Check for updates

Analysis of Spatialization and Determinants of Urban Inclusiveness[*]

Kwon, Yeon-Hwa[**] · Choi, Yeol[***]

Abstract

This study analyzes Korean cities and national spaces from the perspective of "inclusiveness" to resolve conflicts occurring in urban spaces and pursue the sustainable development of national spaces. To evaluate urban inclusiveness, inclusiveness indicators were set by reviewing international discussions and various preceding studies. Based on the collected data, urban inclusiveness was analyzed and the factors affecting inclusiveness were examined.

The results showed that urban inclusiveness was low in cities with small population sizes and in rural areas. Seoul, the metropolitan area (including Incheon and Gyeonggi), Daejeon, Daegu, and Busan, which are the centers of the Gyeongbu line, showed high inclusiveness. However, the inclusiveness of the Gwangju, Jeolla, and Gyeongbuk areas that were off the Gyeongbu line was considerably low. Thus, it was confirmed that the inclusiveness of individual cities in the national territorial space greatly varies regionally. The fewer households receiving basic needs, the lower the ratio of old housing, the more rental housing, and the better access to public services (such as medical facilities, commercial facilities, public transportation, and parks), the higher the city inclusiveness.

Keywords Urban Inclusiveness, Inclusiveness Index, Global Autocorrelation Analysis, Local Spatial Autocorrelation, Binary Logit
주제어 도시포용성, 포용지표, 전역적 공간자기상관, 국지적 공간자기상관, 이항로짓

Ⅰ. Introduction

Cities are experiencing social inequality, extreme regional polarization and social exclusion due to rapid industrialization and urbanization, and such issues have been worsening by the day. To resolve conflicts in urban spaces and pursue sustainable urban development, the international community[1)] has been increasingly engaged in discussions on "inclusive growth," "inclusiveness," and "inclusive cities". The "Right to the City and Cities for All" was incorporated in the New Urban Agenda as a move to expand inclusiveness to not only socially vulnerable groups such as the elderly, children, females, the physically disabled, and the socially neglected, but to all members of society, highlighting the need to establish related policies.

Korea has also been experiencing problems such as slow economic growth and unbalanced income distribution. The economic polarization not only leads to social classes's polarization, but also to separate and divide urban spaces where residents live their daily lives (Kim, D.H. and Ko, Y.H., 2017). As a result, there is a growing debate in our society that economic gaps such as balanced development, social justice, participatory planning, fair society, mutual development, and spatial welfare should be eased, quality of life improvement and universal welfare, and sustainable spatial planning should be pursued (Moon J.H., 2017). To improve

the quality of life and pursue sustainable development of national spaces, the government has established inclusive policies that cover reducing income inequality, fair granting of opportunities and rights, and balanced regional development (Office of the President, 2018). The inclusiveness of individual cities has also been gathering interest (Park, I.K. et al., 2017; Byun, M.R., 2018; Lee, J.J. et al., 2018).

Against this backdrop, this study aimed to evaluate inclusiveness of all cities in Korea (including basic local governments) based on the new paradigm of "inclusiveness," so as to achieve sustainable development of urban and national spaces. Through the process of evaluating urban inclusiveness in terms of spatial inclusiveness, social inclusiveness, and economic inclusiveness it will be possible to identify areas that are far highly inclusive and areas that are not. The findings were utilized to identify indicators influencing the inclusiveness of individual cities. The study is expected to improve the imbalanced inclusiveness across national spaces, and provide insight for the establishment of policies that enhance the inclusiveness of individual cities.

II. Theoretical Review

1. Concept of the Inclusive City

Discussions on the inclusive city began with the concept of "The Right of the City[2)]" proposed by Lefebvre (1968), and resumed in the 2000s. In 2016, the inclusive city emerged as a new paradigm when "Cities for All" was adopted as the official agenda of UN-HABITATE III (Moon, J.H., 2017). Related discussions were led by international organizations such as ADB, World Bank, OECD, and UNDP (Table 1).

Inclusion, which constitutes the concept of the inclusive city, refers to involving the participation of groups excluded from mainstream society on the basis of ethnic group, gender, class, and cultural differences (Booth, 1996). Inclusion is a political goal aimed at overcoming social exclusion, inducing changes in the social structure to ensure equal opportunities for all members of society. The concept of the inclusive city focuses on urban features within the general definition of inclusion.

Under these situations the Korean government declared an "inclusive welfare state" as one of its national strategies, and local governments including Seoul Metropolitan City

Table 1. Discussions on inclusive cities

Division	Contents
ADB (2008)	- Long-term strategy (2020) for inclusive growth - Inclusive growth creates and expands economic opportunities, and the ultimate goal is to provide social services accessible to economic opportunities even for the poor, historically and socially excluded
World Bank (2009)	- Keynote change from the existing shared growth center to inclusive growth: Focusing on the effects of practical poverty reduction and equal distribution
ADB (2011)	- Inclusive Urban Redevelopment Project : Government-led expansion of spatial inclusiveness is promoted so that all residents can access the services available in the city through the maintenance of slums in the city center
OECD (2014)	- Inclusive Growth Framework: In order to solve the problem of poverty and inequality occurring in the process of economic growth, inclusive growth is a growth method that considers non-income-based factors such as education and medical care (reducing poverty, reducing inequality, expanding participation, sustainability)
World Bank (2015)	- Emphasis on the importance of social, economic, and spatial inclusiveness to end extreme poverty and enable all to share the benefits of economic growth
UNDP (2015)	- Sustainable Development Goals (SDGs) : Strengthening capacity to create an inclusive and sustainable urban space strategy and a participatory, inclusive and sustainable human settlement environment → Reflected in the UN-Habitat III (2016) preparation policy document
UN-Habitate III (2015, 2016)	- The New Urban Agenda: In The Right to the City, "All urban residents will be able to use, occupy and change the city as a public good, the services and opportunities it provides, and access to resources, which are necessary conditions for improving the quality of life. City inclusiveness is defined as the degree to which it is possible"

Note: Reorganized by ADB (2008, 2011), World Bank (2009, 2015), OECD (2014), UNDP (2015), Kim, S.J. (2015), UN-Habitat III (2015, 2016), Lee, J.J. et al. (2018)

are developing indicators and conducting policy research to achieve the vision of the inclusive city. One Korea-based study stated that becoming an "inclusive city," which overcomes discrimination against and exclusion of the socially disadvantaged, is a comprehensive solution to resolving various social conflict faced by cities (Park, I.K., 2015). Inclusion city is a concept that embraces the concept of inclusive growth in regional and spatial context (Moon J.H., 2017) and is a term established in terms of urban policy and planning, with more active interpretation of the concept of inclusive growth and its derived policy implications. (Lee J.J. et al.,

2018). Kim, S.J. (2018) stated that the inclusive city is an urban society that can be realized when urban residents are guaranteed access to services and opportunities, and participate in key decision-making processes.

Based on various related discussions, this study defined the inclusive city as a city in which all urban residents are guaranteed access to services, opportunities and resources provided by the city, and are able to use and change such assets as desired. The inclusiveness of city comprised access to services provided by the city (spatial inclusiveness), access to opportunities according to individual capacity (economic inclusiveness), and access to key decision-making processes in urban spaces (social inclusiveness).

2. Indicators of the Inclusive City

Various studies were conducted at home and abroad on indicators of inclusiveness for urban inclusiveness assessment, thereby generating meaningful discussions on the topic. In the early days, most research was focused on indicators related to inclusive growth (Kim, S.J., 2018). As an inclusiveness index to diagnose inclusive growth and inclusive cities, ADB (2010) proposed indicators to measure inclusive growth at the national or project level. ADB (2011) presented 35 indicators (poverty and inequality, economic growth and employment, key infrastructure endowments, access to education and health, access to basic infrastructure, gender equality and opportunity, social safety nets, governance and institutions) under eight domains. OECD (2015) presented the Multidimensional Living Standards (MDLS) as indicators. Byun, M.R. et. al. (2017) developed Seoul-type inclusive city indicators for inclusive city assessment, where the indicators were categorized into six elements under three domains: people (economic capacity, social well-being), space (access to living infrastructure, access to public services), and governance (citizen participation, transparency, responsibility). Lee, J.J. et. al. (2018) developed indicators to analyze the inclusiveness of Gyeonggi-do Province, examining eight elements under the three domains of spatial inclusiveness (housing, infrastructure, education), people inclusiveness (participation, population), and social/cultural inclusiveness (employment, welfare, safety). Extensive discussions were carried out on inclusive city's components such as including spatial elements,

social elements, economic elements, physical environment and qualitative environment, people, space, governance, capacity building, mutual dependence, participation, and spatial development (Table 2).

As mentioned, the inclusive city is a city where all present and future generations share physical, political and social spaces without discrimination, have access to housing, public goods, and services, are guaranteed social and political involvement, and are embraced for their diversity. To diagnose the inclusiveness of cities in Korea, this study examined spatial, social and economic aspects based on not only the inclusiveness index, but also inclusive city components presented in Table 2. First, inclusiveness in the spatial domain, which focuses on housing and public services, comprised housing conditions and access to various public services. Second, inclusiveness in the social domain concerns social change and participation, and was examined through par-

Table 2. Discussion on the conceptual components of an inclusive city

Division		Contents
World Bank (2009)	Spatial inclusion	Affordable land, Improved access to housing service
	Social inclusion	Improving the condition for individual and group participation
	Economic inclusion	Guaranteed opportunities for all, Expectations and distribution of prosperity
OECD (2015)	Physical environment	Income, Jobs, Housing
	Quality of life	Health, Education and training, Environmental quality, Personal safety, Citizen participation and governance, Access to services
Byun, M.R. et al. (2017)	People inclusion	Economic capacity, Social well-being
	Space inclusion	Access to living infrastructure, Access to public services
	Governance inclusion	Citizen participation, Transparency, Responsibility
Park, I.K. and Lee, M.J. (2016)	Capacity building	Income, Health, Education, Culture
	Interdependence	Fair division of labor, Social reciprocity
	Participation	Actual participation, Power distribution
	Spatial development	Inexpensive housing, External orientation, Spatial integration

Note: Gyeonggi-do-Type Inclusive City Policy and Action Plan, 2018, requote

ticipation in decision-making and governance, and demographic and social changes. Third, inclusiveness in the economic domain includes elements contributing to more abundant urban living, and was comprised of economic activities and social welfare. Individual components were constructed using the acquisition and utilisable indicators.

