighborhood changes. The mentioned results reveal that residents with greater responsibility and experience, and more information about their neighborhoods and vacant houses displayed a stronger desire to manage vacant houses, while taking a relatively passive stance on whether their efforts would contribute to practical improvements in neighborhoods. Particularly, 36.8% of residents who could frequently see vacant houses located near their houses gave highest rate of negative responses to the possibility of improving the neighborhood environment by their own efforts.
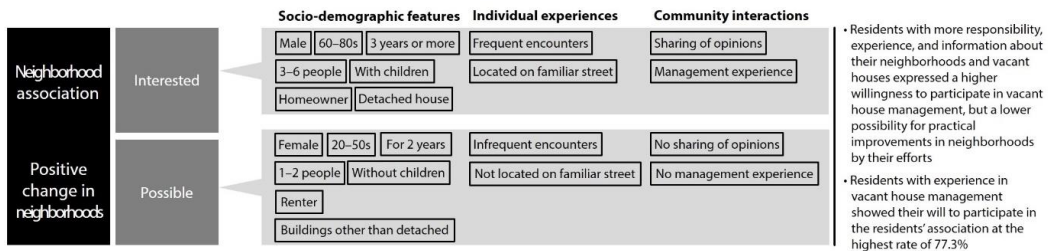
Figure 3-6. Perceptual characteristics of association participation and neighborhood changes related to vacant houses

Table 3-3. Differences in the percentage of responses to questions related to residents' perceptions of vacant houses

Attributes	Perceptions	Feeling (Negative)	Daily life Satisfac-tion (Affected) ***	The most worrying issue (Negative behaviors)	Route change (At night)	Migration Conside-ration (Considered)	Neighbor-hood association (Interested) ***	Positive change in neighbor-hoods (Possible) ***
Gender	Women	**64.7 %**	**44.1 %**	**32.2 %**	**59.0 %**	27.0 %	40.3 %	**66.7 %**
	Men	60.9 %	39.1 %	30.0 %	45.5 %	**33.3 %**	**47.8 %**	60.9 %
Age	20 – 50s	**67.4 %**	**48.8 %**	**37.8 %**	**65.9 %**	**28.6 %**	39.5 %	**71.4 %**
	60 – 80s	58.7 %	37.0 %	25.0 %	45.0 %	27.5 %	**44.4 %**	57.1 %
Length of residence	For 2 years	41.7 %	25.0 %	**66.7 %**	**72.7 %**	16.7 %	16.7 %	**100.0 %**
	3 or more	**66.3 %**	**46.3 %**	26.8 %	52.1 %	**28.8 %**	**44.3 %**	59.2 %
Household size	1 – 2 people	61.1 %	44.4 %	22.6 %	45.2 %	24.2 %	36.1 %	**64.5 %**
	3 – 6 people	**64.2 %**	**45.3 %**	**34.8 %**	**58.0 %**	**30.0 %**	**46.2 %**	64.2 %
Children under 20	With	**81.0 %**	**61.9 %**	**33.3 %**	55.0 %	**38.9 %**	**57.1 %**	61.9 %
	Without	58.3 %	38.9 %	31.7 %	**55.4 %**	25.0 %	36.6 %	**64.2 %**
Home ownership	Owner	**66.7 %**	**46.4 %**	29.5 %	48.4 %	**29.0 %**	**41.2 %**	58.2 %
	Renter	52.2 %	34.8 %	**42.1 %**	**80.0 %**	21.7 %	39.1 %	**80.0 %**
Building type	Detached	**70.0 %**	**63.3 %**	25.0 %	48.1 %	**57.1 %**	**53.3 %**	58.6 %
	The others	60.3 %	34.9 %	**35.8 %**	**58.6 %**	13.8 %	35.5 %	**66.1 %**
Annual income (₩)	0 – 39.99 mil.	**62.1 %**	**46.6 %**	30.8 %	**55.8 %**	27.8 %	**43.9 %**	**64.8 %**
	40 or more	61.3 %	35.5 %	**37.0 %**	53.3 %	27.6 %	35.5 %	58.1 %
Education level	High school	**65.0 %**	**45.0 %**	29.1 %	52.8 %	**29.1 %**	39.0 %	57.1 %
	College	58.1 %	41.9 %	**33.3 %**	**56.7 %**	26.7 %	**48.4 %**	**80.0 %**
Encounters with VH*	Frequent	**66.2 %**	**55.9 %**	25.4 %	52.5 %	**38.1 %**	**47.8 %**	61.9 %
	Infrequent	58.3 %	12.5 %	**50.0 %**	**65.2 %**	0.0 %	25.0 %	**66.7 %**
Visible from the house	Visible	62.5 %	**75.0 %**	9.5 %	36.8 %	**56.5 %**	41.7 %	42.1 %
	Invisible	**64.7 %**	33.8 %	**40.0 %**	**61.5 %**	17.7 %	**41.8 %**	**69.1 %**
Located on familiar street	Located	**68.4 %**	**63.2 %**	22.9 %	52.9 %	**40.4 %**	**48.2 %**	58.5 %
	Not located	55.6 %	13.9 %	**45.5 %**	**58.8 %**	8.8 %	30.6 %	**71.4 %**
Management status of VH **	High quality	37.5 %	25.0 %	0.0 %	50.0 %	14.3 %	28.6 %	50.0 %
	Middle	55.2 %	17.2 %	**42.3 %**	55.6 %	11.5 %	44.8 %	**72.4 %**
	Low	**77.6 %**	**61.2 %**	29.5 %	**56.3 %**	**39.1 %**	**44.9 %**	61.2 %
Direct damage from VH	Damaged	50.0 %	**91.7 %**	33.3 %	37.5 %	**50.0 %**	**50.0 %**	**75.0 %**
	Undamaged	**64.1 %**	35.9 %	33.3 %	**56.8 %**	23.9 %	40.3 %	62.3 %
Sharing of opinions	Shared	**71.7 %**	**58.5 %**	**35.4 %**	52.1 %	**42.9 %**	**51.9 %**	61.2 %
	Not shared	50.0 %	22.2 %	30.0 %	**58.8 %**	5.9 %	22.2 %	**62.9 %**

| Management | Experienced | **72.7 %** | **81.8 %** | 26.3 % | 52.4 % | **66.7 %** | **77.3 %** | 61.9 % |
| participation | Not | 60.3 % | 31.7 % | **38.9 %** | **58.9 %** | 17.2 % | 27.4 % | **62.7 %** |

* VH = Vacant houses/ The 'Frequent' category includes 'Everyday', 'Several times a week', and 'Once a week'. The 'Infrequent' category also includes 'Once a month', 'Every few months', and 'Never encountered'.
** The 'High quality' category means "very good" or "good" physical management of vacant houses, and 'Low quality' category means "poor" or "very poor".
*** These are five multiple choice questions consisting of "strongly agree", "agree", "neutral", "disagree", and "strongly disagree", and this table includes the ratios of the first two choices.

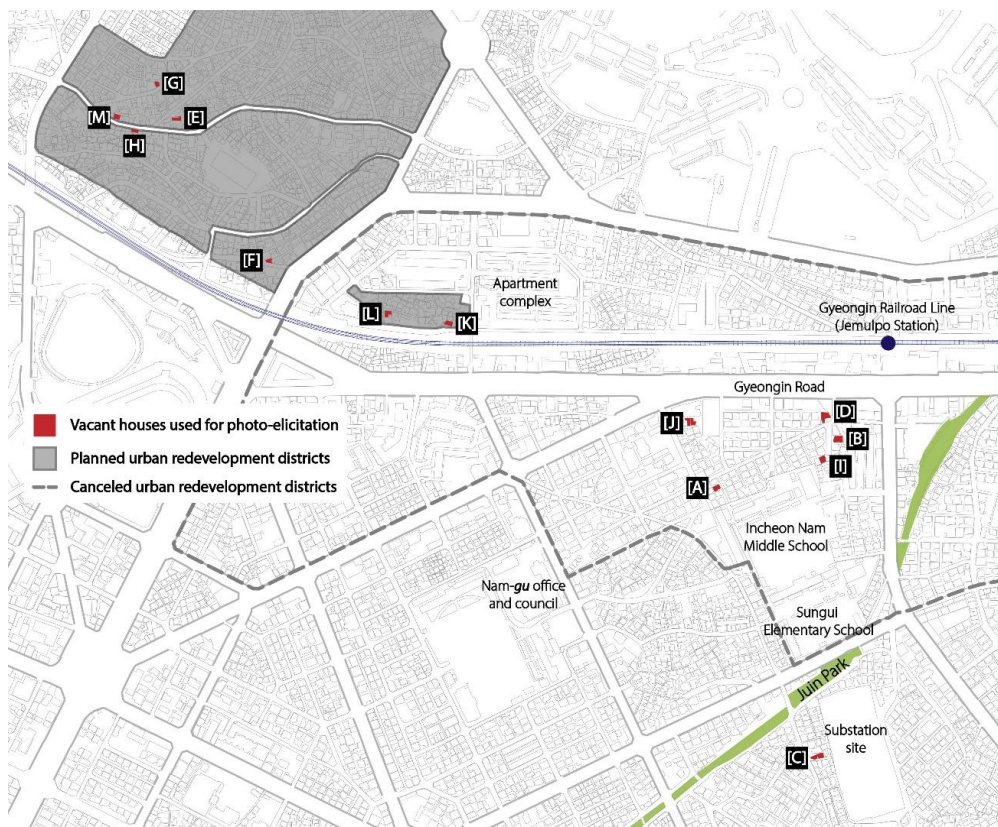## 4.3. How and why do residents and non-residents fear vacant houses?

Figure 3-7. Vacant houses used in photo-elicitation and their urban spatial context

The photo-elicitation of 10 residents from Sungui-*dong* and 10 non-residents allowed us to compare the two groups' perceptions of vacant houses, especially the fear of them (Figure 3-7). The visual stimuli containing different signs of

vacant houses led to heterogeneity in the degree of and reasons for the two groups' fear of stimulus. The average score for each of seven out of 13 photos was higher among residents than it was among non-residents, with one of the 13 photos recording the same score (Figure 3-8). Particularly, the difference in fear ratings between the two groups was most pronounced in photos [E] and [M].
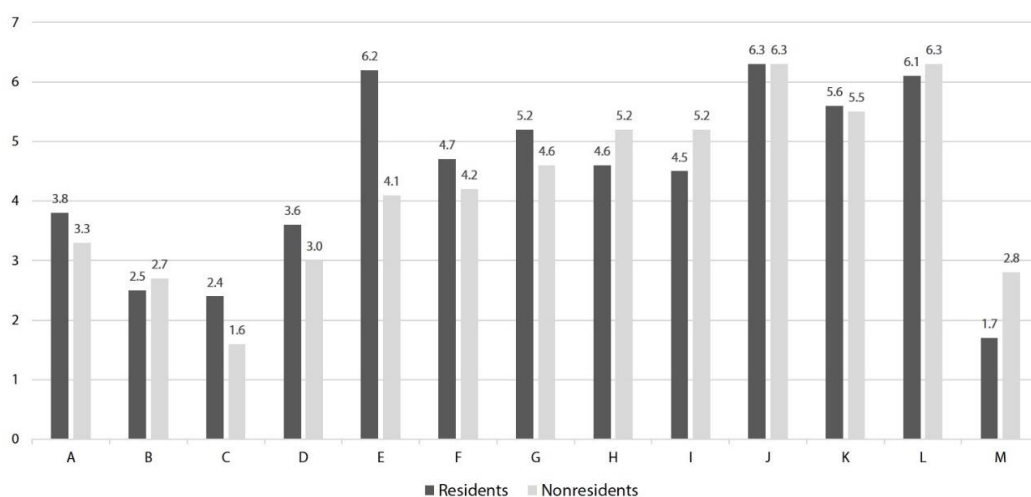
Figure 3-8. The average score for each visual stimulus in fear ratings
by residents and non-residents

The photos with the highest and lowest average scores in the two groups' fear ratings were derived, identifying which cues each group responded to more sensitively when exposed to the same disordered environment (Figure 3-9). In both groups, photo [J] scored the highest with 6.3 points. Both residents and non-residents mentioned disordered physical elements as triggers of fear, including a tumbledown building with collapsed walls and roof, and garbage and waste dumped on the yard and roadside. Some non-residents reported that the vacant

house in the photo felt more desolate and dilapidated in contrast with the new high-rise apartment surrounding it. Resident respondents expressed experienced or predictable fears related to invisible disorder, including beasts, such as wild cats, and insects, such as mosquitoes, a horrible stench, and bad behaviors, while exposing negative feelings about visible disorder, such as anxiety, qualms, and disgust. Additionally, one resident said, "The vacant house and surroundings in the picture were so dirty that the whole neighborhood looked like a slum", expressing concern over the deterioration of the neighborhood's image. Photo [E] received the second highest score for the resident group's fear ratings with 6.2 points, which was considerably higher than 4.1 for the non-resident group. Residents answered that, although the streetlight installed on the wall of the vacant house alleviated fear a little, they would be reluctant to pass on the street shown in the photo and used expressions such as "dark", "grim", and "scary". Residents highlighted the exterior walls of the building with cracks and peeling paint as causes of fear, saying they were afraid of what would happen in the dark interior space of the building. Photo [L] recorded the third highest score (6.1 points) and second highest score (6.3 points) by the resident and non-resident groups, respectively. Both groups blamed a deteriorated building with damaged walls and roof, building waste left on the street, nighttime producing a spooky atmosphere, and insufficient lighting as triggers for fear. One resident stated the following: "[Although the photo showed a scene taken at night], the vacant house and surroundings were unmanaged, so pedestrians might be scared of passing by both during the day and at night". Another resident reported, "Women especially should not go to the area [where the vacant house in the picture was located]."

Residents shuddered, saying that the vacant house was so messy that even potential criminals would not go into it. They also demonstrated their willingness to manage the streets on their own, even aside from vacant houses that were difficult to intervene in because of private ownership. Photo [K] recorded the third highest score with 5.5 points by the non-resident group; Photo [K] was also ranked 4th by the resident group with 5.6 points. Non-residents referred to the long-unmanaged physical environment comprising such things as walls with peeling paint, litter-strewn yard, and uncared-for plants, as elements of fear. They noted that the door-less entrance and the spray-painted red circle marker on the wall exacerbated fear. Residents also indicated the unclosed gate as a pivotal factor of fear, expressing concern that "something", including fires from cigarettes or arson, could be caused by "someone" such as homeless people or bad students, in vacant houses.

Although they were presented in a different order, photos [B], [C], and [M] scored the lowest in fear assessment by both resident and non-resident groups. Regarding photo [C], which received 2.4 points from the former group and 1.6 points from the latter, both groups agreed that the building in the photo did not appear to be a vacant house. Both residents and non-residents mentioned that pots with flowers and plants along the street and clothes hung out on clotheslines alleviated fear that the vacant house generated by implying the presence of people or signs of care. One non-resident respondent speculated that the open door of the building opposite the vacant house revealed that trust endured among residents within declining neighborhoods. Resident respondents suggested that the vacant house itself abutting on the clean street where people passed by was not

frightening, but that their concern was with people, including the homeless, who might be in the vacant house. Residents and non-resident groups ranked photo [B] as third and second with the lowest scores of 2.5 and 2.7 points, respectively. Both groups replied that although a removed electric meter, a missing window, and the darkness of the interior of the house made them recognize the vacant house and feel fear, the degree of fear was low because the physical condition of the building was relatively sound. However, non-residents thought that the tightly shut gate would make it difficult for dangerous events such as crimes to happen, whereas residents feared that even if the doors of the long neglected vacant houses had been locked, homeless people or someone who knew the absence of occupiers could climb over the wall and hide. Photo [M], showing vacant land after a vacant house had been demolished, was ranked first by the resident group and third by the non-resident group, respectively, with the lowest scores for fear assessment, revealing differences in the perception of disorder between the two groups. Members of both groups stated that the green grass of the vacant lot was aesthetically neat and aroused pleasant emotions in contrast to vacant houses with threatening physical elements. However, while the non-resident group commented that uncared-for landscaping, such as lush grass and bushes, could be physically harmful and attract juvenile delinquents, the resident group mentioned that if fresh grass had not been there, the pile of garbage would have accumulated in the vacant land. One resident said the following: "If the residents' association takes care of the vacant lot a little more, it seems to be able to play a role as green space in the neighborhood". Another resident stated, "It would be nice if vacant lands could be used by planting trees or flowers after demolishing vacant houses",

providing views on the demolition of vacant houses and the subsequent use of vacant lands.
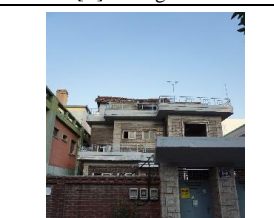
Residents	Highest	[J] Rating = 6.3	[E] Rating = 6.2	[L] Rating = 6.1
	Lowest	[M] Rating = 1.7	[C] Rating = 2.4	[B] Rating = 2.5
Non-residents	Highest	[J] Rating = 6.3	[L] Rating = 6.3	[K] Rating = 5.5
	Lowest	[C] Rating = 1.6	[B] Rating = 2.7	[M] Rating = 2.8

Figure 3-9. Vacant house photos with the highest and lowest fear ratings
by residents and non-residents

Analyzing the reasons for the resident and non-resident groups' fear of vacant

houses through photos made it possible to identify which physical and social factors stimulated each group's sense of fear or safety (Table 3-4). In terms of the built environment, the physical conditions of vacant houses, which were revealed visually, strengthened or, conversely, weakened fear in both groups. The poor condition of building elements, including walls, roofs, windows, doors, and shutters, aggravated fear by indicating the absence of management, while the evidence of a minimum of maintenance by the owners, such as painted exteriors, alleviated fear. Particularly, the darkness of the rooms exposed through broken, open, or missing windows, regardless of the time of day, amplified fear, but the tightly closed doors created a sense of security. This result demonstrated that just closing the openings in managing vacant houses could mitigate the negative emotions, including fear, caused by vacant houses. Moreover, variations in the fear of vacant houses were affected not only by the buildings themselves but also by the surrounding street environment. The garbage and waste accumulated around vacant houses and the neglected landscaping intensified negative feelings such as fear, displeasure, and disgust. Residents said, "Usually, people did not throw garbage on the streets that were managed, but illegal dumping of one person created a garbage mountain on the streets that were not managed like the surrounding areas of vacant house". One astounding example was that in the summer of 2017, 3.5 tons of garbage dumped by residents of the adjoining building were found on the roof of a multi-family house that was left empty for nearly three years in Nam-*gu*, Incheon. Furthermore, the streets that indicated the residents' continued use and care, including pots with flowers or plants and clothes hung out on clotheslines, aroused positive emotions such as warmth and

liveness. When comparing photo [C] showing the poor physical condition of a building but a well-managed street with photo [D], showing opposite characteristics, the average score of fear by both resident and non-resident groups was higher in photo [D]. Additionally, in both groups, street-lights around vacant houses at night certainly served to reduce fear. However, regarding the security CCTVs discovered along with street-lights in the photos, non-residents regarded them as factors reducing fear; however, some residents mentioned that most CCTVs in the neighborhood were fake and did not work and that the phrase "recording CCTV" made people more suspicious.

