

A history of the Republic of Korea's industrial structural transformation and spatial development

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19 chapter

The Korean peninsula, which is situated at the northeastern rim of the Asian continent, covers 221,000 square kilometers and includes both the Democratic People's Republic of Korea and the Republic of Korea. Of that total, 99,000 square kilometers constitute the Republic of Korea, the focus of this paper.

The Korean peninsula historically served as a land bridge over which Chinese culture was diffused from China to Japan. Despite the significant influence of Chinese culture and the frequent invasions by foreign powers, the Republic of Korea has managed to preserve a cultural and ethnic identity that is different from that of either China or Japan, with a distinct language, alphabet, arts, and customs (Lee and others 1988).

The province (*do*) is the country's largest administrative unit. Presently, Korea has nine provinces, with names originating in the early Chosun Dynasty. In addition, Korea has one special city (Seoul) and six mega cities (Busan, Daegu, Daejeon, Gwangju, Incheon, and Ulsan) that have populations over 1 million and are at the same administrative level as provinces (see figure 19.1).

Traditionally, the Korean peninsula was divided into three geographic regions: north, central, and south. Due to the political division of the Korean peninsula in 1953, some of the northern part of the central region and the whole of the northern region belong to the Democratic People's Republic of Korea. In addition, there are cultural and geographic differences between the east and west of each region. For example, the south

is divided into Yongnam (the southeast region) and Honam (the southwest region). In general, the western part of Korea consists largely of plains, while the eastern part consists largely of mountains.

Historically, when agriculture was the major economic activity, the western part of Korea was relatively affluent, largely due to high agricultural productivity in the plains. However, since the early 1960s, Korea's economic geography has changed significantly, with rapid industrial development starting in the southeastern and capital regions. Construction of the Seoul-Busan express highway and the industrial development of the southeastern region, centered on Busan, increased the spatial disparity between the axis of Seoul-Busan and the axis of the southwestern and northeastern corners of Korea.

Korea has experienced remarkable economic growth for the past five decades. Korea was among the poorest countries in the world following the devastation of the Korean War (1950–53). Korea's per capita gross national product (GNP) rose from less than US\$100 (in 1996 US\$) in 1960 to US\$20,000 in 2007. This remarkable economic achievement, known as “compressed economic growth,” is closely related to the successful implementation of export-oriented, sector-specific industrial development strategies and the development of human resources since the launch of the First Five-Year Economic Development Plan in 1962.

Korea's compressed economic growth is dynamic, resulting, first, in the concentration of industry and population in the

capital region and, subsequently, in the convergence of regional GDP per capita, as provincial cities and rural areas began to evolve with the development of information and communications technology (ICT).

Considering the dynamics of the Korean economy and the country's rapid spatial development, this chapter investigates the following issues:

- The role of government policies in the transformation of industrial structure and spatial development;
- The spatial development of economic growth in terms of “distance” and “density” effects, agglomeration, factor mobility, and technological development; and
- The lessons and policy implications.

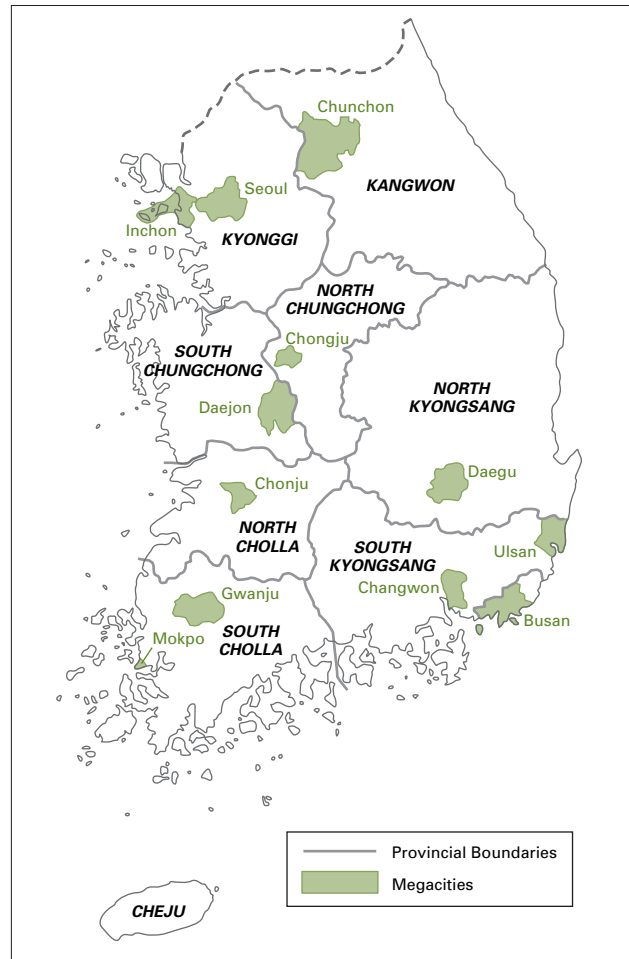
In Korea, structural dimensions are closely related to spatial dimensions, and so this chapter examines industrial policies, spatial transformation, and industrial restructuring. The analyses at the national level are conducted mostly for the period from the 1960s to 2005. However, the analyses at the regional level are conducted mostly for the period from the 1980s to 2005 due to the availability of data by regions and inconsistency of data for earlier years.

The basic unit of analysis is the province: 9 provinces and 7 major cities (Seoul and the mega cities), making 16 units. The 16 basic units of provinces and cities are classified into 4 regions: capital, middle, south-west, and southeast (see figure 19.2).

Industrial policies, structural changes of industry, and spatial transformation

The history of Korean industrialization is rather short. Manufacturing activities were mainly in handicrafts created by middle-class people in the Chosun Kingdom (1392–1910). During the period of Japanese occupation (1910–45), Japan began developing heavy and chemical industries in the north (now the Democratic People's Republic of Korea) to make use of the abundant hydraulic power and mineral resources there. As a result, 90 percent of the minerals,

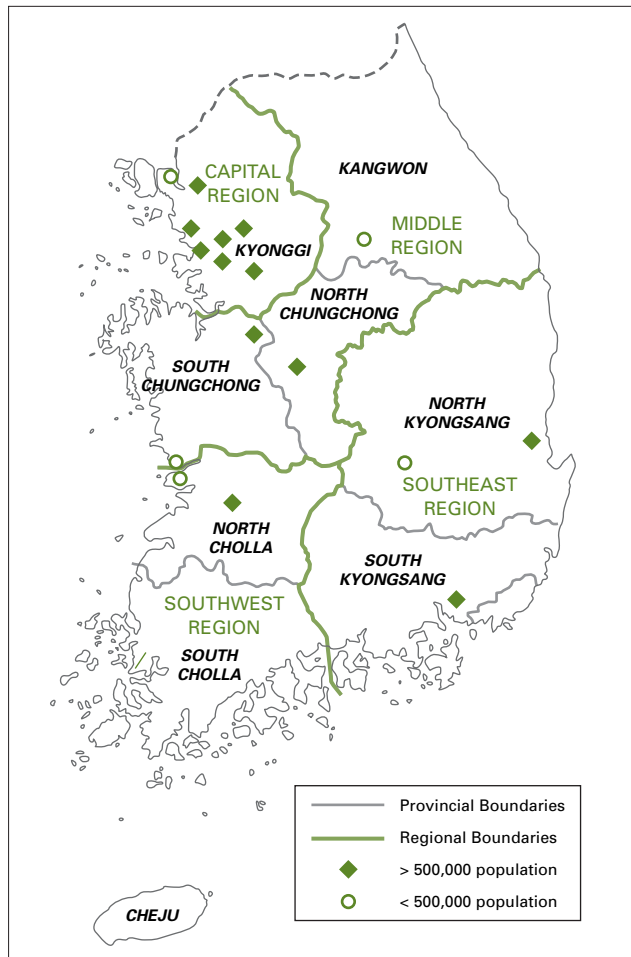
Figure 19.1 Administrative divisions of Korea: provinces, mega cities, and provincial cities



82 percent of the chemical industries, and 90 percent of the electronic power-generating facilities were located in the north when Korea was liberated from Japanese occupation in 1945 (Park 1981). To make matters worse, more than half of the manufacturing facilities were destroyed during the Korean War, weakening the foundations for industrial development.