3. Literature Review

Most local studies have focused on defining the concept of the inclusive city and on developing indicators. Park, I.K. (2015) established the concept of the inclusive city, reinterpreted Korea's urban policies, and proposed participation, mutual dependence and spatial inclusion as conditions of the inclusive city. Other studies viewed the inclusive city as a solution to issues faced by cities in Korea, developed indicators of urban inclusiveness (Park, I.K. and Lee, M.J.; 2016), and analyzed characteristics by type based on inclusiveness assessment of local cities (Park, I.K. et al., 2017). Kim, S.J. (2015) proposed indicator development and systematic implementation to establish inclusive city policies that reflect circumstances unique to Korea. Moon J.H. et al. (2016) proposed policy directions such as implementing space services, strengthening participation capacity and governance as a pursuit of rights and happiness, strengthening opportunity equity and improving system for regional development. More recent studies have developed indicators for specific areas such as Seoul, Gyeonggi-do Province, Gwangju, and Busan, and examined inclusiveness-related policies and action plans (Byun, M.R., 2018; Lee, J.J. et al., 2018; Kim, G.G., 2018, Oh, J.H. et al., 2019). Sohn, J.H. et al. (2016) expanded the concept of the inclusive city to spatial, social and economic domains, and proposed urban planning with spatial (safety of public spaces, pedestrian and traffic safety, housing safety) and socioeconomic (support for vulnerable classes, inter-generation integration, etc.) elements to achieve the inclusive city. Hwang, S.A. et al. (2016) selected indicators to prioritize among social and physical

indicators of the inclusive city, and emphasized the need for plans that include vulnerable classes and improvement of related policies.

Past research established the concept of inclusiveness and the inclusive city, identified components of the inclusive city, and developed related indicators. However, few studies have attempted to utilize indicators in assessing the inclusiveness of national spaces and individual cities. Therefore, this study first established an inclusiveness index for the 229 cities (basic local governments) constituting Korea's national space, and assessed the inclusiveness of individual cities based on the index. Empirical analysis was performed to identify indicators influencing urban inclusiveness, and the roles to be played by different sectors were examined for the purpose of expanding national space inclusiveness and enhancing urban inclusiveness.

III. Overview of Inclusiveness Indicator Selection and Analysis

1. Selection of Inclusiveness Indicators

To evaluate urban inclusiveness, indicators proposed by international organizations and in past research were reviewed. Next, indicators suitable for cities in Korea were selected. The indicators for assessment of the inclusiveness of individual cities were selected with reference to the principles of indicator selection adopted by the Ministry of Land, Transport and Maritime Affairs (2010) (Figure 1). In Step 1, the theoretical basis for indicator selection was established by reviewing past research and identifying indicators regarded as highly related to urban inclusiveness, as presented in Table 3. In Step 2, the indicators were assessed in terms of representativeness of urban inclusiveness, and reorganized by domain to prevent overlapping. In Step 3, directionality was determined according to changes in indicator values, and indicators were adjusted such that larger values meant higher inclusiveness. Preliminary indicators were
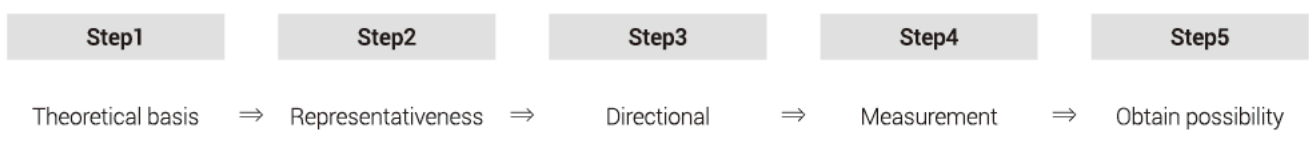
Step1	Step2	Step3	Step4	Step5
Theoretical basis $\Rightarrow$	Representativeness $\Rightarrow$	Directional $\Rightarrow$	Measurement $\Rightarrow$	Obtain possibility

Figure 1. Principles and procedures of indicator selection

Table 3. Inclusion indices in previous study

Division	Related indices
Housing	- Deterioration of buildings, redevelopment and redevelopment projects, deteriorated housing buildings, etc. - Comprehensive housing price sales index, median (average) housing price, etc. - Enhancement of public rental housing, burden of housing expenses, satisfaction with residential environment, separation of residence for the poor, etc. - Water supply/sewer penetration rate, etc.
Public service	- Ratio of national and public childcare facilities and kindergartens, budget for education expenses, number of local child centers, distance from daycare centers and kindergartens, distance from elementary schools, etc. - Number of workers in medical institutions, number of emergency medical specialists, etc. - Distance from hospitals and clinics, distance from 5 major commercial banks, etc. - Public cultural budget ratio, area and utilization rate of public cultural facilities, accessibility and satisfaction, distance from public library, etc. - Park (open space) area, green rate, green environment satisfaction, distance from park, etc. - Public transportation use and satisfaction, access to public service facilities, distance from community center, distance from bus stop, etc.
Social participation	- Turnout, percentage of volunteers, percentage of local council women, female public servants, etc. - Number of civic groups, community participation rate, social group support budget, participation budget project rate, etc. - Public Internet, administrative information disclosure rate, deliberation democracy, etc
Social change	- Population (female population) inflow rate, youth population rate, aging rate, etc. - Openness to foreigners, tolerance to minorities, separation of foreign residents, etc.
Economic activity	- Proportion of working-age population, ratio of university graduates among working-age people, GDP per capita, economic growth rate, etc. - Number of businesses per 1,000 population, number of social and economic organizations, new business registration rate, closing rate, etc. - Employment rate/employment rate, employment rate for the disabled, employment rate for non-regular workers, employment rate for low-wage workers, unemployment rate, etc. - Wage gap, income satisfaction, job access, etc.
Welfare	- Social welfare budget, recipients (low-income single-parent households, disabled people, elderly living alone, old-age pension, etc.) - Life expectancy, infant mortality rate, subjective health satisfaction, stress perception rate, etc. - Poverty rate, Gini coefficient, elderly/child poverty rate, retirement income guarantee rate, density of vulnerable groups, etc.
Safety	- Traffic safety index, 5 crime rates, violation of basic order, etc. - Fire damage, wind and water damage safety service, emergency response service, etc. - Number of police officers and firefighters per 1,000 population, etc.
Transparency, Governance	- Neighbor confidence, integrity and reliability of public institutions, regional pride, corruption perception, etc. - Social network of low-income class, community solidarity, leadership, governance, norms, etc.

Note: Reference Kim, S.J. (2015), EU (2015) National Statistics (2015), Park, I.K. and Lee, M.J. (2016), OECD (2014), Byun, M.R. (2017), Cho, E.S. (2017), Lee, J.J. et al. (2018), Lee, R. (2019)

selected in the process up to Step 3, and evaluated in terms of measurability (Step 4) and clarity. In Step 5, final indicators were selected for comparison of urban inclusiveness by examining the possibility of obtaining related data from statistical databases and public institutions (Table 4).

Urban inclusiveness was examined in terms of spatial inclusiveness, social inclusiveness, and economic inclusiveness. Spatial inclusiveness comprised housing and public services. Housing services included percentage of houses over 30 years old, housing price change rate, and rental housing supply ratio, and public services included percentage of access to educational (elementary schools), medical (public medical facilities), commercial (traditional mar-

kets), and public transportation facilities (bus terminals) within 15 minutes by public transport or foot, number of cultural facilities per 100,000 people, and park area per person. Social inclusiveness was divided into social participation and social change, where social participation included local election turnout,[3] number of non-profit organizations per 1,000 people, and proportion of female local council members, and social change included population change rate in the past five years, elderly rate, and ratio of foreigners. Economic inclusiveness comprised economic activity and welfare, where the former included economically active population, and rate of change in number of businesses and workers in the past five years, and the latter involved social

Table 4. Selection of indicators for urban inclusiveness evaluation

Variables				Related indices in previous study		Source
Spatial inclusiveness	Housing	Percentage of old houses over 30 years	OH	Old houses		1,6
		Housing price change rate	HP	Housing price change		2,4
		Rental housing supply ratio	RH	Rental housing		2,3,4,5
	Public service	Percentage of access to educational facilities within 15 minutes by public transport or on foot	PEF	Access to educational facilities		2,4,5,6
		Percentage of access to medical facilities within 15 minutes by public transport or on foot	PMF	Access to medical facilities		1,2,3,5,6
		Percentage of access to commercial facilities within 15 minutes by public transport or on foot	PCF	Access to commercial facilities		6
		Percentage of public transportation or public transportation accessible within 15 minutes on foot	PPT	Access to public transportation		1,2,3,4,5,6
		Number of cultural facilities per 100,000 people (number)	NCF	Cultural facilities		2,5,6
		Park area for one person (m^2)	PAR	Park		2,4,5,6
Social inclusiveness	Social participation	Turnout for the 7th local election	ELE	Turnout		2,3,5
		Number of nonprofit organizations per thousand	NGO	Nonprofit organizations		3,5
		Proportion of female members of local council	PFM	Female members of local council		2,3,4
	Social change	Population change rate in the last 5 years	PC5	Population change		2,4,5
		Elderly rate	ER	Elderly		2,4,6
		Ratio of foreigners	RF	Foreigners		1,3,5
Economic inclusiveness	Economic activity	Economically active population	EAP	Eonomic activity		3,5
		Rate of change in the number of businesses in the last 5 years	BUS	Businesses change		2,5
		Rate of change in the number of workers in the last 5 years	WOR	Workers change		2,5
	Welfare	Social welfare budget	WEL	Social welfare budget		4
		Ratio of households receiving basic needs	BAS	Households receiving basic needs		1,3,5,6
		Number of medical personnel per thousand	MED	Medical personnel		1,5,6

