

Regional Development in Economic Restructuring toward the Information Society: The Case of Korea

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This study examines the impact of national economic restructuring on regional development patterns. Korea's development over the last decade has been characterized by a rapid economic restructuring towards the information economy. This economic restructuring has had significant impacts on regional development patterns. The most remarkable feature is a clear core-periphery disparity in terms of levels of informatization. Seoul showed an extraordinarily high level of informatization. The process of regional development in the information era is marked by an intensified spatial division of labor, which articulates with the pre-existing pattern of regional disparity. Information infrastructure improvements for regional development do not necessarily result in reductions in regional unevenness. There is an urgent need to develop the integrated regional informatization strategy.

Key Words: economic restructuring, regional development, informatization, spatial division of labor, regional informatization strategy.

1. Introduction

The world economy has changed significantly over the last two decades. The 1980s were a time of dramatic economic change at all geographical scales. Many observers suggest that the world economy has developed into a post-Fordist (Gertler, 1988; Harvey, 1987; Jessop, 1989; Piore & Sable, 1984; Roobeek, 1987; Sayer, 1989; Schoenberger, 1988; Scott, 1988), post-industrial (Bell, 1973; Dahrendorf, 1975; Matejko, 1986; Sternlieb & Hughes, 1975) or information economy (Beniger, 1986; Dizard,

1982; Lyon, 1986; Machlup, 1962; Masuda, 1981; Parat, 1977). Regional economies throughout the world experienced major restructuring. Attempts to explain the process of regional economic restructuring have included 'deindustrialization' (Blackaby, 1981; Blueston & Harrison, 1982; Martin & Rowthorn, 1980; Summers, 1984), 'flexible specialization' (Amin, 1989; Ernste & Meier, 1992; Hirst & Zeitlin, 1991; Phillimore, 1989; Sable, 1989; Sayer & Walker, 1992; Thompson, 1989), 'product-profit cycle' (Henderson & Castells, 1987; Malecki, 1985; Markusen, 1985; Norton & Rees, 1979; Rees, 1979; Storper, 1985), 'the new international division of labor' (Aydalot,

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1984; Ernste, 1980; Fröbel, *et al.*, 1980; Lipietz, 1986; Mandel, 1980; Marshall, 1987). At the core of each of these different views is the recognition of new technologies, which are seen as central to the profound structural changes. Information technology, particularly, is playing key roles in the current process of restructuring, and it has contributed to increased interdependencies at the global scale and to increasing internationalization of the economy.

As the information society has evolved, and the level of interdependency in the global economy has increased, it is likely that a change in the global economy greatly affects regional or local economies. Several empirical studies show that changes in the global economy have resulted in substantial change in labor markets and socio-economic structures at regional and local levels during the last decade (Castells, 1989; Cooke, 1989; Hill & Feagin, 1987; Smith & Feagin, 1987). While some regions have taken advantages of the new options opened up by national and global changes, others have not. Many regions were not able to take advantage of global restructuring because their situation offered them few options for growth within the new global order. Increasingly global competition is making it essential for regional economies to develop the capacity and capability to make rapid adjustments to changing conditions if they are to become and remain competitive. The cause, character, and significance of regional development can best be understood by analyzing regions in terms of their transnational linkages, especially their connections to economic restructuring in the major capitalist societies.

The purpose of this study is to analyze regional development patterns in Korea, a nation entering a new era of development toward an information society. During the past 20 years Korea has become an increasingly important part of, and it is now closely linked into, the international econ-

omy. Trade has been the engine of economic growth in Korea, as the government has tried continuously to improve Korea's competitiveness in the world market. As a result, the Korean economy, has undergone continual restructuring, as it has sought to adjust to changes in the global economy, and to maintain its comparative advantage in international markets. In the 1980s, confronted with a growing shortage of production workers, rising wages, and increasing social costs, alongside growing protectionism in developed countries, the government shifted its industrial policy toward knowledge- and technology-intensive industries. In this process of rapid structural economic change, the government has played a key role by regulating both capital and labor. Such economic restructuring, along with various government policies, has exerted a dramatic impact on the spatial distribution of population and economic activities, thereby affecting the pattern of regional development. The pattern of regional development of Korea should, therefore, be understood as the outcome of actions taken by economic and political actors operating within a complex and changing matrix of global and national economic and political forces.

The first section of this paper conceptualizes the relationship between information technology and regional development. The second section describes the course of Korea's economic restructuring toward and information society and tries to explain why such changes have taken place in Korea. The third section analyzes interregional disparities in the level of informatization, and examines how economic restructuring and state intervention have affected regional differentiation in the development process. Because regions are differentiated on the basis of the quality of their regional information environment in the information era, the final section discusses regional development policies within the context of

the information society of Korea.

2. Information Technology and Regional Development

The great changes — the revolution of information technologies, globalization of the economies, and the shift from manufacturing to service and information sectors — that have occurred in recent decades have marginalized the neoclassical regional development theoretical framework. Political economy approaches to regional development emerged, in part, as a reaction to the rigidities of neoclassical frameworks. Political economy has been fairly effective at grasping the dynamics of regional restructuring and global economic and technological change. However, political economy approaches have not succeeded completely in explaining the complexities of contemporary regional development (Preer, 1992).

Related to the issues of regional development theory, the challenges of regional development planning and policy may have never been greater than in the 1990s.

Competition is intensifying among regions, and cyclical changes and sudden shifts in global markets are jolting regional economies. Due to interregional and international economic integration, regional policies fail to affect the spatial distribution of economic activities to the same extent they did in the past. Moreover, in the 1990s the regional question poses itself quite differently from a decade or two ago. Until the early 1980s, interregional disparities were conceived in quantitative (growth) terms, measured by indicators such as regional product, per capita income, and unemployment level. However, more recently the attention has focused increasingly on qualitative disparities such as regional economic innovation rates, the qualitative structure of employment, the location of the entrepreneur, and the location of headquarters. As far as the prospects for regional devel-

opment policies are concerned, the most fundamental issue is whether they have any real role during the emergence of the information economy within the context of the global economy. Despite nearly over 30 years of regional development efforts in developed as well as less developed countries, it is generally accepted that regional inequalities have not decreased. So, old regional development strategies have been discredited, and doubts are surfacing about the newer ones.

More recently information technology has emerged as an important issue in the discussion of regional development. Information technology — microelectronics, computer, software, telecommunication and electronic equipment integrated into a single system of information processing and exchange — has created a "space of flows" replacing "space of places" (Castells, 1989). New information technology, as the engine of new economic growth and employment generation, is the principal instrument in regional restructuring. Because of the distance-shrinking nature of its impacts, new information technology could have as important an impact on geography as the electricity and telephone networks did in an earlier era (Tarr & Dupuy, 1988). Some have predicted that information technology will, by removing the friction of distance and reducing locational constraints, lead to an economic convergence between the core and the periphery, and the diffusion of information technology will promote the dispersal of economic activities from the core toward peripheral areas (Bell, 1979; Brotchie *et al.*, 1987; Carey, 1981; Oettinger, 1980; Williams, 1990). It is generally assumed that a regional information-rich environment will raise the quality of its economic, social, cultural, and political life. It is, therefore, important to know how to acquire and use information effectively. By the same token, a necessary condition for achieving a regional information-rich envi-

ronment is ease of access to external services of information and information technology. It has also become common to consider the relationship between information infrastructure, generally defined as consisting of the mass media, telecommunication, newspaper, telephone, and other data terminals, and regional economic development as one of interdependence (Antonelli, 1992; Cronin, 1991; Katz, 1988; Parker, 1984; Wellenius, 1984). In particular, the role of telecommunication networks in the process of regional development is highlighted (Giaoutzi & Nijkamp, 1988; Gillespie, 1987; Gillespie & Hepworth, 1988; Gillespie & Williams, 1988).

