

A Study on Spatial Distribution Changes of The U-City Industry

Hojin. Jeong, Kabsung Kim

Abstract— In 2005 central government declared 'U-Korea age' and selected U-City industry as next growth engine. Central and local governments have prosecuted diverse U-City industries in order to improve the quality of living and national competitiveness. Nowadays U-city is gaining popularity as a paradigm of future city which will improve quality of city life and competitiveness. A decade has passed and it is time to look back what we have achieved in U-City industry and what to achieve from now on. This research is to help the idea by analyzing the spatial distribution of U-City by examining the degree of development according to regions, and which place is being promoted in U-City industry, this research is to grasp the spatial patterns and its reasons. Inter-industry relation table, published by the Bank of Korea, will be used to check the industrial distribution, relevant enterprises and its number of employees. However, as there is no U-City industry section in inter-industry relation table, U-City category is necessary to make the table more useful. This research is to redefine the U-City Industry based on related acts as there is no actual legal definition and then classify the industry. Through industrial distribution, it will show the relation between spatial concentration and development of U-City Industry.

Keywords—Spatial Distribution, U-City industry, U-City industry Classification, Location Quotient.

I. INTRODUCTION

AMONG changes in structure and organization of the cities, due to development of information and communication technology industries, 'Smart City' recently appeared in western countries. Smart City uses high tech information and communication technology to construct city environment and indicates cities with sustainable development and highly efficient in economic aspect.

South Korea is transforming into 'Ubiquitous City (U-city)', which is an extended form of Smart City. U-City has infrastructure combined with high tech information and communication technology providing ubiquitous service in transportation, environment, welfare and in other fields, 『Act on the Construction, ETC of Ubiquitous Cities Article 2』.

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Nowadays U-city is gaining popularity as a paradigm of future city which will improve quality of city life and competitiveness. As a result, Ministry of Land, Transport and Maritime Affairs and central departments are setting base of related institutions and putting endeavor on developing core technology.

Central government declared 'U-Korea age' in 2005 and selected U-City industry as next growth engine. Central and local governments have prosecuted diverse U-City industries in order to improve the quality of living and national competitiveness. A decade has passed and it is time to look back what we have achieved in U-City industry and what to achieve from now on. This research is to help the idea by analyzing the spatial distribution of U-City.

By examining the degree of development according to regions, and which place is being promoted in U-City industry, this research is to grasp the spatial patterns and its reasons. Inter-industry relation table, published by the Bank of Korea, will be used to check the industrial distribution, relevant enterprises and its number of employees. However, as there is no U-City industry section in inter-industry relation table, U-City category is necessary to make the table more useful.

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II. LITERATURE REVIEW

As mentioned in the introduction, the existing Korea Standard Industrial Classification(KSIC) or the Inter-industry relation table, published by the Bank of Korea, does not classify U-city industry as a separate industry. Therefore, many studies, concerning the measurement of the ripple effect of U-City industry, focuses on classifying the U-city industry preferentially. Kim Bang Ryong and 2 people(2006) rewrote the Inter-industry relation table including the U-city industry to analyze the economical ripple effect triggered by the investment of U-city construction business in Hwasung and Dongtan area. The study redefined U-city industry as a complex industry in charge of construction industry and IT industry including other concepts defined by government branch, public enterprise, and private enterprise that are directly related to U-city industry. With this new definition in mind, 404 basic sector from the existing Korea Standard Industrial Classification(KSIC) was re-classified into U-city industry, which includes 3 sectors; personal living, industry economy(service, equipment), and

public administration sector. Lim Si Yeong and 3 people(2012) classified U-city industry, using the Inter-industry relation table based on the new regulation according to the U-city act, to measure the industrial ripple effect of the U-city business logically. From the Inter-industry relation table, 8 of the 28 large-sized categories, and 79 of the small-sized categories were re-classified into U-city industry. The newly classified categories were then re-classified into 3 industries: the base-industry for long term U-city development, and service centered industry for optimizing U-city function. Cho Byung sun and 2 people(2006) classified U-city industry, using the inter-industry relation table, to analyze the ripple effect of the introduction of U-city industry towards national economy. From the inter-industry relation table, 10 of the 28 large-sized categories were re-classified into U-city industry, which includes 3 sectors; personal living, industry economy(service, equipment), and public administration sector. Lastly, Lee Heon Yeong and 2 people(2012) classified U-city industry, to analyze the economic ripple effect triggered by the U-city construction industry. This study was different from the other studies, because the focus of the classification is on the area where actual investments are made, unlike other studies which classifies U-city according to service. From the Inter-industry relation table, 4 of the 28 large-sized categories were classified as U-city industry, which includes 3 sectors: U-City hardware, U-city software, Construction sector. As this study's purpose is to investigate the spatial distribution, not the analysis of the economic ripple effect nor the economic feasibility, it will mainly see a advance research classified the u-City industry based on the u-City services.