Note: 1. Kim, S.j., 2015, A Study on Building Inclusive Cites in Korea, Ahn-Yang, Korea Research Institute for Human Settlements. 2. Park, I.K. and Lee, M.J. (2016), Development of the Construct of Urban Inclusivity and its Indicators System: For the Inclusive City Agenda in Korea, Space and Society, 26(4): 109-158. 3. Byun, M.R. et al. (2016), Framework of the Inclusive City Indicators and the Inclusiveness of Seoul. Seoul, The Seoul Institute. 4. Lee, J.J., et al. (2018), Gyeonggi-do-Type Inclusive City Policy and Action Plan, Gyeonggido Assembly, Korea. 5. Lee, L. (2019), Urban Regeneration Evaluation Index Development Direction of Inclusion Index, Korea Management Association. 6. Cho, E.S. (2017), Complex Deficiency Diagnosis and Community Regeneration Direction, Busan Social Welfare Development. Busan, Korea

welfare budget, ratio of households receiving basic needs, and number of medical personnel per 1,000 people.

2. Analytical Method and System

1) Standardization of Indicators

Based on the final selected indicators, data was obtained from the KOrean Statistical Information Service (KOSIS),

Ministry of the Interior and Safety, National Election Commission, and basic local governments to analyze the inclusiveness of cities in Korea and to determine factors influencing inclusiveness. The reference year was 2017, and the latest available data was used if data for 2017 was unavailable. Since the indicators varied in unit and weights, they were standardized through the converting process shown in Eq. 1.

$$x_{i=w} = \frac{x - x_{\min}}{x_{\max} - x_{\min}} \tag{1}$$

x: Original value

The converting equation of "(indicator value-minimum value)÷(maximum value-minimum value)" allows comparison of data originally expressed in different units. The indicators were standardized such that all values fell in the range of 0 to 1. Indicators for which higher values were more negative were standardized using "1-(indicator value-minimum value)÷(maximum value-minimum value)". The calculations were performed separately by indicator, and the direction for inclusiveness evaluation according to variables was the same. Similar to OECD's standardization process, the values were multiplied by 100 for indicators to be distributed in the range of 0 to 100, thereby facilitating summation and comparison across indicators (Ahn, S.H. et al., 2017).

2) Local Moran's I

Through the above process, we established attribute data for inclusive indicators and prepared spatial analysis data to analyze the inclusiveness of all cities in Korea by linking them with urban spatial data (administrative district units). Local Moran's I is commonly used to analyze hot spots when data is collected in the unit of administrative districts.[4] This method identifies zones that are significantly different from neighboring zones by comparing zones in proximity (Kang, H.J., 2008). Since spatial autocorrelation is considered, it is possible to identify hot spots that reflect settlement patterns. Local Moran's I assumes that the target zone is similar to the neighboring zone, and rejects the hypothesis if significantly different attributes are exhibited, making the target zone a hot spot. The local Moran's I (I_i) equation is provided below (Getis and Ord, 1992; Anselin, 1995; Levine, 2004).

$$I_i = \frac{(Z_i - Z)}{S_i^2} \cdot \sum_{j=i}^{n} [w_{ij} \cdot (Z_i - \overline{Z})] \tag{2}$$

S_i^2: Variance, w_{ij}: matrix of spatial weights Z: local attribute

w_{ij} is generally expressed as the proximity of the target zone or the inverse of the distance of between Z_i and Z_j.

Global Moran's I_i is the standardized value of the difference between the target zone and neighboring zone, and can be used to represent similarity or difference between two zones. A high positive (+) value indicates high similarity between the target zone and neighboring zone, while a high negative (-) value implies that the target zone is clearly distinct from the neighboring zone (Lalor and Zhang, 2001).

This study employed ArCGIS for spatial analysis and spatial statistical analysis, and used the SAS statistical package to analyze factors influencing inclusiveness. First, the GIS mapping tool was used to display the spatial distribution of original data, and the results of spatial data analysis were visualized. Second, spatial autocorrelation was determined by using global Moran's I for cluster pattern analysis. Third, cluster features were derived from local Moran's I values. Lastly, the influencing power of individual inclusiveness indicators on urban inclusiveness was analyzed. For this purpose, the influencing power of individual inclusiveness indicators was analyzed under a binary Logit model after categorizing zones into those exhibiting urban inclusiveness (HH = 1) and those that do not (other = 0) based on local Moran's I analysis.

In sum, the spatial autocorrelation of cities in Korea was first determined using global Moran's I, and homogenous regions were identified using local Moran's I. Among regions with homogeneity, factors affecting overall urban inclusiveness were analyzed by distinguishing areas with high urban inclusiveness and areas with low urban inclusiveness.

3. Basic Statistics of Analytical Data

The basic statistics of variables selected as indicators for inclusive evaluation of 229 cities nationwide are shown in Table 5. Under spatial inclusiveness, the percentage of old houses over 30 years had a mean value of 25.31%, and a maximum of 69.7%. Housing price change rate had a mean of 0.36%, minimum of -0.214%, and maximum of 0.902%. The mean rental housing supply ratio was 10.55%, but there were some areas without any rental housing. The mean percentage of access to educational facilities (elementary schools) within 15 minutes by public transport or on foot was 84.10%, indicating that most cities were within walking distance of educational facilities. The mean per-

centage of access to medical facilities (public medical facilities) within 15 minutes by public transport or on foot was 42.59%, and that of access to commercial facilities (traditional markets) was relatively high at 46.74%. However, the maximum and minimum values show that there are significant differences by area. The mean percentage of access to public transportation (bus terminals) within 15 minutes by public transport or on foot was relatively low at 15.80%, and significant differences were observed across areas. The mean number of cultural facilities per 100,000 people was 5.1, but there were some areas without any cultural facilities per 100,000. Park area per person had a mean of 19.83m^2 and maximum of 93.2m^2, but some areas did not have any parks.

Under social inclusiveness, the mean turnout for the local election was 64.47%. The number of non-profit organizations per 1,000 people had a mean value of 63.03, but there were vast differences across areas with the maximum being 537 and the minimum being 1. The proportion of female local council members had a mean of 29.34%, maximum of 63.6%, and minimum of 9.1%. The population change rate in the last five years had a mean of 0.26%, and a minimum of -18.5%, indicating that some areas saw a rapid decline in population. The mean elderly rate was 19.42%, with most areas having a high elderly rate. The maximum elderly rate among the cities was 38.5%. The ratio of foreigners had a mean of 3.59%, maximum of 14.69%, and minimum of 0.52%, indicating that there were prominent differences by region.

Under economic inclusiveness, the mean economically active population was 68.41%, and the city with the minimum value had about half of its population being economically active (54.6%). The mean rate of change in the number of business and number of workers in the last five years was 9.74% and 12.69%, respectively. The maximum was 78.5% and 94.9%, and the minimum was -6.2% and -12.2%, respectively, indicating there were significant differences by region. The social welfare budget per 1,000 had a mean of KRW 1,128,960, maximum of KRW 4,479,000, and minimum of KRW 481,000. The ratio of households receiving livelihood benefits had a mean of 5.99%, and the maximum was a high 29.93%. The number of medical personnel per 1,000 had a mean of 12.86, minimum of 0.5, and maximum of 131, indicating there were significant differences by region.

Table 5. Selection of indicators for urban inclusiveness evaluation

Variables			Mean	S.E	Min	Max
Spatial inclusiveness	Housing	OH	25.31	0.97	1.6	69.7
		HP	0.36	0.01	-0.214	0.902
		RH	10.55	0.47	0	40.7
	Public service	PEF	84.10	1.17	25.86	100
		PMF	42.59	1.26	5.3	100
		PCF	46.74	2.07	0	100
		PPT	15.80	0.88	0	62.07
		NCF	5.1	0.21	0	17.6
		PAR	19.83	1.17	0	93.2
Social inclusiveness	Social participation	ELE	64.47	0.51	51.6	82.7
		NGO	63.03	5.10	1	537
		PFM	29.34	0.85	9.1	63.6
	Social change	PC5	1.26	0.82	-18.5	129.3
		ER	19.42	0.52	7	38.2
		RF	3.59	0.16	0.52	14.69
Economic inclusiveness	Economic activity	EAP	68.41	0.38	54.6	78.24
		BUS	9.74	0.63	-6.2	78.5
		WOR	12.69	0.68	-12.2	94.9
	Welfare	WEL	1128.96	31.6	481	4479
		BAS	5.99	0.21	0.87	29.93
		MED	12.86	0.89	0.5	131

