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Spatial patterns of population turnover in a Japanese Regional City for urban regeneration against population decline: Is Compact City policy effective?

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ABSTRACT

Responding to the international trend of urban population decline, a sustainable urban form has been pursued around the world, with the compact city movement a typical example. However, compact city debate has often been criticized for its inclination to bio-physical environmental and economic goals and a lack of treatment of empirical social aspects like residential behavior. The present study was thus aimed at examining the gap between Japanese compact city policy and actual spatial patterns of population turnover, inheritance and migration. The case study was of residential areas of a Japanese regional city, Utsunomiya. The study used a four-step procedure: a) identifying the distributions of inheritors and migrators; b) constructing a detailed database of five characteristics of the residential areas, i.e., age of development, orderliness, road width, transport access, and social cohesion; c) identifying relationships between the number of inheritors and migrators and residential characteristics using a Poisson regression model; d) comparing the compact city plan underway with established patterns of population turnover. The results show that the number of inheritors has positive relationships with age of the residential area and access to rail transport and downtown. The migrators tend to have a random distribution in comparison with inheritors. These empirical residential patterns appear irrelevant to the government's bus-oriented compact city policy, so the government should reconsider approaches to realize an acceptable sustainable urban form.

1. Introduction

As population decline has become common and serious in a great number of cities around the world (Oswalt & Rieniets, 2006), the focus on argument over how to plan a sustainable urban form has shifted from ideal to the reality. The prime concern of such debate was originally on envisioning the ideal of the bio-physical environmental or economic improvement. However, recently, approaches to reconciliation between bio-physical environmental or economic goals and preferred and established social aspects such as patterns of behavior, values and traditions have seen renewed interest (Vallance & Perkins, 2010; Vallance, Perkins, & Dixon, 2011). The importance of social factors as the foundation of planning attitudes has been indicated in criticism of the compact city movement. Gordon and Richardson (1997) indicated a neglect of social equity concerns in compact city debate. Breheny (1997) and Neuman (2005) posed a doubt as to whether a single compact city model is applicable and feasible unless it considers social or civic factors. Clark (2005) argued that the blunt compact city movement is likely to deteriorate into unanticipated or unregulated

coping strategies.

Considering the suggestions above, a better understanding of established residential preference or motives is required to make a validated plan, and such social aspects are basically reflected in the empirical residential behavior of where to live, i.e., patterns of population turnover by inheritance or migration. The pattern of inheritance of the parents' home has usually been discussed in relation to place attachment, and studies have shown that such attachment is influenced not only by individual factors like gender (Hidalgo & Hernández, 2001), age (Pretty, Chipuer, & Bramston, 2003), level of education (Mesch & Manor, 1998), length of residence (Lewicka, 2005), memorable events (Hay, 1998), or land ownership (Riger & Lavrakas, 1981) but also by social or spatial factors like social cohesion (Twigger-Ross & Uzzell, 1996), physical settings, or natural environment (Schreyer, Jacob, & White, 1981; Schultz, Shriver, Tabanico, & Khazian, 2004). As for the pattern of migration, preferences of residential mobility, which is defined as short-distance moves within the same region (Howley, 2009), have been studied based on relationships with several factors. Some factors related to residential mobility overlap with those noted above

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regarding place attachment, but others like housing price (Clark, Deurloo, & Dieleman, 2000), household market (Ferreira, Gyourko, & Tracy, 2010), and access to good jobs or schools (Briggs, 2005) appear distinct from the indicators of place attachment. In addition to these studies focusing on western cities, Kim, Woosnam, Marcouiller, and Aleshinloye (2015) examined residential mobility, urban preference, and human settlement in several Korean cities as case study sites of the eastern world. They suggested that economic conditions, level of education, transportation elements, social ties, environmental perception, and place-based characteristics contribute to residential mobility preference.

Although studies about place attachment and residential mobility or preference have accumulated and some studies like Howley (2009) have sought to link their outcomes to the compact city movement, there seems to be a gap between such theoretical knowledge and practice of urban planning. This may be because most studies have been largely interested in individual perceptions or attributes, but spatial relationships between the distributions of residents and urban surroundings such as orderliness of development or public transportation, subjects that urban planners manage to control, have attracted less attention in social science. It also may be because what governors or urban planners are instituting in reality has been hardly considered in the analyses. Therefore, a research attempt to bridge the gap between the theory of social science and the action of urban practitioners is necessary to realize feasible and acceptable planning policies.

Looking at the planning practice underway, the approaches appear different between western and eastern cities. Western cities have experienced a great number of residential relocations and rapid decline of urban populations, typically caused by industrial decline or political reformation (Wiechmann & Pallagst, 2012). For example, in Baltimore, USA, the population dropped by approximately one third in 50 years (1950–2000), owing to industrial recession (Cohen, 2001). Such rapid loss of a great number of families in western cities means the “death” of certain urban areas (Silverman, Yin, & Patterson, 2012), so governmental options in such deserted areas include leaving them dead or giving them new life through urban redevelopment or conversion of land use, such as greening of originally residential areas (e.g., Schilling & Logan, 2008). This suggests that the focus of planning in these cities is on management of neighborhoods or districts rather than on city compaction. Right-sizing strategies in the United States seem to be the representative approach to managing cities facing population decline, with attempts to stabilize a dysfunctional market and declining neighborhoods by close alignment of the built environment with the needs of existing and future populations by involving a civically engaged community (Hollander & Cahill, 2011; Schilling & Logan, 2008).