Notable elements related to the fear arising from the built environment were spray-painted markers on buildings that both residents and non-residents mentioned several times, as shown in the photos [A] and [K] (Figure 3-10). The markers "O", "X", and "demolition scheduled" in the photos were not simple graffiti, but signs indicating that the buildings would be demolished through urban redevelopment projects. In most planned redevelopment districts in Korea, after the eviction of residents, letters or signs sprayed in red have customarily marked buildings to notify a forthcoming demolition. However, visually stimulating markers became a bigger problem as redevelopment projects were delayed or canceled, resulting in residents remaining exposed to them in the long term. Additionally, as vacant houses scheduled for redevelopment were clustered adjacent to occupied neighborhood buildings, they and their markers constantly irritated residents in their daily life. Residents noted that these marks not only adversely affected their mental health through fear and depression but also could lead to opportunist crimes by potential criminals. One resident said the following:

"If you enter the inner alleyway from the building on the six-lane street where my shop is located, there are many vacant houses with red markings. I have been using only the main street, and I am not about to go into the alley". Non-residents also noted that these markings conveyed feelings of repulsion and threat. The unsightly markings revealed the absence of occupiers and maintenance, as did broken windows, and the concentration of the marked vacant houses inflated the negative image of neighborhoods among outsiders, as well as residents.

Regarding the specific reasons for the fear of vacant houses, the resident and non-resident groups also highlighted the social elements that could not be seen in the photos. Both groups mentioned that the clues suggesting people' presence or their activities reduced fear, consistent with the conclusions of Crosby and Hermens (2019). Several non-residents reported that the signs of residence found in buildings around vacant houses alleviated fear. One non-resident said, "The door of the house facing the vacant house across the narrow street was open in the photo. This made me sense the trust among residents". However, the two groups paid attention to invisible objects that aggravated fear of vacant houses based on their experiences or visual cues. Residents feared "someone", such as juvenile delinquents or homeless people who would hide in vacant houses, and their negative behaviors, including arson or fire from smoking. One resident expressed concern, saying, "In the case of long-term vacant houses, even if the door is locked, homeless people recognizing that the house is empty can jump over the wall". The fear of invisible objects was more remarkable, especially in the resident group. During the evaluation of 13 photos, only one non-resident expressed concern about bad students, but among residents, invisible but fear-

inducing factors, including juvenile delinquents, homeless people, and "someone", were stated 17 times in total. Furthermore, the resident group specified the principal agents who elicited negative emotions about vacant houses, including fear. Residents reflected on their antipathy to out-of-reach owners of vacant houses, real estate developers involved in delays and cancellations of redevelopment projects, and outsiders who bought old buildings and left them empty in anticipation of development profits. Residents accused them of having some responsibility for the houses' vacancy and their attendant physical and mental harm. This finding indicated that negative feelings about vacant houses and related concerns were not merely triggered in the field relevant to crimes or potential criminals.

Table 3-4. Built environment and social milieu factors reinforcing or alleviating the fear of vacant houses

	Built environment		Social milieu
	Buildings	Streets (surroundings)	(invisible in the photos)
Residents	*Negative* - Long-standing, tumbledown vacant buildings - Large-scale vacant buildings with three or more floors - Exterior walls with cracks, discoloration, or peeling - Dilapidated tiled roofs (vulnerable to rain and wind) - Broken, opened, or missing windows - Unclosed or missing doors - Dark interior space exposed through building openings not boarded up - Shutter closed - Disappeared electric meter - "Demolition scheduled" lettering or "X" sign painted with colored spray	*Negative* - Narrow alleyways - Unmanaged messy streets (attracting feral cats and mosquitoes) - Illegally dumped garbage and waste - Overgrown weeds in front of the gate - Fake CCTV cameras *Positive* - Streets with high foot traffic - Clean and well-maintained streets - Pots with flowers and plants - The washing hung out on clotheslines - Streetlights - Green space	*Negative* - "Someone" including juvenile delinquents and homeless people (who know the location of vacant houses), and their negative behaviors, such as smoking and arson - Out-of-reach owners of vacant houses - Urban redevelopment projects delayed or canceled because of low profitability and related property developers - Outsiders neglecting old buildings after buying them in anticipation of development profits (ex. The people of Seoul) *Positive*

	(causing residents' depression and potential offenders' opportunist crimes) ***Positive*** - Buildings in good condition in terms of structure and materials (ex. red brick building) - Exterior of buildings in good repair (ex. neatly painted facade) - Locked doorway		- Presence of people
Non-residents	***Negative*** - Old ramshackle vacant buildings - Vacant buildings three stories or higher (giving a feeling of intense pressure) - Exterior walls and iron gates with cracks, corrosion, or peeling - Damaged, collapsed tiled roofs - Broken, dirty, or missing windows - Unclosed or missing doors - Dark indoor space with no light exposed through building openings not boarded up - Closed shutters - Rusted security grille on windows and old furniture protruding through grates - Worn, torn awnings - "X" tape marks on windows - "Demolition scheduled" lettering or "X", "O" signs painted with color spray (conveying feelings of repulsion and threat) ***Positive*** - Buildings in optimal condition in terms of structure and materials - Exterior of buildings in good repair (ex. brightly painted walls and fence) - Locked doorway	***Negative*** - Garbage and building waste left unattended - Gate covered with weeds and vines - Uncared-for landscaping (ex. thick bushes on the vacant land) - Insufficient lighting ***Positive*** - Well-maintained streets - Pots with flowers and plants - The washing hung out on clotheslines - Streetlights - Security CCTV cameras	***Negative*** - Juvenile delinquents ***Positive*** - Signs of activities (ex. occupied houses around a vacant house) - Evidence of trust between residents (ex. the house with an open door opposite a vacant house)

Figure 3-10. Spray-painted red markers on vacant houses in Nam-*gu*, Incheon

5. Discussion

In this study, we analyzed the perceptions of vacant houses in the context of neighborhood disorder by using a questionnaire survey and photo-elicitation relating to the inner city of Incheon, which is experiencing long-term urban shrinkage. The survey of 93 residents identified heterogeneity of perceptions and its influencing factors. The perceptions of vacant houses were measured by using three categories: physical and mental health, behavioral reactions, and participation in community activities. The variation in vacant house perceptions was influenced by socio-demographic characteristics, individual experiences, and community interaction. Additionally, the photo-elicitation of vacant houses involving 10 people for each group of residents and non-residents identified how the degree of fear of the two groups varied. The elements reinforcing or alleviating fear in terms of the built environment and the social milieu were also discovered. Based on the mentioned findings, the following four issues can be further discussed to manage vacant houses in shrinking cities and improve the quality of life of the remaining residents.

First, residents have been persistently affected by daily life problems resulting from long-term vacant, inner-city houses in large city experiencing continuous decline, developing perceptions of neighborhood disorder on a local scale, such as micro-neighborhoods. The degree of disorder and the condition of vacant houses varied by neighborhood, even within Incheon's inner city, and residents' perceptions of vacant houses also differed according to their primary living radius. In the case of the number of vacant houses that residents recognized, the average

was approximately eight buildings, but the number ranged from zero to 60, revealing that a bias in perceptions of disorder might occur even in smaller urban spatial units. Moreover, in contrast to broken windows theory, which notes the radical leap from unrepaired signs of disorder to rampant violent crimes, residents were suffering from current harms caused by vacant houses rather than potential crimes. Particularly, residents with a high degree of understanding of neighborhoods and vacant houses, including those who had long lived as detached house owners and those who have had frequent visual or behavioral contact with vacant houses, responded that increasingly dilapidated vacant houses themselves were of the greatest concern. The deterioration of buildings and infrastructure and daily nuisances, such as garbage, odor, and dust, were highlighted as, respectively, the primary cause and related problems of vacant houses. These results suggest that to improve the living environment of declining cities, preparing a vacant house management plan reflecting the characteristics of each neighborhood and seeking a practical and realistic approach to minimizing the damages of daily life is necessary.

Second, the degree of understanding and responsibility for neighborhoods and the level of experiences and information on vacant houses affected the residents' perceptions of vacant houses. Residents who lived in houses where vacant houses came into view or have ever experienced direct harms from them felt relatively familiar with them, but were substantially influenced by daily life satisfaction. Furthermore, long-term resident-owners of detached houses, who have often encountered vacant houses or used streets where they were located, and who have shared opinions about vacant houses with neighbors or participated in vacant

house management had a low rate of route change during the nighttime, but a high rate of migration consideration, compared to those with the opposite characteristics. A higher proportion of them also expressed interest and willingness to participate in planned, vacant house-related associations, but a lower proportion of them deemed that positive changes in neighborhoods through their efforts would be possible. They simultaneously took conflicting feelings and stances toward vacant houses, revealing the helplessness and despair that residents who stayed long in disordered neighborhoods felt. However, residents aged 60 or older living alone or with their spouses were less sensitive to both negative emotion toward and satisfaction by vacant houses and were more passive to both route change and migration consideration, implying their negative familiarity with disordered neighborhoods. The mentioned results indicate that to promote the physical and mental health of residents, programs to remove the negative familiarity with vacant houses based on considering the residents' characteristics and to convert collective helplessness into local attachment and community activities are required. The fact that over three-fourths of residents who had already experienced vacant house management agreed to participate in the planned resident' associations demonstrates the possibility that some resident sub-groups could become community resources to revitalize neighborhoods.

Third, the physical elements implying the presence or absence of management of the built environment, not just the existence of vacant houses, determined the feelings and actions toward vacant houses. Residents who had experienced vacant houses with poor building structures and materials considered them as substantially negative objects, and demonstrated greater willingness to change

routes and move to other areas. In particular, the red markers spray-painted on vacant houses, which indicated that the buildings were scheduled to be demolished through redevelopment projects, exacerbated the fear of vacant houses. Residents have been constantly exposed to a profusion of markers in the inner-city areas where numerous redevelopment projects were delayed or canceled because of low profitability and feasibility. These eyesores provoked not only feelings of depression and fear but also concerns about potential offenders' opportunist crimes. This means that the manner of notifying whether buildings are empty and of dealing with the clustered dilapidated vacant houses must be improved. Moreover, the physical factors associated with fear were not limited to the vacant buildings themselves, but encompassed the surrounding street environment. The closed or boarded-up gates and the steadily used and maintained streets mitigated the fear of vacant houses. We propose that the spatial scope of vacant house management should be expanded to public spaces including streets and that street management around vacant houses can be preferentially performed when immediate regeneration or demolition of privately owned vacant houses is difficult. Some residents mentioned that they could manage streets even though it was impossible to clean the inside of vacant buildings, demonstrating that signs of care could be the starting point of desirable neighborhood changes. However, differences of viewpoint were witnessed between the resident and non-resident groups when detecting the physical elements affecting fear. Residents reflected their experiences in shrinking neighborhoods into fear assessment. They gave an extremely high score to the photo showing streetlights with white light instead of the orange light that is

commonly used in their neighborhoods. In the photo showing the vacant land where the grass was overgrown, non-residents perceived it as an unmanaged landscape or as disorder, whereas residents perceived it as green space or order that replaced vacant houses and piles of waste. This suggests that the standards of the living environment and quality of life for residents, which have been degraded by long-term coexistence with vacant houses in declining neighborhoods and their negative effects, need to be enhanced.

Fourth, the feeling of fear of vacant houses originated not only from the visible built environment but also from the invisible social milieu. Both resident and non-resident groups noted that, while visual cues implying the presence of inhabitants or their activities decreased fear, potential wrongdoers who could sneak inside vacant houses, including juvenile delinquents and homeless people, increased fear. Concerns about social elements that were invisible were especially noticeable in the resident group. Residents were worried that the homeless or someone would obtain information about long-term vacant houses and target them to engage in negative behaviors. Residents such as women with children less than 20 years old, who were vulnerable to safety concerns and altruistic fear, were more sensitive to negative behaviors associated with vacant houses. Furthermore, residents connected negative feelings about vacant houses to owners of vacant houses, real estate developers, and outsiders, placing on them partial responsibility for neighborhood decline and housing abandonment. Based on our findings, we urge the establishment of guidelines for the demolition or utilization of long-term vacant houses that can be a hotbed for illegal activities such as adolescent smoking and arson. We also advise that a management plan should be

created to prevent the invasion of undesirable people into vacant houses before the prevalence of serious crimes and the accompanying health harms to residents.

Chapter 4

The causes and characteristics of housing abandonment in an inner-city neighborhood: Focused on the Sungui-*dong* area, Nam-*gu*, Incheon

1. Introduction

1.1. Background and purpose

More than half of the world's population resides in cities, and urbanization rates continue to increase. However, behind this growth are numerous cities that have declined or stagnated. In the 1990s, more than a quarter of the world's big cities experienced urban decline in terms of population decrease, and the number of these cities is expected to continue to increase (Oswalt, 2005; Pallagst, 2010). In South Korea, since the 1960s, rapid economic growth and urbanization had increased the cities' population, buildings and infrastructure, resulting in continuous urban spatial expansion. However, in the 2000s, quantitative urban growth reached the limit, with the population ratio of urban areas exceeding 90% and the nationwide housing supply ratio exceeding 100%, and urban decline has been witnessed in many cities. In the Western countries, urban decline has been a major area of academic interest in urban-related field such as urban geography

since the mid-20th century, but Korea has recently begun to pay attention to it (Kim, 2010).

Urban stagnation or decline are manifested not only by the prolonged economic recession and the decrease in population, but also by the physical environment changes in urban space (Olsen, 2013; Pallagst, 2010). The most prominent physical change resulting from urban decline is the occurrence of vacant houses. As the number of vacant houses has sharply risen in Korean cities suffering from urban decline, housing abandonment itself has become a noteworthy urban phenomenon. Particularly, the inner-city areas, great and small, are experiencing severe housing abandonment phenomenon due to the initially poorly developed urban environment compared to the new built-up areas (Kim, 2010). According to the Korea National Statistics Office (KNSO)'s Housing Census, the number of vacant houses nationwide increased by about 55% between 2000 and 2010, and as of 2010, vacant houses for more than 12 months accounted for about 33% of the total (Table 4-1). When left unattended for a long time, vacant houses create complicated physical, social and economic problems, including deteriorated residential environment, degraded landscape, increased crime and disasters, decreased property values, and added administrative costs.

As part of prescriptions for solving housing abandonment problems, various researches and projects related to the utilization of vacant houses are being carried out. However, it is difficult to expect to systematically manage and utilize vacant houses until the underlying mechanism of housing abandonment is identified. Additionally, since the spatial units of studies dealing with vacant

houses remain at the macroscopic level such as city (*si*) and ward (*gu*), it is necessary to conduct research at the microscopic level of *dong* (administrative subdivision of *gu*) or neighborhood units that are closely related to the actual living environment. In the case of the vacant house survey of KNSO where the spatial units are limited to the administrative districts of city and ward, the quantity and status of vacant houses are less accurate and less detailed. Therefore, this study aims to analyze the causes and characteristics of housing abandonment at a micro level in shrinking neighborhoods of the inner city, and intends to lay the foundation for effective urban design response.

Table 4-3. Changes in the number of vacant houses by administrative district in Korea between 2000 and 2010

Administrative districts	2000	2005	2010
Seoul Metropolitan City	**56,642**	**79,800**	**78,702**
Busan Metropolitan City	25,031	53,651	40,957
Daegu Metropolitan City	14,223	18,192	29,766
Incheon Metropolitan City	**18,053**	**36,049**	**41,437**
Gwangju Metropolitan City	13,741	12,993	17,534
Daejeon Metropolitan City	12,814	16,267	17,279
Ulsan Metropolitan City	9,673	14,017	15,646
Gyeonggi-*do* Province	**80,720**	**126,581**	**154,099**
Gangwon-*do* Province	38,349	48,077	52,218
Chungcheongbuk-*do* Province	26,492	32,174	37,251
Chungcheongnam-*do* Province	48,245	51,401	60,016
Jeollabuk-*do* Province	32,064	44,696	44,526
Jeollanam-*do* Province	39,955	53,653	56,574
Gyeongsangbuk-*do* Province	50,104	62,650	75,116
Gyeongsangnam-*do* Province	41,711	67,396	64,998
Jeju Island	5,242	10,217	7,729
Total	513,059	727,814	793,848

Source : Housing Census, Korea National Statistical Office (KNSO)

1.2. Scope and method

Table 4-2. Identification process of vacant houses

	Vacant house data	Field surveys
Sources	Architecture department of Nam-*gu* Office	The author
Acquisition time	As of June 2014	August 2014 and between January and August 2015
Criteria	• Number of land lot • Type of use • Total floor area	• Markers on buildings (Words including "vacant house" or "demolition scheduled", and contact information for sale inquiry) • Unacquired postal mails (Bills for arrears of water and electricity, and notices of real estate forced auction) • Removed electric meters

This study analyzed the dynamics of housing abandonment in neighborhoods of Nam-*gu*, Incheon. Since the late 1990s or before, Incheon has experienced urban shrinkage of the downtown area and old built-up areas along with the decline of manufacturing industry. Particularly, Nam-*gu*, the representative inner-city area, has found many vacant houses in general residential areas as well as in urban redevelopment districts. Considering the total number of vacant houses by *dong* and the presence of redevelopment districts, the spatial scope of the study was limited to Sungui-*dong* out of seven *dong*s in Nam-*gu* (including the cancelled redevelopment districts). [7] Sungui-*dong* had the largest number of vacant houses in Nam-*gu*, accounting for about a third of Nam-*gu*'s total vacant houses. The analysis included residential detached houses in terms of building use

---

[7] Urban redevelopment districts were not included in the spatial scope of this study because in those districts vacant houses scheduled for demolition due to planned redevelopment have been collectively created under special circumstances, both institutionally and economically. Vacant houses located in general residential areas have not been handled properly despite the magnitude of the problem since they are not subject to mandatory management within the legal and administrative framework.

and type.[8] In the case of Nam-*gu*, as of 2014, the ratio of detached houses among all housing types was 11.0%, ranking the third highest percentage of Incheon's eight *gu*s after Dong-*gu* and Jung-*gu* (Incheon City, 2015). Meanwhile, this study analyzed the spatial distribution, causes, and characteristics of housing abandonment in Sungui-*dong* using qualitative research methods such as literature review, field surveys, and interviews. A theoretical framework explaining the mechanism of housing abandonment was developed after reviewing the previous studies, and the features of housing abandonment in Sungui-*dong* were identified based on the understanding of Nam-*gu*'s historical development process. Primary data was obtained through the Nam-*gu*'s vacant house data, building register data, and the Incheon City Map Portal. The four field trips targeting the vacant house clusters, conducted in August 2014 and between January and August 2015, allowed for the accurate location identification, further detection, and situation inspection of vacant houses.[9] The criteria for identifying additional vacant houses in field surveys included markers on buildings, unacquired postal mails, and removed electric meters (Table 4-2, Figure 4-1). Moreover, in-depth interviews were carried out to examine the influence of vacant houses on the perception and behavior of residents.[10]

---

[8] In the case of multi-unit dwellings, including apartments, vacancy rate, which is the ratio of the space unoccupied among a building, is calculated based on area or room unit. They have temporary vacant spaces mainly because of the process of sale, rental, move, or repair, and most of them are gradually occupied through changes in market conditions.