Hypothetically, telecommunication improvements would seem to offer great potential for promoting regional economic development. Telecommunication facilitates the economic integration of the core and the periphery, thereby, it is usually assumed, fostering the economic integration of the core and the periphery, thereby, it is usually assumed, fostering the economic development of the periphery. In this view, any shortcoming in the advanced telecommunication network and services available in the periphery will inhibit economic development. Regions that lack the necessary telecommunication infrastructure will lag behind in the race to take advantage of the employment opportunities offered by information technology. Therefore, the strategic use of the information infrastructure to assist in the creation of the information rich environment of the periphery is viewed as one of the tasks to be achieved by planning for regional development, because it enables a peripheral region to mobilize resources and to access vital information and knowledge.

Consequently, the notion that government should intervene in the information infrastructure sector to develop the periphery, through direct investment, subsidies or regulation, is becoming widespread.

However, there has been debate about the spatial impact of new information technologies and whether these favor a trend of centralization and increasing regional disparities or whether they lead to a more decentralized and balanced regional development (Blumenfeld, 1986; Brunn & Leinbach, 1991; Cook & Beck, 1991; Gillespie & Robins, 1989; Hepworth & Robins, 1988; Mandeville, 1983; Nicol, 1985; Pressman, 1985).

According to the results of empirical studies, mainly performed in developed countries, and contrary to popular predictions of its decentralizing impact, the provision of information technology in peripheral regions has been viewed as problematic. Because intercommunications media have great organizing and co-ordinating power due to their inherently interactive nature, the space-binding bias of telecommunication networks tend to favor the penetration of peripheral regions by centrally located organizations (Gillespie & Robin, 1989; Hepworth, 1991). This penetration also makes for a new geography of competition that has profound implications for interregional dependency relationships.

Development toward an information economy with the use of new information technology is likely to make worse regional disparities in economic well-being, and the nature of the region's information economy also reflects the high degree of external control (Hepworth, 1987; Hepworth, Green, & Gillespie, 1987; Johnson, 1988). The distance-shrinking characteristics of new information technology, far from overcoming and rendering insignificant the geographical expression of centralized economic and political power, in fact, constitute new and enhanced forms of inequality and uneven development (Gillespie & Robins, 1989). As such backwash effects are produced whenever peripheral regions are made more accessible through links to the national and international network of highways, information technology contributes to new and

more complex forms of corporate integration, reinforcing core-periphery problems (Janssen & van Hoogstraten, 1989). There is a danger that the expansion of the information infrastructure may accentuate regional disparity, and the implicit and explicit policies of subsidizing telecommunication in GNP in 1990 as Korea became the world's 11th largest trading nation. As indicated by Figure 1, the ratio of exports to GNP increased with the expanding export volume over the last three decades, peripheral regions will widen the development gap between the core and the periphery. In such a case, the strategic use of information infrastructure to develop the peripheral region would be very problematic, since infrastructure has always been a substantive and expensive part of regional policy. Overinvestment or inadequate investment in telecommunication may mean a waste of valuable resources which could be better used in other more productive sectors.

There are still a number of more subtle and wide-ranging issues relevant to regional development that are raised by advances in information technology. Also the precise geographic profile of the impact of information technology remains uncertain. Information technology is in itself spatially ambivalent technology. It is not linked to any specific spatial or organizational form of production. Facilitating space and time convergence, it can be used for both geographical centralization and deconcentration of productive activity.

Consequently, it exerts diverse effects on spatial structures and development, resulting in the emergence of dual spatial development. Due to the nature of new information technology, a complex interplay is always occurring between centrifugal forces and centripetal forces. Its effects largely depend upon the distribution of new information technology over space, and the choice and use of the information technology. In other words, the distribution of gains from

new information technology depends as much upon what technology is introduced as on where it is introduced. Further, much less is known about the impact of development toward the information economy on regional development in third world countries. The following sections will examine whether recent advances in information technology will break down the concentration trend toward the core, using South Korea as a case study.

3. Korean Economic Restructuring and the Rise of an Information Society

Structural changes in both the sectoral component and the labor force distribution of the national economy are usually viewed as occurring over the long-term. Structural changes in the Korean economy, however, have occurred rapidly. Table 1 clearly shows the economic growth and structural changes in Korea during the last three decades. With the implementation of 5-year economic plans beginning in 1962, Korea has been transformed from a very low income country to a middle income country. This transformation has involved a major restructuring of the economy from one dependent on agriculture to one dependent on manufacturing and, increasingly, on services and the information sector. It is generally accepted that Korea's rapid ascent in the world economy is attributable to the Korean government's substantial investments in education and infrastructure, its aggressive export-promotion policies, and its fostering of a national consensus on the importance of international competitive success (Porter, 1990). In fact, much of the economic growth has been driven by success in international trade. Trade volume was about 56 percent of GNP in 1990, as Korea became the world's 11th largest trading nation. As indicated by Figure 1, the ratio of exports to GNP increased with the expanding export

Table 1. Indicators of Economic Development and Structural Change in Korea, 1962–90

Measure	1962	1971	1990
Gross National Product (US \$ Billion)	2.27	9.37	242.2
GNP per capita (US \$)	87	288	5659
employment (%)			
primary industry	66.0	50.4	18.3
secondary industry	8.5	14.3	27.3
tertiary industry	25.5	35.2	54.4
composition of GDP (%)			
primary industry	43.6	26.7	9.1
secondary industry	11.7	22.5	29.7
tertiary industry	44.7	50.3	61.2
trade volume (% of GNP)	20.6	38.2	56.2
export (% of GNP)	2.4	11.7	27.1
agricultural products & raw materials	80.6	22.6	5.9
manufactured goods	19.2	77.4	93.8
import (% of GNP)	18.2	26.5	29.1
primary products	33.7	37.4	17.5
raw materials (include fuel)	7.3	6.9	15.8
chemicals	22.4	8.3	10.6
manufactured goods	36.4	47.5	55.5
investment rate (% of GNP)	12.8	25.1	37.0
domestic saving rate (% of GNP)	3.2	14.6	35.3

Sources: Economic Planning Board, *Statistical Yearbook of Korea* and *Major Statistics of the Korean Economy*; Bank of Korea, *Principal Economic Indicators* and *Economic Statistics Yearbook*.

volume over the last three decades.