Industrialization in Korea has progressed rapidly since the early 1960s, when the First Economic Development Plan (1962–66) was launched. The manufacturing industry became the major driving force of the Korean economy for the next two decades. The share of manufacturing in total national production increased rapidly from 12.1 percent in 1960 to 29.6 percent in 1980, while

Figure 19.2 Four regions, nine provinces, and major cities in Korea



the share of agriculture decreased from 39.9 to 14.6 percent (see table 19.1).

The “density” of a core city and the “distance” to the core city were important in the industrialization phase, as rapid industrialization was accompanied by rapid urbanization. The urbanization ratio (share of cities with a population more than 20,000) increased from 35.9 percent in 1960 to 78.6 percent in 1990. Most of the rapidly growing cities during the last four decades were in the suburban areas of Seoul and the southeast region. In addition, most industrial cities grew rapidly, suggesting that agglomeration or scale economies were important. Most of the industrial cities in these regions were rural agricultural areas in the 1960s.

Industrial decentralization from Seoul was one of the major factors contributing

to the proliferation of industrial cities in the capital region, while the development of a large-scale industrial complex was the major source of growth for industrial cities in the southeast region. Korea’s rural-urban transformation took place through the concentration of industry and population in major urban areas, on the one hand, and the decentralization of industry and population from the large core cities to their hinterlands within the region, on the other. Both processes are related to distance and density effects.

Understanding the government’s industrial policy is a prerequisite to understanding the spatial transformation of Korea. Since the First Five-Year Economic Development Plan was launched in 1962, the national government has sought to promote particular sectors and locations. Export-oriented industrialization has been a major strategy since the early 1960s, and the strategy was fashioned to promote the most promising industries at a certain stage. These were called “strategic industries.” Labor-intensive industries were the key sectors for the expansion of industrial exports before the early 1970s, while heavy and chemical industries were the strategic industries for the expansion of exports in the late 1970s and early 1980s. The government’s policy of support for heavy and chemical industries contributed to the evolution of the chaebol (business conglomerate) system by allowing chaebols to borrow foreign capital and granting them incentives to invest in heavy industries (Park and Markusen 1995). Since the mid-1980s, high-technology industries such as semiconductors have been increasingly favored. Since the 1990s, especially since the financial crisis in November 1997, the Korean government has sought to promote the development of knowledge-intensive industries with the intention of opening up the country to trade and capital movements, restructuring the economy, including the financial sector, and making the labor market more flexible. Regional innovation has been the key policy in the twenty-first century (see figure 19.3).

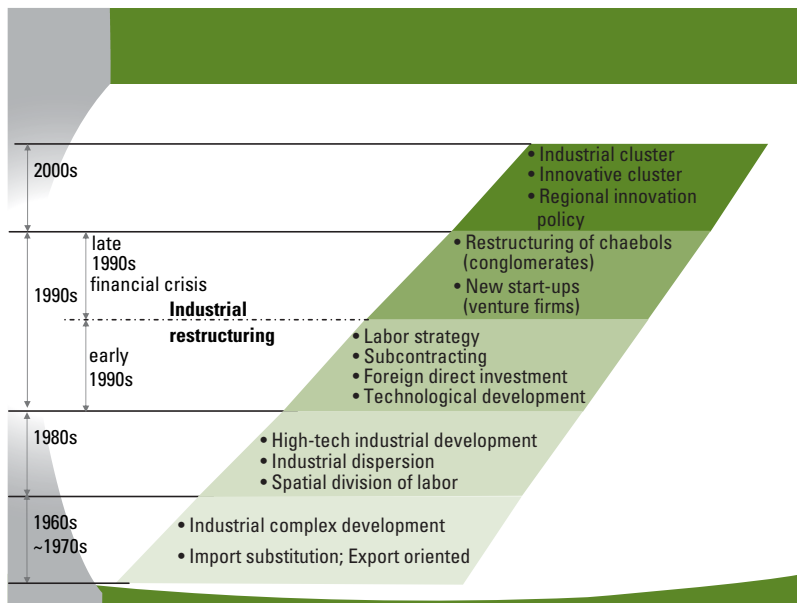
Along with sectoral policies, the national government established several large industrial estates in the southeastern part of the

Table 19.1 Structure of production in Korea, by sector, 1960–2005

percentage of GDP in current prices

Sector	1960	1970	1980	1990	2000	2005
Agriculture	39.9	31.1	14.6	9.0	4.6	3.4
Industry	18.6	28.4	41.4	44.7	42.8	40.4
Mining	2.3	1.3	1.4	0.5	0.3	0.4
Manufacturing	12.1	19.1	29.6	28.9	31.5	28.8
Construction	3.5	6.4	8.2	13.2	8.2	9.0
Utilities	0.7	1.6	2.1	2.1	2.8	2.2
Services	41.5	40.5	44.0	46.3	52.6	56.2
Total (GDP)	100.0	100.0	100.0	100.0	100.0	100.0

Source: Bank of Korea (various years).

Figure 19.3 A brief history of Korean industrial policies

Source: Author.

country. The major new industrial cities or production agglomerations of Ansan, Changwon, Kumi, Pohang, and Ulsan were created as a result of industrial policies implemented in the late 1960s and the 1970s. Chaebols contributed heavily to the development and growth of industrial cities by establishing large branch plants with imported technology and borrowed foreign capital. However, the idea of territorial production systems was not successfully implemented in the early stage of development. That is, at the initial stage, the industrial estates in the industrial cities had only limited local interfirm linkages and were just agglomerations of production activities

without significant intraregional production networks.

The industrial policies have had a significant impact on the structural and spatial makeup of industries. To show the structural changes more clearly, industries can be classified by level of technology or intensity of labor. In this chapter, manufacturing industries are classified, for the sake of convenience, into five types: labor intensive, capital intensive, resource intensive, assembly, and other special types. The classification is based on the results of a factor analysis of manufacturing industries conducted by Park (1993). Assembly-type industries are mostly technology-intensive industries,

except for the manufacture of furniture (see table 19.2). Since the share of furniture manufacturing is very small, assembly-type industries are considered to be technology-intensive industries.

The most distinctive structural change has been the shift from labor-intensive to technology-intensive industries. Labor-intensive industries played a dominant role during the phase of rapid industrialization in the 1960s and 1970s, but their share has declined steadily since the late 1970s. On the contrary, assembly-type industries have steadily increased their share since the late 1970s. There have been slight changes in the use of resources and capital, but the most significant structural shift at the national level has been from labor-intensive to technology-intensive industries.

