

A Study on the Capital Area's Urban Type Analysis and Real Estate Characteristics

Moonoh Jeong¹ and Sangyoub Lee²

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Abstract: *In recent times, multi-centralization and decentralization as well as large Capital area and suburbanization in the spatial structure of capital area. With rapid growth, urbanization and industrialization are unsystematic, and growth inequality between regions caused negative effects such as discordant centralization and decentralization, fluctuating land value, and gap between living conditions. Accordingly, this study analyzed urban spatial indexes by the self-governed body in the capital area such as Seoul, Incheon, and Gyeonggi province for the analysis of the regional inequality phenomenon. We examined the characteristics of temporal and spatial changes in urban spatial structure in the capital area by utilizing the distribution pattern and density of city indexes such as population, employment, etc, and then drew the commonality of those factors through factor analysis. We evaluated the drawn results through the city standard index by each city, conducted factor score analysis, and identified the interaction between each factor and Housing Purchase Price Composite Indices index, housing rent price index(Housing Jeonse Price Composite Indices), land price fluctuation rate, diffusion ratio of house, and financial independence.*

Keywords: *Capital Area, Spatial Structure Analysis, Real Estate Characteristics, Regional Inequality*

I. INTRODUCTION

In the Seoul Capital Region including Seoul, rapid urbanization and industrialization were caused by the past short-term development. As this phenomenon progressed, we had more regions with poor infrastructure, the relative gap increased in terms of the basic living facilities, and population outflowed by the neighboring areas' industrial development. Thus, the potentiality of the city continued to decline in its function. The differences in urban function occurred by the regional inequality, and the relative deprivation between regions can be reduced into uneven regional development as well as balanced development of national land. (Lee Jae-won, 2006). In case of the capital area, regulations have been reinforced due to the regional balancing development policy, and subsequently the regional disparity within the capital area was relatively exacerbated(Park Seung-kyu, 2008).

This study aimed to draw and systematically analyze the indexes that could represent the urban characteristics in the capital area, and patternize the regions by year through gap analysis of urban characteristics by local autonomous government and statistical analysis. This study also aimed to identify the relationship of various regional inequality reasons such as inequality in infrastructure sector, educational condition sector, urban development policy sector, and industrial sector, and analyze how those sectors are affected by housing price gap, financial gap, land price gap, etc.

The financial gap continues to increase because the travel distance and time continues to increase as the

housing and urban development as well as the improvement of wide urban area occur unevenly, and uneven location of the land use such as disparities in workplace and dwelling structuralize the local finance gap as well as the trends of wide urban area improvement(Seong Hyeon-gon, et al. 2006).

As for the spatial areas to conduct our analysis, in this study, we conducted our research on 25 local autonomous regions in Seoul, 10 local autonomous regions in Incheon, and 31 cities(si) and counties(gun) in Gyeonggi province based on statistical data from 2005 to 2009, and as for the temporal aspects, we conducted our research on the statistical data from 2005 to 2009. So the aim of this study is to conduct our analysis and evaluation of the urban spatial structure through spatial structure indexes in the capital area and relevant literature survey.

As for our research procedure, first, we selected the indexes that can explain the urban spatial structure through literature and precedent studies and checked the level of urban spatial structure by local autonomous government through index standardization and weighted value work. In addition, we proceeded our factor analysis to check the components between variables, and analyzed the city level through factor scores. Lastly, we utilized housing price gap, financial gap, land price gap and factor analysis factor value to conduct regression analysis, and then examined the extent and meaning of the interaction between variables.

¹ Ph.D., Konkuk University, k04245@kab.co.kr

² Professor, Konkuk University, sangyoub@konkuk.ac.kr (*Corresponding Author)