The transformation of the Korean economy has been a continuous process of response to changes in international and domestic markets, as the government tried to improve international competitiveness. The nation's response can be seen in the external trade structure, characterized by increasing import specialization in raw materials, resources, and capital goods coupled with the export of higher manufacturing value added products. The government guided firms towards those sectors considered strategic for the national economy, either by creating self-sufficiency or by fostering competitiveness within the international economy. Especially, the government supported the rise of large enterprises by es-

tablishing high protection barriers for these infant industries and provided them with large loans until they became internationally competitive, as well as permitting monopolistic production to help overcome the problems of a small domestic market (Kim, 1986). Conglomerates of big businesses, called "Jaebuls", were a critical element in the implementation of government industrial plans throughout the 1970s. Jaebuls were able to expand and entrench themselves as a formidable power bloc in the Korean political economy (Chang, 1993). However, the state's choice of a developmental strategy and major economic policies has been determined not only by domestic and world market factors but also by political considerations (Koo & Kim, 1992).

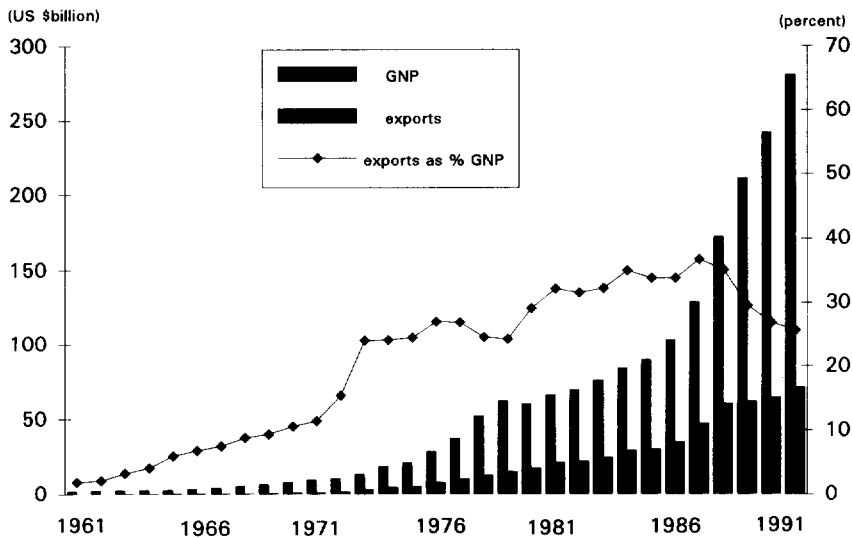


Figure 1. Growth of the ratio of exports to GNP in Korea, 1961-91.

Korea systematically followed a traditional sectoral path of economic growth, investing sequentially in labor-intensive light industry, heavy and chemical industry, and technology and information-intensive industry. Especially in the early 1980s, faced with an unfavorable business environment internationally and nationally, the government shifted its industrial development strategy, moving away from machinery and heavy-chemical industries (petrochemical, shipbuilding, steel, electrical machinery) towards technology- and information-intensive, resource-saving, and high value added industries (electronic, personal computer, microelectronic and telecommunication). However as it is becoming extremely difficult to obtain technology transfers from advanced countries, particularly in the area of information-intensive and high technology industries, great emphasis lies on improving industrial technology by increasing investment in R & D and basic science education and research. In this way, Korea has been able to adapt quickly to changes in the world economy through technological upgrading toward higher value added production (Ernst & O'Connor, 1990).

When the Korean economy moved to more knowledge- and technology-intensive activities in the mid-1980s, the government paid greater attention to the development of a telecommunication infrastructure. In 1983 almost 2 percent of GDP was invested in the telecommunication networks. The level remained about 1 percent of GDP for the rest of the 1980s. By 1987, the waiting list for telephone installation had disappeared and a nationwide subscriber dialing system had been implemented (Kim, 1992). A primary motive behind this heavy investment was to solve the persistent backlog of demand for telephone facilities, and to prepare for the 1986 Asian Games and the 1988 Olympics held in Seoul. However, there was another important goal — that of supporting the development of the electronics industry and the anticipated information society. Thus, the government asserted a legitimate and positive leadership role in promoting the use of information technology and information infrastructure development. A number of forces have come into play to contribute to this shift to an information society. Among them, the current convergence of electronics, computer and

telecommunications into a composite information technology in Korea has facilitated growth both in the information-intensive industries and in producer service industries.

Although scholars agree that Korea is becoming an information society, it is somewhat difficult to measure how well that nation is progressing toward the goal of the information society. Measuring the nature of an information society is by no means straightforward (Karunaratne, 1986; Williams, 1988). An information society can be measured by economic aspects, namely the share and the growth rate of the information sector and the contribution of the information sector to industrial productivity. Examining the economic structure alone,

however, provides only a limited view of the social and cultural implications of an information society. The term informatization generally has been used to denote a progress of change leading to and information society, a process that does not simply involve progress in interconnection between computer and telecommunication system, but also one that alters the entire nervous system of social organizations (Nora & Minc, 1980). Therefore the concept of informatization should contain both economic aspects as well as social aspects and infrastructures (Dordick & Wang, 1993). In this study, informatization is defined along three primary parameters — economic, social, and infrastructure aspects.

Table 2. Major Indicators of the Transition Towards an Information Society in Korea

	1980	1985	1990
Economic Measures			
% of employment in information technology industries ¹⁾	5.3	6.7	8.5
% of employment in information technology industries ²⁾	7.2	9.4	10.6
% of labor force in information related occupations ³⁾	14.6	19.6	24.8
Social Measures			
Telephone calls per 1000 people per day	9.0	18.6	36.7
newspaper circulation per 1000 people	192	245	280
mail received per 1000 people per year	28.7	32.0	54.2
newsprint consumption per 1000 people, year(kg)	5954	5652	11257
literacy rate	91.5	93.4	96.3
No. of school-age pop. attending tertiary school/1000	15.8	34.2	39.2
Infrastructure Measures			
telephone lines per 100 people	7.6	18.2	35.1
radio sets per 100 people	52.5	94.6	100.6
TV sets per 100 people	16.5	18.9	21.0
personal computers per 1000 households	n.a ⁴⁾	7.0	11.0

Notes: 1) The information technology industries include manufacture of machinery, except electrical (SIC382), manufacture of electrical and electronic machinery, apparatus, appliances and supplies (SIC383), and manufacture of medical, photographic and optical, professional, scientific, measuring and controlling equipment and goods (SIC385).

2) The information service industries are classified according to the classification of Son (1993).

3) Information-related occupations are classified according to the classification of OECD (1981).

4) data not available at that time.

Sources: Economic Planning Board, *Statistical Yearbook of Korea* and *Major Statistics of the Korean Economy; Social Indicators of Korea*.

Table 2 shows development of informatization of Korea during the last decade. The number of workers employed in information technology and information service industries, and engaged in information-related occupations has grown rapidly, increasing this sector's share of total employment. Such economic measures are the primary evidence of a transition towards an information era. However, in order for the information sector to contribute to GDP, information infrastructure must be available. Especially, the rapid increase in the supply of telecommunication networks and in the reliability of telecommunication services, which are becoming a structural precondition for economic systems to develop into an information economy, enhance the new emerging information society. As expected, the provision of telephone lines, TV and radio sets, and personal computers has much improved over the last decade. Indeed, a comparison of rates of growth in the various indicators for the period of 1980-90 shows that the level of provision of telephone services increased most rapidly in the late 1980 (Figure 2). Furthermore, the effi-

cient production, distribution, and consumption of information requires an information infrastructure utilized by an educated and trained labor force. Therefore the rate of literacy and tertiary education may be prerequisites for the transition to an information society. In terms of social measures of an information society, Korea is definitely now entering the information era, shown by its very high rate of literacy and increased number of people educated at colleges or universities per 1000 school-age population.