In addition, there are considerable differences in the structural changes occurring in different regions. The southeast region became highly specialized in assembly industries during the last three decades. The middle region began to transform from labor-intensive to technology-intensive industries in the 1990s. The changes to the middle region are closely related to the extension of industrial agglomeration from the capital region to the nearby Chungcheong region as well as the development of Daeduck Research Park in Daejeon in the 1990s. The shift to technology-intensive industries also occurred in the southwest region, but the degree of the shift is relatively small compared to the nationwide trend. The southwest region is rather specialized in resource-based industries.

Changes in the industrial structure of Seoul are significantly different from the nationwide changes. Seoul specialized in labor-intensive industries early in the coun-

try's industrialization, and, even though the share of assembly-type industries has risen slightly since the early 1990s, it remains lower than the share of labor-intensive industries. In Seoul, the structural changes within an industry have been more intensive than the structural changes among types of industry. For example, within the apparel industry, Seoul is highly specialized in fashion design and high-value-added products rather than standardized mass production.

Spatial changes are closely related to the industrial policies and structural changes of industries. In the early phase of industrialization, the export-oriented industrial policy and heavy and chemical industrial policy reinforced spatial disparities, with industries concentrated in the capital region and the southeast region (Park and Wheeler 1983). The capital region increased its share of manufacturing employment in the 1960s and peaked in 1975, with 48.3 percent (see table 19.3). The southeast region increased its share sharply, peaking in 1980, with 40.4 percent.

Furthermore, the government's heavy and chemical industrial development policy resulted in a spatial division of labor, with the headquarters of chaebols concentrated in Seoul and production functions decentralized to other regions, especially the southeast. The high-technology industrial policy resulted in a slight reconcentration of production in the capital region in the 1980s, due to the region's locational advantages. The concentration of high-technology industries and advanced services, including research and development (R&D) activities, in the capital region intensified the spatial division of labor in the 1980s (Park 1993).

The middle and southwest regions, which can be regarded as peripheral regions,

Table 19.2 Share of manufacturing industry in Korea, by type of firm, 1981–2005
percent, unless otherwise noted

Type	1981	1986	1991	1996	2001	2005
Resource based	16.5	15.4	14.9	16.8	15.9	15.1
Technology intensive (assembly)	27.6	33.7	41.8	47.8	51.3	57.6
Labor intensive	43.5	38.3	29.8	21.5	19.0	14.3
Capital intensive	4.5	4.3	5.0	8.8	8.6	8.1
Other	7.9	8.3	8.5	5.0	5.2	4.9
Korea, total number of firms	2,559,473	3,290,035	4,231,080	3,748,516	3,415,996	3,450,893

Source: KNSO, *Census on Basic Characteristics of Establishments* (various years).

Table 19.3 Share of manufacturing employment in Korea, by region, 1963–2005
percent

Region	1963	1970	1975	1980	1985	1990	1995	2000	2005
Seoul	29.6	33.9	30.5	22.1	19.8	15.6	12.5	10.5	9.1
Incheon	—	—	—	7.7	7.2	7.8	8.3	7.8	6.9
Gyeonggi	10.2	12.1	17.8	16.1	20.3	24.4	25.9	28.2	30.9
Capital region	39.8	46.0	48.3	45.9	47.3	47.8	46.7	46.6	47.0
Middle region	10.4	9.8	7.7	7.5	6.9	7.9	10.3	11.4	12.2
Southeast region	36.9	34.5	37.5	40.4	40.2	37.8	35.6	34.8	33.6
Southwest region	12.9	9.7	6.5	6.3	5.6	6.4	7.3	7.2	7.2
Korea, total number of firms	401,981	861,041	1,420,144	2,014,751	2,437,997	3,019,816	2,951,885	2,652,590	2,865,549

Source: KNSO, *Census of Mining and Manufacturing Industry* (various years).

experienced a decrease in their share of manufacturing employment until the mid-1980s, after which the middle region recovered somewhat. The southwest region increased its share of manufacturing employment from the mid-1980s to the mid-1990s, but no significant change has occurred since the mid-1990s. Such regional changes are shown in table 19.3.

Firms' industrial restructuring, spatial changes, and globalization

In the 1990s Korea experienced two phases of industrial restructuring: one was related to the labor movement in the late 1980s and one to the financial crisis in 1997. From 1987 to 1989, the country experienced severe labor disputes, and wages rose sharply. The sharp wage hikes, appreciation of the won with regard to the U.S. dollar, high interest rates, weak financial structure, high turnover rates, and labor shortages in production lines triggered the restructuring of firms, especially the labor-intensive small and medium enterprises (SMEs; see Park 1993, 1994).

Individual corporate strategies became more important than ever for firms' survival and competitiveness as consumer markets became more diversified, technology advanced rapidly, and product life cycles became shorter. Before the early 1990s, the government played a critical role in the industrial development and structural changes taking place in Korea (Markusen and Park 1993; Park 1991). Since the liberalization of labor in 1989, the strategies of private firms have been as important as the policies of the government, and many firms

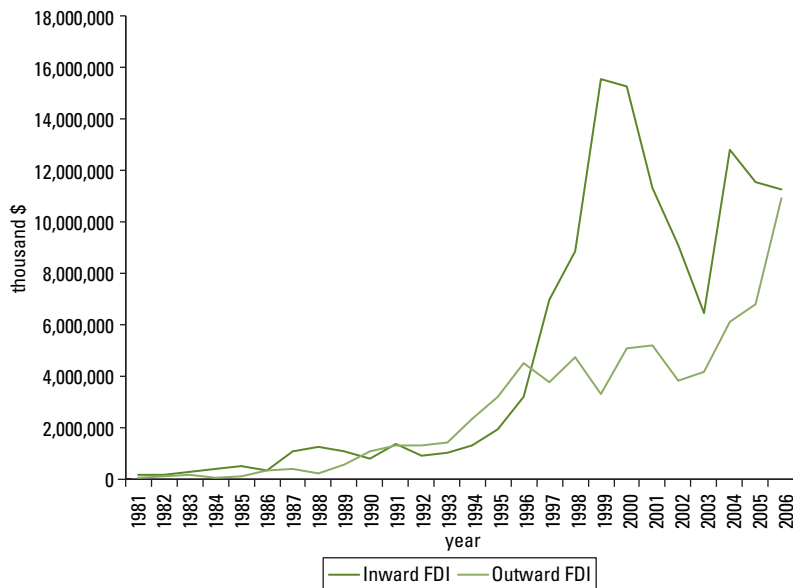
in labor-intensive industries were either closed or restructured in the early 1990s.

According to research on industrial restructuring in the Asian newly industrializing economies of Korea; Taiwan, China; Hong Kong, China; and Singapore in the early 1990s, Korean firms pursued four strategies for industrial restructuring in the areas of labor, organization, location, and technology development (Park 1995). Flexible labor strategies, which focused on numerical rather than functional flexibility, reduced the costs of production by increasing the use of flexible labor, such as temporary workers, part-time workers, and foreign workers. Subcontracting—the major organizational strategy—reduced costs by outsourcing production activities or separating some parts of production lines. Locational strategies focused on foreign direct investment (FDI), which was mainly geared toward low-cost areas such as China and Southeast Asian countries during the early 1990s. There was an increase in outward FDI from Korea during the 1990s until right before the financial crisis in 1997 (see figure 19.4). Along with efforts to reduce costs, technological developments also were emphasized, and the number of firms involved in R&D activities rose. About 19.9 percent of firms conducted R&D activities in 1993, compared with about 34 percent in 1996 (Park 2000).