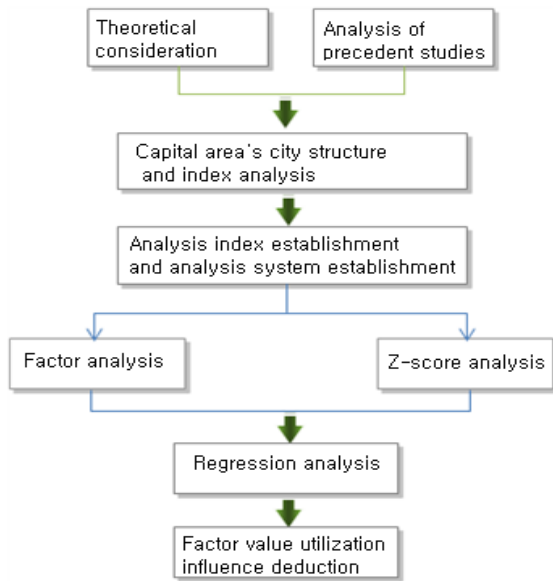


FIGURE I
RESEARCH PROCESS

II. URBAN SPATIAL THEORY AND PREVIOUS STUDY CONSIDERATION

In proceeding this study, we examined the characteristics of urban spatial structure in the capital area, examined the theories on the spatial structure to find out how the variables in terms of real estate aspects and financial variables are affected, and conducted our considerations on the characteristics analysis of the regional spatial structure based on the previous studies.

A. Theoretical Considerations of Urban Spatial Structure

Each and different city is different in terms of geographical and spatial factors, and also different formation factor in terms of periodical factors. Periodically, the cities are being changed into various industrial activities in terms of agricultural, commercial, and manufacturing sector, and those cities' functions were concentrated by the accumulation and then segmentalized and developed into specialized regional structure, and most of all, the biggest influential factor to the urban formation is industrial concentration (Ha Chang Hyeon, 2005).

In recent times, there are some opinions that put stress on the big city's multi-centralization and urban spatial structure's suburbanization and thus focus on the spatial separation between work place and residential area, and similarly in South Korea, we can find the reorganization of the spacial structure from Seoul-centered single core to strong point-centered multi-core (Jang Young-ho, 2010).

The concept of urban spatial structure can be divided into spatial aspect and non-spatial aspect that embraces physical forms, economic factors, social and cultural factors through various discussions.

TABLE I
FOLEY'S URBAN STRUCTURE FACTORS

Classification	Non-spatial aspects	Spatial aspects
Social Factor	Social value, cultural pattern, and social norm, institution, and technology	Spatial distribution of cultural patterns, physical environment, value system and norm related to the population's spatial pattern
Functional Factor	Separation and location of all functions, interdependence between functions, and the function's principle aspect, activity organization	Spatial distribution of function and activity, connectivity between functions, spatial pattern by function's type
Physical Factor	Physical objects and quality aspects	Spatial distribution of physical objects, land type, building structure, and spatial pattern by road

* Sources: Foley, Donald L(1964). An approach to metropolitan spatial structure. In Foley. Exploration into urban structure. pennsylvania : Univ. of Pennsylvania Press, pp23, Reorganization

B. Considerations on the Precedent Studies

To proceed this study, we examined and analyzed the precedent studies related to the urban spatial structure analysis. The urban spatial structure analysis can be divided into big city and capital area spatial structure analysis and regional growth, potential, inequality, and gap according to the aim of this study.

In the first place, when it comes to the studies on the changes in the urban spatial structure, An Geon-hyeok(1997) analyzed the proper level of population in the cities in Korea and stressed that we needed to make an exact analysis on the city size according to the urban development density, distance, and income level. Park Seong-Gu and Lee Chang-Soo(2005) analyzed that the distinguishing factors of self-sufficient new towns are commutability to the capital area and proper distance maintenance from the capital area. In other words, they maintained that key industries in new towns and educational and cultural facilities were the ways to improve the self-sufficiency of the new town itself. In addition, Jang Joon-Sang and Lee Chang-Moo(2006) analyzed the commutability and self-sufficiency level of 5 new towns in the capital area. As a result, shopping functions settled and the level of self-sufficiency continued to increase.

TABLE II

PRECEDENT STUDIES ON THE URBAN SPATIAL STRUCTURE CHANGE

Researcher	Details of research
An Geon-hyeok (1997)	Analyzed proper population level of Korea's cities and emphasized an accurate analysis on the city size according to the urban development density, size, distance and income level
Kin Hyeon-soo (2005)	Evaluated imbalance between work place and residential area to evaluate the employment-centered self-sufficiency
Park Seong-goo, Lee Chang-soo (2005)	Analyzed characteristic items in self-sufficient new towns. Maintained that key industries and the introduction of educational and cultural facilities were the ways to improve the self-sufficiency in new towns
Jang Joon-sang, Lee Chang-moo (2006)	Analyzed commutability and self-sufficiency in new towns. Shopping functions were settled with the increased employment opportunity and self-sufficiency degree continued to increase
Nam Gi-chan, Kim Hong-seok (2008)	Analyzed the effects of industrial structure and land use on the regional proximity by utilizing spatial measurement model.
Park Go-un (2009)	Classified the competitiveness measurement indexes into economic, social, and cultural indexes and analyzed the characteristics by city.