[9] Vacant house inspection checked the building characteristics (type, structure, number of floors, and accessibility) and level of deterioration of vacant houses (conditions of roof, wall and window, and stability), and the maintenance status of parcels (piles of garbage, stacked mails, and doors not boarded up).

[10] Interviewees, who were selected through non-probability sampling (two people for cluster 1,

| Markers on buildings | Unacquired postal mails | Removed electric meters |

Figure 4-1. Criteria for judging additional vacant houses in field surveys

1.3. Urban development process in Nam-*gu*, Incheon

1.3.1. The opening of Jemulpo and the period of Japanese colonialism: Gyeongin Railway and urban spatial expansion

Incheon became the first modern city in Korea since the opening of Jemulpo in 1883. In 1899, the Gyeongin (Seoul−Incheon) Railway, the first modern industrial infrastructure in Korea, was completed. The opening of the railroad brought about the spatial expansion of Incheon, leading to the absorption of Incheon's commercial supremacy into Seoul and the national dispersion of it. The Gyeongin Line has become a major factor causing the spatial disconnection in Nam-*gu*. In 1937, Incheon's first urban plan, the 'Incheon Urban District Planning', was established, and it paved the way for the change of urban space (Figure 4-2). [11] Based on this plan, three land readjustment projects were

---

one for cluster 2, one for cluster 3, two for cluster 4, and one real estate agent), provided information and opinions regarding residence characteristics (housing type, construction year, and residence period) and housing abandonment (the number of vacant houses, and their duration, causes, and effects).

[11] The 'Incheon Urban District Planning', which was based on the 'Choseon Urban District Planning Ordinance', the first modern urban planning law enacted in 1934, set an estimated

designated and approved, and one of them was the 1939 Daehwa district corresponding to the present Sungui-*dong*. In some areas of land readjustment districts, large-scale public housing complexes were built by the Choseon Housing Corporation. The Housing Corporation purchased 52,757 square meters of land in the Daehwa district in 1942, and created four residential areas in 1943 (Incheon Development Institute, 2004; Yum, 2007). In Sungui-*dong*, the urban structure and tissue resulting from the Daehwa land readjustment project and the public housing construction by the Choseon Housing Corporation have partially remained.
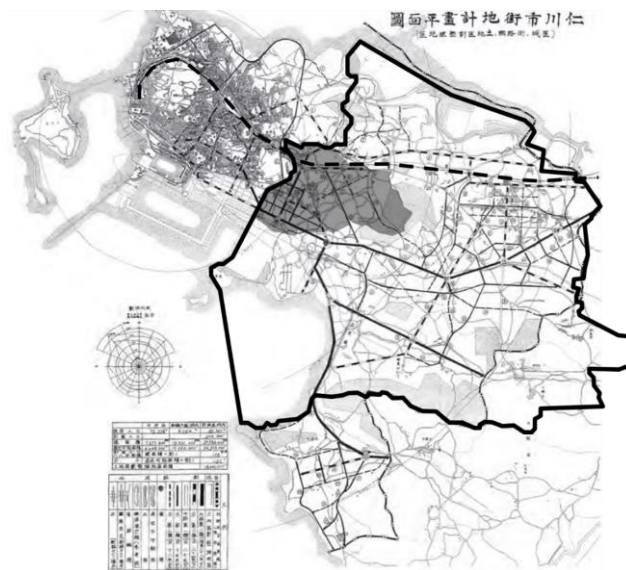
Figure 4-2. The current Nam-*gu* boundary, Sungui-*dong* area, and Gyeongin Line
shown on the map of 'Incheon Urban District Planning'
(*Source*: Incheon Development Institute (2004))

---

population of 200,000 for an administrative area of 27.5㎢ until 1965. It mainly dealt with street network plan, land use zoning, and land readjustment.

1.3.2. From post-liberation to the 1970s: Gyeongin Expressway and the hinterland of industrial complexes

Among the land readjustment projects based on the 'Incheon Urban District Planning', Daehwa district recorded the highest process rate. However, the construction was halted in 1945 with liberation, and the project could not be continued because of the unauthorized occupation of refugees after the Korean War.[12] The road network had been repaired since 1960 following the original plan, but in some areas, disorganized urban forms have been discovered (Yum, 2007). Under the rapid economic growth and urbanization of the 1960s, residential areas were created as a hinterland of industrial complexes in Nam-*gu* through land readjustment projects. Additionally, as the concentration of people and materials into the Gyeongin Industrial Zone intensified, the Gyeongin Expressway, Korea' first expressway, was completed in 1968. The 'Gyeongin Expressway Land Readjustment' was implemented along with concerns about disordered urbanization around the highway. The Gyeongin Expressway district was largely divided into five zones, of which zone 1 and zone 2-2 belonged to the current Nam-*gu* area (Incheon Development Institute, 2004). However, like the Gyeongin Railway, the Gyeongin Expressway, once a symbol of urban growth and a driving force of the city, has acted as a factor causing spatial disconnection and unbalanced development.

---

[12] The population in Sungui-*dong* increased by about 14% from 13,772 people before the 1945 Korean War to 15,653 people at the end of 1953 (Incheon Nam-*gu*, 2015).

1.3.3. From the 1980s to the present: The development of the new suburbs and the decline of the inner city

Major urban development projects of Incheon have primarily concentrated in the city's outskirts, including the current Gyeyang-*gu*, Namdong-*gu*, and Yeonsu-*gu*, since the 1980s (Figure 4-3).[13] The downtown area and inner-city areas of Dong-*gu*, Jung-*gu*, and Nam-*gu* were subject to redevelopment plans because of substandard dwellings (Incheon Development Institute, 2004). Residents of the inner-city areas moved to the outside in pursuit of a good living environment, and numerous public and commercial facilities were also relocated to the suburbs in response to new demand and spatial expansion. Eventually, the downtown area and inner-city areas have declined relatively more in terms of physical, social, and economic conditions compared to the new suburbs. In Nam-*gu*, Incheon's representative inner-city area, residential areas were created based on the development of Daehwa district in the 1940s and industrial complexes and expressway in the 1960s–70s.[14] However, the physical decline is accelerating as the Gyeongin Railway and Gyeongin Expressway cutting cross the urban space of Nam-*gu* have caused spatial disconnection. Nam-*gu* is also suffering from

---

[13] Until the late 1970s, housing site development had relied heavily on land readjustment project. However, as many problems such as depletion of developable lands, sprawling development, difficulty in securing public facilities, prolongation of business periods, and speculation concerns had occurred, since the early 1980s, housing site development projects have been implemented based on the Housing Site Development Promotion Act.

[14] The inner cities, old built-up areas spreading extensively between the downtown and the new built-up areas, were formed mainly through individual land development before and after liberation, or through land readjustment project in the 1960s–70s. Most of the inner cities have poor physical conditions, such as narrow streets, small parcels, overcrowded housing, and lack of infrastructure, which has solidified the image of unfavorable areas by promoting the inflow of low-income group and the outflow of middle-class families (Kim, 2010).

economic and social declines, such as deindustrialization, degradation of commercial vitality, population decrease, and aging (Table 4-3). Furthermore, Incheon's long-term shrinkage have led to the occurrence of over 200 vacant houses throughout Nam-*gu*.
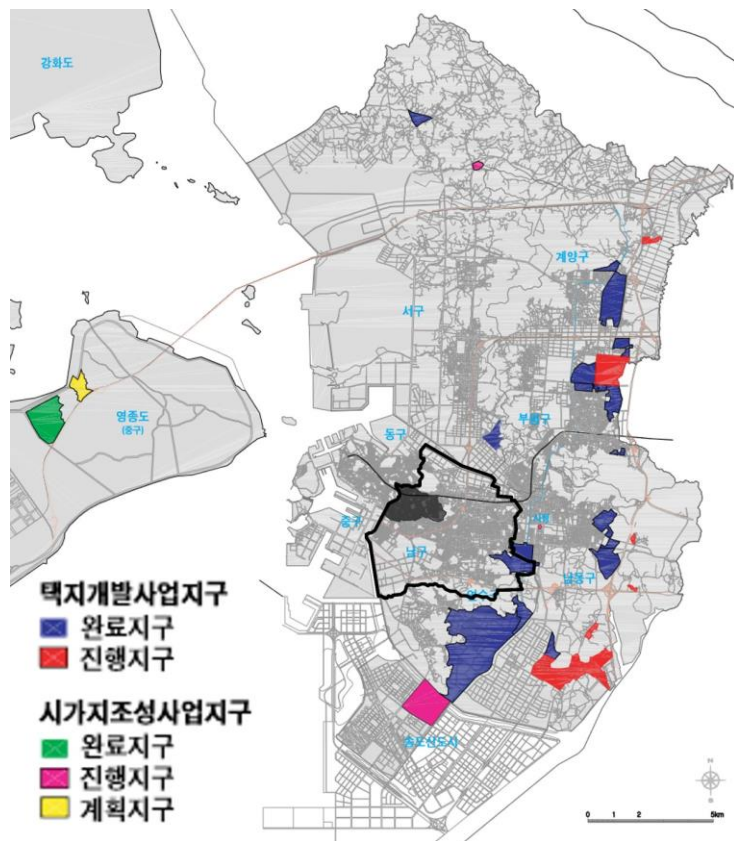
Figure 4-3. Map of Incheon's housing site development and urban district creation projects, and Nam-*gu* boundary (*Source*: Incheon Development Institute (2004))

Meanwhile, Nam-*gu* has been making efforts in policy aspects to solve the vacant house problems. In September 2013, the ordinance 'Incheon Nam-*gu* Vacant House Management for Redevelopment Districts' was enacted, and in

March 2015, this was revised to the ordinance 'Incheon Nam-*gu* Vacant House Management' to expand the spatial scope of management from redevelopment districts to general residential areas. Since the end of 2013, a budget of about 200 million won has been invested in about 10 vacant houses a year. Vacant buildings were renovated based on the agreement with the owners of vacant houses, and then used as public facilities, including studios, offices for village and social enterprises, and elderly welfare facilities. However, practical management of vacant houses has been primarily limited to redevelopment districts.

Table 4-3. Changes in population by age in Nam-*gu*, Incheon between 1990 and 2010

	1990	→	1995	→	2000	→	2005	→	2010
0-9	75,896	−	59,672	−	52,451	−	42,392	−	35,328
10-19	85,369	−	70,583	−	59,411	−	53,774	−	51,035
20-20	99,278	−	89,797	−	79,414	−	76,793	−	66,104
30-39	82,970	−	81,142	−	70,408	−	70,272	−	68,878
40-49	51,377	+	54,344	+	63,412	+	69,533	−	66,574
50-59	34,624	+	37,144	+	42,297	+	48,522	+	59,164
60-69	17,893	+	20,749	+	26,281	+	31,278	+	36,619
70-79	7,958	+	9,288	+	11,618	+	15,387	+	20,589
80 or older	2,071	+	2,610	+	3,501	+	4,865	+	7,465
Total	457,436	−	425,330	−	408,835	+	412,816	−	411,756

Source : Population Census, Korea National Statistical Office (KNSO)

2. Theoretical Consideration

2.1. Vacant houses in shrinking cities

Vacant houses commonly mean unoccupied house that are not inhabited by people, and are sometimes replaced with terms such as empty houses, deserted houses, and underused urban space. Vacant houses can have different meanings and categories depending on the location of occurrence, building use and type, the period of vacancy, causes, and the degree of damage.[15] Housing abandonment in cities is mainly the result of urban shrinkage. According to the Life Cycle Model, which is one of the models that can describe the process of housing abandonment, the city's life is divided into five stages: growth, maintenance, aging, decline, and slum. Since the decline stage, investments in the city's physical environment are rarely made, resulting in vacant houses as the value of houses decrease (Sternlieb et al., 1974). Housing abandonment, one of the common aspects of urban decline in the West, becomes now the most significant feature of urban decline in Korea (Kim et al., 2010). Particularly, vacant houses have been used as representative indicators of the physical aspects of urban decline (Korea Urban Renaissance Center, 2010). However, housing abandonment is not just one of the various consequential aspects of urban shrinkage. Housing abandonment is more important in that it can cause further urban decline through processes such as deteriorating physical environment, degrading local vitality, and falling real estate prices. Vacant houses do not simply mean the absence of owners, but reflect more

---

[15] In the case of the ordinances, 'Seoul Gwanak-*gu* Vacant House Maintenance Support (established on Feb. 6, 2014)' and 'Gwangju Nam-*gu* Vacant House Maintenance Support (established on April 30, 2015)', vacant houses were defined as buildings or structures in which no one had lived for more than one year from the date of confirmation of residence.

chronic and extensive urban problems, including the suspension of private capital investment into the inner cities (Sternlieb & Burchell, 1973). Considering that vacant houses act as causes as well as results of urban shrinkage, vacant houses can be defined as a state of long-term neglect negatively affecting the neighborhood or city-wide sanitation, safety, and landscape, not a state of temporary absence of residents.[16]

2.2. Mechanism between urban shrinkage and housing abandonment

In the West, especially in the United States, which has experienced urban decline before Korea, studies focusing on vacant houses began to appear in the late 1960s. In Korea, studies have been conducted to analyze the status and utilization of vacant houses in rural areas since the mid-1990s, but studies on housing abandonment in cities have not appeared until the early 2000s. The research on vacant houses can be categorized into topics such as causes, status and characteristics, influences, and management and utilization.

Among the studies dealing with the causes of housing abandonment, Sternlieb et al. (1974) identified environmental and behavioral factors influencing the occurrence of vacant houses in Newark, New Jersey, the United States. This study revealed that the social factors, including race, had a significant effect on housing abandonment. Among the physical factors, the maintenance status of buildings and the neighborhoods' vacancy rate and residential conditions were related to it.

---

[16] The 'Special Act on Promotion of and Support for Urban Regeneration (enacted on June 4, 2013)' specified that urban regeneration special accounts could be used to purchase and utilize vacant houses in urban regeneration revitalization areas in consideration of the vicious cycle between housing abandonment and urban shrinkage.

Bassett et al. (2006) viewed housing abandonment as a phenomenon in which the economic value of real estate decreased, and classified the factors affecting the decline in property value and subsequent owner's decision-making into economic and institutional, social and cultural, and environmental and physical categories in Flint, Michigan, the United States. This study revealed that the factors, including race, school closure, neighborhood change, absent landowner, incompetent political leadership, large-scale debt, suspension of community investment, and economic conditions, influenced the occurrence of vacant houses based on literature review and interviews with residents. Moreover, Lee et al. (2005) divided the factors influencing the abandonment of multi-family housing into social, economic, and physical categories in the residential environment improvement districts of Daegu, South Korea, revealing that the substandard residential environment resulting from the emphasis on housing supply, including lack of parking space and amenities, and invasion of privacy, was the main cause of vacant houses.

In relation to studies addressing the status and characteristics of housing abandonment, Morckel (2014) grasped the relationship between housing abandonment and three conditions, including market conditions, gentrification, and physical neglect of the given and surrounding neighborhoods, in Columbus and Youngstown, the United States. The results of this study predicted the cluster effect of housing abandonment by showing that the neighborhood with numerous vacant houses was located near a neighborhood with high rates of them, and vice versa. Silverman et al. (2013) identified the distribution pattern of vacant houses in Buffalo, New York, the United States. This research showed that hospitals,

colleges, and universities tended to be found outside of the areas where the high number of vacant houses occurred, revealing the apparent ability of these institutions influencing the patterns of public and private investment to discourage the proliferation of housing abandonment. Furthermore, Yim et al. (2008) grasped the characteristics of vacant houses and vacant floors by using the physical elements as the standard of analysis, including building use, construction year, number of floors, structures, and roofing materials in the downtown of Cheongju, South Korea. The results revealed that housing abandonment was associated with the deterioration of buildings, as vacant houses mainly had physical features, such as residential use, construction prior to 1969, one floor scale, wooden structures, and cement tile roofs.

Among the studies focusing on the influences of housing abandonment, Han (2014) investigated whether vacant houses affected the depreciation of surrounding buildings in the Baltimore, Maryland, the United States. The study discovered that even if the vacant house was located in a place invisible from the given site, long-lasting vacant house had an effect on the declining property value on the site, exposing that the presence and duration of vacant houses were closely related to changes in the economic value of surrounding real estate. Accordino & Johnson (2000) grasped the influences and management methods of vacant houses targeting officials of about 200 major cities in the United States. The findings of the study demonstrated that although the perception of the severity of housing abandonment differed depending on the growth characteristics of each city, in most cities, the problem of abandonment of detached houses was the most serious, and vacant houses had the greatest effect on the degradation of vitality in

buildings and neighborhoods.