A second industrial restructuring occurred after the financial crisis in 1997, when the central government took a leading role in restructuring chaebol groups. During this period, outward FDI stagnated, while inward FDI increased dramatically. Since 2002, outward FDI has again increased. The

Figure 19.4 Inward and outward FDI in Korea, 1981–2006

US\$ thousand

Source: Korea Trade Statistics (www.global.kita.net).

two periods of industrial restructuring significantly contributed to the globalization of the Korean economy by strengthening the relationship between Korea and other Asian countries in terms of trade and FDI.

The two restructuring processes in the 1990s had a considerable impact on space and globalization in Korea. In the early 1990s, many SMEs in labor-intensive industries were closed or relocated to China or Southeast Asia, seeking low-cost areas. Accordingly, regions that specialized in labor-intensive industries, such as Seoul, were under severe pressure to restructure. Because the firms pursuing strong technological development were mostly located in the capital region, the share of the capital region did not decline in the early 1990s. Because many new high-tech start-ups were established in the capital region, especially in Seoul, there was a slight reconcentration of industries for three to four years after the crisis. During the subsequent restructuring phase, scale economies and “density” effects were significant for high-tech spin-offs. Globalization progressed rapidly, with increasing outward FDI. Especially in the case of outward FDI to China, physical and

cultural “distance” effects were important. Two-thirds of outward FDI to China went to northeast China, focusing on Shandong province, which is near to and has close historical linkages with Korea.

Changes in innovation systems, recent regional innovation, and cluster policies

Innovation systems in Korea have changed significantly during the last four decades. In Korea the issues of innovation were relatively neglected in the 1960s, because the ultimate goal was to provide a foundation for industrialization. The government took the initiative in the 1960s and 1970s by helping research institutes to take a leading role in improving industrial technologies. Most firms were more interested in receiving technology transfers from the industrial countries than in conducting their own R&D activities. Universities, not firms, took the lead in the development of technology. Therefore, the national systems of innovation in the 1960s and 1970s were directed mainly by the government’s science and technology policy, which supported the transfer of technology to firms and the process of learning from imported technology. The impact of inbound FDI on the development of innovation systems was not significant during this period.

Since the 1980s, however, the major role in R&D and innovation has shifted from the government to private firms (Park 2001). Many firms have established their own R&D centers and significantly increased R&D expenditures. Private firms accounted for 56 percent of total R&D expenditure in 1981, surpassing the share of government expenditure, and reached 81 percent in 1985 (MOST 1990). In 1980 only 54 firms, most of which belonged to chaebols, had their own R&D centers, but the figure increased to 2,226 in 1995 (KITA 1995, 1996). Chaebols aggressively established R&D centers in the early 1980s, but by the late 1980s, even the SMEs began to establish their own R&D centers.

According to a survey conducted right after the financial crisis in December 1997, SMEs continued to be involved in R&D activities in the 1990s (Park 2000). Out of 825 firms that responded to the question-

naire, 20 percent of firms conducted R&D activities in 1993 and 34 percent did so in 1996. All in all, the survey revealed that larger SMEs were more interested in R&D activities than smaller SMEs. However, among the firms that conducted R&D activities, smaller SMEs spent a higher percentage of total sales on R&D than larger SMEs, which suggests that a considerable proportion of these smaller SMEs are high-tech businesses. Presently, more than two-thirds of all R&D centers were established by SMEs.

The R&D activities of firms in the 1990s had some distinctive characteristics (Kim 1997): (1) large firms of chaebols established strategic alliances with worldwide high-tech firms; (2) large firms, which mostly belong to chaebols, were aggressive in establishing foreign R&D centers and labs; and (3) due to the difficulties in getting licenses for leading-edge complex technology, large firms sought to secure original technology by merging with or acquiring high-tech firms in the developed countries.

Since the 1990s, regional innovation networks have begun to evolve due to the development of regional clusters of SMEs in technology-intensive sectors. The establishment of science parks and high-tech parks in areas outside the capital region, in addition to the Daeduck Research Park, has contributed to the clustering of innovation networks since the 1990s. Starting in 2002, the participatory government has emphasized balanced national development and promoted regional innovation and cluster policies (Park 2007). Regional innovation policies, which have been promoted as essential for balanced national development, seek to integrate "talent," "technology," and "industry." Major policies for regional innovation are seeking to establish regional innovation systems, strengthen the innovation capacity of universities in provinces, promote science and technology in the provincial regions, and establish networks of industries, universities, and research centers.

In addition to regional innovation policies, the policy of promoting innovative clusters has been pursued strongly since 2002. Seven innovative clusters have been reformulated through the reorganization

of national industrial complexes, including the electronics and information technology (IT) cluster in Kumi, the machinery cluster in Changwon, the automobile cluster in Ulsan, the parts and components cluster in Ahnsan, the parts and components of automobile and machinery cluster in Gunsan-Janghang, the photonics cluster in Kwangju, and the medical instruments cluster in Wonju. Thirty-six mini-clusters emanating from the seven innovative clusters have been developed to promote collaboration and solve problems in industrial practices.

Daeduck Research Park in the city of Daejun has been supported by the special law to promote commercialization of R&D and innovations and was renamed as the Daeduck R&D Special District in 2003. Innovation clusters have been promoted through support for strategic industries in each region. High-tech IT clusters and local culture clusters have been supported through collaboration among diverse economic actors. And the development of clusters by private firms, such as Suwon's IT cluster by Samsung, Paju's semiconductor cluster by LG-Phillips, and Pohang's material cluster by POSCO, has also been promoted.

This strong promotion of balanced national development seems to have had an impact on the share of regional GDP compared to the share of population in the capital region, a subject examined in the next section. The regional innovation policies have certainly increased the density of regional innovation networks in the provinces. However, restrictions on the autonomy of universities have exerted negative effects on the development of high-quality manpower, limiting the ability of Korea to innovate.

Spatial development and change

During the last five decades in Korea, "distance" and "density" effects have been significant in Korea. Population and economic activities have become increasingly concentrated in the capital region, which accounted for only 28.3 percent of the country's total population in 1970 and for 48.2 percent in

2005. Other regions, accordingly, experienced a decline in their share of population (see figure 19.5).

However, there were meaningful exceptions to and fluctuations in this trend. The southeast region's share of population remained steady during the 1970s, when heavy and chemical industries developed rapidly along the southeastern coast, but its share of population has decreased slightly since then. The population share of the middle region declined steadily until 1995, after which it increased slightly. The southwest region, which was underdeveloped during the phase of rapid industrialization, has seen a steady decrease in its share of the population, from 21.3 percent in 1970 to 11.7 percent in 2005, having lost many residents to the capital region. Seoul's share of population increased steadily until the end of the 1980s, but has declined since then, even though there has been no significant change in the absolute number of population (see table 19.4). Gyunggi province, which is essentially a suburb of Seoul, has steadily increased its share of population from 8.2 percent in 1970 to 22.0 percent in 2005, reflecting the