Nam Gi-Chan and Kim Hong-Seok(2008) analyzed the effects of industrial structure and land use on the regional proximity by utilizing spatial econometric model. Park Go-Un (2009) classified the urban competitiveness measurement indexes into economic, social, and cultural ones in the city of population with 200,000 people or more, and investigated the characteristics by city. They segmentalized the classification again into the knowledge-based manufacturing industry and service industry and checked the growth trend of knowledge-based industry in an individual city.

To study on the regional inequality, gap and potential by city, Lee Joo-Hee (2002) utilized such indexes as financial sector, city planning status, residential sector, industrial sector and educational sector to figure out the reasons of regional gap between the southern part and northern part of Han river, Seoul and conducted a ratio analysis by index. Jeong Hui-Yoon (2005) established the indexes that represent the urban characteristics such as the rate of population growth, population aging index, the ratio of parking space, and park area per person, and analyzed the influential factors by spatial structure gap between new town and old town through factor analysis and group analysis.

TABLE III

PRECEDENT STUDIES ON REGIONAL INEQUALITY, GAP, POTENTIAL IN A CITY

Researcher	Details of research
Lee Joo-Hee(2002)	Utilized indexes such as financial sector, city planning status, residential sector, industrial sector and educational sector to figure out the reasons in relation to the gaps in the southern part and northern part of the Han river, Seoul and conducted ratio analysis by index
Jeong Hui-yoon (2005)	Established indexes that indicate urban characteristics and analyzed the influential factors of spatial structure gap through factor analysis and group analysis.
Choi Yeol and Kim Hyeon(2008)	Analyzed the regional growth potential with 2SLS least squares method by utilizing the economic, location, key industry, land use, potential factors.
Jeon Byeong-hye, Lee Myeong hoon and Ok Seok-moon (2008)	Conducted factor analysis and group analysis to analyze the regional characteristics by city
Park Seung-kyu, Yoon Jong-hyeon (2008)	Analyzed an individual data in 18 cities with Gini's coefficient, coefficient of variation, and Theil coefficient
Jeon Young-seo (2009)	Conducted a statistical verification about regional development gap for imbalanced growth reasons

Bettinal Aten and Alan Heston (2005) stressed that the real regional income was an important variable that could be influential in analyzing the regional gap. Choi Yeol and Kim Hyeon (2008) conducted an analysis with 2SLS least squares method in order to examine the interdependence while utilizing economic potential, location, key facility potential, and land use potential for an actual analysis on the regional growth potential that affected regional finance and budget.

Park Byeong-Ho et al.(2008) conducted a comparative analysis on the urban and social factor, economic factor, and welfare factor in local cities, and provided the types on the city-center decline and the entire city decline using distributed index and hollowization index. Jeon Byeong-hye, Lee Myeong-hoon, and Ok Seok-moon (2008) conducted a factor analysis and a group analysis on the population and facility in 3 cities and provinces in the capital area to analyze the regional characteristics by city and stressed the urban growth management system establishment.

Jeon Young-seo (2009) conducted a statistical verification of the factors that could determine the regional development gap in 16 cities and provinces in South Korea based on the industrial organizational method when it comes to the inequality growth reasons that might hinder the balanced regional development. As a result, the manufacturing industry concentration and competitiveness affected the regional development gap.

To proceed this study, we set up the indexes based on the precedent studies in our analysis of city index and applied variables and analysis methods that represent the city characteristics in more detail to differentiate from the existing studies, and then compared and analyzed. We conducted an analysis on the overall influence in the local autonomous districts in Seoul and Incheon and the cities(si) and counties(gun) in Gyeonggi province and examined the characteristics of the urban spatial structure in the capital area.

III. URBAN CHARACTERISTIC INDEX SELECTION AND CURRENT STATUS ANALYSIS

In this study, we examined analysis indexes based on the considerations of the precedent studies in Chapter 2 and then analyzed the city characteristics in the capital area.