Ⅳ. Inclusiveness Analysis of Individual Cities

1. GIS-based Spatial Data Analysis and Visualization

1) Analysis of Spatial Inclusiveness Distribution

GIS visualization of the inclusiveness index was carried out using the natural breaks classification method developed by Jenks (1967). This method, which maximizes homogenity within classes and maximizes variance between classes, is known as a suitable method in the classification of real-world data (Lee, H.Y. and Sim, J.H., 2011). The spatial inclusiveness indicators of individual cities were examined in terms of housing and public services. In the spatial analysis results for spatial inclusiveness, areas colored in red can be seen as less vulnerable and having higher spatial inclusiveness than other areas, while those in blue have lower spatial inclusiveness (Figure 2).
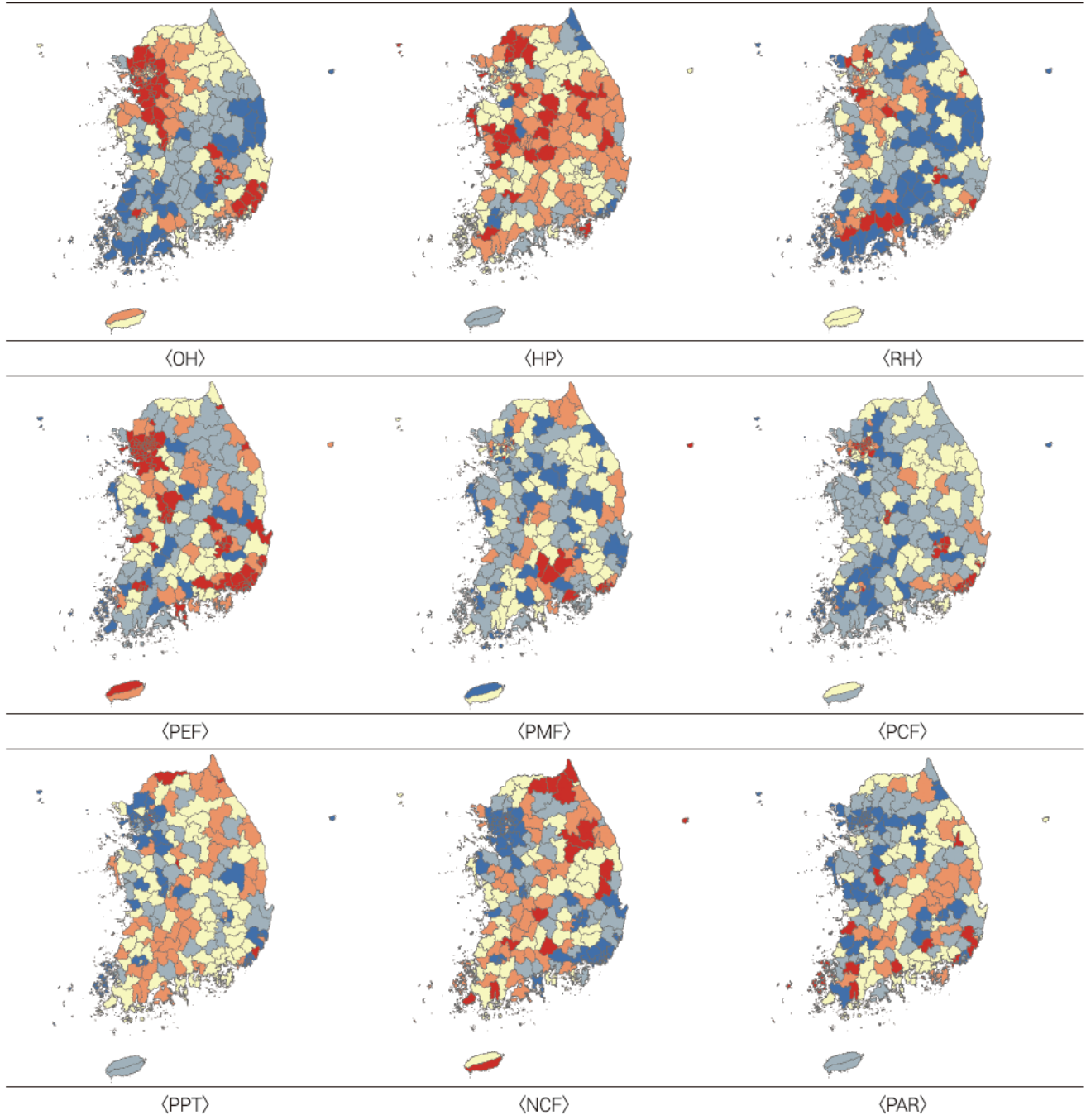
Figure 2. Spatial analysis map of spatial inclusiveness indicators

Among the housing services, the ratio of old housing, which indicates the vulnerability of urban residential space, is low in the metropolitan area and metropolitan city, which can be seen as having a lot of relatively pleasant housing in these areas. Housing price change rate was stable in Chungcheong and northern Gyeonggi, but fluctuated in larger cities, Sejong, innovation cities, and company cities. Rental housing supply ratio was higher in recently constructed areas including new cities, company cities, and innovation cities, which can be seen as the result of urban

development policies requiring new residential areas to supply a certain proportion of public housing. Spatial inclusiveness for housing was relatively high in regions formed under the development of new cities, industrial complexes, and innovation cities. To improve the inclusiveness for housing, it will be necessary to come up with policies such as various types of rental housing supply, inducing housing price stability, and managing old houses.

Accessibility to public services was determined by the percentage of access to such services within 15 minutes by pub-

lic transport or on foot. The metropolitan area and surroundings had high access to elementary schools, and inner Gyeongnam areas had high access to public medical facilities. In large cities enjoyed high access to traditional markets, and in northern Gyeongbuk and southern Gangwon was too. Northern Gangwon and Jeolla had good access to bus terminals, indicating high connectivity to other cities. Gangwon and Gyeongbuk had higher inclusiveness in terms of number of cultural facilities per 100,000. Large park area per person was observed for Sejong, Gijang-gun, and Ulju-gun, but regional characteristics were not as distinct. Spatial inclusiveness for public services was generally poor, except in some metropolitan cities. In order to increase accessibility to public services, it will be necessary to set a direction on whether to focus on hardware installation such as facility supply or strengthen smart software functions to enhance the utilization of existing facilities.

2) Analysis of Social Inclusiveness Distribution

The variables for social inclusiveness were divided into social participation and social change. On the spatial analysis map, areas colored in red are those with higher social inclusiveness, characterized by higher participation and more positive change (Figure 3).

The local election turnout was relatively high in rural areas, i.e. inner Gyeongnam, southern Jeonbuk, and northern Gyeongbuk. The non-profit organization activity was especially vigorous in Jinan-gun (Jeonbuk-gun), and it was also well carried out in Muan-gun and Jangsu-gun. The proportion of female local council members was high in Seoul and parts of Gyeonggi, and metropolitan cities such as Daejeon, Daegu, and Busan. In the social change sector, the population change rate was high in areas undergoing large-scale development such as surrounding Sejong-si and Naju-si, or located close to industrial facilities like some metropolitan areas (Gimpo-si, Hwaseong-si, Gwangju-si, etc.). In most cities and counties except for the metropolitan area and the Gyeongbu line, the elderly rate was quite high, indicating that these areas were quite vulnerable in the population structure. Except for Pocheon-si, where U.S. military units are located, the ratio of foreigners was high in industrial cities such as Eumseong-gun, Jincheon-si (inno-
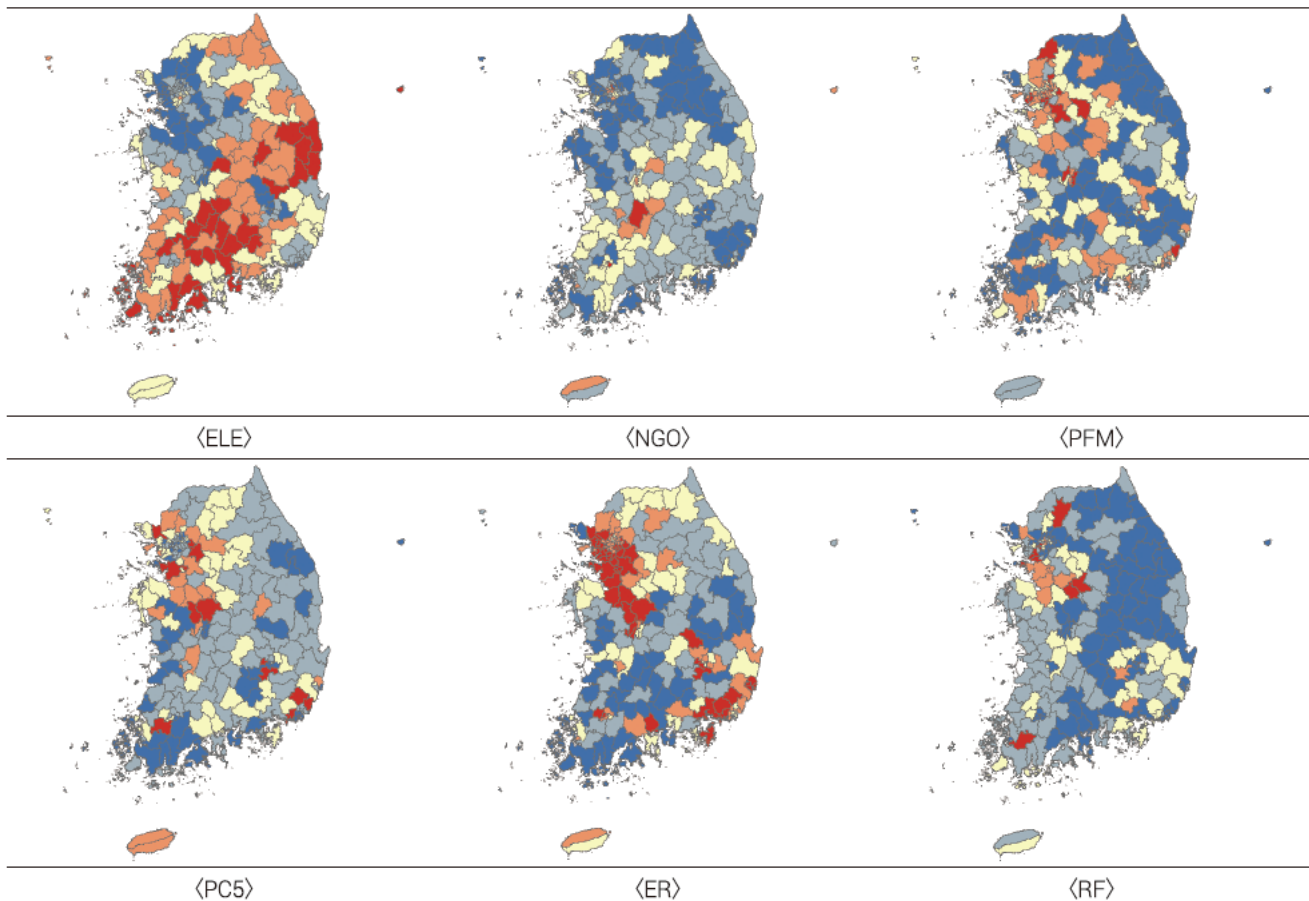