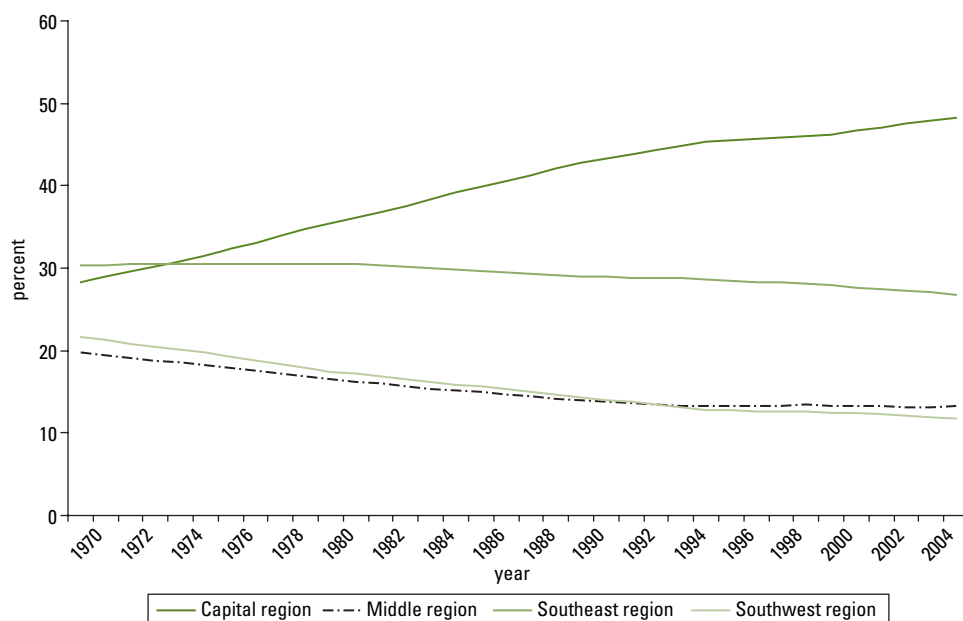
effect of distance from Seoul. Furthermore, the middle region, which is adjacent to Gyunggi province, has declined in population share, reflecting the effects of distance from the capital region.

The entropy index, which declines as disparity rises, suggests that the distribution of population has become more regionally uneven over time (see figure 19.6). While the degree of spatial disparity of population is lower than that of regional GDP and of manufacturing, the spatial disparity of population is increasing, whereas that of regional GDP or manufacturing is not. The entropy value in this chapter is measured as follows:

$$H = - \sum_i^n q_i \log_2 q_i, \quad (19.1)$$

where H is entropy value; q is a set of nonnegative numbers that sum to unity $\left[\sum_i^n q_i = 1.0 \right]$; n is the number of subgroups (in this case, 16). If any q is equal to 1 and all other q s are 0, then H is equal to 0. For a given n , H is at its maximum when all q s are equal, so that

Figure 19.5 Share of population in Korea, by region, 1970–2004

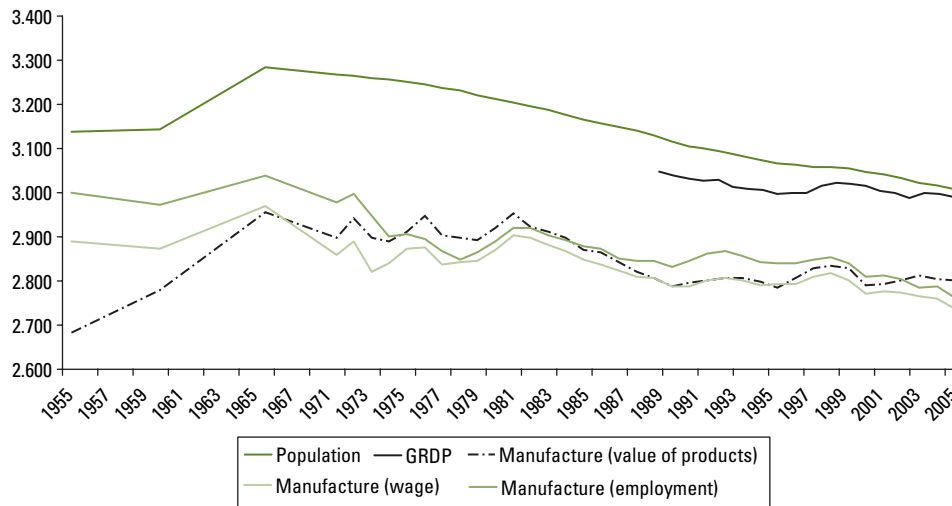


Source: KNSO, Resident Registration Population (various years).

Table 19.4 Share of population in Korea, by region, 1970–2005

Region	1970	1975	1980	1985	1990	1995	2000	2005
Seoul	17.6	19.9	22.3	23.8	24.4	22.9	21.4	20.8
Incheon	2.5	2.8	3.3	3.8	4.4	5.2	5.4	5.4
Gyunggi	8.2	8.9	9.9	11.5	13.9	17.2	19.5	22.0
Capital region	28.3	31.5	35.5	39.1	42.8	45.3	46.3	48.2
Middle region	19.7	18.2	16.5	15.1	13.9	13.2	13.4	13.2
Southeast region	30.4	30.5	30.5	29.8	28.9	28.6	27.9	26.8
Southwest region	21.6	19.8	17.4	15.9	14.4	12.9	12.5	11.7
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Korea, total	32,240,827	35,280,725	38,123,775	40,805,744	42,869,283	45,092,991	47,008,111	48,138,077

Source: KNSO, *Resident Registration Population* (various years).

Figure 19.6 Entropy index

Sources: KNSO (various years); author's calculations.

$$\left[H = -n \left(\frac{1}{n} \log_2 \frac{1}{n} \right) = \log_2 n \right]. \quad (19.2)$$

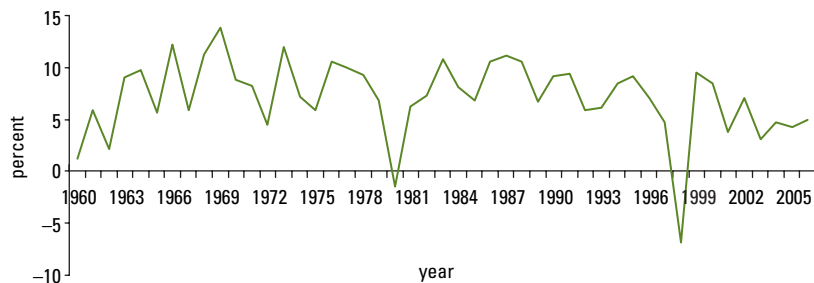
This trend of increasing population disparity is closely related to the continuous concentration of population in the capital region, suggesting the significant effect of agglomeration economies and density.

Spatial pattern of regional GDP growth in 1985–2005

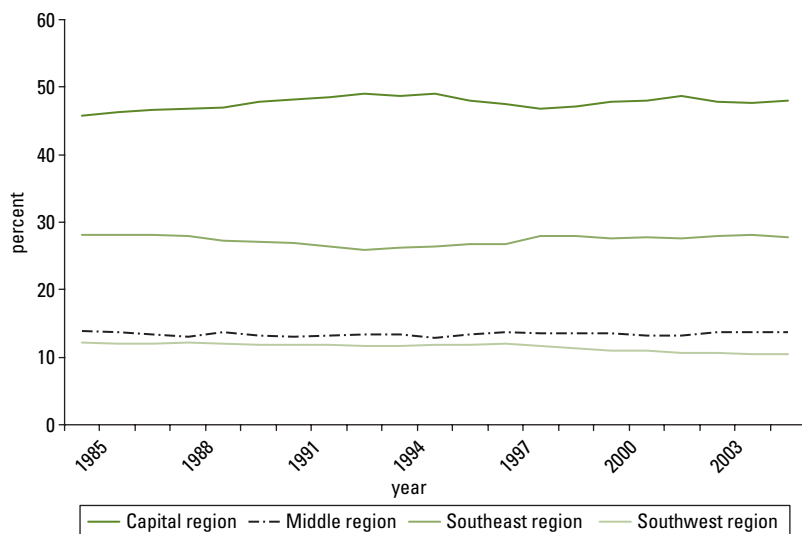
Since the launch of the First Economic Development Plan in 1962, the annual growth rate of gross domestic product (GDP) has been impressive, as shown in figure 19.7. For the most part, annual growth rates were more

than 5 percent, turning negative only twice: during the second oil crisis in 1979 and during the financial crisis in 1997.