A. Analysis index Selection

In this study, we eliminated variables using the correlation between variables in a total of 81 cities based on the precedent studies and finally selected 22 optimal indexes. For analysis indexes, regional differences should be standardized and items should be selected so that we could compare comprehensively. There can be apparent differences in numerical values according to regional population, income, industry, and the size of infrastructure. Accordingly, we standardized and adjusted each index so that the indexes with the same standard could be set up and utilized each of them for an analysis.

Standardization process is $Z = \frac{X - \mu}{\sigma}$, Z is the value of standardization, X = value of criteria, μ = average value, σ = standard deviation.

Fuzzy function that standardizes indexes was used. The fuzzy function standardizes indexes using functions appropriate for each index, and shows the value of each index from high to low in the order of scores from 0 to 1. In case of the increase-typed index whose index measurement value increase or decrease sharply, on the basis of the level of top 5%, if the measurement value is more than the reference value of top 5%, the value is 1, and when selecting the minimum value, the minimum value of the index is selected. Conversely, in case of decrease-typed index, the maximum and minimum value of each index must be selected.

TABLE IV
THE INDEX UTILIZED IN THE PRECEDENT STUDIES

Classification	Details
Population	Population density, population, no. of household, population per household, number of university graduates, and no. of moving out and no. of moving in
Housing	Housing density, land price, housing price, house supply rate, house area, and number of construction permission
Industry	Number of employees, number of businesses, location coefficient, financial independence degree, budget size, number of financial institutions, and number of distribution businesses
Public sector	Rate of roads, number of bus lines, number of subways, supply rate of waterworks and sewage, number of schools, number of students, number of hospitals, number of sickbeds, number of theaters, and number of public institutions
Balance between work place and residential area	Traffic of commuting, traffic density, and traffic distance

*Note: Seoul City Affair Development Research Institution(2009), Living environment measurement indexes reorganized from "A Study on Seoul Urban Spatial Characteristics By Index"

When standardization index is calculated comprehensively, the importance and the influential power between each index can be different and weight needs to added. To calculate weight, we used principal component analysis and used Verymax method to figure out which variable appears higher in which factor. Extract the factors that eigenvalue is higher than 1 and calculate weight of each index based on the common dispersion.

$$\times \text{Weight} = \frac{\text{Commonality of A Particular Variable}}{\text{Sum of Selected Factor Eigenvalue}}$$

The value calculated through square sum of factor load by variable was higher than 0.5 in the commonality in 22 variables, thus indicating that there was no problem for analysis. Use each standardized evaluation index value, multiply it with weight, and then extract 22 city level indexes. To calculate the complex decline index through weight of each index, weighted linear combination method - evaluation method with multiple criteria- was applied and weight was multiplied to each index and all summed up.

$$\times Z_j = \sum_i w_i x_i \quad (Z_i = \text{city level index, } w_i = \text{weight of variable, } x_i = \text{city evaluation index})$$

TABLE V
COMMON DISPERSION AND WEIGHT BY INDEX

Index	2005 ~ 2007		2007 ~ 2009		2005 ~ 2009	
	Common dispersion	Weight	Common dispersion	Weight	Common dispersion	Weight
population density	0.940	0.054	0.814	0.046	0.659	0.036
household	0.910	0.052	0.903	0.051	0.961	0.053
elderly at 65	0.812	0.047	0.915	0.052	0.909	0.050
no. of transfer-in	0.711	0.041	0.765	0.043	0.846	0.047
no. of transfer-out	0.624	0.036	0.716	0.041	0.801	0.044
no. of businesses	0.957	0.055	0.644	0.036	0.915	0.050
no. of employees	0.712	0.041	0.863	0.049	0.890	0.049
no. of distribution business/1,000 persons	0.732	0.042	0.780	0.044	0.819	0.045
no. of financial institution/1,000 persons	0.598	0.034	0.820	0.046	0.705	0.039
no. of hospitals/1,000 persons	0.977	0.056	0.820	0.046	0.979	0.054
no. of sickbeds/1,000 persons	0.976	0.056	0.722	0.041	0.983	0.054
no. of medical staff/1,000 persons	0.734	0.042	0.759	0.043	0.838	0.046
apartments/no. of houses	0.698	0.040	0.789	0.045	0.533	0.029
residential area/city region area	0.607	0.035	0.899	0.051	0.704	0.039
commercial area/city region area	0.850	0.049	0.786	0.045	0.774	0.043
green regions/city region area	0.832	0.048	0.747	0.042	0.728	0.040
park area per person	0.930	0.054	0.682	0.039	0.941	0.052
no. of kindergartners/no. of classes	0.748	0.043	0.766	0.043	0.794	0.044
no. of elementary school students/no. of classes	0.827	0.048	0.935	0.053	0.826	0.045
no. of middle school students/no. of classes	0.850	0.049	0.851	0.048	0.911	0.050
no. of high school students/no. of classes	0.594	0.034	0.810	0.046	0.767	0.042
no. of private educational institutions/no. of classes	0.737	0.042	0.872	0.049	0.913	0.050
sum of eigenvalues	17.355		17.657		18.193	
explanatory power of eigenvalue(%)	78.886	1.000	80.259	1.000	82.697	1.000