During the period of 1980-90, economic growth of Korea appeared to correlate well with information infrastructure. As shown in Table 3, GNP per capita is strongly correlated to the number of telephone lines and television sets, suggesting the importance of the information infrastructure to economic growth. There is also a statistically meaningful and strong relationship between GNP per capita and tertiary education and literacy, suggesting both that increased number of people educated at tertiary schools among its school age population and higher literacy rate have contributed to

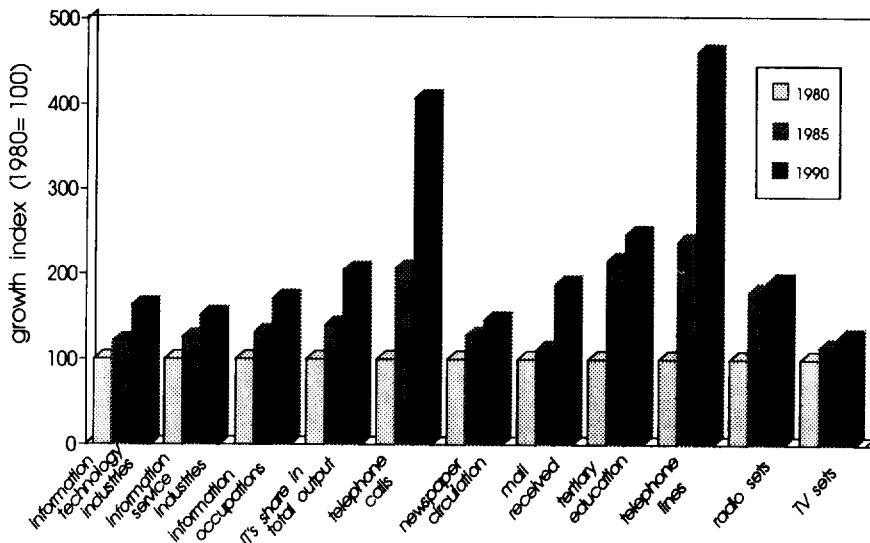


Figure 2. Growth index of indicators toward an information society, 1980-90.

Table 3. Correlation between GNP/Capita and Information Infrastructure, and Education, 1980-90

	telephone lines /100 persons	TV sets/ 100 persons	tertiary education	literacy rate
GNP/Capita (in current prices)	.99**	.96**	.88**	.98**
GNP/Capita (in 1985 constant prices)	.99**	.97**	.90**	.98**
GDP/Capita (in current prices)	.95**	.91**	.77**	.95**

**p<0.001

economic growth of Korea on the one hand, and that increased standards of living through rapid economic growth have led to higher rates of literacy and tertiary education. Therefore, information infrastructure is viewed as both the outcome of and the stimulus to Korean economic development, even though it is hard to distinguish cause from effect.

4. Regional Differentiation in the Level of Informatization

This increased national level of informatization may not necessarily lead to a more equal distribution of development

among regions. It is, therefore, necessary to examine how the transition toward the information economy has affected regional economic development. If the level of informatization of a region is high, it is more likely to attract information-intensive activities and firms headquarters there. Also, a regional information rich environment can play a crucial role as an incubator of innovative activity in an information era. At the beginning of an information age, therefore, a more appropriate barometer of a region's economic health and vitality may be the level of informatization, the concept of which contains economic and social aspects as well as infrastructure aspect of an information society.

Table 4. The Description of Method and Variables for Measuring the Level of Informatization, 1990

method	variables
economic aspect (a+b+c)/3	a) % of employment in information technology industries b) % of employment in information service industries c) % of workers engaged in information-related occupations
social aspect (d+e+f+g+h)/5	d) No. of workers who graduated the university per 1000 persons e) the number of average telephone calls per subscriber, per day f) the amount of mail received per 100 persons, per year g) the quantity of information flow by computer-mediated communication such as HiTel & PC serve per 1000 persons, per year. h) the rate of newspaper subscription
infrastructure aspect (i+j+k+l+m)/5	i) the number of mobilephone subscribers per 1000 persons j) the number of television sets per household k) the provision of telephone lines per 100 persons l) the number of personal computers per 100 households m) the rate of computer-mediated communication lines which represents the number of population per line/the number of subscribers per line

In this study 13 variables were selected, reflecting various economic, social, and infrastructure parameters, to measure the level of informatization for each region. The description of method and variables chosen is shown in Table 4. All variables were transformed into the standardized Z scores in order to make the same weight for composite index of informatization level. The purpose for using this method in this study is to analyze the spatial pattern of the composite index of informatization based on Z scores. Table 5 shows the interregional variation in the level of informatization. As shown in Figure 3, Z score for each region was divided into two distinct groups: one below the national average (negative score) and the other above (positive score), with a wide gap between them. The scores from the economic aspect, which indicate the general level of information economy, show that the distribution of each region's

score on the informatization scale is far from normal. Seoul showed an extraordinarily high score (3.06), and Gyunggi province had the high positive score. Also Pusan and Gyungnam province showed very low positive scores. The scores of the rest regions were negative, indicating a below average presence of the information-based industries and information-related occupations. According to the scores from social aspect of informatization, the distribution of the scores around the mean is relatively symmetrical. Seoul showed the highest score, but that score is lower than the score from the economic aspect of informatization. Especially, Kwangju city showed the high positive score, and the rest four large cities also showed positive scores, reflecting that large cities are more attractive than provincial regions for the various activities related to information circulation and information consumption. The scores

