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著者	CHANG Yang, Yi, CHOI Won, Hoe
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Spatial Pattern of Population Movement in Korean Regional Hierarchy

Yang Yi CHANG* and Won Hoe CHOI**

Abstract This article analyzes the spatial pattern of population movement in Korean regional hierarchy. The city-county consolidation became effective in 1995, and the current administrative districts were created. The urbanization stage for Korea was considered to reach the terminal stage after 1995. Thus, this research is deemed necessary at the terminal stage. For this, the first and second flows were extracted, and horizontal and vertical analysis was carried out using population size data and population movement data. As a result, the hierarchy of Korean regions is separated into five levels. With regards to population movement, the primate city Seoul is a first order hierarchy. Metropolitan cities like Busan, Daegu, Incheon, Daejeon, Gwangju, and Ulsan are second order hierarchy. Third order hierarchy cities a 0.5~1 million population size, the fourth order hierarchy cities a 100,000~500,000 size, and the fifth order hierarchy cities less than 100,000 size. On the other hand, the population movement has four patterns. The patterns are separated as movement to Seoul, to a higher hierarchy, to an equal hierarchy, and to a lower hierarchy. The population movement to metropolitan cities is mainly included in 'the movement to a higher hierarchy.'

Key words: spatial pattern, population movement, regional hierarchy, Korea

1. Introduction

1.1 Purpose

Currently, more than 80% of the population in Korea lives in urban areas¹. According to the [Environmental Statistics Yearbook of Korea], the state of urbanization is in its terminal stage. This state started in 1995 when the population in urban areas reached 78.2%. Especially since 2007, more than 20% of the population lives in Seoul and 48.8% dwell in the capital region. Considering the dimensions of the capital region, which is 11.8%, it can be said that Korean population is concentrated in a very limited area². There is therefore a need for research regarding the Korean regional hierarchy and population movement.

* Graduate school, Institute of Geography, Tohoku University, Sendai 980-8578, Japan

** Faculty of Geography Education, Kongju National University, 189 Gongju, South Korea
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In Korea, the system of cities and phase of change have been an important theme in each decade since the 1970s. However, the research related to the short term terminal urbanization stage has not been carried out. Therefore, analysis of the hierarchy transition at the terminal urbanization stage was carried out in the present study for whole regions using data from 1996, 2000 and 2005. Based on this, the interaction between entire regions of Korea can be grasped. In 1995, the city-county consolidation became effective, but research dealing with whole regions has not been carried out. After analyzing the hierarchy of Korean regions, the patterns of population movement were investigated. There have been many studies that have referenced patterns and reasons for population movement, but in this article, our focus is on the hierarchy of regions rather than population movement. The population was analyzed in relation to whether there was movement to higher or lower levels. Through this, the Korean regional hierarchy and population movement patterns could be identified. The results from this study can be used as the basic framework for regional policy.

1.2 Data

Drawing from literatures, the indicators of population movement/migration, bus networks, passengers, telephone calls, and financial activities were used for classifying the hierarchy. Among these, population movement was selected, for it occurs commonly everywhere in Korea. I then analyzed the movement patterns. There are two different sources of population size data in Korea, 'Registration population' and 'Census population' data. For this study, 'Registration population' data were used because it is annual data and is related to movement data, as opposed to 'Census population' data which are gathered only every 5 years. 'Registration data', for both Koreans and Foreigners exist, and the total data was used. The data from 1996, 2000, and 2005 were used to identify the regional order after 1995.

Population movement data were used for the classifying hierarchy of each region and for finding out features of movement. These data were obtained from 'Regional migration' data by the [Korean National Statistical Office,] and were used together with population size, data from 1996, 2000, and 2005. In-migrants and out-migrants appeared in these data. In-migrant data were selected to create the OD matrix. Based on the arrangement of original data, the horizontal axis of the OD matrix corresponds to departure and the vertical axis to origin, whereby departure (D) and origin (O) are entire regions.

The ratio of movement from origin to departure was evaluated with $P(D)/P(O)*100$. The best value is the movement of the inside region. As the goal of the present study was the interaction of each region, the movement of inside cities was ruled out (the best ratio appears through the diagonal because it means movement of inside city).

Table 1 Ratio of movement for each region

Origin	Seoul	Busan	Daegu	Incheon	Gwangju(omitted)
1 st flow	Goyang 2.57	Seoul 4.23	Gyeongsan 4.37	Seoul 8.14	Seoul 5.35	
2 nd flow	Incheon 2.27	Gimhae 3.16	Seoul 3.31	Bucheon 3.46	Naju 1.71	
Origin	Pyeongtaek	Dongducheon	Ansan	Goyang	Gwachoan	
1 st flow	Seoul 6.83	Seoul 12.64	Seoul 9.21	Seoul 21.58	Seoul 24.27	
2 nd flow	Anseong 5.48	Yangju 9.54	Siheung 6.47	Paju 7.57	Anyang 17.06	
.....	(omitted)					

Source : Korean National Statistical Office Digital Publication (2005)

Note : These data are an example from 2005.

Hence, except for movement of inside city, the best ratio became '1st flow' and the second became '2nd flow.' These were chosen for the direction of the moving interaction. According to example data from Seoul 2005, the best value is for Seoul to Goyang (2.57%) and the second value is to Incheon (2.27%). Therefore, to Goyang became a first flow and to Incheon became a second flow. In this way, the first and second flows of Korean regions were extracted and are shown in Table 1.

The Korean regional order, hierarchy, and population movement patterns were derived from these data regarding population size and population movement. To carry out this task, three figures were made. First, the Rank Size Rule for Korean regions in 1996, 2000, and 2005 were developed to grasp the transform of population size. Second, 'nodes of each region' were made by separating the 1st and 2nd flows in each year. This shows the hierarchy and movement pattern. Third, the movement was displayed on the map to show the regional distribution patterns. For these, origin number for each regions, 1~167, were attached to regions that have existed since 1996, and the disappeared or created cities were attached after 168³.