B. Analysis Index and Real Estate Characteristic Analysis

We aimed to examine the characteristics of regional phenomenon though the factor analysis aforementioned. To analyze the influences on the reasons of regional difference occurrence after an analysis of regional differences, independent variables and dependent variables are required. As for the independent variables, factor value derived from factor analysis, is selected. As for the dependent variables, Housing Purchase Price Composite Indices index, housing rent price index(i.e. houses leased on a deposit basis), land price fluctuation rate, diffusion rate of house, and financial independence in the cities were selected in order to analyze the influential relations between urban characteristics variables. As for the influence analysis of housing rent price index (i.e. houses leased on a deposit basis), and land price fluctuation rate in order to examine the real estate characteristics, a research was conducted under the premise that there would be differences in housing rent price, and then their actual influence relations were analyzed. In addition, the correlation with financial dependence, which emerges as one of the urban issues between regions in recent times, was analyzed. Taking into account of the current leased house-related structure, investment resources are sufficient in autonomous districts with high financial dependency and re-investment is actively conducted, but in the regions in the opposite situation, those resources are insufficient, and

any investment in public goods is not done, thus causing regional differences more and more(Lee Jae-won, 2006)

IV. EMPIRICAL STUDY

A. Annual City Level Rank

By summing up of the weight from indexes of 2005~2007 and of 2007~2009, the city level index was calculated, and the top 66 cities in the capital area were calculated. As a result, Dongjak-gu, Seoul ranked first in 2005~2007 and Gangnam-gu first in 2007~2009.

As for classification of city level, with the standard of city index change rate between 2005, 2007 and 2009, standing of city situation and changes depending on period were examined. In addition, depending on type classification standard of the results, there were largely four types of 'complete growth type', 'complete decline type', 'worse standing type', and 'better standing type'. 'Complete growth type' is located in the first quadrant, indicating increasing changes in the better direction. 'Worse standing type' is located in the second quadrant, indicating improving index, but decrease in change rate of city level. 'Complete decline type' is located in the third quadrant, indicating worse change pattern in city level order and index change pattern. Lastly, 'better standing type' is located in the fourth quadrant, indicating increasing rank of city level index, but worse pattern in change.

TABLE VI
ANNUAL CITY RANK COMPARISON

Rank	2005 ~ 2007		2007 ~ 2009		2005 ~ 2009	
	City	City level index	City	City level index	City	City level index
1	Dongjak-gu	0.247	Dongjak-gu	0.295	Gangnam-gu	0.493
2	Gwanak-gu	0.243	Namyangju	0.285	Gwanak-gu	0.433
3	Yongsan-gu	0.242	Geumcheon-gu	0.275	Yangcheon-gu	0.401
4	Dongdaemun-gu	0.233	Yeonsu-gu	0.272	Jongno-gu	0.401
5	Uijeongbu	0.230	Yongsan-gu	0.268	Songpa-gu	0.401
6	Seongbuk-gu	0.227	Guro-gu	0.264	Mapo-gu	0.393
7	Gangseo-gu	0.215	Bupyeong-gu	0.252	Gangdong-gu	0.374
8	Seongdong-gu	0.214	Yeongdeungpo-gu	0.242	Seodaemun-gu	0.355
9	Donbong-gu	0.200	Dongdaemun-gu	0.239	Seongbuk-gu	0.350
10	Yeongdeungpo-gu	0.198	Yongin	0.230	Uijeongbu	0.294

By utilizing X-axis and Y-axis which are standard, this study compared city distribution depending on type. The results found that complete growth type's cities accounted for the large share at 32.65%, 16 cities out of a total 66. In addition, complete decline type's cities accounted for 18.37%, 9 cities. The analysis results are seen in the below table, and cities' standing changes depending on annual changes of city level index are shown.