There have been some spatial changes in regional GDP (see figure 19.8). The capital region steadily increased its share of total regional GDP until 1993, when it peaked at 49.1 percent. There were some fluctuations after that time: a decrease to 46.8 percent in 1998 and then an increase to 48.6 percent in 2002. There was an opposite trend in the southeast region, where the share of regional GDP declined slightly from 1985 until 1993 and increased slightly from 1993 to 1998. The share of the middle region remained fairly steady, whereas the share of the southwest region declined slightly.

Figure 19.7 Annual growth rate of GDP in Korea, 1960–2005

Source: Bank of Korea (various years).

Figure 19.8 Regional GDP in Korea, by region, 1985–2003

Source: www.kosis.kr.

Regional GDP per capita, by region, however, shows an interesting pattern, with a general trend of convergence. There were two turning points (see figure 19.9, panel A). First, the middle region overtook the southeast region in 1989, when President Tae-Woo Rho liberalized labor. During the phase of rapid industrialization in the 1970s, industry clearly was concentrated in the capital and the southeast regions. However, with the high-tech industrialization that began in the 1980s, especially after the labor disputes from 1987 to 1989, the southeast region lost its second-place position to the middle region.

Second, the capital region lost its primacy in terms of regional GDP per capita to the middle and southeast regions in 2003. Until 2003, the capital region had always been the

leader. Beginning in 2002, the participatory government offered diverse incentives for industries to locate in provinces other than the capital region, on the one hand, and imposed strong restrictions on the expansion of economic activities in the capital region, on the other.

Moreover, spatial disparity, in terms of regional GDP per capita, declined continuously from the mid-1980s until the financial crisis in 1997, showing a clear trend of convergence (see figure 19.9, panel B). In 1997 the southwest region reached 95 percent of the national average, rising from 77 percent in 1985. However, there was a trend of slight divergence after the financial crisis until 2002. Since 2002, the trend once again has been toward convergence.

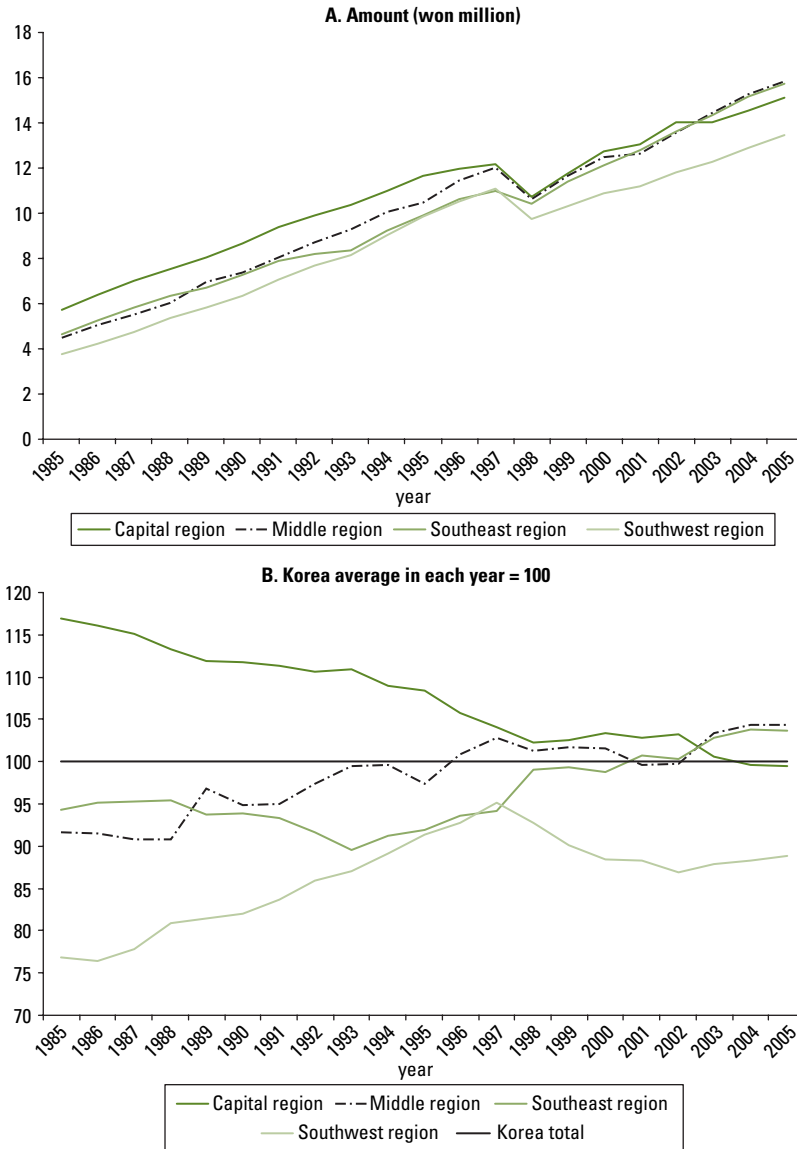
Seoul's regional GDP per capita has been continuously higher than the national average, even after 2002, when the capital region's GDP per capita was lower than the national average. Seoul has attracted new industries or restructured its economy to keep its comparative advantages. Seoul is the center of new industries and innovations, taking a leading role in the spatial division of labor in Korea.

Accordingly, the relative stagnation of regional GDP per capita in the capital region is not the result of the stagnation of Seoul. It is due to the stagnation of Gyunggi province. Per capita regional GDP in Gyunggi province has stagnated for the following reasons. First, the population growth rate is high in Gyunggi because of the continuous in-migration from the rest of the country, while the location of industry in the capital region is controlled by law. Second, the statistics underestimate the amount of service activities in regional GDP because of difficulties in measuring the production of small service-related firms. Because service activities are concentrated overwhelmingly in the capital region, the capital region's regional GDP is underestimated, especially in Seoul.

Spatial division of labor

Large industrial firms or chaebols evolved during the phase of heavy and chemical industrialization in the 1970s. Large firms located their headquarters mostly in Seoul and located their plants in the major

Figure 19.9 Per capita regional GDP in Korea, by region, 1985–2005



Source: www.kosis.kr.

industrial estates outside Seoul, especially in the southeast region. With the trend of spatial separation between headquarters and manufacturing plants, about 85 percent of the headquarters of firms that had spatially separated plants were located in Seoul, while about 87 percent of the plants that had spatially separated headquarters were located outside Seoul (Park 1985).

During the 1970s, to develop heavy and chemical industries in the 1970s, the

government provided support mainly to large firms because the scale of investments required in these industries was exceptionally large. During the 1970s, loans to heavy and chemical industries accounted for more than 70 percent of all government funds made available to manufacturing (Park 1981). These government loans were provided at very low interest rates, often negative in real terms. In addition, government supported the rise of large firms by

establishing highly protective barriers for infant industries and by permitting monopolistic production to overcome the problems of a small domestic market.

During the 1980s, when government policy emphasized high-tech industrial development, another spatial division of labor evolved beyond the division between the headquarters' control functions and the plants' production functions. Because the capital region had advantages in terms of skilled labor, technology, engineering services, and so forth, it became more specialized in high-tech industries and R&D activities, while the rest of the country remained more specialized in the less high-tech industries. Even in the traditional sectors, such as textiles and apparel, the production of technology-intensive or high-value-added products was concentrated in the capital region.