Most studies dealing with the management and utilization of vacant houses regarded vacant houses as resources that could be used, rather than urban ills. Schilling (2002) linked the smart growth in the United States to the revitalization of vacant houses, indicating that vacant houses provided perfect opportunities for the principles and policies of smart growth which was seeking to find solutions to new growth and affordable housing demand in the downtown area. Lim & Lim (2012) regarded vacant urban spaces, including vacant houses, as resources for neighborhood regeneration, and suggested three directions for effective management and utilization of vacant urban spaces, including a step-by-step approach considering the utilization state and the degree of decline, role division between the public and private sectors, and place-centered approach considering the causes and characteristics of vacant urban spaces. Additionally, some studies approached housing abandonment in terms of the decision-making process. They analyzed what caused residents to leave or stay in shrinking cities, and showed that the factors affecting residents' decision-making on migration differed according to the regional context (Bassett et al., 2006; Guimarães et al., 2016).

Although social and policy interest in vacant houses has gradually increased, academic research and comprehensive understanding on housing abandonment are limited. Particularly, studies to explore housing abandonment within the mutual influencing relationship with urban shrinkage are insufficient. As most of the studies examining both urban shrinkage and housing abandonment have targeted certain urban redevelopment districts, it is difficult to understand the

mechanism of housing abandonment in the general residential areas of the inner cities.
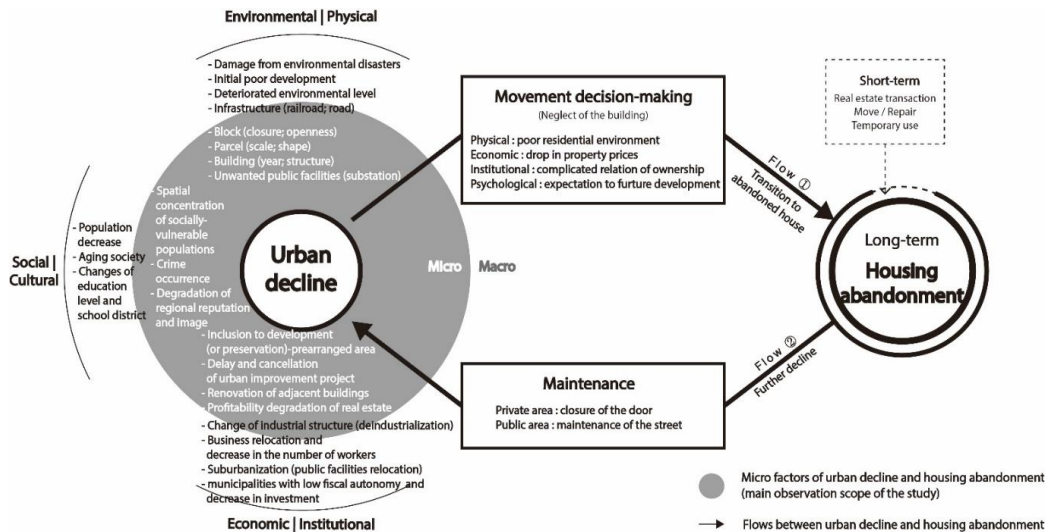
Figure 4-4. A theoretical framework explaining the mechanism between urban decline and housing abandonment

This study established a theoretical framework explaining the mechanism between urban decline and housing abandonment based on empirical observations in the inner city of Incheon (Figure 4-4). Urban shrinkage stems from the complex interactions of the environmental, physical, social, cultural, economic, and institutional elements that also contribute to the occurrence of vacant houses. The related elements can be divided into macroscopic and microscopic aspects according to the scale and scope of influence, and this study focused more on the microscopic aspect. Housing abandonment is manifested as a result of urban shrinkage (flow ①), but conversely, it also acts as a cause of additional shrinkage

(flow ②), thereby creating vicious cycle of repetition and accumulation. Moreover, each intermediate step between the bidirectional flows serves to exacerbate or alleviate urban shrinkage and housing abandonment. Whether or not vacant houses are generated is determined by the residents' decision-making process in shrinking cities. Even if residents live in similar types of buildings within the same block, some of them continue to stay, but some leave. Most of vacant houses in shrinking cities occurring as a result of decision making are left unattended for a long period of time, mass-producing urban problems, unlike temporary vacant houses. The maintenance of vacant houses plays a significant role in the possibility of further urban shrinkage and, by extension, that of a downward vicious cycle.

3. Results

3.1. Distribution patterns and characteristics of housing abandonment

3.1.1. Analysis of distribution patterns of vacant houses in the inner city of Incheon

According to the Nam-*gu*'s vacant house data, Nam-*gu* had a total of 216 vacant houses in areas excluding urban redevelopment districts, of which Sungui-*dong* had about 72, accounting for 33.3% of the total number of vacant houses in Nam-*gu* (Table 4-4). However, field surveys that identified the presence and addition of vacant houses confirmed that approximately 80 vacant houses were located in Sungui-*dong*.[17] When examining the rate of vacant detached houses in Nam-*gu* and Sungui-*dong* based on the Nam-*gu*'s data and field surveys, Sungui-*dong* was 1.7% compared to the average of 0.8% in Nam-*gu*, more than double (Table 4-5).[18] Additionally, the distribution patterns of vacant houses by zoning in Sungui-*dong* showed that 42 vacant houses were located in the 2nd class residential district, 13 in the semi-residential district, and 25 in the commercial district, revealing that 52.5% of the total 80 vacant houses were found in the 2nd class residential district.

---

[17] The increase in the number of vacant houses might be due to the Nam-*gu*'s inaccurate data derived based on on-site surveys and residents' reports which did not include all vacant houses, and the possibility of occurrence of vacant houses after the investigation period.

[18] Given that vacant houses which were not detected through both the Nam-*gu*'s data and author's field surveys might be located, it could be expected that the rate of vacant houses in Sungui-*dong* would be higher.

Table 4-4. The number and ratio of vacant houses by *dong* in Nam-*gu*, Incheon (excluding redevelopment districts)

Dong	The number of vacant houses*	Ratio (%)	Major urban infrastructure and characteristics of urban development
Sungui-dong	**72 (80**)** (including 2 neighborhood facilities, 1 elderly and children facility, and 1 medical facility)	**33.3**	• Dowon and Jemulpo Subway Station Areas • Gyeongin Railway and Gyeongin-*ro* (road)
Dohwa-*dong*	55 (including 1 neighborhood facility, and 1 warehouse)	25.5	• Jemulpo and Dohwa Subway Station Areas • Dohwa urban development district (previous Incheon National University site)
Juan-*dong*	45 (including 1 neighborhood facility)	20.8	• Juan and Ganseok Subway Station Areas • The Juan 2-4 urban renewal acceleration district (residential area as a hinterland of industrial complexes)
Yonghyeon-*dong*	30	13.9	• Gyeongin Expressway • Yonghyeon−Hagik prearranged housing site development district
Hagik-*dong*	9	4.2	• The 2nd Gyeongin Expressway • Yonghyeon−Hagik prearranged housing site development district
Munhak-*dong*	5	2.3	• The 2nd Gyeongin Expressway • Incheon Munhak Stadium
Gwangyo-*dong*	-	-	• Incheon Terminal Station • Incheon Bus Terminal
Total	216 (7 non-residential buildings)	100	

* The number of vacant houses refers to the Nam-*gu*'s data.
** This includes vacant houses additionally discovered through field surveys.

Table 4-5. The ratio of vacant houses in Sungui-*dong*, Nam-*gu*, Incheon

	The number of vacant houses (detached houses)	The total number of houses (detached houses)*	The rate of vacant detached houses
Incheon	7,656 (2010 Housing Census Data)	108,315	7.1 %**
Nam-*gu*	1,183 (2010 Housing Census Data)	26,850	4.4 %***
	209 (Nam-*gu*'s data)		**0.8 %**
Sungui-*dong*	80 (Nam-*gu*'s data + Field surveys)	4,621	**1.7 %**

* The total number of houses (detached houses) refers to 2010 Housing Census Data.
** Gyeonggi-*do* 6.2%, Gwangju 5.3%, Busan 4.3%, Ulsan 3.8%, Daegu 3.8%, Daejeon 3.3%, Seoul 2.1%
*** Jung-*gu* 14.7%, Dong-*gu* 8.1%, Seo-*gu* 4.8%, Yeonsu-*gu* 3.9%, Bupyeong-*gu* 3.5%, Gyeyang-*gu* 2.9%, Namdong-*gu* 2.5%
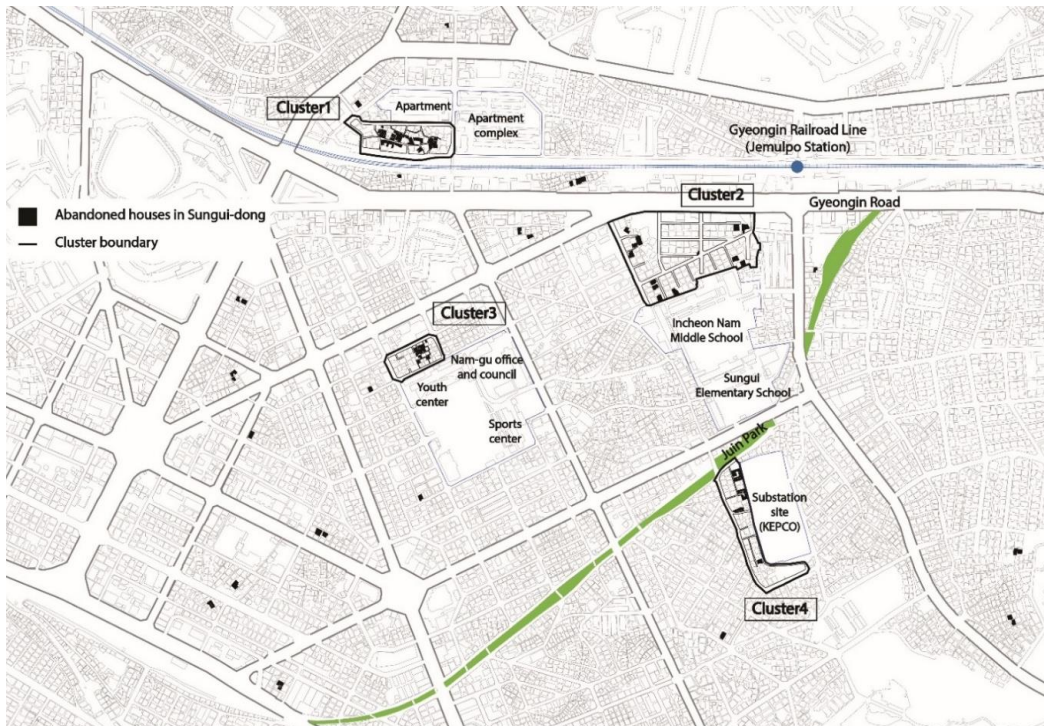
Figure 4-5. Spatial distribution of vacant houses in Sungui-*dong*
(the total 80 vacant houses)

Vacant houses in Sungui-*dong* were mainly clustered in four areas (Figure 4-5). Cluster 1, including the area surrounded by both apartment complexes and the Gyeongin Railroad Line crossing Sungui-*dong*, had 18 vacant houses. Cluster 2, including the area near Incheon Nam Middle School below the Gyeongin Railway and Gyeongin Road, had 14 vacant houses. Cluster 3, including the urban block around the Nam-*gu* Office's Youth Center building, had 15 vacant houses. Additionally, in Cluster 4 including the elongated land between the Juin Park and the Korea Electric Power Corporation (KEPCO) site, 6 vacant houses were discovered. This distribution pattern of housing abandonment made it possible to suppose that not only the building characteristics of each vacant house

but also the urban spatial characteristics of each area had a significant influence on the occurrence of vacant houses. Although vacant houses that were distributed independently like points were also found in Sungui-*dong*, this study attempted to focus on the four clusters of vacant houses to figure out the mechanism of housing abandonment caused by urban decline.

3.1.2. The characteristics of four vacant house clusters

The four vacant house clusters in Sungui-*dong* exposed differences in the characteristics of housing abandonment based on the urban, architectural, and socio-economic conditions (Table 4-6, Figure 4-6).[19]

In Cluster 1, most of the buildings inside the area were left empty. The degree of deterioration and damage to the roofs, walls, windows, and doors of vacant houses was serious, and many vacant houses, whose doors were not closed, allowed outsiders to enter. Large-scale wastes, such as electronic appliances, were dumped inside vacant houses and in the yards, and garbage and wildlife excrement were spread all over the streets. In the summer, the grass on the unmanaged streets surrounding vacant houses grew lush enough to make it impossible for people to pass. In Cluster 2, vacant houses, mostly maintaining

---

[19] The construction year of vacant houses by cluster was identified through the building register and the Incheon City Map Portal, and the building register existed in 38 of the total 53 vacant houses of the four clusters. 33 of the 38 building registers had records of the date of building permit or using approval, and of these, 2 buildings were built or approved in the 1960s, 6 in the 1970s, and 25 in the 1980s, showing that more than 3/4 were built in the 1980s. However, given that the using approval dates for all 1980s buildings, except for the two, were concentrated on certain dates in 1985, it could be assumed that the existing buildings were collectively registered in 1985. Considering the similarity of the building type and the degree of deterioration for each cluster, it could be confirmed that most of vacant houses in the four clusters were buildings that were at least 30 years old.

good physical condition, were mixed with occupied buildings and scattered all over the area. Some vacant houses were left unclosed, and domestic wastes were discarded inside vacant houses and in the yards. Although garbage was found on the streets around vacant houses, they did not show much difference from the streets of other normal residential areas. However, despite the fact that Cluster 1 and Cluster 2 were simultaneously designated and then canceled as the urban renewal acceleration district, they showed distinguishing aspects and influences in the density of vacant houses and the condition of buildings and streets because of differences in existing urban and building features. In Cluster 3, many of the buildings in the small parcels inside the block were converted to vacant houses. The block was difficult to find the entrance from the outside, and the very narrow width of the inner alleys and high building density hindered healthy lighting and ventilation. The windows of some vacant houses were not closed, and household goods were left unattended inside vacant houses. The streets inside the block with litter and wild animal wastes were not properly managed. In Cluster 4, most of vacant houses scattered in the area faced the huge wall of the KEPCO site. Compared to Cluster 1 and Cluster 3, the infrastructure and buildings were in good condition, but domestic wastes were also left neglected inside vacant houses and in the yards. Additionally, most vacant houses in the four clusters had the removed electric meters and piled up unacquired postal mails in common, and the overgrown weeds were observed inside and outside of long-term vacant houses.

Previous studies have mentioned that in Korea's cities, the effect of vacant houses on neighborhood decline was not apparent. However, in the case of Sungui-*dong*, as vacant houses were clustered in some areas, not only did vacant

houses intensify the decline of the areas, but also had negative impacts on adjacent areas in terms of physical environment and residents' perceptions.

Table 4-6. Building and urban spatial characteristics by the vacant house cluster*

	Cluster1	Cluster2	Cluster3	Cluster4
The number of vacant houses	18	14	15	6
Building scale of vacant houses (the average total floor area)**	49.3 ㎡	85.2 ㎡	22.6 ㎡	57.9 ㎡
Building structure of vacant houses	cement block 14, brick 1, wooden 3	cement block 2, brick 11, wooden 1	cement block 6, brick 6, wooden 3	cement block 3, brick 3
Width of the internal streets (possibility of vehicle traffic)	within 3m (X)	about 5–6m (O)	within 3m (X)	about 3–4m (X)
Adjacent urban infrastructures	Gyeongin Railway, Community service center	Gyeongin Road, Incheon Nam Middle School	Nam-*gu* Office	Juin Park (former Juin Railroad Line), Korean Electric Power Corporation
Zoning	18 of the 2nd class residential district	8 of the 2nd class residential district, 6 of the commercial district	15 of the 2nd class residential district	6 of the semi-residential district
Urban redevelopment district	cancellation after designation	cancellation after designation	-	-
Influence of redevelopment project's cancellation	strong	weak	-	-
Maintenance state of parcels and buildings	low	high	low	medium

* When land and building information did not exist in the building register or the Incheon City Map Portal, it was identified through field surveys.
** In the case of building scale, vacant houses that could not be checked through the building register or the Incheon City Map Portal were excluded from the calculation.

| Cluster 1 | Cluster 2 | Cluster 3 | Cluster 4 |
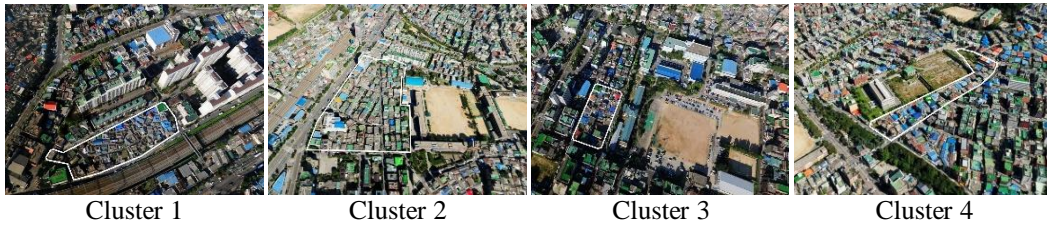
Figure 4-6. The boundaries of each cluster shown on the aerial photographs
(*Source*: map.naver.com))

3.2. The mechanism of housing abandonment

3.2.1. Macroscopic and microscopic factors

Housing abandonment in Nam-*gu*, Incheon, has been influenced, at the macro level, by the weakening of manufacturing competitiveness, the development of new suburbs, the relocation of public institutions, population decrease, aging, and the deterioration of urban infrastructure, similar to other shrinking cities (Lee et al., 2016). From the perspective of the urban regeneration revitalization area, which is designated by each city's mayor when two or more of the three requirements are met in terms of population decrease, industry departure, and inferior dwelling condition, in Nam-*gu*, the area of *dong*s meeting the above requirements occupied 76.2% of the total area, recording third after Dong-*gu* and Jung-*gu*, and the number of *dong*s was 16, ranking first (Cho & Kim, 2014). Out of 16 *dong*s in Nam-*gu*, 12 *dong*s met all three requirements, and Sungui 2-*dong* and Sungui 4-*dong* were included. In particular, considering that the areas satisfying all three requirements were concentrated around the Gyeongin Railway and the Gyeongin Expressway, it could be assumed that urban infrastructure, such as railroads and roads, created during the initial urbanization process, had effects

on urban shrinkage and housing abandonment, as it acted as urban morphological constraints through spatial disconnection and impediment of balanced development. In Sungui-*dong*, the Gyeongin Railway and the Gyeongin Road traverse the urban space from east to west.