III. DEFINITION AND CLASSIFICATION OF U-CITY INDUSTRY

As U-City has appeared recently, the exact range of U-City Industry is unclear. However, prior to examine spatial distribution of U-City, proper classification of the industry is essential and specific definition is needed to classify the industry.

In this research, as there is no exact legal definition of U-City Industry, it seemed appropriate to use the definition stated in related acts. For this reason, a research conducted by Im Si Young and 3 people (2010) was applied.

Related acts of U-City define service, infrastructure and technology of U-City.

First, industries related to conduct and apply U-City service, second, industries related to form U-City infrastructure, third industries to develop and utilize U-City technology are included in U-City Industry category.

First, U-City Service is defined as service providing about key functions of the city and classified it according to industries to perform or designed to apply and conduct U-City Service.

Second, U-City infrastructure indicates infrastructure which is intellectualized by combining Construction and Information and Communications technology. Network System and facilities to manage and operate U-City is also included in U-City infrastructure. In this research, U-City Infrastructure is

divided into industries with direct involvement and industries with indirect involvement holding industries of research and development.

Lastly, U-City technology is defined as combined technology between Construction and Information and Communications technology. Related industries are categorized into technology development and utilization.

TABLE I
U-CITY INDUSTRY CLASSIFICATION

Large-Sized	Small-Sized	Basic
	Motors, generators, capacitors and rectifiers,	
Electronic and electrical equipment	Other electrical equipment and supplies, Electronic signal equipment, Semiconductors and related devices, Other electric components and accessories,	240-255, 259-261 (19)
	Communications and broadcasting	
Construction	Residential construction, Nonresidential construction, Building repairs, Traffic construction, Heavy construction, Other civil engineering	305-320 (16)
	Research institutes,	
Real estate and business services	Research and experiment in enterprise, Architectural, engineering and related technical services, Computer related service	357-360, 364-367 (8)
	Electric utilities	
Electricity, gas, steam and water supply	Manufactured gas supply, Steam and hot water supply, Water supply	208-304 (7)
	Rail transport, Road transport, Door to door transport, Water transport,	
Transportation	Air transport, Support activities for transportation, Cargo handling, Warehousing and storage, Other services incidental to transportation,	327-340 (14)
	Other telecommunication and information services	343-345 (3)
Public administration and defense	Public administration and defense	372-373 (2)
	Education,	
Education, and health	Medical and health services, Social work activities, Sanitary services	374-383 (10)

Note: Reprocessed from [3]

IV. SPATIAL DISTRIBUTION OF U-CITY : CURRENT STATUS AND FEATURES

This part is to examine the regional specialization degree of U-City industry in Seoul, based on previous classification of U-City Industry. 3 years of Location Quotient (LQ) of U-City Industry, based on employees of Seoul Metropolitan Council, are used to comprehend regional specialization degree.

If LQ is below 1, it means that the industry employees are less concentrated in that region compared to the whole country. But, if it is over 1, the region is more concentrated. Reason why 2000

and 2010 are anchor year is to look at the development degree and changes in spatial distribution of previous and after 5 years declaring 'U-Korea age' in 2005. <TABLE II > and <Fig. 1>, <Fig. 2> shows the result. Through the picture, it is able to understand some features of spatial patterns of U-City Industry.