R&D activities in Seoul were oriented more toward basic and applied research, which required more qualified manpower and information infrastructure, whereas R&D activities in the periphery were

oriented more toward production research. In addition, high-tech sectors in the capital region had much stronger local linkages than other areas for purchasing input materials. Such differences in R&D activities and the degree of local linkages of high-tech sectors indicate that spatial divisions of labor intensified significantly during the 1980s (Park 1993).

Since the early 1990s, headquarters and high-tech industries have tended to locate outside the capital region, especially in the middle region. However, the spatial division of labor persists. In recent years, more than half of the headquarters of the top 100 firms were located in Seoul, even though some of them have decided to leave Seoul, and the share of manufacturing plants of the top 100 firms in Seoul has declined from 3.0 percent in 2002 to 2.3 percent in 2007 (see table 19.5).

In addition to the concentration of headquarters in the capital region, knowledge-intensive activities are concentrated in Seoul, suggesting that distance and density effects are important in the advanced services. However, the capital region's share of the headquarters of the top 100 firms declined from 79 percent in 2002 to 72 percent in 2007, and its share of patents declined from 80.6 in 1995 to 75.3 percent in 2005 (see table 19.6). Seoul has specialized in advanced production services, such as design, advertising, legal and financial, management consulting, and ICT services. For example, Internet domains are highly concentrated in Seoul, as is the transaction of business-to-business (B2B) e-commerce (Park 2004).

Table 19.5 Share of headquarters and plants of top 100 firms in Korea, by region, 2002 and 2007
percent

Region	HQ of top 100 firms		Plants of top 100 firms	
	2002	2007	2002	2007
Seoul	66.0	58.0	3.0	2.3
Incheon	4.0	5.0	5.6	5.8
Gyeonggi	9.0	9.0	16.1	14.5
Capital region	79.0	72.0	24.6	22.5
Middle region	6.0	6.0	22.3	21.5
Southeast region	12.0	17.0	39.0	38.9
Southwest region	3.0	5.0	14.1	17.0
Korea, total number of firms and plants	100	100	305	311

Source: Maeil Economic Daily (various years).

Table 19.6 Share of industrial patents in Korea, by region, 1995, 2000, and 2005
percent

Region	1995	2000	2005
Seoul	57.8	43.7	44.9
Incheon	4.6	5.1	4.2
Gyeonggi	18.2	24.9	26.2
Capital region	80.6	73.7	75.3
Middle region	5.2	8.4	8.2
Southeast region	12.5	14.3	12.8
Southwest region	1.7	3.5	3.7
Korea, total number of patents	52,449	106,363	162,844

Source: MOST (various years).

Dynamics of Seoul and the capital region

Population growth in Seoul was rapid in the 1970s and 1980s but has stagnated in recent years, whereas population growth in Gyeonggi province has been rapid since the 1990s, due to the influx of in-migration. Regional GDP seems to be related to population growth. During the recent years of growth, Gyeonggi's regional GDP per capita has been lower than the national average. During its period of growth in the 1980s, Seoul's regional GDP per capita was lower

than the average of the capital region, though still higher than the national average; as Seoul's population growth has stagnated, its regional GDP per capita has risen and is now higher than the average of the capital region (see table 19.7).

Seoul is the home of many new start-ups in the technology-intensive sectors or newly emerging industries, even though many firms have relocated to adjacent Gyunggi province. In the late 1980s and early 1990s, new high-tech firms that were established in Seoul relocated to or established branch plants in Gyunggi province, while maintaining their headquarters in Seoul, creating a spatial division of labor in high-tech sectors within the capital region. Gyunggi province has specialized in high-tech industries and has hosted a number of high-tech agglomerations since the 1990s, whereas Seoul has specialized in advanced services, such as computer software, engineering, legal services, and high-tech start-ups.

Three factors have been significant in this spatial restructuring: distance, density of network, and path dependence and creation. First, the movement of industrial agglomeration from the central part of Seoul before the early 1960s to the inner city of Seoul in the 1970s; the movement of high-tech industrial agglomeration from Seoul in the 1980s to the nearby suburbs in Gyunggi province in the 1990s; and the current extension of high-tech agglomeration to distant suburbs of Gyunggi province and the nearby middle region, such as the city of Cheonan. The extension of agglomeration has a wave-like pattern, with "distance" being the key factor.

Second, the density of networks and collaboration is critical for innovation and the generation of new firms and industries. New industries in Korea always evolve from

Seoul, especially from the Gangnam area, where informal and formal networks are intensive. The Gangnam area is the center of breakfast meetings and evening gatherings, where new ideas, information, and knowledge are exchanged, transferred, and generated (Park 2005). There are many high-class hotels and restaurants, and Gangnam is the center of new fashion, knowledge creation, and innovation.

Third, path dependence and path creation are important spatial processes in the capital region. The extension of high-tech industrial agglomeration to the middle region along the Seoul-Busan expressway is a spatially path-dependent process, on the one hand, and the development of Gangnam as a new core in Seoul and the development of a new R&D center in Hwasung, Gyunggi province, are examples of the creation of new spatial paths, on the other hand.

Development of ICT and spatial changes

The number of ICT-related firms has grown considerably in recent years, and almost half of all ICT firms (44.8 percent) were concentrated in Seoul in 2003. The degree of concentration in Seoul varies by type of firm. Firms in the ICT-related service sector and in wholesale and retail trade are far more concentrated in Seoul than firms in ICT-related manufacturing. During the last decade, IT-related service industries have tended to concentrate in Seoul, whereas IT-related manufacturing industries have dispersed to other regions.

The impact of ICT on the Korean economy can be examined through the creation of Internet domains, e-commerce, and virtual networks in the rural areas. The Internet infrastructure in Korea has been well developed since the late 1990s. By the end of

Table 19.7 Regional GDP per capita in the capital region of Korea, 1985–2005
million won

Region	1985	1990	1992	1993	1997	2000	2003	2005
Seoul	5.4	8.5	10.0	10.7	13.2	13.7	15.4	15.8
Gyunggi	6.4	9.0	10.0	10.2	11.1	12.2	13.2	15.0
Capital region	5.7	8.7	9.9	10.4	12.2	12.7	14.0	15.1
Korea, total	4.9	7.8	8.9	9.4	11.7	12.3	14.0	15.2

Source: www.kosis.kr.

June 2007, there were 34.43 million Internet users, and the rate of Internet usage had risen to 75.5 percent (see www.nida.or.kr). In general, the younger generation shows a much higher usage rate than older generations, and the usage rate of males is somewhat higher than that of females. The data on Internet usage suggest that there is no significant difference in access to the Internet by regions (that is, between the capital and other regions), but rural and urban areas differ somewhat, largely as a result of the age distribution of the population. In 2000 the proportion of persons belonging to the older age groups in rural areas was 17.9 percent, compared with only 4.3 percent in the cities (see isis.nic.or.kr).

Even though the regional disparity in usage rates is not significant, the dot-kr domains are concentrated mostly in the capital region. According to a survey by the Korea Network Information Center (see www.nida.or.kr), in August 2007, Seoul had 58 percent and the capital region had 78 percent of the total number of dot-kr domains in Korea. The share of Seoul and the capital region has increased slightly in recent years (see table 19.8). The higher concentration of dot-kr domains in the capital region compared with the share of population or Internet users suggests that the concentration might be related to other factors that attract ICT-related firms in Seoul. The number of B2C (business-to-consumer) e-marketplaces is also highly concentrated in the capital region, with Seoul having about 73 percent of the total number (Choi 2003).