The analysis of the four vacant house clusters in Sungui-*dong*, at the micro level, indicated that the mechanism of housing abandonment was related to the factors, including the physical characteristics of streets, blocks and buildings, the designation and cancellation of urban redevelopment districts, the spatial concentration of socially vulnerable groups, and the formation of negative reputation and image of the area by unwanted public facilities.

3.2.2. Cluster-specific causes and characteristics

• *Cluster 1: The increased impact of the cancellation of redevelopment projects because of poor physical environment*

Cluster 1 was a closed block surrounded by railroad, apartment complexes and community center on the north side of the Gyeongin Line (Figure 4-7). The outer buildings enclosing the block fronted 5–9 m wide roads. As shown in Figure 4-8, although Cluster 1 had belonged to the land readjustment project district (Expressway zone 2-2, 1968.01.27–1980.06.04) originating from the construction of Gyeongin Expressway in the 1960s, the skewed parcels and the narrow streets within 3 m with uneven surfaces have been found inside the block, making vehicle traffic impossible (Incheon Development Institute, 2004). Then, Nam-*gu* designated the Jemulpo station area including Cluster 1 and 2 as the urban

renewal acceleration district in March 2007 and, eventually, canceled the project because of the opposition from residents for public sector development in February 2010. This process accelerated not only the decline of the Jemulpo station area but also the occurrence of vacant houses. When Cluster 1 was designated as the urban renewal acceleration district, residents who were mostly owners of small-scale parcels did not reach a consensus for redevelopment. As the project's delay and cancellation was combined with the poor physical and economic conditions of the cluster, housing abandonment was aggravated.
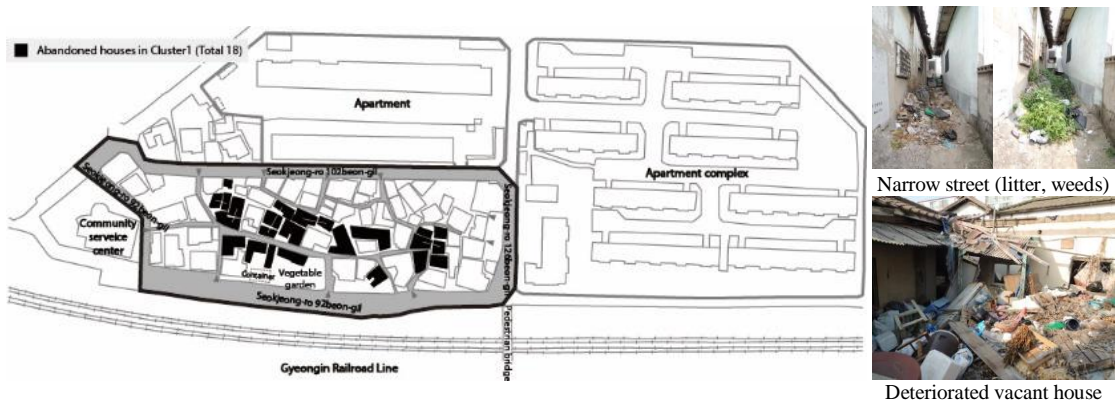
Figure 4-7. Spatial characteristics of housing abandonment in Cluster 1

In Cluster 1, vacant houses, excluding 2 out of 18, were concentrated along the narrow streets inside the block. They had 49.3 m² total floor area on average and primarily cement block structure with severe damage. Some owners of vacant houses moved to other areas where their family members were living, abandoning their buildings. Vacant houses, left unattended for a prolonged period, became more deteriorated and damaged. Because of the unclosed doors of vacant houses,

the negative influences, such as littering and odor, extended to the outside of buildings. Furthermore, as the streets adjacent to vacant houses were not properly managed, the problem of housing abandonment led to the decline of the entire block (Table 4-7).

Cluster 1 before the project   Cluster 1 after the project
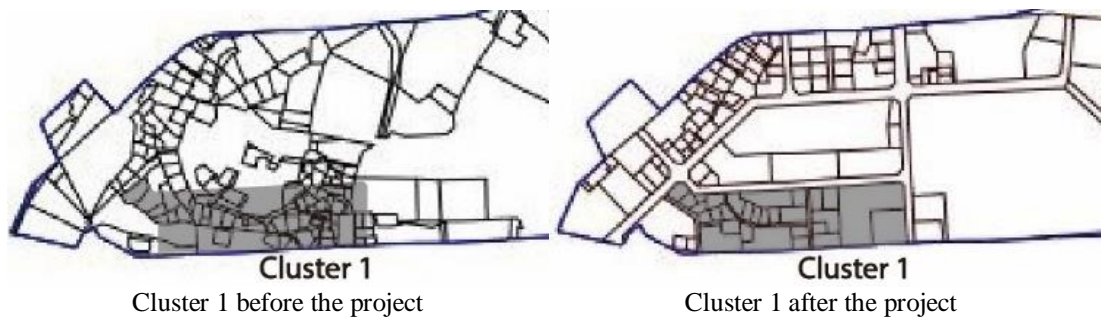
Figure 4-8. Cadastral maps before and after
the Expressway zone 2-2 land readjustment project

In an interview with a resident living in the building facing the exterior street of the block for almost 30 years, she mentioned that vacant houses had increased for the last 3 years and that only several families who could not afford to move out were left. She also reported that she did not feel threatened by vacant houses because she did not own precious things which could be stolen. This made it possible to speculate that residents' characteristics, including residence period, age, and economic conditions, affected the perception of vacant houses.

Table 4-7. Mechanism of housing abandonment in Cluster 1

Urban shrinkage ➔	Decision-making ➔	Vacant houses ➔	Maintenance ➔	Urban shrinkage
• Closed block • Narrow streets • Skewed parcels • Deteriorated buildings 　　+ • Delay and cancellation of redevelopment	• Lower real estate profitability • Movement to other areas, abandoning the buildings	• Long-term vacant houses	• Private domain (X) • Public domain (X)	• The spread of decline to the entire block
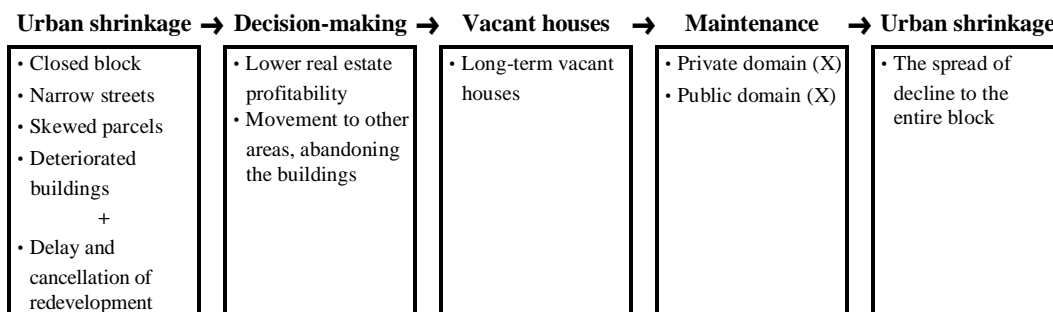
• *Cluster 2: The good physical environment, but the expectations for redevelopment*[20]

Cluster 2 was located between the Gyeongin Road and Incheon Nam Middle School, near Jemulpo station (Figure 4-9). According to an interview with a real estate agent in Sungui-*dong*, the area, including Cluster 2, was a rich neighborhood 30 years ago, called "the thief village". The cluster had large-scale rectangular parcels and well-paved streets 5–6 m wide, allowing vehicle traffic and parking inside the area. Cluster 2, along with Cluster 1, was designated as the Jemulpo station urban renewal acceleration district, but eventually it was canceled. When Cluster 2 was included in the urban renewal acceleration district, the developer (H Company) bought 10 buildings in the area, arousing residents' expectations for future redevelopment. As the building owners who had received

---

[20] Field survey in August 2015 showed that the changes of status occurred in six vacant houses in Cluster 2 compared to February 2015. After the two vacant houses were demolished, a construction fence screen was installed on each parcel. The other two vacant houses, located next to each other, were demolished, and then the two lots were combined to build a new building. The remaining two vacant houses were also demolished, and then the two lots were combined with adjacent two parcels to build a new building. The spatial characteristics of Cluster 2, including large-scale parcels compared to other clusters and locational advantage of being adjacent to Gyeongin-*ro* commercial street, seemed to lead to these neighborhood changes.

total transaction cost from the developer moved to other areas after the cancellation of the project, those buildings have been unoccupied for about 6–7 years without the developer's plan. After the cancellation, some owners who tried to sell the buildings but failed moved to Seoul or Gyeonggi-*do*, leaving their buildings neglected.

In Cluster 2, vacant houses except four were located along not main streets, including Gyeongin-*ro* no. 98, 106, and 116, but alleys, especially at the end of them. However, as Cluster 2 had a good physical environment compared to Cluster 1, the project's delay and cancellation had a relatively less effect on housing abandonment in the area. Vacant houses in Cluster 2 had 85.2 m^2 average total floor area, which was the largest of the four clusters, and most of them were 1 or 2 floors brick buildings with flat roofs built in the 1970s. Their exteriors, including roofs, walls, and windows, did not remain in a seriously damaged or deteriorated state. Although some vacant houses had unclosed doors and scattered domestic wastes in the yards, the adverse effects of them did not extend to the adjacent streets. Housing abandonment became a matter of deterioration of individual buildings rather than of further decline of the entire area (Table 4-8).

Moreover, as vacant houses in Cluster 2 were mixed with general buildings in good condition, residents showed a difference in the spatial range of recognition to vacant houses. A resident living in Cluster 2 for about 28 years and operating a beauty salon was aware of four vacant houses located within a 40 m radius from her house (In fact, there were five vacant houses within a 40 m radius). Since the resident's building faced the main street and the nearest vacant house was located

inside the alley, although the vacant house was involved in her visual scope in the living space on the second floor, it was not involved in her behavioral scope of everyday life. Therefore, she mentioned that although there were the fear of fire and homeless intrusion and the discomfort of odor in summer, it seemed to be no direct damage from vacant houses because she never approached the alley where the vacant house was located.

Street of good state

Vacant house

Unclosed door

Household waste in the yard

Figure 4-9. Spatial characteristics of housing abandonment in Cluster 2

Table 4-8. Mechanism of housing abandonment in Cluster 2

Urban shrinkage →	Decision-making →	Vacant houses →	Maintenance →	Urban shrinkage
• Delay and cancellation of redevelopment	• Expectations of redevelopment • Movement to other areas, selling or abandoning the buildings	• Long-term vacant houses	• Private domain (X) • Public domain (O)	• The matter of deterioration of individual buildings rather than of further decline of the entire area
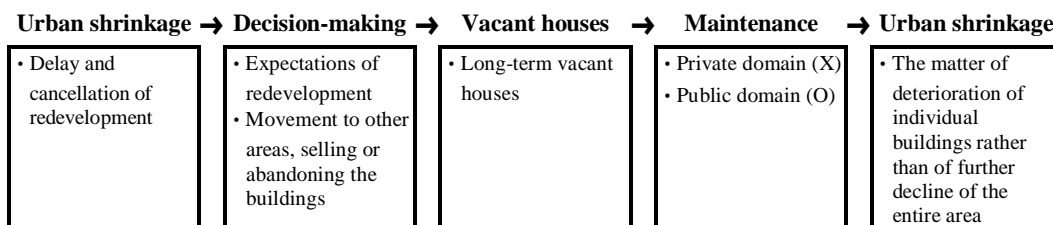
• Cluster 3: The intensification of relative decline because of the concentration of socially-vulnerable groups and the renovation of roadside buildings

Cluster 3 was a rectangular closed block surrounded by 6–9 m streets, bordering the north side of the youth center building of Nam-*gu* office (Figure 4-10). New multi-family houses had been constructed in surrounding areas of Nam-*gu* office when it moved to the current location, whereas Cluster 3 has retained the same physical condition of the past without any development. As the streets inside the block were too narrow within 3 m, even people were difficult to pass, let alone cars. The scale of parcels and buildings was the smallest of the four clusters, and small parcels were clustered inside the block.

In Cluster 3, most of the small buildings were converted to vacant houses, and vacant houses except one were located along extremely narrow alleys inside the block. Vacant houses in Cluster 3 had the smallest average total floor area of 22.6 m² among the four clusters, and most of them were composed of cement block or brick structures. On the walls of some vacant houses, the words like "vacant house" or the contact number for sale inquiry were marked. Since Cluster 3 has retained a seriously underdeveloped state of infrastructure and buildings for a long period, socially-vulnerable populations with poor economic conditions have

occupied the block repeatedly. At the time of the field survey, approximately 33 households receiving the national basic livelihood benefits were residing. Meanwhile, some roofs of the buildings facing external streets of the block were replaced with new ones under the support of Nam-*gu* office or repaired by individual owners. The renovation of the roadside buildings made it difficult to confirm the presence and condition of vacant houses located inside the enclosed urban block. Eventually, the impossibility of maintenance effort and property investment has intensified the decline of the inner block (Table 4-9).

In an interview with a resident living near Cluster 3, he reported that he was not about to enter the block and reluctant to enter. He mentioned that although he had occasionally confirmed the closure of doors of vacant houses inside the block because he was one of the community leaders, he was concerned about the risk of crimes against the socially disadvantaged such as women and elderly people. He also thought that the block with vacant houses had an adverse effect on the image of the neighborhood. These views formed a contrast with the opinion of the resident living in Cluster 1 that she did not feel threatened by vacant houses, making it possible to guess that the residents' residence period and location affected the way of perception of vacant houses.

Narrow entrance and inner street

Deteriorated vacant house

Unclosed window

Renovation of the building
on roadside

Figure 4-10. Spatial characteristics of housing abandonment in Cluster 3

Table 4-9. Mechanism of housing abandonment in Cluster 3

Urban shrinkage →	Decision-making →	Vacant houses →	Maintenance →	Urban shrinkage
· Closed block · Narrow streets · Small-scale parcels · Deteriorated buildings + · Spatial concentration of socially-vulnerable groups	· Substandard physical environment · Movement to other areas, abandoning the buildings	· Long-term vacant houses	· Private domain (X) · Public domain (X) * Roof replacement and repair of the roadside buildings of the block	· The intensification of relative decline of the inner block

• *Cluster 4: The poor infrastructure, and the large-scale unwanted public facility*

Cluster 4 was surrounded by 6–9 m roads three sides, facing the huge wall of the KEPCO site one side (Figure 4-11). The streets with 3–4 m width inside the area did not allow vehicle traffic and parking. The Juin park, which was formed linearly from the north side of Cluster 4 towards the southwest, was formerly the Juin Railroad Line (Juan station – South Incheon station), and the closed railway had remained until the park was completed in 2005.

In Cluster 4, most vacant houses were located on the end of the alleys, fronting the huge wall of the KEPCO site. They had 57.9 m^2 total floor area on average and mostly consisted of block or brick structures. In interviews with residents in the area, they reported that many vacant houses were still discovered in the neighborhood despite more improved physical environment than in the past through new building construction, road pavement, and park creation. They also mentioned that the underground installation of the KEPCO substation was not so long ago and the presence of substation site seemed to be influencing the degradation of regional reputation and image. Meanwhile, they talked about one of vacant houses in Cluster 4 that was left neglected for about 5 years without the owner in very complicated ownership relationship. After the elderly couple, owners of the building, had passed away, their son lived in the house with his wife. However, as son and his wife found the fact that a friend of his father owned some of the land, they moved to other area leaving the building empty. This made it possible to speculate that the complicated relation of ownership and the high cost of demolition could lead to long-term vacant houses (Table 4-10).

Street of good state

Vacant house

Huge wall of substation site

Figure 4-11. Spatial characteristics of housing abandonment in Cluster 4

Especially, the resident living opposite the above vacant house across 3 m street was concerned that the building was going to collapse because of heavy rain and snow. She said that there were harms from odor and insects in the summer because of the vacant house located too close. She was also concerned about crimes and homeless intrusion. Therefore, she hung out the washing and put some flowerpots in front of the vacant house not to appear to be empty to outsiders. This was probably because the vacant house was involved in the visual and behavioral range of resident's daily life. This presented a contrast with the

situation that the resident in Cluster 2 did nothing about vacant houses because they were not involved in her behavioral range.

Table 4-10. Mechanism of housing abandonment in Cluster 4

Urban shrinkage →	Decision-making →	Vacant houses →	Maintenance →	Urban shrinkage
• Poor infrastructure • Large-scale unwanted public facility + • Degradation of neighborhood reputation and image	• Complicated relation of ownership • High cost of demolition	• Long-term vacant houses	• Private domain (X) • Public domain (O) - Street space managed by the neighbor	• The matter of deterioration of individual buildings rather than of further decline of the entire area

4. Discussion

The analysis of the dynamics of housing abandonment showed that cluster-specific physical characteristics, including block (closure; openness), street (width; connectivity), parcel (scale; shape), and building (construction year; type; total floor area; structure), affected the location, spatial density, and condition of vacant houses. Vacant houses were concentrated inside the blocks of Cluster 1 and Cluster 3 with closed urban space, whereas they were scattered across the areas, especially at the dead end of the alleys, of Cluster 2 and Cluster 4 with unclosed urban space.

The physical characteristics of each cluster served as factors to make a difference in the seriousness of vacant houses' effects in the process of combining with social, economic, and institutional conditions. The same external factor, the delay and cancellation of the urban renewal acceleration project, acted on housing abandonment in Cluster 1 and Cluster 2. Vacant houses in Cluster 1 with a poor physical environment were easily exposed as targets of vandalism, leading to an intensification of damage and deterioration, whereas vacant houses in Cluster 2 with a good physical environment were mixed with general buildings and did not reveal their presence or incompatibility significantly.