1.3 Korean administrative district

Each Korean region is currently classified as either a Special city, Metropolitan city, Province, or Special province. There is one Special city, Seoul, and six Metropolitan cities Busan, Daegu, Incheon, Daejeon, Gwangju, and Ulsan. The Metropolitan cities have population of at least a million. Each province has several City and Kun. The City should have a population of more 50,000 and the rest are Kuns (Kun has less than 50,000). Jeju-island is a Special province. Thus, Korean whole regions were separated into Special city, Metropolitan city, City, and Kun after the city-county consolidation of 1995. This article deals with every region and classifies them hierarchically.

2. Analysis of Korean regional hierarchy

2.1 Population size and its change in Korea

After city-county consolidation in 1995, the number of Korean regions did not change significantly. There were 167 in 1995, 165 in 2000, and 167 again in 2005. This is because Yecheon City and Yecheon Kun were merged into Yeosu in 1998, and Jincheon and Geryong became a Kun and City, respectively, in 2003⁴.

Figure 1 shows 'the rank size rule of Korean regions'. The graphs have not changed significantly from 1996 to 2005. However, the populations for regions of more than 100,000 have increased, while those with less than 100,000 have decreased. This means that those living in cities with population of less than 100,000 population have moved to cities with population larger than 100,000. In particular, the populations of cities located in the capital area and that have a more than 500,000 population size have grown significantly.

The populations of Seoul, which is capital city, and Busan, which is second city, have decreased by 170,000 and 220,000, respectively, but they are still first and second cities. The populations of local central cities with population of 100,000~300,000 have grown by approximately 10% (1996~2005). Based on the populations from 1996

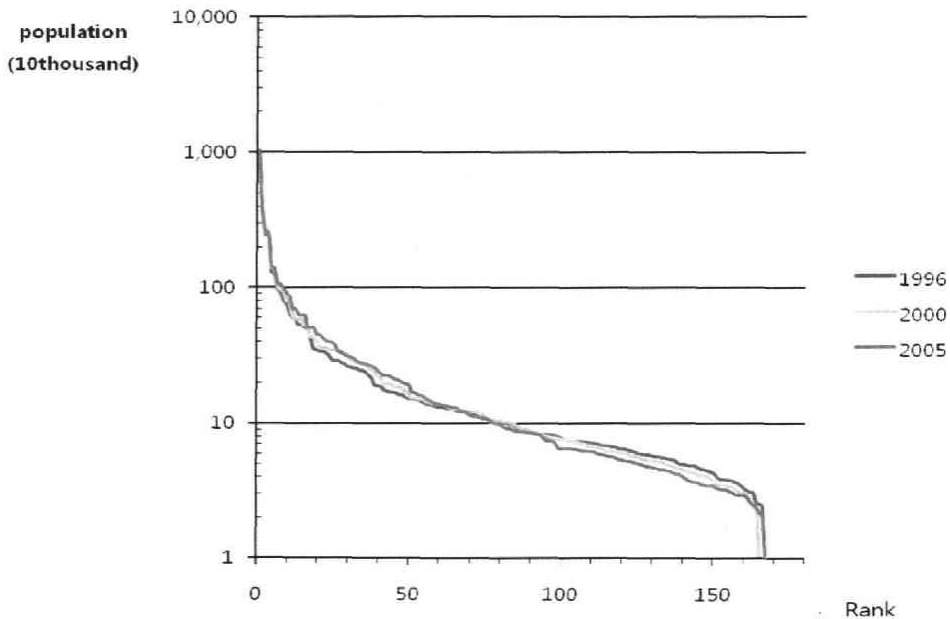


Fig. 1 Rank size rule of Korean regions

Source : Korean National Statistical Office Digital Publication (1996, 2000 and 2005)

~2005, Seoul has larger than twice the population of Busan, and it can be said that a 'Primate urban system' appeared in Korea even though the population of Seoul has actually decreased.

The hierarchies has 6 categories, at the transition of population size in 1996, 2000 and 2005 ; ① more than 10 million (Seoul), ② 3~10 million (Busan), ③ 1~3 million (metropolitan city), ④ 0.5~1 million (central cities which population increased largely), ⑤ 100~300 thousand (local medium-small cities, population increased), ⑥ less than 10 thousand (population decreased). However, these divisions are based simply on population size, while the interactions between each region must be understood to classify the hierarchy.

2.2 Classification of the Korean regional hierarchy through population movement

An OD matrix was drawn on the graph, whereby a vertical structure of population was revealed. The horizontal axis is the distance in a straight line from Seoul ('0'). In the graph, based on the latitude of Seoul, regions that are located on the left side of Seoul are on the left of the datum point and those on the right are on the right-side. The vertical axis of ordinates corresponds to the population size. Thus, this graph represents the regional population distribution and regional location in relation to Seoul. Seoul is located on the western side of Korea, so, right-side regions are more than left-side in the graph. Based on the above, the first and second flows of 1996, 2000, and 2005 were nested, as shown in Fig. 2.

According to Fig. 2, the increasing numbers of people moved from cities with small populations to those with a larger population. Considering all first and second flows, movement to Seoul is the highest, but there are also high values corresponding to movement to various metropolitan cities.

Most of the regions in Korea have populations of less than 100,000, although movement from these regions points toward ones with more population. Regions with population of 100,000~500,000 also have population movement toward those with larger populations. In the case of 0.5~1 million regions, there is movement toward regions of the similar size and be moved from the vicinity with population less than 500,000. Regions with populations 1~10 million regions are metropolitan cities, and there is a great deal of influx from neighboring regions. It can therefore be said that these regions are central cities in their provinces.