TABLE II
CHANGE IN THE NUMBER OF SEOUL U-CITY INDUSTRY WORKERS

classification	2000	2010	Percentage change
Jongno-gu	79117	81643	3.19
Jung-gu	90509	76778	-15.17
Yongsan-gu	32927	31304	-4.93
Seongdong-gu	33189	45541	37.22
Gwangjin-gu	31838	48321	51.77
Dongdaemun-gu	35258	47721	35.35
Jungnang-gu	26013	34718	33.46
Seongbuk-gu	30302	42266	39.48
Gangbuk-gu	17120	22678	32.46
Dobong-gu	23825	30170	26.63
Nowon-gu	38103	49879	30.91
Eunpyeong-gu	27003	34438	27.53
Seodaemun-gu	29670	44236	49.09
Mapo-gu	41155	56644	37.64
Yangcheon-gu	37978	47693	25.58
Gangseo-gu	50632	80257	58.51
Guro-gu	34734	53617	54.36
Geumcheon-gu	29063	65950	126.92
Yeongdeungpo-gu	69898	78141	11.79
Dongjak-gu	27306	37986	39.11
Gwanak-gu	33421	41241	23.40
Seocho-gu	101284	140304	38.53
Gangnam-gu	193703	187808	-3.04
Songpa-gu	63714	98333	54.33
Gangdong-gu	32968	43166	30.93
Seoul (u-City)	1210730	1520833	25.61
Seoul(total)	3574824	4487357	25.53

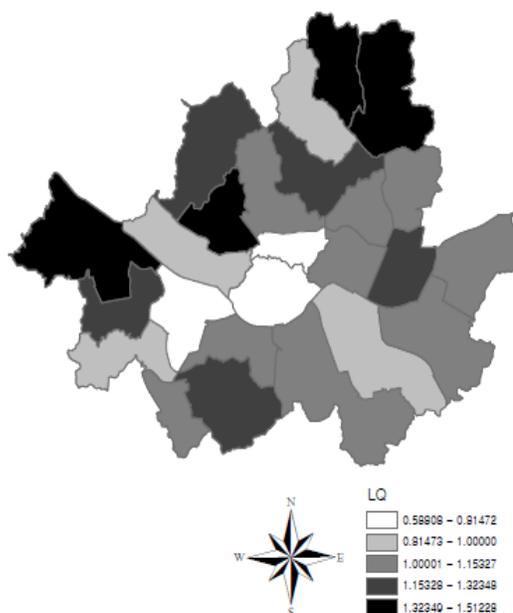


Fig. 2 LQ of Seoul u-City industry (2010)

First, U-City Industry is developing concentrated in specific areas. Look at the increase of employees of U-City Industry. Some areas have increased more than double that of entire Seoul City. As in <Chart4>, the increase rate of entire industry employees in Seoul City is 25.53% while ones in U-City Industry is 25.61%.

In district units, Geumcheoun-gu increased by 126.92%, 58.51% for Gangseo-gu, 54.36% for Guro-gu. Whereas Jung-gu, Yongsan-gu, Gangnam-gu each dropped by 15.17%, 4.93%, 3.04%. This shows that U-City Industry is concentrated in specific areas and this is shown again in <Picture 1, 2>. In 2000, LQ of U-city industry in Seoul municipal corporations shows little difference but in 2010, there are big differences of LQ between these organizations. It shows more clearly in <Picture 3>, comparing the LQ of 2013. When U-City Industry is concentrated in specific areas, other areas seems to decline. This means that U-City Industry is getting focused on particular areas.

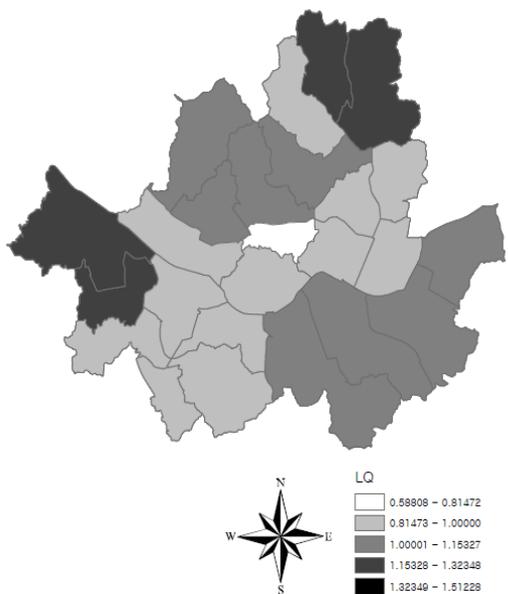


Fig. 1 LQ of Seoul u-City industry (2000)

V.CONCLUSION

In this research, U-City Industry was classified based on preceding research analysis. Then, it was used to draw the LQ of U-City Industry of Seoul City and grasp the characteristic of spatial distribution. Results were as follow.

First, U-City Industry is concentrated in specific areas and second, it is gaining greater importance in most of the self-governments in Seoul.