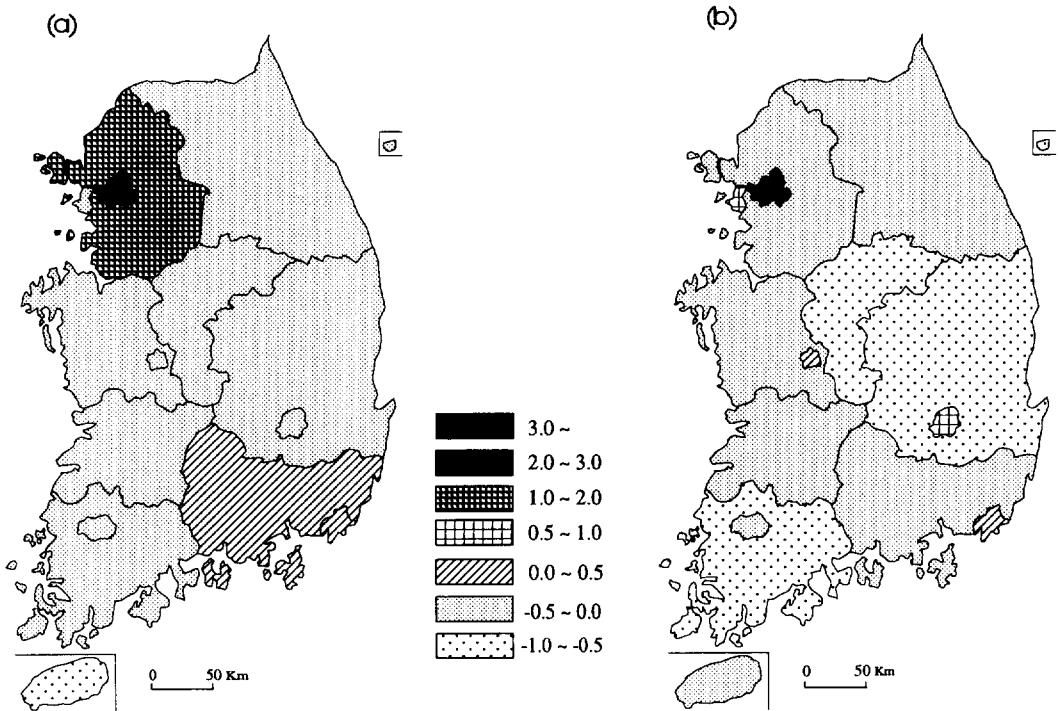


Figure 3. Spatial pattern of the level of informatization, 1990.
 a) economic aspect b) infrastructure aspect

from the aspect of information infrastructure showed a very different pattern. Seoul showed the highest score, but that score is much lower than the score from the economic and social aspects of informatization. While the major industrial cities of Incheon and Daegu had relatively high positive scores, and cities of Pusan and Daejeon showed very low positive scores, the rest of regions showed low negative scores. The gap between the highest and lowest scores in the aspect of information infrastructure is much smaller than the gap in economic or social aspect of informatization. It may be interpreted, therefore, that the physical information infrastructures are less concentrated in Seoul than information-related activities or information flow and information consumption. In other words, the level of informatization based on an economic aspect index showed the largest discrepancy among regions, indicating that informatization level composed of economic sector

was much more unequal among regions than that of social or infrastructure aspect. In contrast to the very high level of Seoul, the relatively low levels of informatization in provincial regions are partly attributed to their regional economic structures. Since those regions specialize in either labor-intensive or capital-intensive low value-added industries, they are facing serious regional adjustment problems that accompany industrial restructuring toward the information economy.

In the case of Korea, regional economic development is correlated with the level of informatization of the region. Average yearly income per household, Gross Regional Product, and levying local tax, as indicators of economic development of a region, are positively correlated with the level of informatization (see Table 6). The economical aspect of the level of informatization showed the highest correlation coefficient with GRP (0.97) and local tax (0.99), and

Table 5. The Level of Informatization by Region based on Z scores, 1990

region	scores from the economic aspect	scores from the social aspect	scores from the infrastructure
Seoul	3.06	2.49	2.03
Pusan	0.10	0.29	0.47
Daegu	-0.24	0.23	0.67
Incheon	-0.14	0.15	0.92
Kwangju	-0.46	1.01	-0.26
Daejeon	-0.49	0.52	0.10
Gyeonggi	1.15	0.10	-0.04
Gangweon	-0.49	-0.28	-0.49
Chungbuk	-0.43	-0.38	-0.54
Chungnam	-0.49	-0.67	-0.45
Jeonbuk	-0.46	-0.60	-0.36
Jeonnam	-0.43	-1.06	-0.75
Gyeongbuk	-0.19	-1.10	-0.67
Gyeongnam	0.15	-0.53	-0.15
Jeju	-0.63	-0.17	-0.49
the gap between the highest and lowest scores	3.69	3.59	2.78

Table 6. Correlation between Regional Level of Informatization and Regional Economic Development, 1990

regional level of informatization	the level of regional economic development		
	average yearly income	GRP	local tax
economic aspect	0.79**	0.97**	0.99**
social aspect	0.76**	0.56*	0.73**
infrastructural aspect	0.80**	0.65**	0.78**

* $p < 0.05$ ** $p < 0.01$

the infrastructure aspect of informatization level showed the highest correlation coefficient with average yearly income (0.80). Such a result indicates that the spread of information technology and telecommunication networks, and the location of information-related activities have been directed predominantly towards the already developed core region, whereas peripheral regions have remained largely devoid of them. Much as the structural change of the Korean economy influenced differential regional growth levels, the existing regional economic structure constrained the development of information related activities. Therefore, informatization level and regional prosperity are both caused by some structural differences between the core and the periphery, and the existing regional economic structures that has set the basic conditions for the level of informatization may cause differential regional economic development. Regional prosperity and regional development of the level of informatization in Korea are two sides of the same coin. Therefore, it may be interpreted that the high level of informatization of a region, especially economic aspects, is viewed as both the outcome of and the stimulus to regional economic development. Based on such empirical results, it may be hypothesized that as long as economic activities are increasingly dependent on informatization, the different levels of informa-

tization among regions will induce further regional inequality in the information era. Obviously, peripheral economic structures tend to reduce rather than increase opportunities for growth under economic conditions in which expansion is based on an advanced information economy. Such a spatial pattern of differential levels of informatization has important implications for balanced regional development. The next section examines the underlying determinants of differential levels of informatization among regions, and in particular, examines the factors that have generated a high level of informatization in Seoul in the context of the economic restructuring process in Korea.

5. Underlying Determinants of the Regional Disparity in the Level of Informatization

Government industrial policies in the 1980s induced a shift away from labor-intensive and low technological industries to more skill-intensive and technological industries. The restructuring process of the 1980s had significant impacts on the regional level of informatization, since technology-information driven economic growth requires a highly skilled labor force, sophisticated telecommunications, a high level of innovative activity, and easy access to technological information. Because these

Table 7. Indicators of Spatial Re-concentration to Seoul and the Capital Region

	Seoul's share (%)				Capital Region's share (%)			
	population	all industries	manufact.	GRP	population	all industries	manufact.	GRP
1980	22.3	36.0	28.2	26.9	35.5	50.1	49.1	41.1
1985	23.8	32.4	26.8	24.8	39.1	49.4	50.1	42.6
1990	24.4	32.0	26.8	24.6	42.8	50.8	53.5	45.8

Source : Economic Planning Board, *Statistical Yearbook of Korea*.

conditions are distributed unequally among regions, so were the effects of economic restructuring. Different regions undergo restructuring with varying degrees of difficulty in regional adjustment.

In the case of Korea, the spatial re-concentration of production, employment, and population that was generated by structural changes towards the information mode of development has been remarkable. As shown in Table 7, there is evidence of a trend towards spatial concentration of industries, employment, and population during the last decade. Growth rates of population of Seoul were much higher than those of the national average during the last two decades, resulting in the increase of its share. Furthermore, despite industrial decentralization policies, Seoul's shares of employment in all industries and manufacturing industries, and GRP were almost the same in the period of 1986-91.

Continuing concentration of population, employment, and production can be seen more clearly in the Capital region, due to the spillover effects from Seoul. The share accruing to the Capital region continued to increase at a precipitous pace toward and information era.

The Capital region is viewed as the preferred location for new industrial investment and the relocation of facilities from Seoul. Despite its awkward location near the border with North Korea, and on the wrong side of the country for international overland trade, the rapid growth of Seoul

has been so extreme that it has been deemed to be "the product of the most intense and compressed process of urbanization in the world" (Yeung, 1988).