⟨ELE⟩   ⟨NGO⟩   ⟨PFM⟩

⟨PC5⟩   ⟨ER⟩   ⟨RF⟩

Figure 3. Spatial analysis map of social inclusiveness indicators

vative city), Yeongam-si (corporate city), Siheung-si, and Ansan-si.

3) Analysis of Economic Inclusiveness Distribution

The economic inclusiveness of individual cities was examined in terms of economic activity and welfare. On the spatial analysis map, areas colored in red are those with higher economic inclusiveness, that is, higher economic activity and lower ratio of households receiving livelihood benefits (Figure 4). The economically active population was high not only in Seoul, metropolitan areas, Daejeon, Daegu, Busan, but also Gumi-si, Gimhae-si, and Changwon-si. The rate of change in the number of businesses was high in the cities (Namyangju-si, Hanam-si, Paju-si, Gimpo-si, Hwaseong-si, Yangsan-si, Seongju-gun, Cheongju-si, Asan-si, etc.), which are areas known for having specialized industries. A similar trend was observed for the number of workers. Economic inclusiveness was high not only along the Gyeongbu line, that is, the metropolitan area, Sejong,

Daegu, and Busan, but also in Naju-si and Wanju-gun of Jeolla. Social welfare budget was higher in cities and counties that were not in the metropolitan area or along the Gyeongbu line. Households receiving livelihood benefits are more concentrated in Chungju-si, Gimje-si, Miryang-si, Jinju-si, and Tongyeong-si, as well as in cities and counties of Jeolla.

The number of medical personnel per 100,000 was higher in Chungju-si, Jinju-si, Miryang-si, Tongyeong-si, and Hwasun-gun, and lower in northern Gangwon and southern Gyeongsang. Welfare-related economic inclusiveness was good in the metropolitan area, northern Chungcheong, and southern Gyeongnam, but much poorer in other areas.

4) Spatialization of Urban Inclusiveness

Figure 5 presents the overall urban inclusiveness map, derived by examining urban inclusiveness in terms of spatial, social and economic inclusiveness. Table 6 gives the inclusiveness of individual cities. In Figure 5, areas colored in red
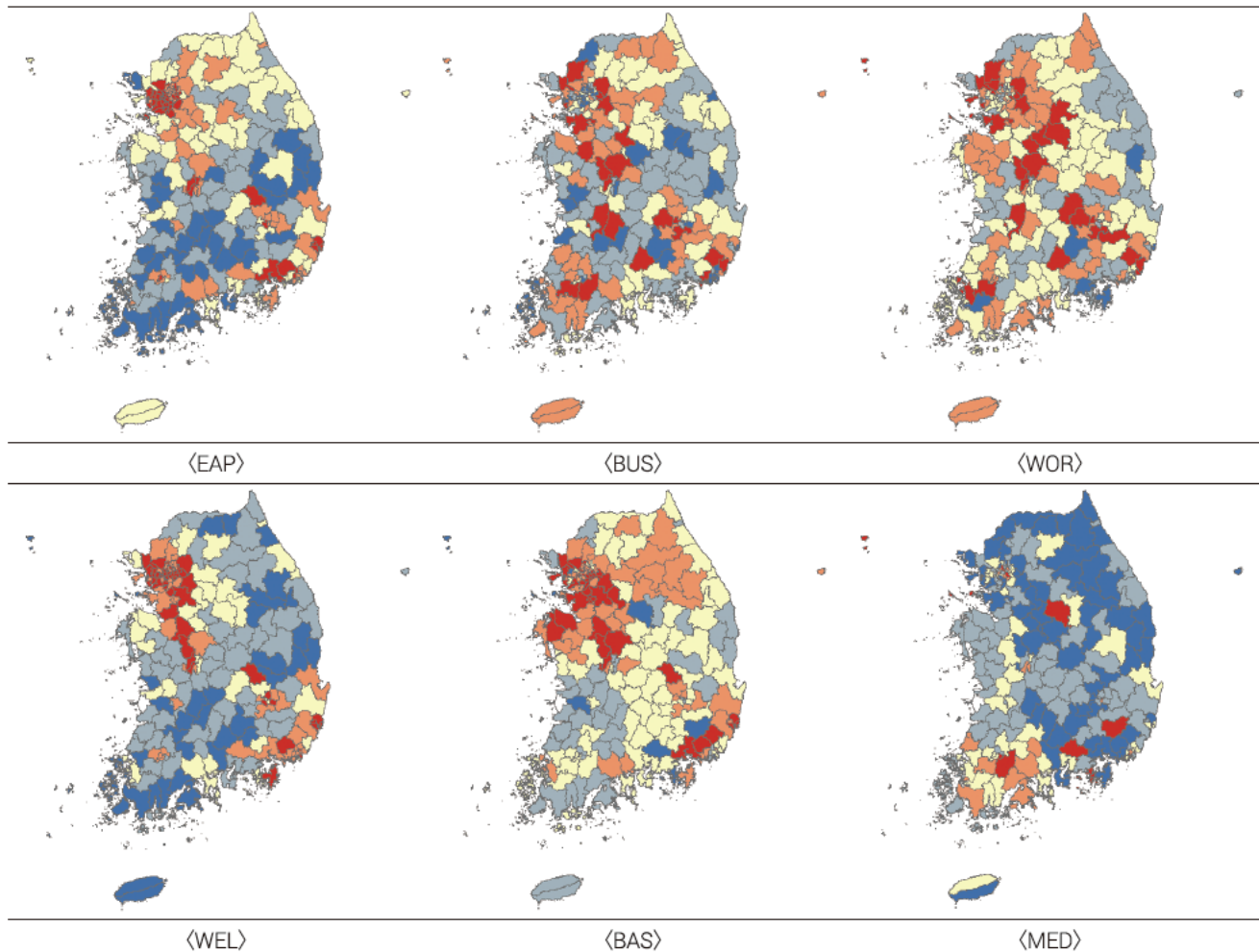

⟨EAP⟩　　　　　　　⟨BUS⟩　　　　　　　⟨WOR⟩

⟨WEL⟩　　　　　　　⟨BAS⟩　　　　　　　⟨MED⟩

Figure 4. Spatial analysis map of economic inclusiveness indicators
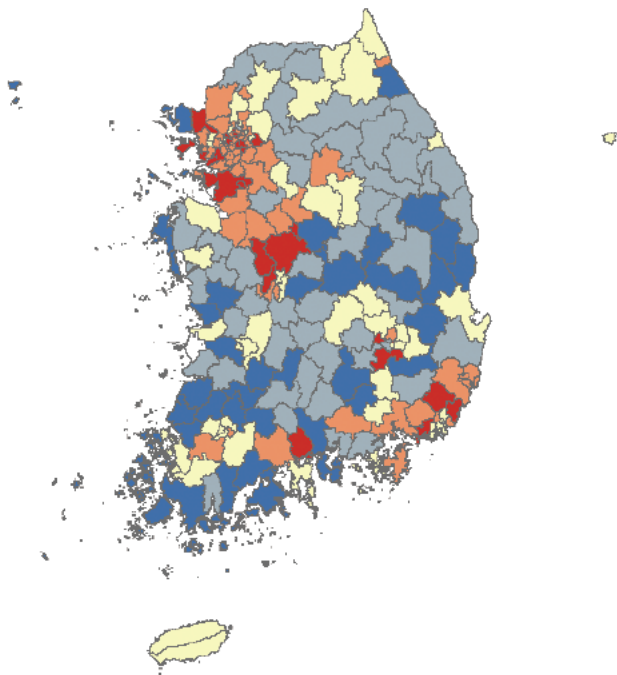
Figure 5. Urban inclusiveness map