In contrast, the principal causes of population decline in regional cities of eastern countries are a steady low birthrate and population emigration to larger cities that offer better opportunities for education and employment. The total fertility rate in major eastern countries such as Japan, Korea and Taiwan have been steadily below the population replacement level since the late 1980s, and the rate in 2014 was lower than major western countries such as the United States, United Kingdom and France (COGJ, 2016). Population emigration to larger cities has also been a common trend in Japan, Korea and Taiwan (Watanabe, 1998), resulting in much denser megacities (e.g., Tokyo, Seoul and Taipei) than in the western world (e.g., New York, London and Paris) (Hanaoka & Acharya, 2008). The progress of population decline in eastern cities seems therefore much more gradual than western urban shrinkage owing to drastic changes of economic or political structure, so their approaches to urban population decline appear less imminent than western attempts. In particular, Japanese governmental responses to urban population decline have continued to be oriented to the ideal of the compact city policy, which is aimed at inducing people to relocate where there is high accessibility to downtown and public transportation networks. Some recent criticism, however, argued a lack of consideration for established communities or

residential behavior in the Japanese compact city policy (Nozawa, 2014). At least, the policy has paid little attention to actual patterns of inheritance and migration in residential neighborhoods of cities facing population decline.

Hence, the purpose of the present study was to identify spatial patterns of population turnover, inheritance and migration in a Japanese regional city, using relationships between the distributions of inheritors and migrators and several specific neighborhood characteristics. This was done to extend empirical and physical aspects of the theory of social science such as place attachment or residential behavior and to bridge the gap between the theory and practice of urban planning for urban regeneration in the age of urban population decline.

2. Material and methods

The Japanese Government revised the Act on Special Measures concerning Urban Reconstruction in 2014 in order to promote a compact city policy, which obliges each city to newly establish *Urbanization Promotion Areas* and *Urban Function Induction Areas*, under which the government expects dense populations in current *Urbanization Promotion Areas*. MLIT (2017) shows that 302 of all 791 cities in the nation have been implementing the compact city policy. Furthermore, 112 of the 302 have already published their concrete plans. The populations of these cities range widely, from 30,000 to 2,000,000. The present study focused on a city with relatively large population, because the size of the urban area in a city is proportional to its population. The larger the urban area is, the harder it is to realize city compaction in the future. We thus selected Utsunomiya City in Tochigi Prefecture as a case study city. Utsunomiya is one of the central cities in the Kanto region, about 100 km north of central Tokyo (Fig. 1). Total population of Utsunomiya was 511,296 in 2010, the seventh largest of the 112 cities above. It has a population of 424,532 in the Urbanization Promotion Area, which is 92.0 km² in area (Utsunomiya City, 2010). The population of Utsunomiya has been steadily increasing, but it is estimated that the population will begin to decline in 2017 because of the low birthrate and population emigration from the Tokyo metropolis (Utsunomiya City, 2015).

The study area was the Urbanization Promotion Area of Utsunomiya City. Utsunomiya is known for its historical artifacts and especially its 17th century castle, which is at the core of the present-day downtown. The main train station is JR Utsunomiya station on the east side of downtown, which provides frequent train service to central Tokyo or other large cities, so the number of its passengers is considerably larger than other stations in the Urbanization Promotion Area (Tochigi Prefecture, 2015). Moreover, public bus routes run radially from JR Utsunomiya as the hub (Utsunomiya City, 2016a). Although the public transportation networks in Utsunomiya are centered on that station, the share of public buses and trains for daily transportation in 2015 was only 4.6%. The share of cars was 67.5%, which was 9% larger than the average of all regions other than metropolises in Japan (MLIT, 2016).

People change their location in accord with life stage (Kim, Horner, & Marans, 2005), but most people in Japan tend to settle in their own house (MIC, 2015) when they marry or have children. Therefore, residents who were already married and lived in their own house were selected as study subjects. We also focused on young married couples under the age of 49 and whether they lived with their parents, in order to understand intergenerational relationships with population turnover. The population sample was extracted from data of a questionnaire survey by Utsunomiya City in 2011, which was tabulated by grid cells (1 km²). The grid cells are officially standardized by the Statistic Bureau based on longitude and latitude and the approximate shape of a square.

A summary of this survey is shown in Table 1. The respondents were classified as inheritors and migrators, according to the difference of residential transition based on answers to several questions. Those who lived with their parents were classified as inheritors, whereas the migrators were residents living independently from their parents. After

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