Seoul's overwhelmingly high level of informatization is mainly attributed to strong attractive locational factors such as a highly skilled labor force, a high level of entrepreneurship, the availability of advanced producer services, the location of international financial institutions, and the availability of advanced telecommunication services. The existence of a business and social milieu with strong cultural connotations, and the prestige of initial location of firms and organization in Seoul may have induced additional levels of informatization. The information rich environment of Seoul contributes to the concentration of information processing industries, R & D laboratories, and information related activities regardless of government decentralization policies. The more recent processes of structural change toward services, particularly information and international finance and business services, have accentuated this trend (Lee, 1990). Seoul initially served as a manufacturing location, but has recently become a specialized center of finance and business headquarters. The city not only has a number of multinational corporation and financial institution headquarters, but also has numerous branch offices of multinational corporations and financial institutions headquarters abroad. As shown in Table 9, the locations of head-

Table 9. The Degree of Concentration for Economic Activities of Seoul, 1990

Economic Activities	share (%) = (Seoul/Nation)*100
Employment of non-information based industries	19.3
Employment of all industries	23.4
Employment of manufacturing industries	25.3
Employment of social & personal service industries	27.3
Information workers in manufacturing industries	34.8
Workers in information-related occupations	35.2
Establishment in all industries	39.2
Employment of information-based industries	39.4
Location of headquarters in manufacturing industries	40.7
Workers received tertiary education in all industries	43.5
Subscribers of computer-mediated communication	51.3
Establishment of wholesale firms	51.7
Employment of producer service industries	56.7
Nationwide city banks	59.8
Amount of deposit money at deposit money banks	64.4
Location of headquarters in producer service industries	72.1
Location of headquarters in information technology industries	75.4
Location of headquarters of firms in Jaebul groups	75.5
Employment of information processing industries	80.2
Establishment in technical and computer services firms	84.9
Establishment of information processing industries	86.4
Location of branches of foreign banks	87.1

Sources: Economic Planning Board, *Statistical Yearbook of Korea*; *Establishment Census of Korea, Report on Mining and Manufacturing Survey*, Ministry of Communication, *Statistical Yearbook of Communication*, Korea Productivity Center, *A Comprehensive Bibliography of Korean Enterprises*.

quarters of information technology industries, producer services, and multilocation firms in big business groups, and the locations of foreign branch banks, deposit money banks, wholesales firms, and producer services industries showed much more concentrated patterns than those of manufacturing, consumer and public service industries. Such patterns can be interpreted to mean that structural change toward an information economy has added to attractiveness of Seoul. As a core region, Seoul enjoys a kind of cumulative and circular advantage. Its existing concentration of information-based industries create a high level of demand for further advanced telecommunications. This, in turn, brings forth the

supply, creating additional incentive for the kinds of activities that depend on these services. Seoul's agglomeration economies and its impressive infrastructure have attracted high value added producer services to replace the manufacturing activity, spilling out of the confined city into the adjacent Gyunggi province (Auty, 1990). The high level of informatization of Seoul may thus be explained by technological developments, historical inertia, cumulative causation, and agglomeration economies.

However, this concentration of economic activities in Seoul brings with it, an increase in land prices and other costs, traffic congestion, massive environmental deterioration, and inadequate public services, all of

which provide incentives for decentralization of production activities. Sophisticated telecommunication linkages make it possible to operate more routine operations in the periphery at a far distance from headquarters.

Telecommunications, often called the 'invisible layer of transport', are being developed over and above the traditional means of communication in Korea allowing Seoul to communicate instantly with the whole country. Advanced telecommunication systems are also strengthening Seoul's position as a headquarters and a financial capital, while also facilitating the spatial dispersion of routine production activities. The resulting concentration of information-intensive firms, interconnected by means of fiber-optic networks within the Seoul region, may well reinforce the economic dependence of other regions, and thus deepen existing regional imbalances.

The corporate sector is considered to be one of the institutional forces influencing the level of informatization among regions. Changes in corporate strategy in relation to industrial restructuring have resulted in the concentration of headquarter functions, intensifying the spatial divisions of labor. The current spatial division of labor first appeared in the 1970s, as a result of governmental regulation of capital and labor. At that time, the government promoted the rise of large enterprises in order to institutionalize the development of heavy, chemical industries, as well as export-oriented industries.

Industrialization in Korea has largely been a process of big business groups diversify into new industries on the basis of their technological capabilities. There were 822 firms in Jaebul groups in 1992. The Jaebuls continue to work toward greater command over the Korean economy by joining forces in key growth sectors, and acquiring backing through government subsidies and R & D expenditures. Korea's four largest Jaebul

have all entered into semiconductor production and high-tech computer electronics, now accounting for half of Korea's production of electronic goods. Because of their internal scale economies and vertical integration, they have been able to disperse large plants to the periphery where cheap industrial land is available as a result of the government's establishment of industrial parks, while their headquarters remain concentrated in Seoul. Seoul accounts for 71.4 percent of headquarters of firms with multi-plants in Jaebuls. Furthermore, 60.7 percent of plants of firms locating their headquarters outside Seoul are located in Seoul, indicating the importance of the linkages to Seoul for the plant operations of firms locating headquarters outside Seoul. Through their participation in the development of information-intensive industries, most enterprises have attempted to increase the flexibility of their labor process, intensifying the spatial division of labor. As a result, hierarchically structured production pyramids and spatially segmented labor markets have been created.

On the other hand, as production systems have become more flexible with the adoption and advance of information technology, the control function of Seoul has increased and intensified. Whether or not a regime of flexible specialization is emerging in Korea can be assessed partially by the following two statistics. First, firms with less than 5 employees are the only group that has increased its share of manufacturing employment since 1980. Park's (1993) found that small high technology firms and small business services have recently concentrated in Seoul. It is rational for them to locate in Seoul in order to reduce the costs and difficulties of carrying out such transactions, and to maximize their access to state agencies, and to the cultural and informational context of the production district itself. Second, the ratio of subcontracting production costs to total production

costs in Seoul increased much more rapidly since 1980. The ratio for Seoul was more than two times higher than that of national average. Such flexibly specialized small-scale enterprises linked with the Jaebul through subcontracting appear to be concentrating around Seoul as well (Douglass, 1993).

One of factors affecting the level of informatization is partly related to the change in government economic policy in the 1980s. The keystone of this new economic policy was liberalization: reduced government intervention in the economy, promotion of market mechanisms through enhanced competition, and a wider opening of the domestic market to foreign goods. Such liberalization has, in turn, contributed to a rise in economic concentration. The combination of the centralization of industrial capital in the hands of the Jaebul, and the extreme concentration of state power in the capital city, generated an extraordinary concentration of political and economic power in Seoul, enhancing its comparative advantage.

In short, the existing geography of the information economy in Korea reveals a structure of regional dependency. Seoul controls economic activities in other parts of Korea. Many information flows are taking place within large multiplant firms as part of internal corporate control relationships. The industrial and personnel structure of peripheral regions is a result of their economic dependence on branch plants of large multilocal corporations. Such plants tend to have lower levels of highly trained and skilled personnel, certainly lower levels of R & D, and little attention is given to non-routine activities or new products.