According to population size, Busan is the second largest city, but based on population movement, it is not. That is because, Busan does not have more 'origin (O)', than Daegu or Gwangju, and it exists on the same level as other metropolitan cities.

Seoul is the largest city in Korea, with a population of more than 10 million, and has the most 'origin (O)' from not only the vicinity but also all provinces, so it can be

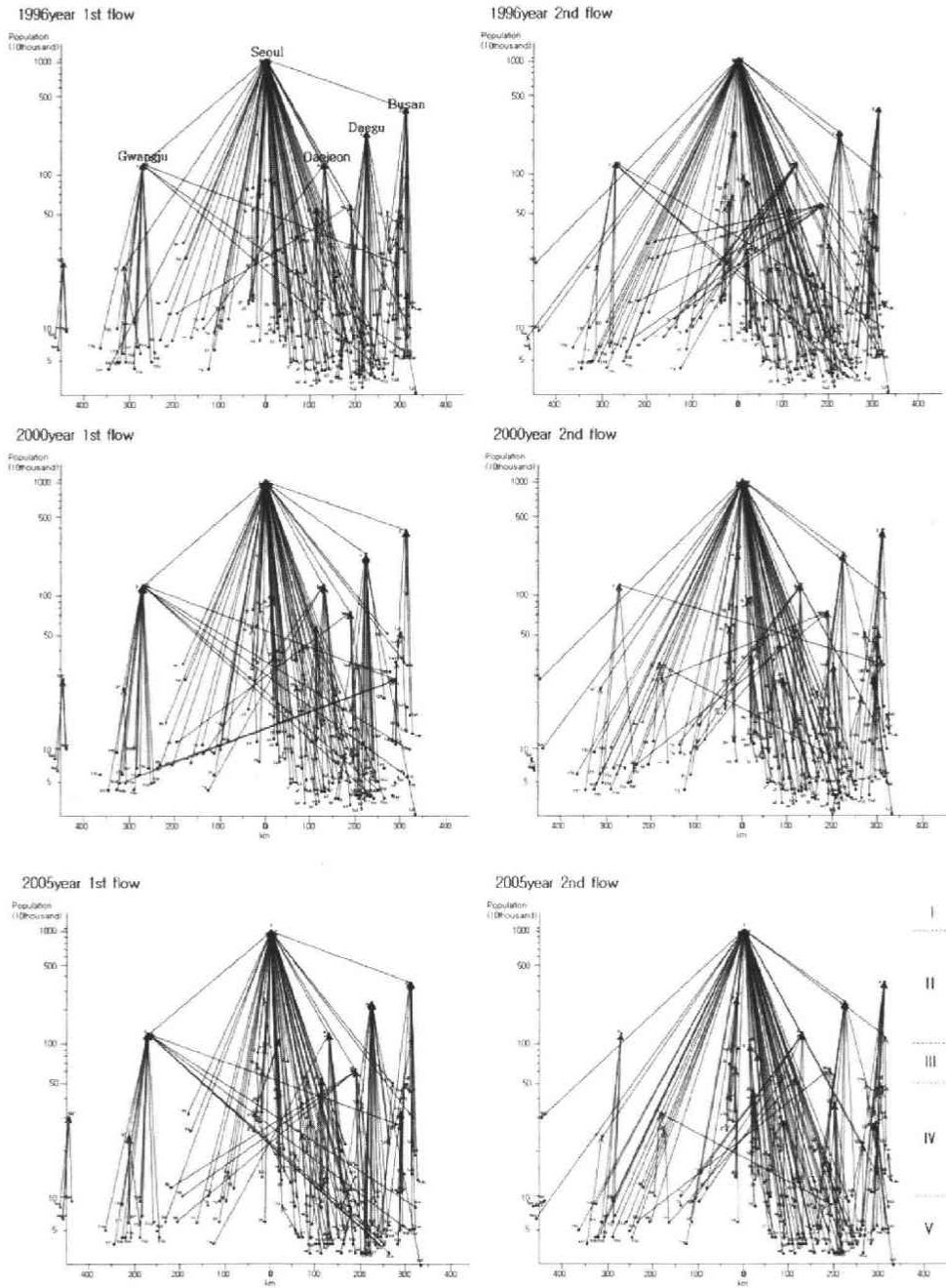


Fig. 2 Nodes of each regions with population movement
Source: Korean National Statistical Office Digital Publication (1996, 2000 and 2005)

Table 2.1 Korean regional hierarchy and cities at each level (1996)