A decade has passed since the declaration of U-Korea, and U-City Industry is showing sustainable development. Moreover, considering the diverse combinableness of the U-City Industry, the limitation of its development seems unlimited.

Therefore, there is a need of systematic approach to make U-City Industry the next growth power.

This research shows that balanced development of U-City Industry is necessary. The support should be made priority in lagging region.

However, the spatial distribution shown in this research is not enough to come up with organized strategy. Firstly, the data is not based on times series from 2000 to 2010. It was based on comparative static analysis. Secondly, it was not surveyed specifically as in unit of dong, nor general as in unit of the whole country. Therefore, there is a need to search in times series and find out the LQ in more specific unit of districts in further study. Then it will be the foundation to construct the cooperation network between clusters and to plan more organized strategy.

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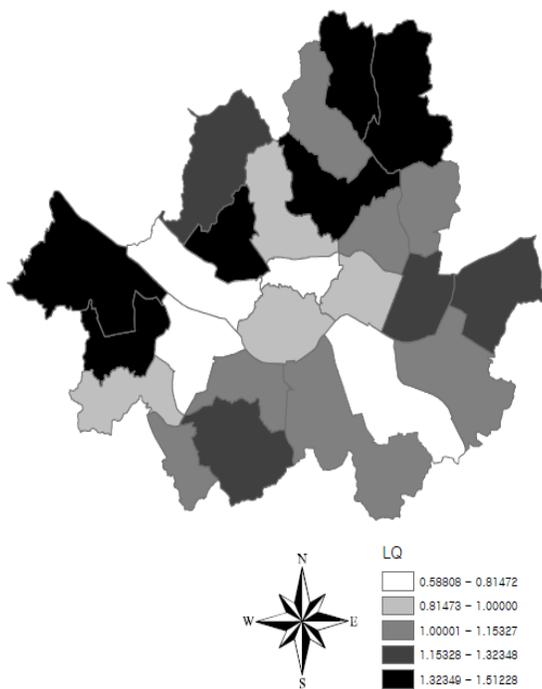


Fig. 3 LQ of Seoul u-City industry (2013)

Second, comparing 2000 and 2010, it is able to infer that specification of U-City is getting larger. As seen in <Chart 6>, the proportion rate of U-City Industry in 17 districts out of 25 has increased. There were only 13 districts which showed higher specification in 2000, but in 2010, there were 18 out of 25 districts. This shows that the specification of U-City is getting bigger in Seoul City

TABLE III
LQ OF SEOUL U-CITY INDUSTRY

classification	2000Y		2010Y		Perce ntage change
	LQ	u-city percentage	LQ	u-city percentage	
Jongno-gu	1.06	35.89	1.01	33.89	↓
Jung-gu	0.78	26.29	0.60	34.23	↑
Yongsan-gu	0.84	28.49	0.77	20.17	↓
Seongdong-gu	0.85	28.80	1.00	26.21	↓
Gwangjin-gu	0.97	32.94	1.20	33.93	↑
Dongdaemun-gu	0.86	28.96	1.11	40.70	↑
Jungnang-gu	0.92	31.28	1.15	37.59	↑
Seongbuk-gu	1.07	36.18	1.28	39.03	↑
Gangbuk-gu	0.94	31.92	0.99	43.44	↑
Dobong-gu	1.23	41.56	1.43	33.67	↓
Nowon-gu	1.29	43.73	1.46	48.34	↑
Eunpyeong-gu	1.13	38.30	1.31	49.37	↑
Seodaemun-gu	1.10	37.21	1.45	44.54	↑
Mapo-gu	0.95	32.20	0.82	49.10	↑
Yangcheon-gu	1.21	41.03	1.29	27.87	↓
Gangseo-gu	1.26	42.81	1.48	43.62	↑
Guro-gu	0.90	30.57	0.88	50.06	↑
Geumcheon-gu	0.83	28.10	1.05	29.74	↑
Yeongdeungpo-gu	0.83	27.97	0.71	35.46	↑
Dongjak-gu	0.92	31.15	1.10	23.90	↓
Gwanak-gu	0.99	33.50	1.16	37.37	↑
Seocho-gu	1.09	36.79	1.04	39.17	↑
Gangnam-gu	1.15	39.04	0.86	35.12	↓
Songpa-gu	1.02	34.64	1.14	29.22	↓
Gangdong-gu	1.00	33.90	1.12	38.53	↑