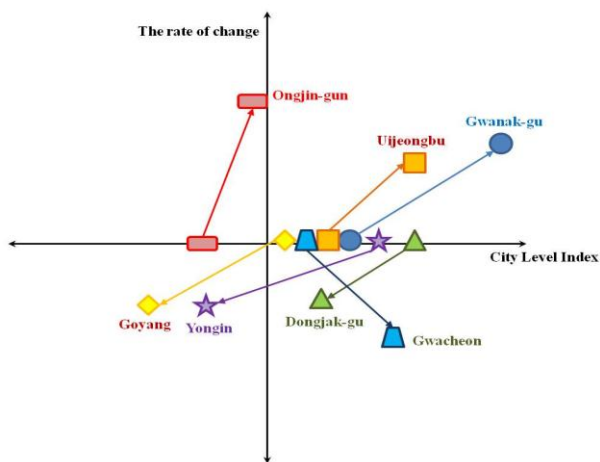


FIGURE II
CITY RANK COMPARISON

B. Factor Analysis

Factor analysis is a statistical analysis method that is available to explain the relations between variables which have correlations, but it's hard to be interpreted through independent factors. While loss of information inherent in many original variable is minimized, and this method finds the way to compress and summarize into a small number of new complex factor group (Lee Jae-won, 2006). The purpose of factor analysis is to reduce to a small number of factors while loss of information of many variables. For examining explanation of interrelations

between items of each variable, KMO-Bartlett examination was conducted. KMO value in this study showed average level of 0.760 more than the appropriate level, indicating that the factor composition is in good condition. The examination value of 22 variables (items) was 1947.724, and level of significance was 0.000. This suggests that there was common factor as null hypothesis could be rejected and it was appropriate for factor analysis.

Eigenvalues and explanatory power of extracted factors explained in the total dispersion were seen and a total of five factors were extracted. Eigenvalue means explained quantity of dispersion and high value means important factor. A total of five factors explained 83.226% of the entire dispersion.

In the factor analysis for analyzing characteristics between autonomous districts of Seoul, and Incheon, and cities and counties in Gyeonggi province, factor 1 indicated the highest factor value in population density, and showed high correlations with number of transfer-in, transfer-out, businesses, and employees. It indicates overall population relations and industry aspects, and it was thought that there were characteristics of population movement depending on development of industries. Regarding factor 2, in variables of number of financial institution, distribution business, hospital, and employees, possession of facilities depending on basic living environment was indicated, showing differences in basic living quality. Factor 3 is the variable showing ration of the number of kindergartners, schools, students and private education institutions. Factor 4 shows structural aspects of cities as variables related to urbanization area and house types. Lastly, factor 5 shows differences of green environment though green area and park area.

When cities, where functions of the factor concerned were specialized, were examined, on the scores, cities of factor score of more than 1 conducted more specialized functions of each factor.

TABLE VII
FACTOR CLASSIFICATION BY FACTOR ANALYSIS

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
	Population and Industry	Living Environment	Educational Condition	Structure of Use Land	Green Environment
Factor Variable	population density	no. of financial institutions /1,000 persons	no. of kindergartners /no. of classes	commercial area /city region area	green regions /city region area
	no. of transfer-out	no. of sickbeds/1,000 persons	no. of elementary school students /no. of classes	residential area /city region area	park area per person
	transfer of transfer-in	no. of distribution businesses /1,000 persons	no. of private educational institutions /no. of classes	apartment/no. of houses	
	no. of households	no. of hospitals/1,000 persons	no. of middle school students /no. of classes	detached house/no. of houses	
	no. of businesses	no. of medical staff/1,000 persons	no. of high school students /no. of classes		
	no. of employees				

When cities, whose characteristics were overlapped, were examined, Jongno-gu conducted functions of living environment and green environment factors. Gananam-gu conducted the functions of populations and industry factors and also the function of living environment. Most of the cities having population and industry factors in Gyeonggi province were satellite cities where development was conducted with the concept of new town, but the function of living environment was relatively low.