Hierarchy	Population size (10 thousand)	City	the number of cities
I	more than 1,000	Seoul	1
II	100~1,000	Busan, Daegu, Incheon, Gwangju*, Daejeon	5
III	50~100	Suwon, Seongnam, Anyang, Bucheon, Ansan, Goyang, Cheongju, Jeonju, Pohang, Ulsan	10
IV	10~50	Uijeongbu, Gwangmyeong, Pyeongtaek, Guri, Namyangju, Siheung, Gunpo, Uiwang, Hanam, Yongin, Paju, Icheon, Hwaseong, Pocheon, Anseong, Gimpo, Chuncheon, Wonju, Gangneung, Chungju, Jecheon, Cheongwon, Cheonan, Gongju, Boryeong, Asan, Seosan, Nonsan, Dangjin, Gunsan, Iksan, Jeongeup, Gimje, Mokpo, Yeosu Suncheon, Naju, Gwangyang, Gyeongju, Gimcheon, Andong, Gumi, Yeongju, Yeongcheon, Sangju, Gyeongsan, Changwon, Masan, Jinju, Jinhae, Tongyeong, Sacheon, Gimhae, Miryang, Geoje, Yangsan, Jeju	57
V	less than 10	Dongducheon, Gwacheon, Osan, Yangju, Yeosu, Gwangju**, Yeoncheon, Gapyeong, Yangpyeong, Donghae, Taebaek, Sokcho, Samcheok, Hongcheon, Hoengseong, Yeongwol, Pyeongchang, Jeongseon, Cheorwon, Hwacheon, Yanggu, Inje, Goseong, Yangyang, Boeun, Okcheon, Yeongdong Jincheon, Goesan, Eumseong, Danyang, Geumsan, Yeongi, Buyeo, Seocheon, Cheongyang, Hongseong, Yesan, Taean, Namwon, Wanju, Jinan, Muju, Jangsu, Imsil, Sunchang, Gochang, Buan, Yecheon, Damyang, Gokseong, Gurye, Yecheon, Goheung, Boseong, Hwasun, Jangheung, Gangjin, Haenam, Yeongam, Muan, Hampyeong, Yeonggwang, Jangseong, Wando, Jindo, Sinan, Mungyeong, Gunwi, Uiseong, Seongsong, Yeongyang, Yeongdeok, Cheongdo, Goryeong, Seongju, Chilgok, Yecheon, Bonghwa, Uljin, Ulleung, Uiryeong, Haman, Changnyeong, Goseong, Namhae, Hadong, Sancheong, Hamyang, Geochang, Hapcheon, Seogwipo, Bukjeju, Namjeju	94
	Total		167

Note: There are 2 Gwangju in Korea. * is metropolitan city and ** is city.

Table 2.2 Korean regional hierarchy and cities at each level (2000)

Hierarchy	Population size (10 thousand)	City	the number of cities
I	more than 1,000	Seoul	1
II	100~1,000	Busan, Daegu, Incheon, Gwangju, Deajeon, Ulsan	6
III	0~100	Suwon, Seongnam, Anyang, Buchoen, Ansan, Goyang, Cheongju, Jeonju, Pohang, Changwon	10
IV	10~50	Uijeongbu, Gwangmyeong, Pyeongtaek, Guri, Namyangju, Siheung, Gunpo, Uiwang, Hanam, Yongin, Paju, Icheon, Hwaseong, Gwangju, Pocheon, Anseong, Gimpo, Yangju, Chuncheon, Wonju, Gangneung, Chungju, Jecheon, Cheongwon, Cheonan, Gongju, Boryeong, Asan, Seosan, Nonsan, Dangjin, Gunsan, Iksan, Jeongeup, Gimje, Mokpo, Yeosu, Suncheon, Gwangyang, Gyeongju, Gimcheon, Andong, Gumi, Yeongju, Yeongcheon, Sangju, Gyeongsan, Masan, Jinju, Jinhae, Tongyeong, Sacheon, Gimhae, Miryang, Geoje, Yangsan, Jeju	57
V	less than 10	Dongducheon, Gwacheon, Osan, Yeosu, Yeoncheon, Gapyeong, Yangpyeong, Donghae, Taebaek, Sokcho, Samcheok, Hongcheon, Hoengseong, Yeongwol, Pyeongchang, Jeongseon, Cheorwon, Hwacheon, Yanggu, Inje, Goseong, Yangyang, Boeun, Okcheon, Yeongdong, Jincheon, Goesan, Eumseong, Danyang, Geumsan, Yeongi, Buyeo, Seochon, Cheongyang, Hongseong, Yesan, Taeon, Namwon, Wanju, Jinan, Muju, Jangsu, Imsil, Sunchang, Gochang, Buan, Naju, Damyang, Gokseong, Gurye, Goheung, Boseong, Hwasun, Jangheung, Gangjin, Haenam, Yeongam, Muan, Hampyeong, Yeonggwang, Jangseong, Wando, Jindo, Sinan, Mungyeong, Gunwi, Uiseong, Seongsong, Yeongyang, Yeongdeok, Cheongdo, Goryeong, Seongju, Chilgok, Yecheon, Bonghwa, Uljin, Ulleung, Uiryeong, Haman, Changnyeong, Goseong, Namhae, Hadong, Sancheong, Hamyang, Geochang, Hapcheon, Seogwipo, Bukjeju, Namjeju	91
	Total		165

Table 2.3 Korean regional hierarchy and cities at each level (2005)

Hierarchy	Population size (10 thousand)	City	the number of cities
I	more than 1,000	Seoul	1
II	100~1,000	Busan, Daegu, Incheon, Gwangju, Deajeon, Ulsan, Suwon	7
III	50~100	Seongnam, Anyang, Buchoen, Ansan, Goyang, Yongin, Cheongju, Cheonan, Jeonju	9
IV	10~50	Uijeongbu, Gwangmyeong, Pyeongtaek, Guri, Namyangju, Siheung, Gunpo, Uiwang, Hanam, Paju, Icheon, Anseong, Gimpo, Hwaseong, Gwangju, Yangju, Pocheon, Chuncheon, Wonju, Gangneung, Chungju, Jecheon, Cheongwon, Gongju, Boryeong, Asan, Seosan, Nonsan, Dangjin, Gunsan, Iksan, Jeongeup, Mokpo, Yeosu, Suncheon, Gwangyang, Pohang, Gyeongju, Gimcheon, Andong, Gumi, Yeongju, Yeongcheon, Sangju, Gyeongsan, Chilgok, Changwon, Masan, Jinju, Jinhae, Tongyeong, Sacheon, Gimhae, Miryang, Geoje, Yangsan, Jeju	57
V	less than 10	Dongducheon, Gwacheon, Osan, Yeosu, Yeoncheon, Gapyeong, Yangpyeong, Donghae, Taebaek, Sokcho, Samcheok, Hongcheon, Hoengseong, Yeongwol, Pyeongchang, Jeongseon, Cheorwon, Hwacheon, Yanggu, Inje, Goseong, Yangyang, Boeun, Okcheon, Yeongdong, Jeungpyeong, Jinchon, Goesan, Eumseong, Danyang, Geryong, Geumsan, Yeongi, Buyeo, Seocheon, Cheongyang, Hongseong, Yesan, Taean, Namwon, Gimje, Wanju, Jinan, Muju, Jangsu, Imsil, Sunchang, Gochang, Buan, Naju, Damyang, Gokseong, Gurye, Goheung, Boseong, Hwasun, Jangheung, Gangjin, Haenam, Yeongam, Muan, Hampyeong, Yeonggwang, Jangseong, Wando, Jindo, Sinan, Mungyeong, Gunwi, Uiseong, Cheongsong, Yeongyang, Yeongdeok, Cheongdo, Goryeong, Seongju, Yecheon, Bonghwa, Uljin, Ulleung, Uiryeong, Haman, Changnyeong, Goseong, Namhae, Hadong, Sanchong, Hamyang, Geochang, Hapcheon, Seogwipo, Bukjeju, Namjeju	93
	Total		167