Table 6. Distribution of urban inclusiveness

Division		City
High inclusiveness city	Seoul	Jongno-gu, Jung-gu, Yongsan-gu, Gwangjin-gu, Dongdaemun-gu, Seongbuk-gu, Seodaemun-gu, Mapo-gu, Gangseo-gu, Guro-gu, Dongjak-gu, Geumcheon-gu, Yeongdeungpo-gu, Gwanak-gu, Seocho-gu, Gangnam-gu, Songpa-gu
	Busan	Jung-gu, Dong-gu, Nam-gu, Buk-gu, Haeundae-gu, Gangseo-gu, Suyeong-gu, Sasang-gu, Gijang-gun
	Incheon	Jung-gu, Yeonsu-gu, Namdong-gu, Seo-gu
	Daegu	Jung-gu, Dong-gu, Dalseong-gun
	Gwangju	—
	Daejeon	Jung-gu, Yuseong-gu
	Ulsan	Nam-gu
	Others	Suwon-si, Seongnam-si, Anyang-si, Bucheon-si, Goyang-si, Guri-si, Osan-si, Siheung-si, Gunpo-si, Hanam-si, Gimpo-si, Hwaseong-si, Sejong-si, Cheongju-si, Gwangyang-si, Yangsan-si
Low inclusiveness city	Others	Ganghwa-gun, Jeongseon-gun, Yangyang-gun, Okcheon-gun, Yeongdong-gun, Goesan-gun, Danyang-gun, Buyeo-gun, Seocheon-gun, Taean-gun, Jangsu-gun, Sunchang-gun, Gochang-gun, Damyang-gun, Gokseong-gun, Goheung-gun, Boseong-gun, Haenam-gun, Hampyeong-gun, Yeonggwang-gun, Imsil-gun, Jangseong-gun, Wando-gun, Jindo-gun, Gunwi-gun, Uiseong-gun, Cheongsong-gun, Yeongyang-gun, Cheongdo-gun, Sinan-gun, Yeongdeok-gun, Yecheon-gun, Bonghwa-gun, Uiryeong-gun, Namhae-gun, Hadong-gun, Hapcheon-gun

are those exhibiting higher inclusiveness and lower vulnerability. Inclusiveness is high in Seoul and the metropolitan area (including Incheon), as well as in parts of Busan, Yangsan-si, Daegu (Dong-gu, Dalseong-gun), Daejeon (Jung-gu, Yuseong-gu), and Ulsan (Nam-gu). Other than metropolitan areas and metropolitan cities, high inclusiveness was observed in Sejong-si, Chungju-si, Yangsan-si, and Gwangyang-si, which are home to industrial complexes or business clusters.

Looking at the national space as a whole, there is a wider distribution of areas having low inclusiveness, and appropriate measures will be needed. When we evaluated the inclusiveness of cities in Korea using various inclusiveness indicators, the results revealed significant gap by region. In the process of narrowing this gap, urban inclusiveness can be improved at the national level.

2. Global Autocorrelation Analysis on Urban Inclusiveness

Spatial autocorrelation analysis is a traditional method of examining regional correlation or spatial distribution, and spatial autocorrelation is established when zones with similar spatial data are in proximity. Urban inclusiveness, determined by various urban activities and attributes, is thus not randomly distributed, but closely related to geographically neighboring zones. As such, this study used global Moran's I to determine the presence of spatial autocorrelation across the entire national space and to evaluate the significance of data (Table 7).

Global Moran's I indicates clustering if close to 1 or variance if close to -1. The spatial autocorrelation of urban inclusiveness revealed that Moran's I value was 0.312, predicted index -0.004386 and Z value was 22.36, indicating a strong cluster tendency.

In terms of spatial inclusiveness, the Moran's I and Z-score

Table 7. Global spatial autocorrelation analysis on urban inclusiveness

Grobal-Moran's I	Index	Z-score	P-value
Spatial inclusiveness	0.131	9.60	0.00
Social inclusiveness	0.225	16.21	0.00
Economic inclusiveness	0.314	22.50	0.00
Urban inclusiveness	0.312	22.36	0.00

were 0.131 and 9.60 respectively. In terms of social inclusiveness, the Moran's I and Z-score were 0.225 and 16.21, respectively. In terms of economic inclusiveness, the Moran's I and Z-score were 0.314 and 22.50, respectively. In other words, clustering tendencies increased in the order of economic inclusiveness, social inclusiveness, and spatial inclusiveness. High clustering patterns were seen for both inclusiveness by domain and urban inclusiveness as a whole.

3. Local Autocorrelation Analysis on Urban Inclusiveness

After determining the significance of cluster patterns for the national space global autocorrelation analysis, urban inclusiveness patterns were identified and examined through cluster and outlier analysis, which is a type of local spatial autocorrelation analysis. Local autocorrelation analysis identifies clusters of cities having similar standardized values at 95% reliability. Zones with high values surrounded by zones with high values are represented as HH, zones with low values surrounded by zones with low values as LL, zones with high values surrounded by zones with low values as HL, and zones with low values surrounded by zones with high values as LH.

Here, HL and LH can be seen as zones having unusual values compared to the average spatial autocorrelation index. HH zones are zones having high inclusiveness and sur-

rounded by similar zones, while LL zones are zones having low inclusiveness and surrounded by similar zones. LH zones are zones having low inclusiveness but surrounded by zones with high inclusiveness, and HL zones are zones having high inclusiveness but surrounded by zones with low inclusiveness.

The results of cluster and outlier analysis for urban inclusiveness are shown in Figure 6, and the inclusiveness of individual cities presented in Table 8. The metropolitan area,

Table 8. Local spatial autocorrelation analysis on urban inclusiveness

| Division		City
HH	Seoul	Jongno-gu, Jung-gu, Yongsan-gu, Seocho-gu, Seongdong-gu, Gwangjin-gu, Dongdaemun-gu, Jungnang-gu, Seongbuk-gu, Eunpyeong-gu, Dobong-gu, Nowon-gu, Seodaemun-gu, Mapo-gu, Yangcheon-gu, Yeongdeungpo-gu, Gangseo-gu, Guro-gu, Geumcheon-gu, Dongjak-gu, Gwanak-gu, Gangnam-gu, Songpa-gu, Gangdong-gu
	Busan	Jung-gu, Seo-gu, Dong-gu, Nam-gu, Buk-gu, Haeundae-gu, Geumjeong-gu, Gangseo-gu, Saha-gu, Suyeong-gu, Sasang-gu, Gijang-gun
	Incheon	Yeonsu-gu, Namdong-gu, Bupyeong-gu, Jung-gu, Gyeyang-gu, Seo-gu, Michuhol-gu,
	Others	Suwon-si, Seongnam-si, Uijeongbu-si, Anyang-si, Bucheon-si, Gwangmyeong-si, Pyeongtaek-si, Ansan-si, Goyang-si, Gwacheon-si, Guri-si, Namyangju-si, Osan-si, Siheung-si, Gunpo-si, Uiwang-si, Hanam-si, Yongin-si, Gimpo-si, Hwaseong-si, Gwangju-si, Cheonan-si, Paju-si, Asan-si, Gimhae-si, Yangsan-si
HL		Gwangsan-gu, Suncheon-si, Gwangyang-si
LH		Yeonje-gu, Ganghwa-gun, Ongjin-gun, Yeoju-si, Yeoncheon-gun, Gapyeong-gun, Taean-gun Yangpyeong-gun, Hongcheon-gun, Cheorwon-gun, Hwacheon-gun, Yesan-gun,
LL	Others	Gangneung-si, Taebaek-si, Jeongeup-si, Gimje-si, Namwon-si, Yeongju-si, Jeongseon-gun, Yeongdong-gun, Geumsan-gun, Seocheon-gun, Jinan-gun, Muju-gun, Jangsu-gun, Imsil-gun, Gurye-gun, Sunchang-gun, Gochang-gun, Buan-gun, Damyang-gun, Gokseong-gun, Goheung-gun, Boseong-gun, Jangheung-gun, Gangjin-gun, Haenam-gun Hampyeong-gun, Wando-gun, Yeonggwang-gun, Jangseong-gun, Jindo-gun, Sinan-gun, Sangju-gun, Gunwi-gun, Uiseong-gun, Cheongsong-gun, Yecheon-gun, Yeongyang-gun, Yeongdeok-gun, Bonghwa-gun, Namhae-gun, Hadong-gun, Sancheong-gun, Uljin-gun, Hamyang-gun, Geochang-gun, Hapcheon-gun
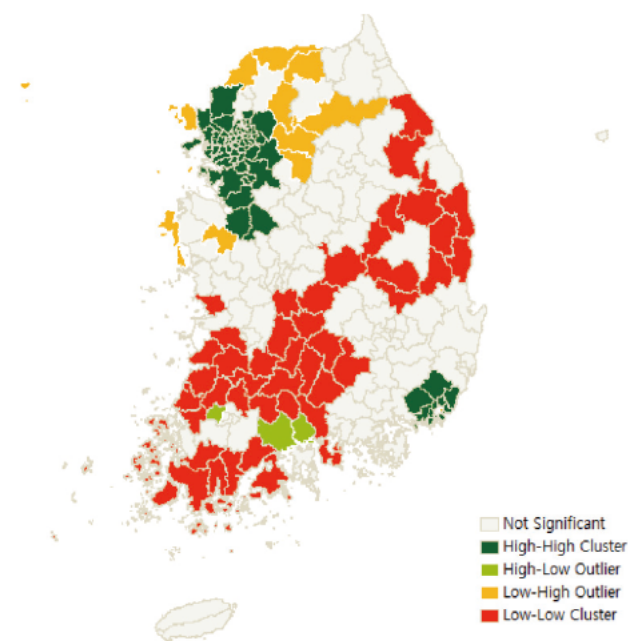
Figure 6. Cluster and outlier analysis for urban inclusiveness

including Seoul and Incheon, and areas surrounding Busan (Gimhae-si, Yangsan-si) were the only HH zones, and zones distributed between Gangwon and Jeolla were mostly LL zones. Gwangsan-gu in Gwangju, Suncheon-si, and Gwangyang-si were identified as HL, that is, areas having higher inclusiveness than surrounding areas, Yeonje-gu in Busan, Gwanghwa-gun in Incheon, Ongjin-gun in Incheon, Yeoju-si, Yeoncheon-gun, Gapyeong-gun, Yangpyeong-gun, Hongcheon-gun, Cheorwon-gun, Hwacheon-gun, Yesan-gun, and Taean-gun fell under LH, that is, areas having lower inclusiveness than surrounding areas. HH zones do not necessarily have high inclusiveness on an absolute scale, but are those found to have high inclusiveness and surrounded by areas with similarly high inclusiveness according to the results of spatial autocorrelation analysis.