Moreover, the analysis showed that the public domain management surrounding vacant houses played a decisive role in the progress of additional decline and the formation of declining image. In Cluster 1 and Cluster 3, the streets with domestic wastes, wildlife excrement, and weeds highlighted the presence of vacant houses, leading to the formation of unpleasant spatial image

and additional waste dumping. However, In Cluster 2 and Cluster 4, the well managed streets made vacant houses less noticeable, alleviating the negative effects, including waste dumping. This implies that although the management of vacant houses have focused on the repairs of buildings themselves by the owners already leaving the area, emphasizing on the maintenance of public areas surrounding vacant houses by local authorities is essential. Meanwhile, the results revealed that residents perceived the severity of housing abandonment differently depending on their location and social characteristics, and they responded to housing abandonment differently according to the density of and distance from vacant houses.

Furthermore, the analysis showed that all four clusters were located near large facilities, including apartment complexes, school, *gu* (borough) office, and substation. This makes it possible to guess that although traditional public institutions, including schools and *gu* offices, were the triggers for housing environment improvement and population influx in the period of economic development and urban growth, these institutions do not have the power to curb the spread of vacant houses in the period of urban shrinkage after urbanization. Additionally, the presence of unwanted public facilities, including substation, can be connected to the possibility of housing abandonment by forming a negative image of the neighborhood as well as aggravating residential environment.

5. Conclusion

The study created a theoretical frame explaining the mechanism between urban shrinkage and housing abandonment, and then analyzed the causes and characteristics of vacant houses at a micro level in the declining inner-city neighborhoods of Sungui-*dong*, Nam-g*u*, Incheon. The analysis showed that vacant houses acted not only as the results of urban decline but also as the causes of additional decline of the neighborhoods, indicating that they were not simple the buildings without owners. The results revealed that in the vicious cycle between urban shrinkage and housing abandonment, the movement decision-making and the public domain management played a decisive role as intermediate steps in determining the conversion to vacant houses and the further decline, respectively. The findings also revealed that the triggers for four vacant house clusters were associated with the poor physical environment of blocks, streets, parcels and buildings, the delay and cancellation of urban redevelopment projects, the spatial concentration of socially-vulnerable populations, and the degradation of neighborhood reputation and image.

After all the mentioned results, some implications can be drawn for the phenomenon of housing abandonment in declining inner-city areas. First, it is necessary to carefully examine the microscopic elements that are closely linked with residents' living environment along with macroscopic factors when dealing with urban shrinkage and housing abandonment. The causes, characteristics and influences of housing abandonment vary by neighborhood even within the same inner city, and, ultimately, different approaches are required for dealing with the

problems of vacant houses in each neighborhood. Second, it is needed to have an in-depth analysis of physical characteristics that make the difference in the aspects and influences of housing abandonment. Particularly, in the case of the vacant house clusters, it is required to investigate not just architectural characteristics of vacant houses but urban spatial characteristics, including streets, blocks, and unwanted public facilities. Third, it is essential to board up the doors or windows of buildings thoroughly and to manage the public domain consistently, to prevent the negative impacts and the further decline resulting from vacant houses. Fourth, it is important to realize that there are differences in how residents perceive and respond to vacant houses according to the neighborhood-specific characteristics, and to consider this point in setting the improvement and utilization plans.

This study has a significance in identifying the spatial distribution patterns, causes, and characteristics of housing abandonment at a micro level in the declining inner-city neighborhoods. But, because of the limitation in generalizing the results of this study, further studies addressing the dynamics of housing abandonment based on the city-specific characteristics of urban decline are needed. In the spatial aspect, it will be possible to compare and analyze the causes and characteristics of housing abandonment in cities with different formation period, urban morphology, and physical environment. In terms of time, it will be possible to grasp the changes in the aspects and influences of housing abandonment through time series observations. Furthermore, as the number of vacant houses continues to increase in shrinking cities, local authorities are required to identify the status and influence of vacant houses and to accumulate

the building unit information of vacant houses for the effective management and regeneration of declining neighborhoods.

Conclusion

Shrinkage-related urban problems have arisen not only in some well-known former industrial cities of the West but also in East Asia, including Japan, South Korea, and China, where shrinkage was never expected in the era of their high-degree economic growth just a few decades ago. Especially in Korea, distinct patterns of urban shrinkage have emerged, such as changes of industrial structure in a very short period, state-led construction of new towns and new built-up areas, initial poor development, and demographic transition, in addition to the common causes and effects of shrinkage shared with Western countries. These local-based patterns of urban shrinkage have influenced the dynamics of housing abandonment that forms a vicious cycle with shrinkage as an obvious spatial manifestation of it. Long-term vacant houses have caused urban problems, such as the deterioration of residential environment, the degradation of local vitality, decreases in property values, increases in administrative costs, vulnerability to crime and disasters, and threats to the physical and mental health of residents, subsequently leading to additional shrinkage. Particularly, vacant houses have been persistently irritating the remaining residents in declining neighborhoods through the daily harms, including garbage, odor, and dust. Furthermore, the distribution patterns of vacant houses have revealed the socio-spatial inequalities between inner-city areas and newly developed suburbs, and within smaller urban spatial units. However, most policies and projects related to vacant houses have focused on short-term palliative measures, while placing little importance in

identifying how the dynamics of housing abandonment work. Therefore, this study, based on empirical observations in Incheon, attempted to investigate the paths, triggers, characteristics, influences, and perceptions associated with housing abandonment, contributing to breaking the vicious circle in declining neighborhoods. Consequently, this study derived meaningful findings on the mechanism of housing abandonment and suggested implications for the management of vacant houses in shrinking cities from a series of four chapters as follows.

The first chapter, as an exploratory study based on empirical observations in Incheon, examined the five paths triggering housing abandonment and their interactions in shrinking cities. The five major paths were associated with the following political-economic, physical, socio-demographic, and institutional issues: the state-led construction of new towns and new built-up areas with the relocation of public institutions; the delay and cancellation of urban redevelopment projects indiscriminately designated in inner-city areas; the poorly built buildings from the beginning; the concentration of aged populations and their death; and the reduction of infrastructure and services in the process of deepened decline. The patterns and characteristics of vacant houses differed depending on the main triggers of occurrence. In the local context, paths were closely inter-related and simultaneously exerted their influences. Additionally, some of the paths discovered in Incheon have been witnessed in Japan and China, as well as in other Korean cities. The findings indicated that it is essential to identify facilitating factors of housing abandonment and their interrelationship to select the priority management areas, take appropriate actions, and prevent the

proliferation of vacant houses.

In the second chapter, the analysis of valuable parcel-level spatial data on vacant houses using the *firth*'s logistic regression enabled the identification of the influential determinants of housing abandonment in the inner-city areas of Incheon in terms of spatial inequality. Housing abandonment occurred in a spatially selective manner between the inner city and the new suburbs, and even within the inner city. The conversion to vacant houses in the inner city was significantly associated with the building and parcel, urban neighborhood, economic, and socio-demographic factors: the older, smaller, wooden detached houses located in inaccessible parcels with substandard physical conditions; the indiscriminate designation of urban redevelopment districts and their delays causing declined land prices, deteriorated residential environment, and forced evacuation; the degradation of vitality in major local industrial and commercial sectors; the rapid growth of single elderly households and the spatial concentration of the poor and low-educated. The results revealed that remarkable spatial imbalances have been manifested within smaller spatial units, and that the delayed or canceled redevelopment districts have created the densely concentrated vacant houses. Moreover, the findings showed that beyond the simple economic inequalities, the skewed demographic structure is leading to an enhanced spatial polarization threatening social sustainability.

The third chapter analyzed the perceptions of vacant houses, one of the representative aspects of neighborhood disorder, by utilizing the semi-structured questionnaire and photo-elicitation methods in the inner city of Incheon

experiencing long-term urban shrinkage. The survey of 93 residents identified heterogeneity in the perceptions of vacant houses in terms of three categories: physical and mental health, behavioral responses, and participation in community activities. The variation in vacant house perceptions was influenced by variables related to socio-demographic characteristics, individual experiences, and community interactions. Additionally, the photo-elicitation of vacant houses with 10 people, each from residents and non-residents, investigated differences in the degree of fear of vacant houses between the two groups. The elements reinforcing or alleviating fear in terms of the built environment and social milieu associated with vacant houses were also detected. The findings raised four issues that need to be in-depth discussion to manage vacant houses in shrinking cities and improve the quality of life of the remaining residents. First, residents have suffered from daily life damages, including garbage, odor, and dust, caused by long-term vacant houses, rather than potential crimes. Second, the degree of understanding and responsibility for neighborhoods and the level of experiences and information on vacant houses made a difference in residents' perceptions. Third, the physical elements implying the presence or absence of management in terms of the built environment, such as the spray-painted markers, determined the feelings and actions toward vacant houses. Finally, the fear of vacant houses originated not only from the visible built environment but also from the invisible social milieu. Especially, residents connected negative feelings about vacant houses to vacant house owners, real estate developers, and outsiders.

In the fourth chapter, a theoretical framework explaining the mechanism between urban shrinkage and housing abandonment was established, and then the

causes and characteristics of housing abandonment were analyzed, focusing on the four vacant house clusters in Sungui-*dong*, Nam-*gu*, Incheon. The exploration of the dynamics of housing abandonment revealed that the triggers for vacant houses involved the poor physical environment of blocks, streets, parcels and buildings, the delay and cancellation of urban redevelopment projects, the spatial concentration of socially-vulnerable populations, and the degradation of neighborhood reputation and image. The results showed that the cluster-specific physical characteristics changed the location, spatial density, conditions, and impacts of vacant houses, and that, particularly, the unmanaged public areas surrounding vacant houses played a decisive role in inducing additional shrinkage and forming a decline image. The results also exposed that residents perceived the severity of housing abandonment differently according to their location and socio-demographic characteristics, and responded distinctively to abandonment depending on the density of and distance from vacant houses. Furthermore, all four clusters, which were located near large facilities such as apartment complex, school, *gu* (borough) office, and substation, made it possible to assume that although traditional public institutions were the impetuses for residential environment improvement and population influx in the period of urban growth, these institutions have no power to prevent the spread of vacant houses in the decline phase.

The comprehensive exploration of housing abandonment in a shrinking city through the four chapters above led to the following planning and policy implications. First, vacant house management plans and utilization projects should be established in line with comprehensive urban growth management

policies, but tailored to the characteristics of neighborhoods and residents. Second, to deal with the potential occurrence of the vacant house clusters in delayed urban redevelopment districts, it is necessary to clearly define an area with a high concentration of vacant houses and devise a related management system distinct from managing individually scattered vacant houses. Particularly in the case of canceled redevelopment districts, more systematic regeneration plans should be developed using local resources, including vacant houses, to prevent additional shrinkage. Third, a deeper understanding of the changing demographic structure, such as the soaring elderly population, is crucial to break out of the vicious cycle between housing abandonment and urban shrinkage. A tracking system that observes buildings vulnerable to the conversion to vacant houses, including deteriorated houses owned by elderly living alone, could be established to enable proactive responses to long-term vacant houses and their damages. Fourth, an in-depth analysis of the condition and influence of each vacant house in terms of the built environment is required, not just a survey of the existence or location of vacant houses. Considering that the negative effects of vacant houses can be alleviated by boarding up openings and managing streets surrounding vacant houses, the spatial scope of vacant house management should be expanded from the buildings themselves to the public domain. Fifth, it is important to understand that there are differences in how residents perceive and respond to vacant houses according to neighborhood and socio-demographic characteristics, individual experiences, and community interactions. The features of residents' perceptions should be considered when setting the direction of policy interventions related to housing abandonment. Especially, to enhance the quality of life of the remaining

residents in declining neighborhoods, programs to remove negative familiarity with vacant houses and convert collective helplessness into local attachment and community activities are required.

This study has great significance in identifying the dynamics of housing abandonment, including causes, patterns, characteristics, and influences, in shrinking cities based on empirical exploration in Incheon. The findings would be helpful to reveal an undiscovered part of the complex spectrum of urban shrinkage and suggest implications for urban design and planning related to vacant houses. However, this study has an underlying limitation in that it encompassed only a single city, Incheon as a spatial scope and did not consider variations over time. Thus, future studies can compare and analyze the mechanism of housing abandonment in shrinking cities with different formation periods, urban forms, and built-social environments, and derive the city-specific management plans. It will be also possible to grasp changes in distribution, status, and influence of vacant houses through times series observations and determine the proper direction for long-term regeneration policies. Finally, elaboration of vacant house data, including the acquisition of owners' information, could provide a means for multidimensional analysis of the characteristics of housing abandonment in shrinking cities.

Acknowledgments

References

Introduction

Buhnik, S. (2010). From shrinking cities to Toshi no Shukushō: Identifying patterns of urban shrinkage in the Osaka metropolitan area. *Berkeley Planning Journal*, 23(1), 132–155.

Cunningham-Sabot, E., Audirac, I., Fol, S., & Martinez-Fernandez, C. (2013). Theoretical approaches of shrinking cities. In: K. Pallagst, T. Wiechmann, & C. Martinez-Fernandez (Eds), *Shrinking cities: International perspectives and policy implications* (pp. 14–30). New York: Routledge.

Großmann, K., Bontje, M., Haase, A., & Mykhnenko, V. (2013). Shrinking cities: Notes for the further research agenda. *Cities*, 35, 221–225.

Haase, A., Bernt, M., Großmann, K., Mykhnenko, V., & Rink, D. (2013). Varieties of shrinkage in European cities. *European Urban and Regional Studies*, 23(1), 86–102.

Jeon, Y., & Kim, S. (2019). Housing abandonment in shrinking cities of East Asia: Case study in Incheon, South Korea. *Urban Studies*, https://doi.org/10.1177/0042098019852024.

Kim, S. (2019). Design strategies to respond to the challenges of shrinking city. *Journal of Urban Design*, 24(1), 49–64.

Martinez-Fernandez, C., Audirac, I., Fol, S., & Cunningham-Sabot, E. (2012). Shrinking cities: Urban challenges of globalization. *International Journal of Urban and Regional Research*, 36(2), 213–225.

Martinez-Fernandez, C., Weyman, T., Fol, S., Audirac, I., Cunningham-Sabot, E., Wiechmann, T., & Yahagi, H. (2016). Shrinking cities in Australia, Japan, Europe and the USA: From a global process to local policy responses. *Progress in Planning*, 105, 1–48.

Chapter 1

Accordino, J., & Johnson, G. T. (2000). Addressing the vacant and abandoned property problem. *Journal of Urban Affairs*, 22(3), 301–315.

Buhnik, S. (2010). From shrinking cities to Toshi no Shukushō: Identifying patterns of urban shrinkage in the Osaka metropolitan area. *Berkeley Planning Journal*, 23(1), 132–155.

Cha, H. (2006). *The country in the aging era learning from Japan*. Seoul: Samsung Economics Research Institute (in Korean).

Cho, S. (2015). *Analysis on the urban decline in Incheon using multiple deprivation index*. Incheon: Incheon Development Institute (In Korean).

Choi, M., & Kim, Y. (2018). Planning paradigm shift in the era of transition from urban development to management: The case of Korea. In: A. I. Frank, & C. Silver (Eds), *Urban planning education* (pp. 161–174). Cham: Springer.

Cunningham-Sabot, E., Audirac, I., Fol, S., & Martinez-Fernandez, C. (2013). Theoretical approaches of shrinking cities. In: K. Pallagst, T. Wiechmann, & C. Martinez-Fernandez (Eds), *Shrinking cities: International perspectives and policy implications* (pp. 14–30). New York: Routledge.

Ekers, M., Pierre, H., & Keil, R. (2012). Governing suburbia: Modalities and mechanisms of suburban governance. *Regional Studies*, 46(3), 405–422.

Gao, X., Xu, A., Liu, L., Deng, O., Zeng, M., Ling, J., & Wei, Y. (2017). Understanding rural housing abandonment in China's rapid urbanization. *Habitat International*, 67, 13–21.

Großmann, K., Beauregard, R., Dewar, M., & Haase, A. (2012). European and US perspectives on shrinking cities. *Urban Research & Practice*, 5(3), 360–363.

Großmann, K., Bontje, M., Haase, A., & Mykhnenko, V. (2013). Shrinking cities: Notes for the further research agenda. *Cities*, 35, 221–225.

Haase, A., Bernt, M., Großmann, K., Mykhnenko, V., & Rink, D. (2013). Varieties of shrinkage in European cities. *European Urban and Regional Studies*, 23(1), 86–102.

Haase, A., Rink, D., Grossmann, K., Bernt, M., & Mykhnenko, V. (2014). Conceptualizing urban shrinkage. *Environment and Planning A*, 46(7), 1519–1534.

Hartt, M. (2018). The diversity of North American shrinking cities. *Urban Studies*, 55(13), 2946–2959.

He, S. Y., Lee, J., Zhou, T., & Wu, D. (2017). Shrinking cities and resource-based economy: The economic restructuring in China's mining cities. *Cities*, 60, 75–83.

Incheon Development Institute (2004). *Urban planning in Incheon 1883–2001*. Incheon: Incheon City (in Korean).

Jackson, K. T. (1987). *Crabgrass frontier: The suburbanization of the United States*. Oxford: Oxford University Press.

Jeon, Y., & Kim, S. (2016). The causes and characteristics of housing abandonment in an inner-city neighborhood: Focused on the Sungui-dong area, Nam-gu, Incheon. *Journal of the Urban Design Institute of Korea*, 17(1), 83–100 (in Korean).

Joo, Y., & Park, S. (2016). Overcoming urban growth coalition: The case of culture-led urban revitalization in Busan, South Korea. *Urban Affairs Review*, 53(5), 843–867.

Kim, K. (2010). Causes and consequences of urban decline in Korean cities. *Journal of the Korean Urban Geographical Society*, 13(2), 43–58 (in Korean).

Kim, S. (2019). Design strategies to respond to the challenges of shrinking city. *Journal of Urban Design*, 24(1), 49–64.

Koetse, M.. China's disappearing rural schools: Teacher keeps school open for two students. (2017). https://www.whatsonweibo.com/chinas-disappearing-rural-schools-teacher-keeps-school-open-two-students/ Accessed 7 February 2019.