considered a first level city. Hence, the hierarchy of Korean regions can be considered to have five classifications. These classifications are as follows :

① more than 10,000,000 (Seoul), ② 1,000,000~10,000,000 (metropolitan city), ③ 500,000~1,000,000 (local central city), ④ 100,000~500,000 (local medium city), ⑤ less than 100,000 (region which experienced population decrease and no influx).

As a result, the numbers of regions at each level of the hierarchy are 1-5-10-57-94 in 1996, 1-6-10-57-91 in 2000, and 1-7-9-57-93 in 2005. This results shows that hierarchy is stable, as postulated in Christaller's concept. As can be seen, there is no massive change between years. But the regions' hierarchy has changed a little. The regions that have experienced a shift in hierarchy are as follows ;

① 1996→2000 :

Ulsan 3→2, Changwon 4→3, Gwangju(city) 5→4, Yangju 5→4, Naju 4→5

② 2000→2005 :

Suwon 3→2, Yongin 4→3, Cheonan 4→3, Pohang 3→4, Changwon 3→4, Chilgok 5→4, Gimje 4→5, Jeungpyung 5, Geryong 5(newly)

Note: Each number refers to the hierarchy

3. Patterns of population movement in the Korean regional hierarchy

3.1 Pattern of population movement

Figure 2 shows the population movement patterns. The movement to Seoul has the highest value, and many of the other movements point toward a higher hierarchy. Even if the percentage was low, the movement in equal and to lower hierarchy is found. Therefore, four population movement patterns in the Korean regional hierarchy can be identified as follows :

- ① To primate city Seoul
- ② To a higher hierarchy except for Seoul
- ③ To an equal hierarchy
- ④ To a lower hierarchy

3.2 Tendency of each pattern

The four patterns have changed each year. But there are only 5-year intervals to show the transition, and the changes are not exceptionally large. This necessitates a detailed numeral analysis.

Table 3 shows the movement tendency of the first flow. The tendency shows both increases and decreases in regional amounts (1996→2000→2005 : 167→165→167). The movement toward Seoul shows the highest value as a single region, but it shows a

tendency toward some decrease. In contrast, the movement to higher hierarchies other than Seoul shows an increased tendency, and this value is the highest among the four patterns. The movement to equal hierarchies remains the same and to lower hierarchies is decreased. Based on these results, it can be said that Korean people primarily migrate to metropolitan cities in their own province.

According to Table 4, the second flow of movement to Seoul is also the highest value for a single region, and the tendency is increased. The movement to higher hierarchies other than Seoul is decreased, especially from 2000 to 2005. The movement to equal hierarchies is increased and to lower is decreased. In the second flow, the movement to higher hierarchies is the highest value among the patterns.

Table 5 shows on the total values and tendencies of the first and second flows, and

Table 3 Movement tendency of the 1st flow

Pattern \ year	1996	2000	2005	tendency
To Seoul	69	64	54	↓
To higher	81	88	101	↑
To equal	8	7	9	—
To lower	7	6	5	↓

Table 4 Movement tendency of the 2nd flow

Pattern \ year	1996	2000	2005	tendency
To Seoul	58	60	64	↑
To higher	76	76	68	↓
To equal	15	20	19	↑
To lower	17	16	16	↓

Table 5 Total values and tendencies (1st, 2nd flow)

Pattern \ year	1996	2000	2005	tendency
To Seoul	127	124	118	↓
To higher	157	164	169	↑
In equal	23	27	28	↑
To lower	24	22	21	↓

it shows an overall trend. The movement to Seoul and lower hierarchies is decreased, but to higher hierarchies other than Seoul and equal hierarchies is increased. Hence, population movement in Korea tends toward higher hierarchies and especially for metropolitan cities and Seoul. These two patterns have appeared mainly in Korea. Movement to Seoul, however, shows some decrease, despite the overall increase in movement to higher hierarchies.

3.3 Features of population movement on the map

In Fig. 2, the characteristics of vertical structure are revealed. In the mean-time (Fig. 3), the horizontal features of movement between regions are revealed. The locations of each region are shown in Fig. 4 with their original numbers.