Peripheral regions with a low level of informatization are unlikely to innovate, especially in a setting of short product cycles, which requires a continual flow of up-to-date information and knowledge. Because the locations of new information

technology, telecommunication facilities, and producer services are essentially demand-related, leading to concentration in the core region, jobs have been generated continuously in Seoul. On the other hand, the structural deficiencies of peripheral regions have led to a widening of the informatization gap. So, the process of regional development in the information era of Korea is marked by an intensified spatial division of labor, superimposed upon, and articulating a pre-existing and enduring pattern of regional disparity. If we consider that the spatial dimension of economic growth has been a product of implicit and explicit state involvement in Korea, the regional disparity in the level of informatization and the emergence of an intensified spatial division of labor raise fundamental policy issues for the alleviation of regional disparities in the information era.

6. Policy Implications for Regional Development in the Information Society

Spatial unevenness is socially and historically produced out of the basic dynamics of structural changes in the Korean economy. Korea offers a good example of the impacts of national economic growth via structural change on regional development, and an analysis of how the transition to an information economy has affected regional economic development. Whether measured by sophisticated information technologies and infrastructure, or by the location of information-intensive industries and information-related occupations, or even by information flow and information consumption, Seoul continues to win out while the peripheral regions continue to lose. Without policy intervention, the benefits of new information technology within the expanding information economy will continue to accrue primarily to the prosperous core region, thereby widening further the interre-

gional disparities in economic well-being.

For the coming decades, the pace of scientific and technological development worldwide is expected to accelerate. Such development will no doubt bring about a fundamental restructuring of world trade. For Korea to remain competitive in such an environment, it must not only continue to restructure its industry, but also move up the technological ladder if it is not to lose export markets to other developing countries. The economy's ability to restructure toward an information mode of development itself will be a key determinant of Korea's success. However, in the process of economic restructuring toward the information economy, in the absence of appropriate regional development policies, interregional disparities are likely to remain. Korea's highly concentrated information-related activities in Seoul, the Jaebuls' control of economic power, and the deepening spatial division of labor may well create economic, social, and spatial friction. Moreover, Koreans are starting to demand the rewards of economic growth, given the fast growth over the past three decades. The Korean government is faced with the decision whether to continue to aim for high economic growth and restructure toward an information mode of development, or to concentrate on a more equal distribution of wealth among regions and people. Any choice, however, will be problematic because sectoral development policies may conflict with balanced regional development policies. What Korea has experienced over the past two decades is that the desired impacts of spatial policies have been overshadowed by the spatial impacts of sectoral policies. As a result, spatial policies have proved of little influence in altering the overall spatial pattern of economic activities and population distribution.

In the case of Korea, the provision of telecommunication among regions is relatively well-distributed due to the vigorous

efforts of the government's telecommunication policy. However, overall levels of informatization showed a large discrepancy between Seoul and the rest of the country. Therefore, it can be argued that the provision of a telecommunication network is not a sufficient condition for development. Information infrastructure provision for regional development does not necessarily result in a reduction of regional unevenness. In the short run, peripheral regions have failed to participate fully in the transformation to an information society, and in fact we can not envisage any policy that will provide peripheral regions with a growth rate equal to that of the core region in the near future. There is still, however, a need for policy intervention to ensure that spatial economic disparities are not exacerbated by the development of an information economy. It is important to ensure that the opportunities associated with the information economy are shared among the different regions. The desirable approach is to pursue policies that focus upon ways of making the industries in less favored regions more competitive and to encourage the growth of indigenous economic activity there, enabling less favored regions to make better use of new opportunities and to minimize the threats which such developments pose to their existing economic activity.

Given the reconstruction of regional comparative advantage in the beginning of the information era, there is a need to develop a regional informatization strategy. The strategy has to ensure that the electronic highways of the future do not become associated with predominantly one-way traffic, in which unequal relationships of regional dependency become entrenched, and the prospects for regional economic development become further polarized (Goddard & Gillespie, 1986). In order to do so, a regional informatization strategy should be multi-dimensional, and should emphasize four key factors such as capital, skill and

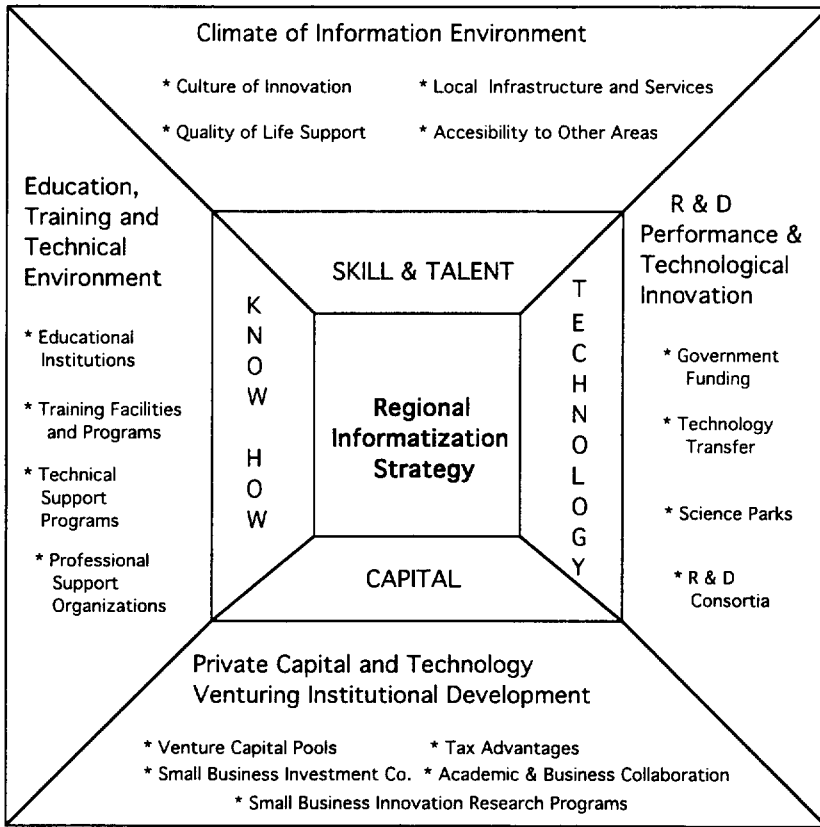


Figure 4. Key factors in development of regional informatization strategy.

talent, know how, and technology (see Figure 4). The objectives of this strategy are to generate sustained and propulsive economic activities and to reinforce indigenous growth potential in the periphery. It must recognize the primacy of the existing regional infrastructure and knowledge based and its existing institutional capabilities in the development process. The main effort of a regional informatization strategy should be made to create innovative capability of the periphery in order to compete for economic development in an information society. This capability is dependent on new form of integration between skill, capital, technology, and infrastructure. This strategy focuses on four main tasks.

The first task is to create the information rich environment of the periphery, provid-

ing intellectual and physical infrastructure for skilled and talented workers, and also the cultural and social environment for those workers' personal needs. The government supports good social environment for those workers' personal needs. The government supports good quality of life that is critical to attracting and keeping the skilled labor force. An information infrastructure, especially, telecommunication network, should be provided in creating an information rich environment of the periphery. The key to the success of a regional informatization strategy is to identify the manner in which telecommunications could best contribute to realizing a region's development potential. While there may exist in any telecommunication infrastructure bottlenecks which hold back the peripheral de-

velopment, we need to assess in quite a detailed way, a region's strengths and weaknesses, and identify its development potential, before we conclude anything about the likely benefits of telecommunication improvement to economic development prospects of the periphery.