C. Regression Analysis

This study conducted a factor analysis on 22 variables selected to examine the urban characteristics of city, county and gu of Seoul, Incheon, and Gyeonggi province, and the characteristics was divided into population and industry, living environment, educational condition, structure of use land, and green environment factors. In addition, Regions with similar characteristics and specialized functions were analyzed, but there were a lot of limitations in explaining the real estate phenomenon and social phenomenon. Accordingly, factor values in 22 variables explaining the characteristics between regions were utilized to analyze the causal relations between financial independence degree, Housing Purchase Price Composite Indices index, price index of houses leased on a deposit basis, land price fluctuation rate, and diffusion rate of house, which basically explain real estate characteristics and regions.

The overall explanatory power of Housing Purchase

Price Composite Indices was 53.4%, and value R, coefficient of correlation was 0.731, indicating significant relations of Housing Purchase Price Composite Indices regarding independent factors. Factor value of the factor affecting Housing Purchase Price Composite Indices suggested that factors of population and industry, living environment, educational condition, and structure of use land except for green environment had a significant influence at 0.05 of significance level. In other words, region with high level of each factor had high Housing Purchase Price Composite Indices of each region. In addition, in the case of green environment, at the level of 0.1 of significance probability of 0.088, and unlike other factors, it had the negative(-) value, suggesting that Housing Purchase Price Composite Indices was increasing in regions of low green environment.

The overall explanatory power was 53% and value R, coefficient of correlation was 0.727, indicating significance in correlations of Housing Jeonse Price Composite Indices.

The factor value affecting price index of houses leased on a deposit basis had a significant influence in population and industry, living environment, educational condition, and structure of use land factors except for green environment factor at the level of significance at 0.05 like sale price. In other words, the regions with high factor level had the high price index of houses leased on a deposit basis. In addition, in the case of green environment, the level of significance was 0.088, indicating significance at 0.1 level (negative direction).

TABLE VIII
REGRESSION ANALYSIS RESULT

Independent variable	Model 1 : dependent variable				Model 2 : Dependent variable			
	= Housing Purchase Price Composite Indices				= Housing Jeonse Price Composite Indices			
	Unstandardized Coefficients	Standardized Coefficients	t	p-value	Unstandardized Coefficients	Standardized Coefficients	t	p-value
(constant)	81.536		22.872	.000	83.944		22.674	.000
population and industry factor	14.646	.359	4.077	.000	15.045	.357	4.033	.000
living environment factor	9.763	.239	2.718	.009	9.754	.232	2.615	.011
educational condition factor	15.063	.369	4.193	.000	15.923	.378	4.268	.000
structure of use land factor	17.682	.434	4.923	.000	17.811	.423	4.774	.000
green environment factor	-6.232	-.153	-1.735	.088	-6.683	-.159	-1.792	.078
R ²	0.534				0.529			
revised R ²	0.495				0.489			

Independent variable	Model 3 : dependent variable				Model 4 : dependent variable			
	= land price change rate				= house supply rate			
	Unstandardized Coefficients	Standardized Coefficients	t	p-value	Unstandardized Coefficients	Standardized Coefficients	t	p-value
(constant)	1.358		17.993	.000	99.636		73.376	.000
population and industry factor	-.046	-.074	-.603	.549	-2.994	-.229	-2.188	.033
living environment factor	-.070	-.112	-.915	.364	-3.165	-.242	-2.313	.024
educational condition factor	-.007	-.012	-.096	.924	-4.080	-.312	-2.982	.004
structure of use land factor	-.030	-.049	-.398	.692	-4.753	-.364	-3.473	.001
green environment factor	-.167	-.270	-2.198	.032	.028	.002	.020	.984
R ²	0.094				0.341			
revised R ²	0.018				0.286			

Independent variable	Model 5 : dependent variable			
	= financial independence			
	Unstandardized Coefficients	Standardized Coefficients	t	p-value
(constant)	47.074		35.638	.000
population and industry factor	7.192	.436	5.403	.000
living environment factor	8.770	.531	6.589	.000
educational condition factor	5.508	.334	4.138	.000
structure of use land factor	-2.525	-.153	-1.897	.063
green environment factor	.920	.056	.691	.492
R ²	0.610			
revised R ²	0.577			

The overall explanatory power about land price change rate was 9% which was low unlike other real estate variables. The value R, coefficient of correlation showed no or weak correlation of land price change rate to independent variable factors at 0.306. In other words, the regions with many green environment factors showed narrow range of change in land price in the regions where development was not made such as residential and commercial regions.