On the left side of Fig. 3 is the first flow. Each figure for 1996, 2000 and 2005 shows a very similar pattern. In the aggregate, movement is toward Seoul. But there is also a strong tendency toward concentrations moving to metropolitan cities. These cities are central cities and have the highest populations in their area. Except for Incheon and Ulsan, which are close to Seoul and Busan, respectively, the movement is toward metropolitan cities such as Busan, Daegu, Daejeon, and Gwangju. In the case of Chungcheongbukdo and Jeolabukdo provinces, movement is toward Cheongju and Jeonju, which have the highest populations in their area. In the capital area, a

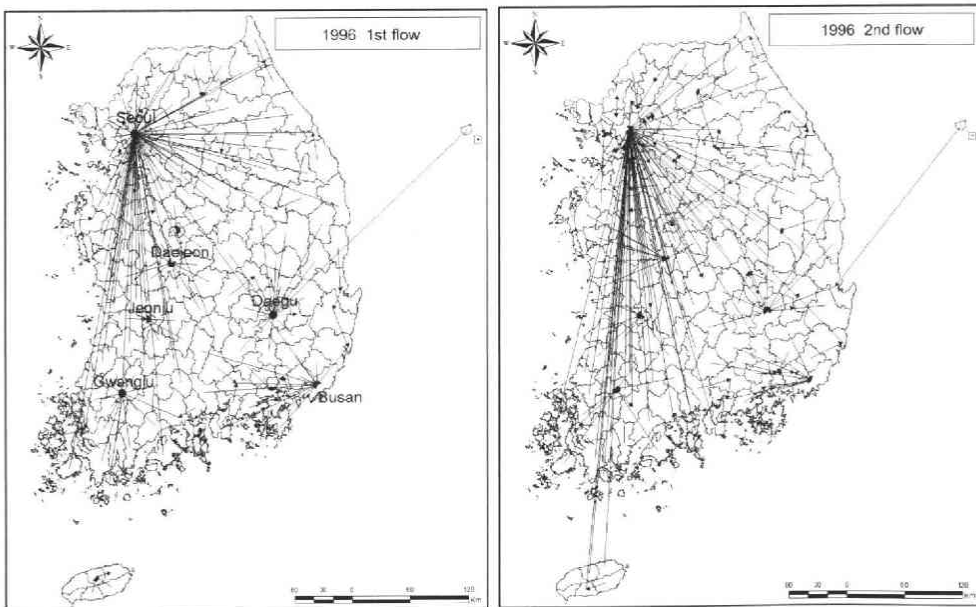


Fig. 3 Population movement of the 1st and 2nd flow in each year

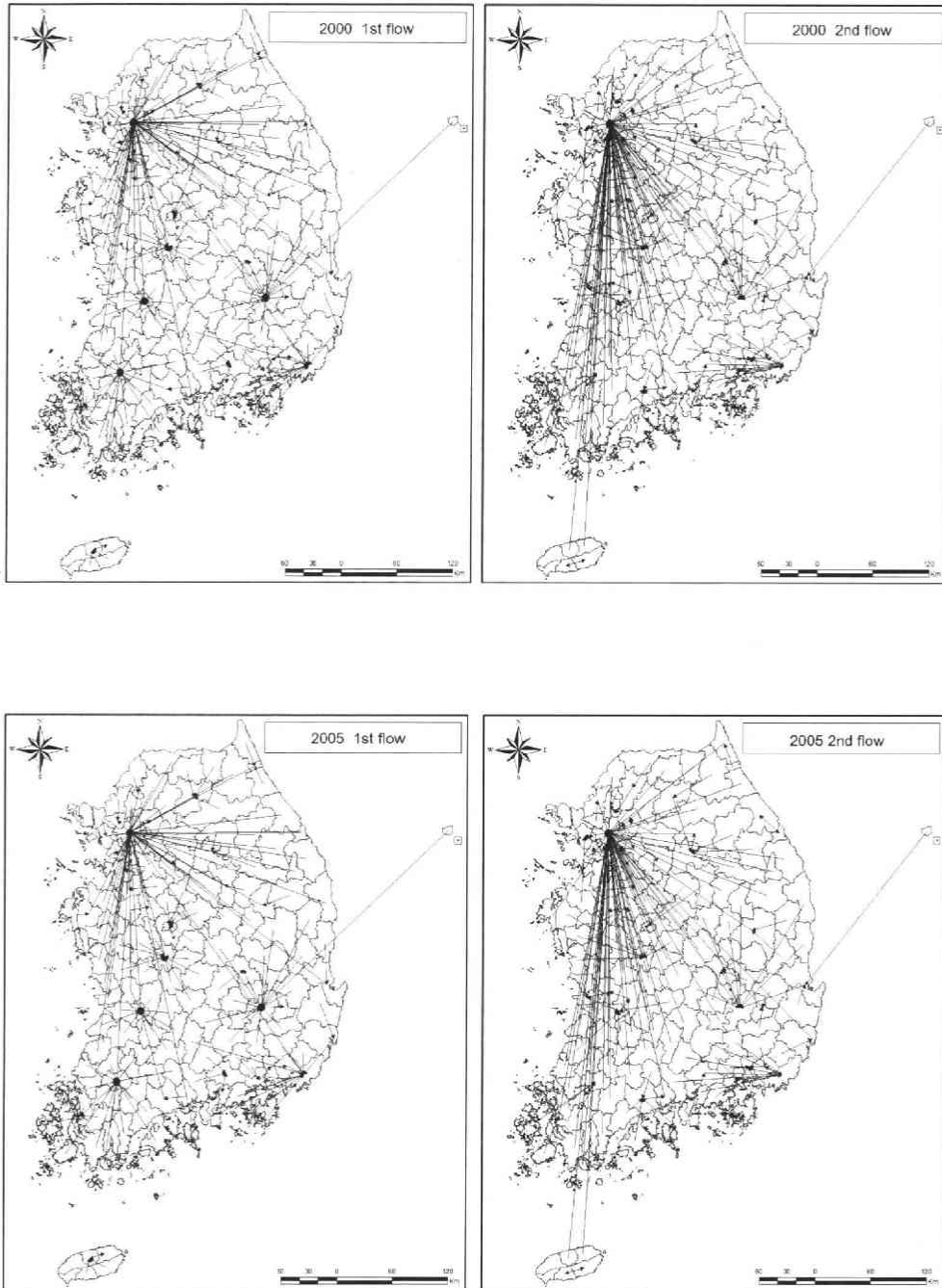


Fig. 3 Population movement of the 1st and 2nd flow in each year (continued)