Firms operating B2B e-marketplaces are even more concentrated in Seoul and its surrounding areas. The capital region had a

79.5 percent share of the total firms operating B2B e-commerce sites in Korea in 2003 (Park 2004). If we consider only the public B2B e-marketplaces, in which many sellers and many buyers can conduct transactions, the degree of concentration in Seoul is overwhelming, at 84 percent (Choi 2003). The predominance of Seoul in the location of public B2B e-marketplaces might be related to the clustering of ICT firms, ICT-related spin-offs, and innovative entrepreneurs and knowledge workers, especially in Gangnam area (Park 2004). ICT-related firms and advanced producer services are strongly concentrated in the Gangnam district within Seoul (Park and Choi 2005). The overwhelming concentration of the dot-kr domain, B2B e-commerce, and B2C e-commerce in Seoul suggests a strong tendency of ICT firms to cluster in Seoul, even though the Internet infrastructure (transferability) is present throughout the country.

Virtual innovation networks in peripheral areas

Although many people regard the importance of networks in spatial clustering and dispersal as applicable only to advanced economies, box 19.1 shows that new economic spaces can also occur in peripheral areas.

The case of Sunchang suggests a new paradigm in the organization of production systems and economic spaces, with the creation of new ideas based on intensive local and nonlocal networks. Sunchang has insufficient high-quality manpower, but it has networks of advanced services and top-level scientists and engineers. These networks do not represent actual clusters of advanced services; rather, they represent a virtual innovation network that has allowed the transfer of knowledge and innovation. High-quality Internet infrastructure has enabled high-tech engineers and scientists to meet periodically, while paved roads and easy access to highways have made Sunchang accessible to major regional cities and Seoul.

Policy implications

Industrial and innovation policies need to keep pace with the transformation of society and economy. In the knowledge-based

Table 19.8 Share of dot-kr domains in Korea, by region, 2001–07
percent

Region	2001	2003	2005	2007
Seoul	58.50	55.60	56	57.60
Incheon	1.20	1.30	3.40	3.40
Gyunggi	2.00	2.00	17.30	17.10
Capital region	61.70	58.90	76.70	78.10
Middle region	11.80	12.10	5.90	5.80
Southeast region	21.70	24.40	13.00	12.00
Southwest region	4.70	4.50	4.40	4.10
Korea, total number of domains	457,450	611,548	642,770	928,177

Source: www.nida.or.kr (National Internet Development Agency of Korea).

BOX 19.1 *The case of Sunchang*

Sunchang-gun in Jeonbuk province is one of the most underdeveloped regions in Korea (Park 2005). Sunchang is located in a mountainous, peripheral area in southwestern Korea where the population has been declining steadily since the 1970s. Agriculture is the key economic sector, producing principally tobacco, red pepper, and diverse vegetables and fruits. Gochoojang (a thick soy paste mixed with red pepper) is a product of Sunchang, famous for its distinct taste, which is acquired in the fermentation process. Traditionally, most of the households in Korea made their own gochoojang. However, nowadays most households buy gochoojang in the market, and the brand name "Sunchang Gochoojang" has become famous.

Since the late 1990s, the production system of Gochoojang has changed significantly as a result of two developments. First, Daesang Company, one of the large companies in the food industry of Korea, established a branch plant in Sunchang to produce standardized gochoojang under the brand name "Sunchang Gochoojang," with quality control and a

traditional taste. Daesang Company has invested in advertising and R&D activities and has introduced automated mass production. Daesang Company illustrates the possible link between the production technology of a large company and traditional local culture and resources. That is, the codified knowledge of the Daesang Company is linked to locally embedded knowledge and resources.

Second, the county of Sunchang designed a complex to gather the traditional gochoojang makers together in one place. The county allowed skilled persons, who have a license to make traditional gochoojang and more than 10 years of experience in making it, to move their household into the complex. As a result, 54 households live in the complex and make their own specialized traditional gochoojang, selling their products in the local market and through the Internet to consumers in large cities. In addition, the county recently established a Research Institute of Soybean Paste for continuous development of several types of soybean paste industries.

information society of the twenty-first century, a new industrial policy is needed that focuses on the supply of qualified human resources. A policy of simply relocating industrial firms may not be enough to spur regional development in the provincial areas. Accordingly, Korea needs integrated regional innovation policies, which can be improved to promote spontaneous regional development. Future policy should seek not only to promote balanced national development but also to provide an engine for sustainable development with the interplay of scale economies, factor mobility, and development of ICT.

First, attracting talented persons to the provincial regions is critical, as regional development depends largely on the creation of knowledge and capacity to innovate. To entice such talent to areas outside the capital, it is essential to promote the interaction of all economic actors in the region and to create an environment in which creative people and scientists can thrive. A policy of merely relocating R&D centers and firms will not sufficiently improve the innovation potential of peripheral regions. "Brain drains" of the past, which represent out-migration of talented people toward Seoul and foreign countries, should be transformed into "brain

circulation," which encourages talented people to live in the provincial areas. Qualified high schools and good living and service environments are needed if regions outside the capital are to attract and retain talented people. Specifically, university-industry collaborative networks should be strengthened in the provinces, and at least one good high school should be nurtured in each province.

Second, regional innovation and clustering strategies should be promoted with regional integration of the central city and hinterlands. The regional innovation policies in Korea have been promoted based on the administrative boundaries of 16 cities and provinces. Special cities and provinces have promoted regional innovation policies separately, and there has been no regional integration between a central city and its surrounding province(s). To promote regional innovation successfully, a central city (special city) and its hinterlands (provinces) should be integrated to generate synergy effects and scale economies. Accordingly, a wide-area regional integration plan, which considers a central city and surrounding province(s) as one regional innovation system, should be developed. Strategic industries and cluster strategies should also be promoted at the level of an integrated

wide area, not at the level of a province or city within a wide area.

Third, new strategies to diffuse innovation to the level of counties and small cities within an integrated region are needed. For example, a “local learning festival” could be considered, in which firms, schools, public institutes, all levels of students, and residents from counties or cities get together to display their creative and cooperative power. To counter the recent trend of high school students avoiding engineering school and the natural sciences, efforts should be made to inspire them to study science and engineering and to help them to understand the importance of scientific technology and enterprise in their daily lives through fun opportunities such as symposiums, work in scientific laboratories, and programs that expose students to science and open them to the exchange of ideas. Regional innovation should be promoted, as should networks joining firms, universities, research institutions, and government agencies.

Fourth, considering the demographic trends of low birth rates and population aging, a new system should be established to use talented people in the provinces to assist Korea’s aging society. As most longevity is occurring in the provinces, efforts are needed to attract “retired brains” to provinces and involve them in contributing to local development. Attracting retired brains to the provincial regions could enhance the innovation capacity of regions and help to solve regional problems, including the shortage of qualified manpower.

Finally, beyond the regional industrial strategy and cluster policies, sustainability of rural areas should be considered. Continuous out-migration of population from rural areas can result in the deterioration of rural economies. Virtual innovation networks using local resources and culture should be promoted in remote areas. Regional integration of diverse areas within a region with an emphasis on sustainability should be actively promoted, in addition to balanced national development. Spatial disparity among regions has declined somewhat, but disparities among localities within a region are still problematic. Some rural areas can be globally

competitive by supporting the sustainability of their population and the development of virtual innovation networks.

Note

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