The overall results of urban inclusiveness analysis (Table 5, Figure 5) identified Seoul and the metropolitan area, Daejeon, Daegu, and Busan as areas having high inclusiveness, whereas cluster and outlier analysis identified only the metropolitan area, including Seoul and Incheon, and areas surrounding Busan. This implies that areas exhibiting urban inclusiveness can be spatially concentrated. The areas identified as having high urban inclusiveness were the metropolitan area, including Seoul and Incheon, and the Busan area, which are characterized by their high population, extensive commercial activities, and well-established public services. Given the spatial differences in inclusiveness of individual cities, areas other than Seoul, Incheon and Gyeonggi are unlikely to see an increase in inclusiveness under current trends. Establishing policies to reduce differences across regions and to strengthen inclusiveness are thus essential for balanced and sustainable development of the national space.

4. Analysis of Determinants of Urban Inclusiveness

Based on the results of local autocorrelation analysis of urban inclusiveness, the attributes of cities having high inclusiveness were analyzed using a binary Logit model. The dependent variable was the classification of areas into HH (areas having high inclusiveness and surrounded by areas having similar high inclusiveness, HH = 1) and otherwise (other areas = 0), and independent variables were previously used inclusiveness indicators, namely, housing services (per-

centage of old houses over 30 years, housing price rate change, rental housing supply ratio), public services (access to educational facilities, access to medical facilities, access to commercial facilities, access to public transportation, number of cultural facilities, park area), social participation (election turnout, number of non-profit organizations, proportion of female local council members), social change (population change, elderly rate, ratio of foreigners), economic activity (economically active population, rate of change in number of businesses, rate of change in number of workers), and welfare (social welfare budget, ratio of households receiving basic needs, number of medical personnel).

The estimates, expressing the relationship between independent and dependent variables, were obtained using the maximum likelihood method; the results are presented in Table 9. Statistically significant likelihood of change in urban inclusiveness can be inferred from changes in independent variables, and analyzed using the odds ratio. The analysis revealed that inclusiveness was significantly influenced by percentage of old houses, rental housing supply ratio, access to medical facilities, access to commercial facilities, access to public transportation, park area per person, proportion of female local council members, ratio of foreigners, rate of change in number of workers, ratio of households receiving basic needs, and medical personnel. Under housing services, cities with a lower percentage of old houses and higher rental housing supply ratio had 1.124 and 1.127 times higher urban inclusiveness, respectively. Under public services, cities with access to medical facilities (higher proportion of facilities within 15 minutes), commercial facilities (higher proportion of facilities within 15 minutes), and public transportation (higher proportion of facilities within 15 minutes) had 1.069, 1.048, and 1.05 times higher urban inclusiveness, respectively. Cities with larger park areas per person had 1.068 times higher urban inclusiveness. Cities with a higher proportion of female local council members and higher ratio of foreigners had 1.144 and 1.104 times higher urban inclusiveness, respectively. Cities with a higher rate of change in number of workers saw a 1.085 times increase in urban inclusiveness. Cities with fewer households receiving livelihood benefits and more medical personnel per 1,000 had 1.387 and 1.097 times higher urban inclusiveness, respectively. Among the various inclusiveness indicators, the number of households receiving livelihood benefits had the

Table 9. Determinants of urban inclusiveness using Logit model

Variables			Estimates	Standard error	Prob>|r|	Odds ratio
Intercept 1			-38.6008**	15.4724	0.0126	
Spatial inclusiveness	Housing	OH	-0.1163*	0.0619	0.0602	0.89
		HP	-0.00753	0.0379	0.8425	0.992
		RH	0.1192***	0.0354	0.0008	1.127
	Public service	PEF	0.1072	0.0655	0.1018	1.113
		PMF	0.0671***	0.0242	0.0056	1.069
		PCF	0.0472*	0.0254	0.0633	1.048
		PPT	0.0484**	0.0241	0.045	1.05
		NCF	0.0237	0.0532	0.6561	1.024
		PAR	0.0657**	0.0314	0.0364	1.068
Social inclusiveness	Social participation	ELE	-0.0615	0.0461	0.1821	0.94
		NGO	-0.0579	0.0442	0.1905	0.944
		PFM	0.1347***	0.0382	0.0004	1.144
	Social change	PC5	-0.0465	0.068	0.4944	0.955
		ER	0.1685	0.1149	0.1426	1.183
		RF	0.0993***	0.0349	0.0044	1.104
Economic inclusiveness	Economic activity	EAP	0.1119	0.1016	0.2706	1.118
		BUS	0.0625	0.0529	0.2378	1.064
		WOR	0.0816*	0.0482	0.0905	1.085
	Welfare	WEL	0.0698	0.0906	0.4412	1.072
		BAS	-0.3273***	0.1017	0.0013	0.721
		MED	0.093**	0.0415	0.0252	1.097

1) *P < 0.1, **P < 0.05, ***P < 0.01.
2) R-Square: 0.6092, Max-rescaled R-Square: 0.8877
3) Likelihood Ratio0| Chi-Square: 215.1595, P < 0.001

greatest influence, indicating the need to actively support vulnerable groups and to implement policies aimed at expanding inclusiveness. Improving housing services is also expected to contribute to enhancing urban inclusiveness as the percentage of old houses and rental housing supply ratio were among highly influential factors.

V. Summary and Conclusion

This study examined Korea's cities and national spaces from the perspective of "inclusiveness" to resolve conflicts occurring in urban spaces and to pursue sustainable development of national spaces, and presented results useful for the development of policies and plans that seek to expand the inclusiveness of such spaces. Inclusiveness indicators were set by reviewing international discussions and related literature, and the collected data was analyzed in terms of spatial inclusiveness, social inclusiveness, and economic inclusiveness. After categorizing areas according to level of inclusiveness, the factors influencing inclusiveness were identified.

The results of analysis are as follows. Urban inclusiveness was low in cities with small population sizes and generally in counties. This can be traced to the establishment of population-based policies and plans, and supply of facilities matching the population. Considering the rapid increase in elderly rate and decrease in population, it is necessary to establish new standards for the supply and management of urban facilities. Seoul, the metropolitan area (including Incheon and Gyeonggi), Daejeon, Daegu, Busan, Ulsan, some new cities, industrial complexes, and company cities showed high inclusiveness, However, areas off the Gyeongbu line (Gwangju, Jeolla, Gyeongbuk, etc.) had low urban inclusiveness. From examining local autocorrelation on inclu-

siveness, clusters of cities with high inclusiveness were found only in the metropolitan area including Seoul and Incheon, and near Busan. The inclusiveness of individual cities in the national territorial space varies greatly depending on the region, which calls for efforts to reduce the regional gap in inclusiveness. The ongoing discussions on balanced regional development, decentralization, and strengthening of regional capacity should be carried out more efficiently.

Cities had higher inclusiveness when there were fewer households receiving basic needs, lower ratio of old houses, higher supply of rental housing, and better the access to public services such as medical facilities, commercial facilities, public transportation, and parks. Improving the urban environment with a focus on these indicators is expected to enhance urban inclusiveness. In terms of spatial inclusiveness, the government should supply residential service facilities by considering changes in demand and development of response technologies and prepare management measures applying smart technology to enhance accessibility and utilization of public services. In terms of economic inclusiveness, the government should expand jobs and economic bases that can increase the number of workers in the industry. And to expand inclusiveness in the dimension of welfare, they should manage households receiving livelihood benefits and secure sufficient medical personnel.

This study analyzed global and local autocorrelation on urban inclusiveness of Korea's national spaces in terms of spatial inclusiveness, social inclusiveness, and economic inclusiveness using the inclusiveness indices of past research, and employed a Logit model to examine factors influencing inclusiveness. While the authors attempted to utilize as many indicators as possible to achieve the purpose of the study, there were difficulties in obtaining related data for all cities (basic local governments).

The limitation of this study is thus the exclusion of certain indicators from the final analysis. The cities identified as having high (or low) inclusiveness can be further examined in follow-up studies of urban inclusiveness aimed at reducing regional imbalance, reducing social exclusion, and improving inclusiveness.

Note 1. International organizations and groups such as UN-Habitate, World Bank, OECD, and Asian Development Bank (ADB)

Note 2. See *The Right to the City* by Henri Lefebvre

Note 3. The election held closest to the time of data collection was the 7th local election on June 13, 2018

Note 4. Hot spots can be derived using hierarchy process or point location for data collected based on event occurrence, but such methods are difficult to apply to data collected in the unit of administrative districts

References

1. Ahn, S.H., Ki, J.H., and Yun, S.J., 2017. "The Use of Indicators for Evaluating Urban Sustainability: A Comparative Analysis of Korean and International Major Cities", *Space and Society*, 27(4): 183-217.
안승혁·기재홍·윤순진, 2017. "도시의 지속가능성 평가를 위한 지표의 활용: 국내외 대도시 비교 분석", 「공간과 사회」, 27(4): 183-217.