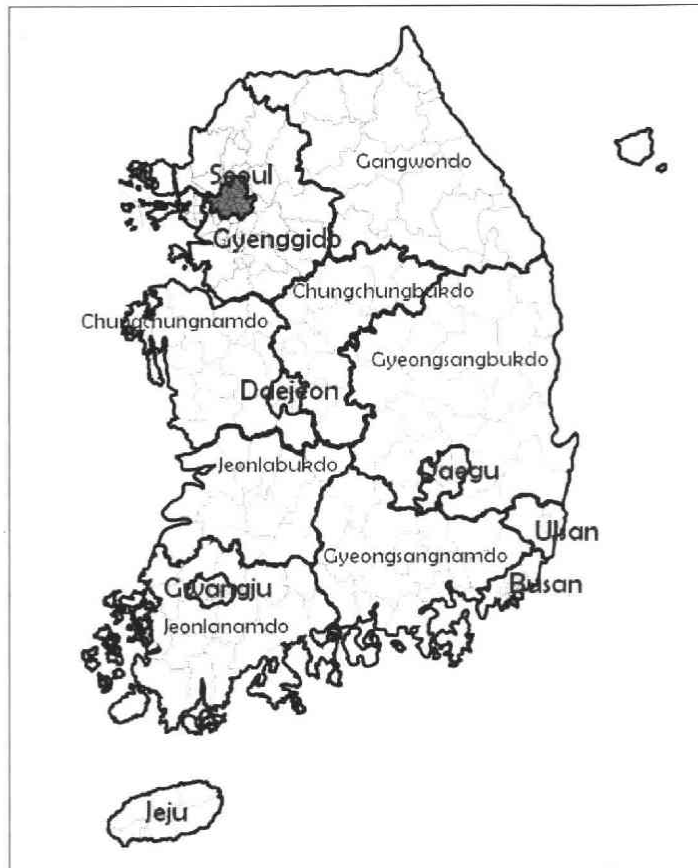


Fig. 4 Main cities and provinces in Korea

comparison of 1996 and 2005 shows that movement inside the capital area has increased.

The second flow, on the right side of Fig. 3, shows concentrations of movement toward Seoul and central cities of each province. In particular, the movement from Jeollanamdo and Jeollabukdo (south-west side) with their population of less than 10 thousand to Seoul can be noted. This tendency is particularly clear in 2005. But compared with the first flow, the concentration tendency to each metropolitan city was dispersed. In other words, the concentration to metropolitan cities was most apparent in the first flow, but the concentrations move not only toward metropolitan cities but to also regional medium size cities in second flow. It can therefore be said that the concentrations to metropolitan cities was mitigated in the second flow.

A remarkable phenomenon of population changes for Daegu and Busan can be

observed. In the case of Daegu, a distribution of origins shapes circle in the first flow, but shapes sector in the second flow. This means that origins are distributed in a limited area of the administrative district in the province of Deagu. In Busan, the movement from its administrative province tends to appear more strongly. This phenomenon may be concerned with locality, so, further research is required.

4. Concluding remarks

4.1 Classification of the Korean regional hierarchy

The Korean regional hierarchy and the patterns of population movement were revealed from analysis of movement data from 1996, 2000, and 2005. The hierarchy of Korea was found to have 5 classifications, since it cannot be said that Busan has taken the place of a second city with regard to population movement. It is a stable hierarchy since the number of regions decrease as one goes to a higher hierarchy. Since the primate city Seoul has more than twice the population of the second city Busan, a 'Primate urban system' appears.

4.2 Patterns of population movement in the Korean regional hierarchy

The hierarchy of Korean regions was divided into 4 ; movement to Seoul, movement to a higher hierarchy other than Seoul, movement to an equal hierarchy, and movement to a lower hierarchy. The movement tended to be primarily to Seoul as a single city, but in general movement to a higher hierarchy has the highest value with regard to movement patterns. Considering the first and second flows, compared between each year, the movement to Seoul decreased and movement to a higher hierarchy increased in 2005. Form a regional perspective, the increasing concentrations appeared primarily in metropolitan cities and mostly occurred with the first flow. In this article, the Korean regional hierarchy and population movement patterns were analyzed. Hereafter, the analysis of movement motivation which has been revealed in this research will be necessary.

Acknowledgements

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Notes

- 1) This rate is based on a city with a population size of more than 500,000. : Including cities of more than 200,000, the Korean urbanization rate exceeded 90% in 2007 [Environmental

Statistics Yearbook] of Korea.

- 2) The population values and dimensions for 2007 are based on the [Korean Statistical Yearbook] by the Korean National Statistical Office.
- 3) This data is attached at the end of article.
- 4) This data is used by the Korean National Statistical Office. Special city, Metropolitan city, City and Gun were included. It included entire Korean regions and a method of movement data separation.