The second task is to provide a steady flow of skilled and trained labor force to the periphery. Human resources are the core of the growth and innovative capability in an information economy. In the light of the fact that intensified processes of social and spatial inequality have arisen from the changing division of labor in Korea, and that the ability to sustain and attract information based activities into a region will critically depend upon the nature and the quality of its labor force, there is a great need for a policy to improve labor skills and hence job mobility in peripheral labor markets. The adequate supply of human resources is probably the single most important element in the successful use of new information technologies and infrastructures. If information infrastructure has the potential to strengthen the productive capacities of peripheral economies and lower regional inequalities, investment in telecommunication infrastructure must be associated with its effective use. Without a rise in investment in physical capital, it would not be profitable to acquire advanced skills, and without a critical mass of skilled labor, the return on capital investment may be inadequate. The provision of right kind of education and training facilities, and technical support programs in the peripheral regions may add to the locational attractiveness for information-related activities, and create an environment conducive to private information technology investment. Furthermore, it may be possible to develop a flexible employment system through diversifying and upgrading the skills and technical qualifications of the labor force.

The third task is to develop venture capi-

tal, venture small business, and capital assistance program in the periphery. A regional informatization strategy should promote a thriving venture capital market and start-up companies or venture small businesses. The absence of sufficient capital in the periphery is a barrier to the formation and growth of information related industries. So private venture capital may be the decisive factor in developing the periphery. Also capital assistance funds should be established by the government, seeking to stimulate information-intensive, and high technology development in the periphery. To induce indigenous and sustainable development in the periphery, the policy should emphasize the establishment of venture information-intensive and producer service industries so that small and medium sized businesses on which peripheral economies depend can remain and survive. In addition, it may be good to introduce a tax policy that makes investment in R & D attractive.

The fourth task is to support R & D funds and technology transfer, and establish business incubators or science parks. Government funding is essential to establish science parks or to perform R & D projects. By financing specific R & D projects, it is possible to sustain a capacity for technological advancement in the periphery. It is important to provide for innovation flux in the periphery. Reducing the overall rate of business tax is a means of making funds available which could be used by business for investment in research and development. Because the relative costs and availability of information services and the access to and the use of specific information and technology are critical conditions for a firm to survive in highly competitive markets, improved access to a high level of information and technology transfer will provide the peripheral regions with better opportunities for performing functions connected with the administration, direction, and planning of both regional and branch plant pro-

duction. The approach to developing a regional infomatization strategy suggested above—support for R & D institutions, invest in information infrastructures, and education and training programs, develop venture capital and venture business, provide good quality of life—must have long time horizons. They require patience as well as commitment.

If we recognize that the regional policy and planning domain is essentially constructed within the social, economic, and ideological framework dominant during a given historical era, the regional development pattern in the long run will be open to the play of social and political forces. The larger and more difficult tasks will be in the realm of regional development policy in Korea. However, any political action should, at least, attempt to prevent Korea from becoming even more geographically and socially polarized than it is now. Persistent efforts should be made on the basis of well conceived and integrated regional informatization strategies that reinforce indigenous growth potential, creating an information rich environment, and improving the locational attractiveness of the periphery. There is also an urgent need to understand the impacts of structural changes and their dynamics on regions that have different socio-economic heritages and internal spatial structures.

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정보화사회로의 경제재구조화과정에 따른 지역발전*

— 한국을 사례로 하여 —

이 희 연**

지난 30여년간 국제경제와 긴밀하게 연관을 맺으면서 급성장해온 우리나라의 경우, 세계시장에서의 경쟁력을 지속적으로 강화시키기 위하여 산업구조를 조정하면서 경제의 재구조화과정을 겪고 있다. 특히 1980년대에 들어오면서 생산직 노동력의 부족, 임금 인상과 더불어 선진국들의 보호무역주의가 강화되자 정부는 산업정책을 기술·지식집약적 산업을 육성하는 정책을 실시하게 되었다. 즉 국제적으로 기술우위에 있는 선진국가들과의 경쟁속에서 국제시장확보를 위해 중화학공업에 치중하던 국내의 산업을 “고부가가치 산업인 첨단 산업의 육성과 정보집약적인 서비스산업의 육성”으로 재구조화 시키는 정책을 시행하였다. 본 연구의 목적은 기술·지식 집약적 산업의 육성책과 더불어 점차 정보화되어가는 경제의 재구조화과정이 지역성장에 미친 영향을 분석하려는 것이었다.

지난 10년동안 우리나라는 전반적으로 정보화가 상당히 진전되어왔다고 볼 수 있다. 그러나 정보화의 진전도와 그 수준은 지역간에 상당히 차이가 나고 있는 것으로 알려져 왔다. 본 연구에서는 정보화수준의 지역격차를 비교하고, 또 어느 분야에서의 격차가 더 크게 나타나고 있는가를 분석하기 위하여 경제적, 사회적, 하부구조의 세 가지 측면에서 정보화수준을 측정하였다. 분석결과에 의하면, 경제적 측면에서의 지역간의 정보화수준은 사회적, 하부구조적 측면에서의 정보화수준보다 그 격차가 가장 크게 나타나고 있다. 본 논문에서는 서울의 정보화수준이 다른 지

역들과 비교하여 두드러지게 높게 나타나고 있는 요인들을 규명해 보고자하였다. 또한 우리나라의 경우 정보화수준은 경제발전과도 상당히 상관성을 갖고 있는 것으로 나타났다. 따라서 경제가 재구조화되어가는 과정에서 지역간의 경제성장의 격차가 야기된 것 처럼, 지역의 경제구조는 차별적인 정보화를 진전시키고 있다고 말할 수 있다. 그러므로 정보화사회로 점차 진전됨에 따라 경제활동이 점차로 정보집약적으로 진전되어간다고 볼 경우 차별적인 정보화수준은 지역성장의 격차를 더욱 심화시키게 될 것이라고 전망해 볼 수 있다.

서울로의 정보집약적 활동의 과도한 집중과 재벌 그룹들이 가지고 있는 경제통제력, 그리고 점점 심화되어가는 노동의 공간적 분업화는 앞으로 경제적, 사회적 그리고 공간적인 마찰을 가져올 것이다. 따라서 우리나라가 직면한 가장 큰 문제는 국제적으로는 국가의 경쟁력을 유지하고 수출력을 신장시키면서도 국내적으로는 보다 균형적인 지역발전을 가져올 수 있거나, 적어도 지금보다는 더 심각한 지역격차를 야기시키지 못하게 하는 정책을 마련하는 것이다. 본 논문에서는 주변지역의 잠재적인 성장을 유도하며 정보화사회로의 진전을 촉진시킬 수 있는 다차원적인 측면에서의 지역정보화 전략에 대해 모색하였다.

主要語 : 경제재구조화, 지역개발, 정보화, 노동의 공간적 분업화, 지역정보화전략

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