2. ADB, 2008. *Strategy 2020*. Manila: Asian Development Bank.

3. ADB, 2010. *Access to Justice for the Urban Poor: Toward Inclusive Cities*, Asian Development Bank.

4. ADB, 2011. *Inclusive Cities, Urban Development Series*, Asian Development Bank.

5. Anselin, L., 1995. "Local Indicators of Spatial Association –LISA", *Geographical Analysis*, 27(2): 93–115.

6. Byun, M.R., 2017. "Inclusive City Research Trends and Features", *Urban Issue*, 52(582): 26-29.
변미리, 2017. "포용도시 연구동향과 특징", 「도시문제」, 52(582): 26-29.

7. Byun, M.R., 2018. *Toward an Inclusive City: Developing Seoul-type Inclusive City Indicators and Diagnosing Inclusion*, Seoul: The Seoul Institute.
변미리, 2018. 「포용도시를 향하여: 서울형 포용도시 지표개발과 포용성 진단」, 서울: 서울연구원.

8. Byun, M.R., Cho, K.J., Park, M.J., Kim, J.A., Choi, Y.S., Choi, J.W., 2017. *Framework of the Inclusive City Indicators and the Inclusiveness of Seoul*, Seoul: The Seoul Institute.
변미리·조권중·박민진·김진아·최윤석·최지원, 2017. 「서울형 포용도시 지표체계 개발과 서울시의 포용성」, 서울: 서울연구원.

9. Booth, T., 1996. "A Perspective on Inclusion from England", *Cambridge Journal of Education*, 26(1): 87-99.

10. Cho, E.S., 2017. *Complex Deficiency Diagnosis and Community Regeneration Direction*, Busan: Busan Social Welfare Development.
초의수, 2017. 「부산의 복합결핍진단과 커뮤니티재생방향」, 부산: 부산복지개발원.

11. EU, 2015. *Portfolio of EU Social Indicators for the Monitoring of Progress Towards the EU Objectives for Social Protection and Social Inclusion*, EU: Belgium.

12. Getis, A. and Ord, J.K., 1992. "The Analysis of Spatial Association by Use of Distance Statistics", *Geographical Analysis*, 24: 189–206.

13. Hwang, S.A., Kim, J.G., and Sohn, J.H., 2016. "A Study on the Establishment and Application Plan of Social and Physical Indicators for the Inclusive City", *Journal of the Korean Society of Civil Engineers*, 36(4):735-745.
황선아·김종구·손지현, 2016. "포용도시를 위한 사회적·물리적 지표의 구축과 활용방안에 관한 연구", 「대한토목학회논문집」, 36(4): 735-745.

14. Jenks, G. F., 1967. "The Data Model Concept in Statistical Mapping", *International Yearbook of Cartography*, 7: 186-190.

15. Kang, H.J., 2008. "Hot Spot Analysis: Basics of Spatial Analysis, Recent Lean Cluster Analysis and Understanding and Using the Local Moran's Index", *KRIHS Monthly Magazine*, (324): 116-121.
강호제, 2008. "핫스팟분석기법(Hot Spot Analysis): 공간분석의 기초, 최근린군집분석과 국지모란지수의 이해와 활용", 「국토」, (324): 116-121.

16. Kim, D.H. and Ko, Y.H., 2017. "The Current State of Urban Polarization and Policy Implications", *KRIHS Policy Brief*, 106: 1-6.
김동한·고영화, 2017. "도시양극화의 실태와 정책적 시사점", 「국토계획 Brief」, 106: 1-6.

17. Kim, G.G., 2018. *A Study on the Acceptance and Settlement of Inclusive City in Gwangju*, Naju: Gwangju Jeonnam Research Institute.
김기곤, 2018. 「광주 지역사회의 포용도시 수용과 정착방안」, 나주: 광주전남연구원.

18. Kim, S.J., 2015. *A Study on Building Inclusive Cites in Korea*, Anyang: Korea Research Institute for Human Settlements.
김수진, 2015. 「포용도시정책 수립을 위한 기초연구」, 안양: 국토연구원.

19. Kim, S.J., 2018. *Reinterpreting the Right to the City in Korea: Policy Responses to Urban Vulnerable Areas*, Sejong: Korea Research Institute for Human Settlements.
김수진, 2018. 「포용도시를 위한 도시취약지역 실태와 정책제언」, 세종: 국토연구원.

20. Lalor, G.C. and Zhang C.S., 2001. Multivariate Outlier Detection and Remediation in Geochemical Databases, *Science of The Total Environment*, 281(1-3): 99–109.

21. Lee, H.Y. and Sim, J.H., 2011. *Geographic Information System*, Paju: Bobmunsa.
이희연·심재헌, 2011. 「GIS 지리정보학」, 파주: 법문사.

22. Lee, J.J., Kwon, H.S., and Kang, D.W., 2018. *Gyeonggi-do-Type Inclusive City Policy and Action Plan*, Suwon: Gyeonggido Assembly.
이재준·권혁성·강동완, 2018. 「경기도형 포용도시 정책 및 실천방안」, 수원: 경기도의회.

23. Lefebvre. H., 1968. Le droit a la ville. Paris: Anthropos. 〈English translation〉 1996. *Right to the city*. Kofman, E. and Lebas, E. (eds, and translators) Writing on Cities. Oxford: Blackwell Publishing.

24. Lee, L., 2019. *Urban Regeneration Evaluation Index Development Direction of Inclusion Index*, Seoul: Korea Management Association.
이립, 2019. 「도시재생 평가지표화 포용성지수 개발방향」, 서울: 한국능률협회.

25. Levine N., 2004. *Crime Statistics III: A Spatial Statistics Program for the Analysis of Crime Incident Locations*, Ned Levine & Associates, Houston, TX, and the National Institute of Justice: Washington, DC.

26. Ministry of Land, Transport and Maritime Affairs, 2010. *Urban Regeneration Project 1-1: Survey of Urban Decline of Korean Cities And Urban Regeneration of Foreign Countries*, Seoul National Seoul: University R&D Foundation.
국토해양부, 2010. 「도시재생사업 최종연구결과보고서: 도시쇠퇴 실태 자료구축 및 종합정보시스템 구축(제1권)」, 서울: 서울대학교 산학협력단.

27. Moon, J.H., 2017. "Background and Meaning of the Inclusive City", *Urban Issue*, 55(582): 22-25.
문정호, 2017. "포용도시 등장배경과 의미", 「도시문제」, 55(582): 22-25.

28. Moon, J.H., Lee, S.J., Kim, J.B., Min, S.H., Kim, S.J., and Park, K.H., 2016. *Conception, Normative Directives and Policy Tasks Towards Inclusive National Territory*, Anyang: Korea Research Institute for Human Settlements.
문정호·이순자·김진범·민성희·김수진·박경현, 2016. 「포용적 국토실현을 위한 정책과제 연구」, 안양: 국토연구원.

29. National Statistics, 2015. *The English Indices of Deprivation 2015*, Department for Communities and Local Government: UK.

30. OECD, 2014. *Report on the OECD Framework for Inclusive Growth*. Paris: OECD.

31. OECD, 2015. *All on Board: Making Inclusive Growth Happen*, Paris: OECD.

32. Oh, J.H., Kim, H.G., Park, S.P., and Kim, M.Y., 2019. *Strategies and Tasks of Busan as an Inclusive City*, Busan: Busan Development Institute.
오재환·김형균·박상필·김미영, 2019. 「도시권 보장을 위한 포용도시 부산 전략과 과제」, 부산: 부산연구원.

33. Office of the President, 2018. *2018 Inclusive National Strategy Meeting (2018. 9. 6)*, Seoul.
청와대, 2018. 「2018 포용국가전략회의(2018. 9. 6)」, 서울.

34. Park, I.K., 2015. "The Inclusive City: Concepts and Korean Experiences", *Space and Society*, 25(1): 95-139.
박인권, 2015. "도시의 공공성: 포용도시 개념과 한국의 경험", 「공간과 사회」, 25(1): 95-139.

35. Park, I.K. and Lee, M.J., 2016. Development of the Construct of Urban Inclusivity and Its Indicators System: For the Inclusive City Agenda in Korea, *Space and Society*, 26(4): 109-158.
박인권·이민주, 2016. "도시 포용성 구성개념과 지표체계의 개발: 한국의 포용도시 의제 설정을 위하여", 「공간과 사회」, 26(4): 109-158.

36. Park, I.K., Lee, M.J., Hong, Z., and Lim, I.S., 2017. A Typology of Korean Cities Based on Urban Inclusivity –Evaluation and Characterization by Type–, *Journal of the Korean Urban Management Association*, 30(3): 111-130.

박인권·이민주·홍철·임인선, 2017. "한국도시의 포용성 진단과 유형별 특성분석", 「도시행정학보」, 30(3): 111-130.

37. Sohn, J.H., Kim, J.G., and Hwang, S.A., 2016. "A Study on Establishment and Application of Planning Elements for the Inclusive City −Focused on Busanjin-Gu, Busan in Korea−", *Journal of Korea Planning Association*, 51(6): 5-21.
손지현·김종구·황성아, 2016. "포용도시 계획요소 구축 및 활용에 관한 연구: 부산광역시 부산진구를 대상으로", 「국토계획」, 51(6): 5-21.

38. UNDP, 2015. *Sustainable Development Goals*, United Nations Sustainable Development Summit 2015, New York: UNDP.

39. UN-Habitat, 2015. *Inclusive Cities*, Habitat III Issue Papers.

40. UN-Habitat, 2016. *Policy Paper No.1: Right to the City and Cities for All*, UN-Habitat.

41. World Bank, 2009. *What is Inclusive Growth?*, Washington DC: World Bank.

42. World Bank, 2015. *Inclusive Cities Approach Paper*, GSURR, Washington DC: World Bank.