References

- Choi, J.H.** (1987): Urban System and the Spatial Structure of Financial Activities in Korea, Geography education, Korea, Vol. 18, pp.94-124.
- Choi, W.H.** (2005): The Regional Structure of Chungcheong Sphere in South Korea, The Korean Geographical Society, Vol. 49, pp. 336-354.
- Choi, E.Y.** (2004): Migration Selectivity and Growing Spatial Inequality: In case of the Seoul Metropolitan Areas, Journal of the Korean Urban Geographical Society, Vol. 7, No. 2, pp. 57-69.
- Hino, M.** (1998): The relationship between the centrality of cities and the agglomeration of branch offices of enterprises in Tohoku region: On the Japanese Urban Systems General Consideration, Geographical sciences, Vol. 48, No. 3, 184-193.
- Incheon development institute** (2006): Gate way city, Incheon.
- Kwon, S.C.** (2000): Migration and the role of large cities in Korea with reference to geographic flow and social mobility, Journal of the Korean Urban Geographical Society, Vol. 3, No. 1, pp. 57-68.
- Kwon, S.C.** (2001): Migration and Regional Development: Human Capital Drain in Korea, Journal of the Korean Urban Geographical Society, Vol. 4, No. 1, 67-79.
- Kwon, Y.W.** (1998): Urban rank size rule in Korea, 1789~1995, The Korean Geographical Society, Korea, Vol. 32, No. 1, pp. 57-70.
- Kwon, Y.W. and Yu, H.Z.** (2005): Changes of Urban Systems and Management of Urban Governance in Korea, 2005, The Korean Geographical Society, Vol. 39, No. 1, pp. 149-159.
- Lee, H.S.** (2003): Changes of Global Urban System Reflected in International Air Passenger Flow Data's 1992-2001, Journal of the Korean Urban Geographical Society, Vol. 6, No. 2, pp. 103-117.
- Lee, O.H.** (1990): Urban System and Passenger Bus Network in Korea: 1960-1985, The Korean Geographical Society, Vol. 25, No. 2, pp. 67-84.
- Morikawa, H.** (1990): Urbanization and Urban Systems, Daimeido.
- Yang, O.H.** (1979): A study on the urban system in Korea through the analysis of long-distance telephone calls between cities, Geography and Geography education, Vol. 9, No. 0, pp. 204-223.
- Poul, J.S.** (1971): The spatial structure of migration behavior, migration and regional development in the United States, pp. 1-133.
- Richard, E.P.** (1971): The structure of Central Place Systems, Economic geography, Vol. 47, No. 2, pp. 136-55.



Fig. 5 The original number of Korean regions (The number is used only for this study)

Table 6 The original number of Korean regions

1	2	3	4	5	6	7	8	9	10
Seoul	Busan	Daegu	Incheon	Gwangju (metro)	Dae jeon	Ulsan	Suwon	Seongnam	Eujeongbu
11	12	13	14	15	16	17	18	19	20
Anyang	Bucheon	Gwangmyeong	Pyeongtaek	Dongducheon	Ansan	Goyang	Gwacheon	Guri	Namyangju
21	22	23	24	25	26	27	28	29	30
Osan	Siheung	Gunpo	Euwang	Hanam	Yongin	Paju	Icheon	Anseong	Gimpo
31	32	33	34	35	36	37	38	39	40
Hwa seong	Gwangju (city)	Yangju	Pocheon	Yeosu	Yeoncheon	Ga pyeong	Yang pyeong	Chuncheon	Wonju
41	42	43	44	45	46	47	48	49	50
Gang reung	Donghae	Tae baek	Sokcho	Sam cheok	Hongcheon	Hweng seong	Yeong Wol	Pyeongchang	Jeongseon
51	52	53	54	55	56	57	58	59	60
Cheolwon	Hwacheon	Yanggu	Inje	Go seong	Yang yang	Cheongju	Chungju	Jecheon	Cheongwon
61	62	63	64	65	66	67	68	69	70
Boeun	Okcheon	Yeongdong	Jincheon	Gwesan	Eum seong	Dan yang	Cheonan	Gongju	Boryeong
71	72	73	74	75	76	77	78	79	80
Asan	Seosan	Nonsan	Geumsan	Yeongi	Buyeo	Seocheon	Cheongyang	Hongseong	Yeosan
81	82	83	84	85	86	87	88	89	90
Taeon	Dangjin	Jeonju	Gunsan	Iksan	Jeongeup	Namwon	Gimje	Wanju	Jinan
91	92	93	94	95	96	97	98	99	100
Muju	Jangsu	Imsil	Sunchang	Gochang	Buan	Mokpo	Yeosu	Suncheon	Naju
101	102	103	104	105	106	107	108	109	110
Gwangyang	Damyang	Gokseong	Gurye	Goheung	Buseong	Hwasun	Jangheung	Gangjin	Haenam
111	112	113	114	115	116	117	118	119	120
Yeongam	Muan	Hampyeong	Yeonggwang	Jangseong	Wando	Jindo	Shinan	Pohang	Gyeongju
121	122	123	124	125	126	127	128	129	130
Gimcheon	Andong	Gumi	Yeongju	Yeongcheon	Sangju	Mungyeong	Gyeongsan	Gunwi	Euseong
131	132	133	134	135	136	137	138	139	140
Cheongsong	Yeongyang	Yeongdeok	Cheongdo	Goryeong	Seongju	Chilgok	Yecheon	Bonghwa	Uljin
141	142	143	144	145	146	147	148	149	150
Ulreung	Changwon	Masan	Jinju	Jinhae	Tongyeong	Sacheon	Gimhae	Milyang	Geoje
151	152	153	154	155	156	157	158	159	160
Yangsan	Euryeong	Haman	Changnyeong	Go seong	Namhae	Hadong	Sancheon	Hamyang	Gechang
161	162	163	164	165	166	167	168	169	
Hapcheon	Jeju	Seogwipo	Bukjeju	Namjeju	Jeungpyeong	Gyeongryong	Yecheon (city)	Yecheon (Gun)	

Note: The number is used only for this article.