Lee, J., Won, S., & Kim, S. (2016). Describing changes in the built environment of shrinking cities: Case study of Incheon, South Korea. *Journal of Urban Planning and Development*, 142(2), 05015010.

Lee, Y. and Shin, H. (2011). New towns for suburbs? Developmental state politics and New Town development in Seoul metropolitan region. In: N. A. Phelps, & F. Wu (Eds), *International perspectives on suburbanization: A post-suburban world?* (pp. 225–244). New York: Palgrave Macmillan.

Liu, Y., Liu, Y., Chen, Y., & Long, H. (2010). The process and driving forces of rural hollowing in China under rapid urbanization. *Journal of Geographical Sciences*, 20(6), 876–888.

Martinez-Fernandez, C., Audirac, I., Fol, S., & Cunningham-Sabot, E. (2012). Shrinking cities: Urban challenges of globalization. *International Journal of Urban and Regional Research*,

36(2), 213–225.

Martinez-Fernandez, C., Weyman, T., Fol, S., Audirac, I., Cunningham-Sabot, E., Wiechmann, T., & Yahagi, H. (2016). Shrinking cities in Australia, Japan, Europe and the USA: From a global process to local policy responses. *Progress in Planning*, 105, 1–48.

Morckel, V. C. (2014). Spatial characteristics of housing abandonment. *Applied Geography*, 48, 8–16.

OECD. Fertility rates (indicator). (2019). https://data.oecd.org/pop/fertility-rates.htm/ Accessed 21 February 2019.

Oswalt, P. (2005). *Shrinking Cities. Vol. 1: International research*. Ostfildern-Ruit: Hatje Cantz.

Reckien, D., & Martinez-Fernandez, C. (2011). Why do cities shrink? *European Planning Studies*, 19(8), 1375–1397.

Ryan, B. D. (2012). Rightsizing shrinking cities: The urban design dimension. In: M. Dewar, & J. M. Thomas (Eds), *The city after abandonment* (pp. 268–288). Philadelphia: University of Pennsylvania Press.

Sorensen, A. (2001). Building suburbs in Japan: Continuous unplanned change on the urban fringe. *Town Planning Review*, 72(3), 247–274.

Sternlieb, G., Burchell, R. W., Hughes, J. W., & James, F. J. (1974). Housing abandonment in the urban core. *Journal of the American Institute of Planners*, 40(5), 321–332.

The Japan Times. Japan's glut of abandoned homes: Hard to sell but bargains when opportunity knocks. (2017). https://www.japantimes.co.jp/news/2017/12/26/national/japans-glut-abandoned-homes-hard-sell-bargains-opportunity-knocks/#.W6CafTZrxD8/ Accessed 30 August 2018.

The Nikkei Shimbun (2015). 68% of Japan's empty homes are in old buildings. *The Nikkei Shimbun*, 21 April.

UN (2002). *World population ageing 1950-2050*. New York: Department of Economic and Social Affairs, United Nations.

Wang, L., Kundu, R., & Chen, X. (2010). Building for what and whom? New town development as planned suburbanization in China and India. In: M. Clapson, & R. Hutchison (Eds), *Suburbanization in global society* (pp. 319–345). West Yorkshire: Emerald Group Publishing.

Wiechmann, T., & Pallagst, K. M. (2012). Urban shrinkage in Germany and the USA: A comparison of transformation patterns and local strategies. *International Journal of Urban and Regional Research*, 36(2), 261–280.

World Bank (2016). *Live long and prosper: Aging in East Asia and Pacific*. Washington, DC: World Bank.

Yang, Z., & Dunford, M. (2018). City shrinkage in China: Scalar processes of urban and hukou population losses. *Regional Studies*, 52(8), 1111–1121.

Yui, Y., Kubo, T., & Miyazawa, H. (2017), Shrinking and super-aging suburbs in Japanese metropolis. *Sociology*, 7(4), 195–204.

Chapter 2

Accordino, J., & Johnson, G. T. (2000). Addressing the vacant and abandoned property problem.

Journal of Urban Affairs, 22(3), 301–315.

Allison, P.. Logistic regression for rare events. (2012). https://statisticalhorizons.com/logistic-regression-for-rare-events/ Accessed 16 April 2019.

Batchis, W. (2010). Urban sprawl and the constitution: Educational inequality as an impetus to low density living. *Urban Lawyer*, 42(1), 95–133.

Beauregard, R. A. (2006). *When America became suburban*. Minneapolis: University of Minnesota Press.

Cho, S. (2015). *Analysis on the urban decline in Incheon using multiple deprivation index*. Incheon: Incheon Development Institute (in Korean).

Großmann, K., Bontje, M., Haase, A., & Mykhnenko, V. (2013). Shrinking cities: Notes for the further research agenda. *Cities*, 35, 221–225.

Grossmann, K., Haase, A., Arndt, T., Cortese, C., Rink, D., Rumpel, P., Slach, O., Ticha, I., & Violante, A. (2013). How urban shrinkage impacts on patterns of socio-spatial segregation: The cases of Leipzig (Germany), Ostrava (Czech Republic), and Genoa (Italy). In: C. C. Yeakey, V. S. Thompson, & A. Wells (Eds), *Urban Ills: Twenty-first-century complexities of urban living in global contexts, Volume 1* (pp. 241–267). New York, London, Boston: Lexington Books.

Haase, A., Bernt, M., Großmann, K., Mykhnenko, V., & Rink, D. (2013). Varieties of shrinkage in European cities. *European Urban and Regional Studies*, 23(1), 86–102.

Haase, A., Rink, D., Grossmann, K., Bernt, M., & Mykhnenko, V. (2014). Conceptualizing urban shrinkage. *Environment and Planning A*, 46(7), 1519–1534.

Han, H. (2014). The impact of abandoned properties on nearby property values. *Housing Policy Debate*, 24(2), 311–334.

Hattori, K., Kaido, K., & Matsuyuki, M. (2017). The development of urban shrinkage discourse and policy response in Japan. *Cities*, 69, 124–132.

Incheon City (2018). *The 58th Incheon statistical yearbook*. Incheon: Incheon Metropolitan City (in Korean).

Jeon, Y., & Kim, S. (2016). The causes and characteristics of housing abandonment in an inner-city neighborhood: Focused on the Sungui-dong area, Nam-gu, Incheon. *Journal of the Urban Design Institute of Korea*, 17(1), 83-100 (in Korean).

Jeon, Y., & Kim, S. (2020). Housing abandonment in shrinking cities of East Asia: Case study in Incheon, South Korea. *Urban Studies*, 57(8), 1749–1767.

Joo, Y., & Seo, B. (2018). Dual policy to fight urban shrinkage: Daegu, South Korea. *Cities*, 73, 128–137.

Kilroy, A. (2009). *Intra-urban spatial inequality: Cities as "urban regions"*. Washington, DC: World Bank.

Kim, S. (2019). Design strategies to respond to the challenges of shrinking city. *Journal of Urban Design*, 24(1), 49–64.

Kwon, Y., Kim, S., & Jeon, B. (2014). Unraveling the factors determining the redevelopment of Seoul's historic hanoks. *Habitat International*, 41, 280–289.

Lee, J., Won, S., & Kim, S. (2016). Describing changes in the built environment of shrinking cities: Case study of Incheon, South Korea. *Journal of Urban Planning and Development*, 142(2), 05015010.

Martinez-Fernandez, C., Audirac, I., Fol, S., & Cunningham-Sabot, E. (2012). Shrinking cities: Urban challenges of globalization. *International Journal of Urban and Regional Research*, 36(2), 213–225.

Martinez-Fernandez, C., Weyman, T., Fol, S., Audirac, I., Cunningham-Sabot, E., Wiechmann, T., & Yahagi, H. (2016). Shrinking cities in Australia, Japan, Europe and the USA: From a global process to local policy responses. *Progress in Planning*, 105, 1–48.

Morckel, V. C. (2014). Spatial characteristics of housing abandonment. *Applied Geography*, 48, 8–16.

OECD. Fertility rates (indicator). (2019a). https://data.oecd.org/pop/fertility-rates.htm/ Accessed 01 May 2019.

OECD (2019b). *Society at a glance 2019: OECD social indicators*. Paris: OECD Publishing.

Park, J., & Oh, S. (2018). Spatial pattern and causative factor analysis of vacant housing in Daegu, South Korea using individual-level building DB. *Journal of the Korean Regional Science Association*, 34(2), 35–47 (in Korean).

Petsimeris, P. (1998) Urban decline and the new social and ethnic divisions in the core cities of the Italian industrial triangle. *Urban Studies*, 35(3), 449–466.

Ryan, B. D. (2012, September). Shrinking-city urban form as a determinant of urban policy: The case of Flint, Michigan, USA. Conference paper at *the 48th ISOCARP Congress*, Perm, Russia.

Silverman, R. M., Yin, L., & Patterson, K. L. (2013). Dawn of the dead city: An exploratory analysis of vacant addresses in Buffalo, NY 2008-2010. *Journal of Urban Affairs*, 35(2), 131–152.

Sternlieb, G., Burchell, R. W., Hughes, J. W., & James, F. J. (1974). Housing abandonment in the urban core. *Journal of the American Institute of Planners*, 40(5), 321–332.

The Japan Times. Address the vacant home problem. (2019). https://www.japantimes.co.jp/opinion/2019/05/04/editorials/address-vacant-home-problem/#.XTq0IDZrxD-/ Accessed 13 June 2019.

Van Allsburg, M. (1974). Property abandonment in Detroit. *Wayne Law Review*, 20, 845–888.

Wei, Y. D., Li, H., & Yue, W. (2017). Urban land expansion and regional inequality in transitional China. *Landscape and Urban Planning*, 163, 17–31.

Williams, R.. Analyzing rare events with logistic regression. (2018). https://www3.nd.edu/~rwilliam/ Accessed 16 April 2019.

Wilson, D., Margulis, H., & Ketchum, J. (1994). Spatial aspects of housing abandonment in the 1990s: The Cleveland experience. *Housing Studies*, 9(4), 493–510.

Xie, Y., Gong, H., Lan, H., & Zeng, S. (2018). Examining shrinking city of Detroit in the context of socio-spatial inequalities. *Landscape and Urban Planning*, 177, 350–361.

Chapter 3

Alexander, V. D. (2013). Views of the neighbourhood: A photo-elicitation study of the built environment. *Sociological Research Online*, 18(1), 1–26.

Baba, H., & Hino, K. (2019). Factors and tendencies of housing abandonment: An analysis of a

survey of vacant houses in Kawaguchi City, Saitama. *Japan Architectural Review*, 83(749), 1263–1271.

Benediktsson, M. O. (2014). Territories of concern: Vacant housing and perceived disorder on three suburban blocks. *City & Community*, 13(3), 191–213.

Branas, C. C., Rubin, D., & Guo, W. (2012). Vacant properties and violence in neighborhoods. *ISRN Public Health*, doi: 10.5402/2012/246142.

Crosby, F., & Hermens, F. (2019). Does it look safe? An eye tracking study into the visual aspects of fear of crime. *Quarterly Journal of Experimental Psychology*, 72(3), 599–615.

Doran, B. J., & Lees, B. G. (2005). Investigating the spatiotemporal links between disorder, crime, and the fear of crime. *The Professional Geographer*, 57(1), 1–12.

Foster, S., Giles-Corti, B., & Knuiman, M. (2010). Neighbourhood design and fear of crime: A social-ecological examination of the correlates of residents' fear in new suburban housing developments. *Health & Place*, 16(6), 1156–1165.

Franzini, L., Caughy, M. O. B., Nettles, S. M., & O'Campo, P. (2008). Perceptions of disorder: Contributions of neighborhood characteristics to subjective perceptions of disorder. *Journal of Environmental Psychology*, 28(1), 83–93.

Garvin, E., Branas, C., Keddem, S., Sellman, J., & Cannuscio, C. (2013). More than just an eyesore: Local insights and solutions on vacant land and urban health. *Journal of Urban Health*, 90(3), 412–426.

Gourlay, G. (2007, September). 'It's got a bad name and it sticks…' Approaching stigma as a distinct focus of neighbourhood regeneration initiatives. Paper presented at *the EURA Conference, 'The Vital City'* (pp. 12–14), Glasgow, Scotland.

Hipp, J. R. (2010). Resident perceptions of crime and disorder: How much is "bias," and how much is social environment differences?. *Criminology*, 48(2), 475–508.

Hofmann, M., Westermann, J. R., Kowarik, I., & Van der Meer, E. (2012). Perceptions of parks and urban derelict land by landscape planners and residents. *Urban Forestry & Urban Greening*, 11(3), 303–312.

Hur, M., & Nasar, J. L. (2014). Physical upkeep, perceived upkeep, fear of crime and neighborhood satisfaction. *Journal of Environmental Psychology*, 38, 186–194.

Jamme, H. W., Bahl, D., & Banerjee, T. (2018). Between "broken windows" and the "eyes on the street:" Walking to school in inner city San Diego. *Journal of Environmental Psychology*, 55, 121–138.

Jaśkiewicz, M., & Wiwatowska, E. (2018). Perceived neighborhood disorder and quality of life: The role of the human-place bond, social interactions, and out-group blaming. *Journal of Environmental Psychology*, 58, 31–41.

Jeon, Y., & Kim, S. (2016). The causes and characteristics of housing abandonment in an inner-city neighborhood: Focused on the Sungui-dong area, Nam-gu, Incheon, *Journal of the Urban Design Institute of Korea*, 17(1), 83–100 (in Korean).

Jeon, Y., & Kim, S. (2020). Housing abandonment in shrinking cities of East Asia: Case study in Incheon, South Korea. *Urban Studies*, 57(8), 1749–1767.

Jiang, B., Mak, C. N. S., Zhong, H., Larsen, L., & Webster, C. J. (2018). From broken windows to perceived routine activities: Examining impacts of environmental interventions on perceived safety of urban alleys. *Frontiers in psychology*, 9:2450, doi: 10.3389/fpsyg.2018.02450.

Johansen, R., Neal, Z., & Gasteyer, S. (2015). The view from a broken window: How residents make sense of neighbourhood disorder in Flint. *Urban Studies*, 52(16), 3054–3069.

Kelling, G. L., & Wilson, J. Q. (1982). Broken windows. *Atlantic Monthly*, 249(3), 29–38.

Klinenberg, E.. The other side of "broken windows" (2018). https://www.newyorker.com/books/page-turner/the-other-side-of-broken-windows/ Accessed 24 September 2019.

Lorenc, T., Clayton, S., Neary, D., Whitehead, M., Petticrew, M., Thomson, H., Cummins, S., Sowden, A., & Renton, A. (2012). Crime, fear of crime, environment, and mental health and wellbeing: Mapping review of theories and causal pathways. *Health & Place*, 18(4), 757–765.

O'Brien, D. T., Farrell, C., & Welsh, B. C. (2018). Broken (windows) theory: A meta-analysis of the evidence for the pathways from neighborhood disorder to resident health outcomes and behaviors. *Social Science & Medicine*, 228, 272–292.

O'Brien, D. T., Farrell, C., & Welsh, B. C. (2019). Looking through broken windows: The impact of neighborhood disorder on aggression and fear of crime is an artifact of research design. *Annual Review of Criminology*, 2, 53–71.

OECD (2019). *Society at a glance 2019: OECD social indicators*. Paris: OECD Publishing.

Painter, K. (1996). The influence of street lighting improvements on crime, fear and pedestrian street use, after dark. *Landscape and Urban Planning*, 35(2-3), 193–201.

Park, J., & Oh, S. (2018). Spatial pattern and causative factor analysis of vacant housing in Daegu, South Korea using individual-level building DB. *Journal of the Korean Regional Science Association*, 34(2), 35–47 (in Korean).

Perkins, D. D., Meeks, J. W., & Taylor, R. B. (1992). The physical environment of street blocks and resident perceptions of crime and disorder: Implications for theory and measurement. *Journal of Environmental Psychology*, 12(1), 21–34.

Permentier, M., Van Ham, M., & Bolt, G. (2009). Neighbourhood reputation and the intention to leave the neighbourhood. *Environment and Planning A*, 41(9), 2162–2180.

Ross, C. E. (2000). Neighborhood disadvantage and adult depression. *Journal of Health and Social Behavior*, 41(2), 177–187.

Sampson, N., Nassauer, J., Schulz, A., Hurd, K., Dorman, C., & Ligon, K. (2017). Landscape care of urban vacant properties and implications for health and safety: Lessons from photovoice. *Health & Place*, 46, 219–228.

Sampson, R. J., & Raudenbush, S. W. (2004). Seeing disorder: Neighborhood stigma and the social construction of "broken windows". *Social Psychology Quarterly*, 67(4), 319–342.

Sampson, R. J., & Raudenbush, S. W. (2005). Neighborhood stigma and the perception of disorder. *Focus*, 24(1), 7–11.

Schachterle, S. E., Bishai, D., Shields, W., Stepnitz, R., & Gielen, A. C. (2012). Proximity to vacant buildings is associated with increased fire risk in Baltimore, Maryland, homes. *Injury Prevention*, 18(2), 98–102.

Skogan, W. G. (1992). *Disorder and decline: Crime and the spiral of decay in American neighborhoods*. New York: The Free Press.

South, E. C., Kondo, M. C., Cheney, R. A., & Branas, C. C. (2015). Neighborhood blight, stress, and health: A walking trial of urban greening and ambulatory heart rate. *American Journal of Public Health*, 105(5), 909–913.

Taylor, R. B., Gottfredson, S. D., & Brower, S. (1984). Block crime and fear: Defensible space, local social ties, and territorial functioning. *Journal of Research in Crime and Delinquency*, 21(4), 303–331.

Teixeira, S. (2016). Beyond broken windows: Youth perspectives on housing abandonment and its impact on individual and community well-being. *Child Indicators Research*, 9(3), 581–607.

Vrij, A., & Winkel, F. W. (1991). Characteristics of the built environment and fear of crime: A research note on interventions in unsafe locations. *Deviant Behavior*, 12(2), 203–215.

Wallace, D. (2015). A test of the routine activities and neighborhood attachment explanations for bias in disorder perceptions. *Crime & Delinquency*, 61(4), 587–609.

Wallace, D., & Louton, B. (2018). The disorder perceptions of nonresidents: A textual analysis of open-ended survey responses to photographic stimuli. *City & Community*, 17(1), 21–43.