The overall explanatory power was low at 34% unlike other real estate characteristic variables. The value R, coefficient of correlation was 0.584, indicating correlation and significance of house supply rate to independent variable factors. The value of factor affecting house supply rate showed a significant influence in the negative (-) direction in population, industry, living environment, educational condition, and structure of use land factors except for green environment factor at the level of significance of 0.05. The regions with low level of each factor showed high house supply rate of region.

The overall explanatory power of financial independence was 61%, and value R, coefficient of correlation was 0.781, indicating a significant correlation of financial independence to independent variable factors.

The value of factor affecting financial independence was had a significant influence in population and industry, living environment, and educational condition factors at the significance level of 0.05. In other words, the regions of high level of each factor had high degree of financial independence. Analysis of five dependent variables found that other factors except for financial independence, Housing Purchase Price Composite Indices, Housing Jeonse Price Composite Indices, and house supply rate had influences, and regarding land price change rate, only the factor of green environment had a high influential relations. The cities, where residential or commercial functions were developed, had a high degree of housing price index aspect and financial aspect, and in the regions with lots of green land such as limited area had influences on land price change due to expectation for the present and the future development.

V. CONCLUSION

This study drew the indexes that represent the characteristics of urban space structure in the capital area and patternized the regions through an analysis of the characteristics differences and the statistical analysis through city level comparison. This study examined the current status of the city situation and changes over the period with the criteria of change rate of city indexes in 2005, 2007, and 2009. According to the region type classification criteria, we have largely four classifications such as 'complete growth type', 'complete decline type', 'worse standing type', and 'better standing type.' In addition, this study examined the urban characteristics by region in the capital area and found out what it means in the differences from growth inequality through an analysis of housing rent price, finance, land price, and diffusion ratio of house.

A total of 4 city level type was patternized including

the other 66 cities in the capital area, which suggested that there were worsening or improving patterns in the cities and there was a need to make an effort by the local autonomous government to rebuild/redevelop the urban area as soon as possible particularly in the cities with consistently decreased and declined. In addition, it is expected that consistent examination of level index of cities would be helpful in establishing urban rebuilding policy in the capital area. For future researches, more detailed analysis based on the social, economic and cultural data and more multi-faceted researches on the reasons of the urban area decline would also be needed.

The city index characteristics by each local autonomous government was examined and commonalities were derived from population and industry, living environment, educational condition and structure of use land through factor analysis. The derived results were used to examine the existence of excellent and similar regions depending on each factor through factor score analysis in each city. Moreover, analysis about urban characteristics in each region was conducted, and influence between Housing Purchase Price Composite Indices, Housing Jeonse Price Composite Indices, land price fluctuation rate, diffusion ratio of house, and financial independence were examined. As a result, there were influential relations between commonalities representing urban characteristics in terms of Housing Purchase Price Composite Indices, Housing Jeonse Price Composite Indices, and financial independence.

However, there were some limitations as well. This study could not provide more concrete and specific urban characteristics because we couldn't narrow the spatial range of data in our analysis - not the concepts like city, county, and gu, but rather with the concepts like eup, myun and dong. Moreover, the study was conducted only in the capital area, and could not derive the characteristics of the entire nation.

As for the analysis method, in the analysis of common factors of urban characteristics variables and dependent variables, there was a need for application of more diverse dependent variables, and it would be possible to apply from many other methods such as metropolitan economic area (not administrative area). It would be possible to comprehensively analyze the regional common features using group analysis, and further researches for analysis utilizing GIS in urban spatial structure analysis would be needed for comparative analysis. Not only GRID time series change pattern, dispersion measuring through standard deviation distance, and group degree measuring through Moran's I, but also central place system diagnosis through 3D space modeling are needed.

When it comes to the urban characteristics between local autonomous governments in the capital area, there existed diverse and complicated correlations and imbalances between cities as well. New town development and large-sized housing land development, which continue to develop recently, expect effects of comprehensive development and of condition improvement, and self-sufficiency from proximity of

work and residential places in accordance with the efficiency of city infrastructure, reinforcement of educational institution and distribution institution, and establishment of residential place in the near area, and there is a further need for more in-depth research.

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