Wallace, D., Louton, B., & Fornango, R. (2015). Do you see what I see? Perceptual variation in reporting the presence of disorder cues. *Social Science Research*, 51, 247–261.

Wallace, D., & Schalliol, D. (2015). Testing the temporal nature of social disorder through abandoned buildings and interstitial spaces. *Social Science Research*, 54, 177–194.

Wickes, R., Hipp, J. R., Zahnow, R., & Mazerolle, L. (2013). "Seeing" minorities and perceptions of disorder: Explicating the mediating and moderating mechanisms of social cohesion. *Criminology*, 51(3), 519–560.

Chapter 4

Accordino, J., & Johnson, G. T. (2000). Addressing the vacant and abandoned property problem. *Journal of Urban Affairs*, 22(3), 301–315.

Bassett, E. M., Schweitzer, J., & Panken, S. (2006). *Understanding housing abandonment and owner decision-making in Flint, Michigan: An exploratory analysis*. Cambridge: Lincoln Institute of Land Policy.

Cho, S., & Kim, Y. (2014). *Incheon's policy issues and direction for Special Act on the Promotion and Support of Urban Regeneration*. Incheon: Incheon Development Institute (in Korean).

Guimarães, M. H., Nunes, L. C., Barreira, A. P., & Panagopoulos, T. (2016). What makes people stay in or leave shrinking cities? An empirical study from Portugal. *European Planning Studies*, 24(9), 1684–1708.

Han, H. (2014). The impact of abandoned properties on nearby property values, *Housing Policy Debate*, 24(2), 311–334.

Incheon City (2015). *The 54th Incheon statistical yearbook (2014)*. Incheon: Incheon City (in Korea).

Incheon Development Institute (2004). *Urban planning in Incheon 1883–2001*. Incheon: Incheon City (in Korean).

Incheon Nam-gu (2015). *Life history of urban village: Sungui-dong and Dohwa-dong*. Incheon: Nam-gu, Incheon (in Korean).

Kim, K. (2010). Causes and consequences of urban decline in Korean cities. *Journal of the Korean Urban Geographical Society*, 13(2), 43–58 (in Korean).

Kim, K., Park, H., Kim, Y., & An, H. (2010). The evidences of inner-city decline at site level in

Korean cities. *Journal of the Korean Urban Geographical Society*, 13(2), 27–42 (in Korean).

Korea Urban Renaissance Center (2010). *Urban regeneration project 1-1: Survey of urban decline of Korean cities and urban regeneration of foreign countries*. Gwacheon, South Korea: Ministry of Land, Transport and Maritime Affairs (in Korean).

Lee, D., Kim, J., Lee, J., & Ha, J. (2005, October). A study on a physical factor for empty of house in multi-family housing. Conference paper of *the 60th anniversary of AIK (Architectural Institute of Korea)*, South Korea, 25(1), 453–456 (in Korean).

Lee, J., Won, S., & Kim, S. (2016). Describing changes in the built environment of shrinking cities: Case study of Incheon, South Korea. *Journal of Urban Planning and Development*, 142(2): 05015010.

Lim, Y., & Lim, H. (2012). *Neighborhood regeneration policy proposal on the revitalization and reclamation of vacant urban spaces*. Anyang, South Korea: Architecture and Urban Research Institute (AURI) (in Korean).

Morckel, V. C. (2014). Spatial characteristics of housing abandonment. *Applied Geography*, 48, 8–16.

Olsen, A. K. (2013). Shrinking cities: Fuzzy concept or useful framework?. *Berkeley Planning Journal*, 26(1), 107–132.

Oswalt, P. (2005). *Shrinking cities. Volume 1: International research*. Ostfildern-Ruit: Hatje Cantz.

Pallagst, K. (2010). The planning research agenda: Shrinking cities–a challenge for planning cultures. *Town Planning Review*, 81(5), 1–6.

Schilling, J. M. (2002). *The revitalization of vacant properties*. Washington, D.C.: ICMA(International City/County Management Association).

Silverman, R. M., Yin, L., & Patterson, K. L. (2013). Dawn of the dead city: An exploratory analysis of vacant addresses in Buffalo, NY 2008-2010. *Journal of Urban Affairs*, 35(2), 131–152.

Sternlieb, G., & Burchell, R. W. (1973). *Residential abandonment: The tenement landlord revisited*. Piscataway: Rutgers University.

Sternlieb, G., Burchell, R. W., Hughes, J. W., & James, F. J. (1974). Housing abandonment in the urban core. *Journal of the American Institute of Planners*, 40(5), 321–332.

Yim, J., Kim, T., & Park, C. (2008). A study on the distribution and characteristic of the empty houses and vacant floors in historic district on Cheongju city. Conference paper of *the 2008 autumn Korean Housing Association*, South Korea, 278–283 (in Korean).

Yum, B. (2007). The expansion of administrative districts and urban planning in Incheon in the 1930s-1940s. *The Journal of Incheon Studies*, 6, 83–105 (in Korean).

국문초록

쇠퇴도시 내 빈집 발생의 주요 경로 및
공간적 특성과 주민인식에 미치는 영향
: 인천 구시가지를 대상으로

전 영 미

서울대학교 공과대학
협동과정 도시설계학 전공

　　도시쇠퇴는 전 세계 수많은 도시들이 경험하고 있는 가장 두드러지는 도시현상들 중 하나이다. 도시쇠퇴는 공통적이면서도 차별화된 세계적 현상으로, 경제적·사회적·물리적 측면에서 특정 개발 논리를 따르는 한편, 국가 및 도시에 따라 다양한 동기, 유형, 접근방식을 가진다. 서구 도시들에서는 탈산업화, 교외화, 인구감소가 쇠퇴의 주요 패턴으로 이해되어 왔다. 도시쇠퇴의 가장 심각하고 명백한 공간적 발현으로는 주택 포기, 즉 빈집을 꼽을 수 있다. 빈집은 도시쇠퇴와의 하향적 악순환의 관계 안에서, 물리적 환경의 악화, 지역 활력도의 저하, 부동산 가치의 감소, 관리비용의 증가 등을 통해 추가적인 쇠퇴를 유도한다. 빈집은 건물 자체로는 쇠퇴도시의 황폐화된 건조환경을 나타내지만, 넓게는 분포패턴을 통해 구시가지와 신시가지 사이의 공간사회적 불균형

을 드러낸다. 더불어 장기간 방치된 빈집은 쇠퇴근린에 자의적 또는 타의적으로 남겨진 주민들의 일상생활에 서서히 침투하여, 신체적 및 정신적 건강을 포함한 삶의 질에 악영향을 미친다. 한국의 경우, 통계청에 따르면 2017년 기준으로 총 주택 수의 7.4%에 해당하는 약 130만 채의 빈집이 집계되었으며, 이는 2010년의 약 80만 채 대비 59.3%가 증가한 수치였다. 한국 정부는 빈집 발생을 심각한 사회현상으로 인지함에 따라, 2017년에 「빈집 및 소규모주택 정비에 관한 특례법」을 제정하였다. 그런데 한국 쇠퇴도시 내 빈집현상에 대한 포괄적 논의의 필요성과 체계적 대책마련의 시급성에도 불구하고, 지금까지 대부분의 관련 연구들은 미국 또는 유럽의 사례들 그리고 그들의 시각에 초점을 맞춰왔다. 또한 지금까지 추진된 빈집 관련 정책 및 사업들은 단기적이고 일시적인 대책들을 제시하는 것을 우선시 해왔다. 이에 본 논문은 도시쇠퇴의 시기, 속도, 양상에 있어 서구와는 구별되는 징후들을 드러내는 동아시아 국가들, 그 중에서도 특히 한국 인천에서의 실증적 관찰을 기반으로 경로, 원인, 특성, 영향력, 주민인식을 포함한 빈집의 역학에 대해 분석하고자 했다. 결과적으로, 다음의 네 개의 연구를 통해 쇠퇴도시 내 악순환의 고리를 끊고, 빈집을 바람직하게 관리·활용하며, 남아있는 주민들의 삶의 질을 개선하기 위한 토대를 마련하고자 했다.

첫 번째 연구는 아직까지 동아시아 맥락에서 도시쇠퇴의 일반화 가능한 패턴과 이것의 빈집 발생의 특성과의 관계에 대해 조사한 연구는 거의 없다는 점에 착안하여, 한국 인천에서의 경험적 관찰을 기반으로 쇠퇴하는 구시가지에서 빈집 발생의 원인 및 양상을 설명하는 다섯 가지 주요 경로들을 분석하고자 했다. 먼저는 도시쇠퇴의 구조적 문제에 부정적으로 영향을 준 두 개의 정치경제적 측면의 경로들로, 각각 강력

한 정부 주도의 신시가지 개발 및 공공기관의 이전 그리고 구시가지에서 무차별적으로 시행된 정비사업의 지연 및 취소에 해당되었다. 빈집 발생과 관련된 신시가지와 구시가지 사이의 인구이동에 있어 전자는 유인요인, 후자는 배출요인으로 작용하였으며, 특히 후자는 빈집 클러스터를 야기하는 역할을 하였다. 세 번째 경로는 압축 성장 하의 급격한 도시화의 기간 동안 불충분한 기반시설을 바탕으로 개발된 열악한 건물들과 이들의 가속화된 노후화와 관련되었다. 네 번째 경로는 급격한 사회구조의 변화 및 심각한 고령화 현상에서 비롯되었으며, 유지관리의 부족으로 황폐화된 건조환경에 취약계층이 집중됨에 따라 공간적 불균형이 고착화되고 새로운 인구의 유입을 저해하였다. 마지막 경로는 낙인 찍힌 지역에서 기반시설, 서비스, 젊은 인구층의 유출로 인해 남아있는 주민들의 삶의 질이 저하되고 빈집 발생의 악순환이 지속됨을 드러내었다. 각각의 경로들은 지역적 맥락에서 서로 밀접하게 관계를 맺고 동시에 그 영향력 행사함으로써, 보다 극심한 빈집 문제를 초래할 것으로 예상되었다. 더불어 동아시아적 관점에서, 이와 같은 경로들은 국가주도의 도시개발을 통한 고도경제성장을 경험한 일본과 중국에서도 유사하게 발견됨과 동시에, 도시계획 관련 법 및 정책, 도시개발의 시기 및 방식에 따라 그 양상의 차이를 보임을 확인할 수 있었다. 본 연구의 다섯 가지 경로들에 대한 탐색은 빈집의 주요 원인에 따라 발생 특성이 상이하기에, 적절한 빈집 관리 방안의 마련과 추후 급증에 대한 예방을 위해서는 빈집 발생의 주요 경로들과 그들의 상호관계를 이해하는 것이 중요함을 시사하였다.

두 번째 연구는 필지 수준의 데이터를 기반으로 퍼스(*firth*)의 로지스틱 회귀분석을 활용하여 짧은 시간 내에 도시화 및 경제성장을 경험

한 지역에서 빈집 발생이 공간적 불균형의 측면에서 어떤 특성을 지니는지에 대해 분석하고자 했다. 2017년 기준으로, 연구 대상지인 인천 구시가지에는 인천 전체 빈집의 3/4에 해당하는 약 1,600여 채의 빈집이 위치했으며, 건물 및 필지, 도시근린, 경제적, 인구사회적 측면의 결정요인들이 빈집의 공간선택적인 발생 패턴을 설명할 수 있을 것이라 예상되었다. 분석결과에 따르면, 급속한 도시화의 시기에 저품질로 개발된 보다 오래되고, 규모가 작고, 접근성이 떨어지는 주거용 건물들이 빈집으로의 전환에 더 취약했다. 성장 지향적 정책 하에서 무차별적으로 계획된 정비사업의 실패는 빈집 밀집지역을 초래했으며, 실제 구시가지 빈집의 약 64%가 정비구역에 위치했다. 제조업의 영세화와 상업지역의 황폐화는 지역 경제활동과 커뮤니티의 활력을 약화시킴으로써, 인구유출에 기반한 빈집 발생을 촉진시켰다. 더불어, 구시가지로의 노인 및 저학력 인구의 집중과 같은 사회적으로 지속 불가능한 환경의 조성은 근린의 낙인 찍힌 이미지를 형성함과 동시에, 고학력의 젊은 인구층의 이탈을 통한 빈집 출현에 기여했다. 본 연구는 앞선 분석결과를 기반으로 도시설계 및 계획의 관점에서 더욱 심도 있게 논의되어야 할 세 가지 이슈를 제시하였다. 첫째, 뚜렷한 공간적 불균형이 도시 내, 구시가지 내, 근린 내, 심지어 도시블록 규모와 같이 점점 더 작은 공간 단위에서 발현되고 있다는 것이다. 둘째, 구시가지 내에서 지연되거나 취소된 정비사업 구역이 빈집 밀집지역의 온상이 되고 있다는 것이다. 셋째, 이미 잘 알려진 경제적 불평등 및 이와 관련된 주거지 분리에 더해, 왜곡된 인구구조가 사회적 지속가능성을 위협하는 공간적 양극화를 심화시키고 있다는 것이다.

세 번째 연구는 지속적·점진적인 쇠퇴를 경험하는 도시에서 도시

설계 및 계획의 렌즈를 통해 빈집에 대한 주민들의 경험 및 해석에 대해 탐색한 연구는 거의 없다는 점에 착안하여, 설문조사 및 사진유도기법(photo-elicitation)을 활용하여 인천 남구의 쇠퇴하는 구시가지 근린에서 빈집에 대한 인식을 분석하고자 했다. 지금까지 빈집은 주로 공중보건 및 범죄학의 분야에서 깨진 유리창 이론의 관점을 통해, 폭력범죄의 만연을 유도하는 근린 무질서의 징후들 중 하나로 간주되어 왔다. 하지만 본 연구는 무질서에서 범죄로의 전환 가능성, 무질서가 발생하는 지역의 주요 인구사회학적 및 건조환경의 특성을 검토함으로써, 이 이론을 한국의 쇠퇴도시에서 재맥락화 하고자 했다. 연구의 첫 번째 단계에서는 인천 남구의 93명의 주민들을 대상으로 빈집 인식과 관련된 설문조사를 진행하였다. 빈집에 대한 인식은 신체적 및 정신적 건강, 행동적 대응, 공동체 활동에의 참여의 세 가지 측면을 통해 확인되었으며, 인구사회학적 특성, 개인적인 경험, 공동체 상호작용과 관련된 요인들이 인식의 이질성을 형성하는 데 관여했다. 두 번째 단계에서는 인천 남구 숭의동의 주민 10명과 비주민 10명을 대상으로 사진유도조사를 실시함으로써, 총 13장의 빈집 사진에 대해 두 집단이 두려움을 느끼는 정도와 이유에 대해 비교하였다. 연구결과는 쇠퇴도시 내 빈집들을 효율적으로 관리하고 남아있는 주민들의 삶의 질을 개선하기 위해 다음의 네 가지 이슈들을 제시하였다. 첫째, 주민들은 지속적인 쇠퇴를 경험하는 구시가지 근린에서 강력범죄보다는 고착화된 빈집들에서 기인한 쓰레기, 먼지, 악취 등의 일상생활의 문제들로부터 끈질기게 영향을 받아왔다. 둘째, 근린에 대한 이해 및 책임의 정도, 빈집에 대한 경험 및 정보의 수준이 빈집에 대한 주민인식에 있어 차이를 형성했다. 셋째, 단순히 빈집의 존재가 아닌, 건조환경 측면에서 관리의 유무를 암시하는 물리적 요소들이 빈집에 대한 감정 및 대응을 결정지었다. 넷

째, 빈집에 대한 두려움의 감정은 가시적인 건조환경뿐만 아니라 비가시적인 사회적 환경에서도 기인했다.

네 번째 연구는 빈집의 체계적인 관리 및 활용을 위해서는 도시근린과 같은 미시적 공간 차원에서의 빈집 발생 메커니즘에 대한 파악이 필수적이라는 점을 바탕으로, 쇠퇴현상을 겪고 있는 인천 남구 숭의동 내 근린, 특히 빈집 클러스터를 중심으로 빈집 발생의 원인 및 특성을 분석하고자 했다. 정성적인 연구 방법론을 활용하여 도시쇠퇴와 빈집 사이의 반복 및 누적되는 악순환의 고리를 드러내는 메커니즘을 이론적 틀로 정리한 후, 빈집의 분포 현황 및 특성, 그리고 인과관계를 탐색하였다. 남구의 공가현황 자료 및 현장답사를 기반으로, 숭의동에는 약 80여 채의 빈집이 4개의 클러스터에 집중 분포되어 있는 것을 확인하였다. 각 클러스터의 서로 다른 건축적·도시공간적 특성들이 빈집 발생 양상의 차이를 만들어내는 요인으로 작용하고 있었다. 클러스터 1은 열악한 물리적 환경으로 인해 재개발 취소의 영향력이 심화된 구역이었으며, 클러스터 2는 양호한 물리적 환경을 보유했지만 재개발에 대한 기대 심리를 기반으로 빈집이 발생하게 된 구역이었다. 클러스터 1과 2의 경우 동일하게 재정비촉진지구로 지정된 후 해제되었지만, 기존의 도시·건축적 특성의 차이로 인해 빈집의 밀도, 건물 및 가로의 상태에 있어 서로 다른 양상과 영향력을 드러냈다. 더불어 클러스터 3은 사회취약계층의 공간적 집중과 가로변 건물들의 개보수로 인해 상대적 쇠퇴가 심화된 구역이었으며, 클러스터 4는 열악한 기반시설 및 대규모 기피시설이 빈집 발생을 유도한 구역이었다. 연구결과에 따르면, 폐쇄적 블록, 협소한 가로, 소규모 필지 등의 열악한 물리적 환경이 재정비촉진지구의 해제, 사회취약계층의 공간적 집중 등과 결합됨에 따라

빈집현상의 심화 및 확산으로 연결되었다. 또한 빈집 인근 공적영역의 유지관리 여부가 추가적인 쇠퇴의 진행 및 쇠퇴 이미지 형성에 중요한 역학을 하고 있었다. 한편 연구결과를 통해 거주위치 및 거주특성에 따라 주민들이 빈집문제의 심각성을 인식하고 대응하는데 있어 차이가 존재함을 확인할 수 있었다.