地域研究, 第10卷 第2號
1994年 12月 pp. 31～44

Prospects and Development Strategies of High Technology Parks in Korea

Yang－Ho Park,
Korea Research Institute for Human Settlements

1. Introduction

Competition is a key element of the capitalist society. The Korean society nowadays is evolving toward more advanced society where such elements as information, technology, and local autonomy become much important. There will be certainly an increasing competition in industrial development among regions, resulting in dynamics of rise and fall of regions in the process of the competition. What kind of competition? It could be brought about by high technology industries, because we are in the early phase of a fifth Kondratieff upswing(Hall 1988;Rostow, 1977).

As Gerhard Mensch(1979) found, many innovations occur almost simultaneously within a few years—the radical years of history. The peak years for such technological clustering were 1764, 1825, 1886, 1935, and 1985. Mid of 1980s was a starting point of a fifth Kondratieff cycle. Such a clustering has a waggon－train effect. The fifth Kondratieff upswing is spurred by high technology industries in which micro－processor technology is the most critical. Korea itself and regions within national territory should be adapted to this new long－term wave of industrial development, so that will be able to avoid the Upas Tree effect which may inhibit the growth of new and delicate industrial vegetation.

This paper aims to overview challenges and opportunities to the Korea and her regions by examining special features of high technology industries. It will also investigate current situation and prospect of regional distribution of high technology industries, then will draw some policy implications of listening opinions coming from the high tech firms which are principal promoters of regional change of high tech sectors. Then this paper will focus of the Korean strategies and critical policy elements of high technology parks.

2. High Techonlogy Industry and Korean Regional Development; Challenges and Opportunities

Special features of high technology industries provide Korea and her regions with both challenges and opportunities.

High technology industries are raw material－saving industries. For example, the raw materials in a semiconductor microchip account for one to three percent of total production cost; in an automobile their share is 40%, and in pots and pans 60%. Fifty to 100 pounds of fiberglass cable transmit as many telephone message as does one ton of copper wire(Drucker, 1986).

---

* This paper was presented at the International Symposium on "Development Strategies for Science Town" organized by KOSEF in Taejon, November 19－20, 1992

High technology industries are not labor-intensive but knowledge-intensive industries. For example, the manufacturing costs of the semiconductor microchip are about 70% knowledge consisted of research, development and testing and no more than 12% labor. In the case of prescription drugs, labor represents no more than 15%, with knowledge representing almost 50% (Drucker, 1986).

The products of high technology industries have a special character of short life cycle indicating that time is the major source of competitive advantage. The products are also high value-added and light in weight, and they are system outputs to which many other high technologies are closely related.

High technology industries have different location factors from low technology industries. They tend to be free of the resources and markets. Water and natural resources become less important as locational factors for cities, particularly as, with newer technology, the size of manufacturing plants begins to shrink. Markets are no longer places but networks(Bell, 1990). High technology sectors are oriented towards locations with a highly-skilled labor force and the amenity milieu to anchor them there. Proximity to universities and culture becomes more important as a locational factor. As geography is no longer the controller of costs, distance becomes a function not of space but of time; and the costs of time and rapidity of communication become the decisive variables.

These special qualities of high technology industries give challenges to the nation and her regions. The Korean economy should increase national competitive advantages not through labor intensive industrial strategy but through knowledge and technology intensive industrial strategy. Overall industrial structural transformation should be pursued. The conventional strategy has relied mainly on labor-intensive industrial one. Modern Korea has had little experiences and performance in creating new technologies and new products, with depending too much on import of old or quasi-new technologies from advanced countries. Goverment and business have been very reluctant to invest in R&D. Some regions in the nation will also have challenges for those regions with low capacity to attract and anchor highly skilled labor force could have greater difficulties in growing their economy.

By contrast, the special qualities of high technology industries give the opportunities to the nation as well as her regions. Because Korea is poor in the stock of raw materials for industrial production, high technology sectors will be certainly 'appropriate' sectors to save raw materials and so to decrease import volume of them from foreign countries Korea has a capacity of bountiful supply of highly educated manpower. The population rate of attending colleges out of 18-21 age group is very high, about 38 percent in 1989. It is much higher than that of most advanced nations. So, knowledge intensive industries are a good candidate for Korean people to realize their potentials. But it will depend greatly on reasonable industrial policy, efficient integration of goverment, business, academics, and research sides, resulting in higher industrial total productivity.

Those regions with better milieu in attracting and anchoring high technology manpower could have a possibility of taking lead in competition of industrial development and restructring. However if national and regional efforts and policies are well taken, opportunities could also spread widely to peripheral regions.

In the process of the Fifth Kondratieff cycle, individual city can be classified into one of four types of regions. Regions can be classified into 4 categories according to the degree of technological creation and the growth rate of high technology industries. Those regions with low degree of

technology and low rate of high technology industrial growth are likely to be driven into declining regions. Those regions with high degree of technology but low rate of new industrial growth are likely to be called science or research regions where technology transfer to other regions happens. Those regions with low degree of technology but high growth rate of high technology industries are likely to receive benefits from location of branch plants of standardized products.

Those regions with both high growth rate of high technology industries and high degree of technology creation are likely to enjoy almost self-sustained development. As shown in Table 1, category Ⅰ, Ⅱ and Ⅲ regions will have visible or invisible competition to become the self-sustaining region(category Ⅳ). Although with different capacities from region to region, opportunities can be given to most regions in arriving at and transforming to the self-sustaining region.

Table 1. Regional Classification of Rise and Fall in Economic Growth

Indicator		Degree of technology creation	
		Low	High
Growth rate of High Tech Industries	Low	Declining Region Ⅰ	Research & Science Region Ⅱ
	High	Ⅲ Standardized Production Region	Ⅳ Self-sustaining Region

Source : Park(1988)

3. Current Situation and Prospects of high Technology Industrial Location

Table 2. Regional Distribution of High Tech Industries in Korea : 1989.

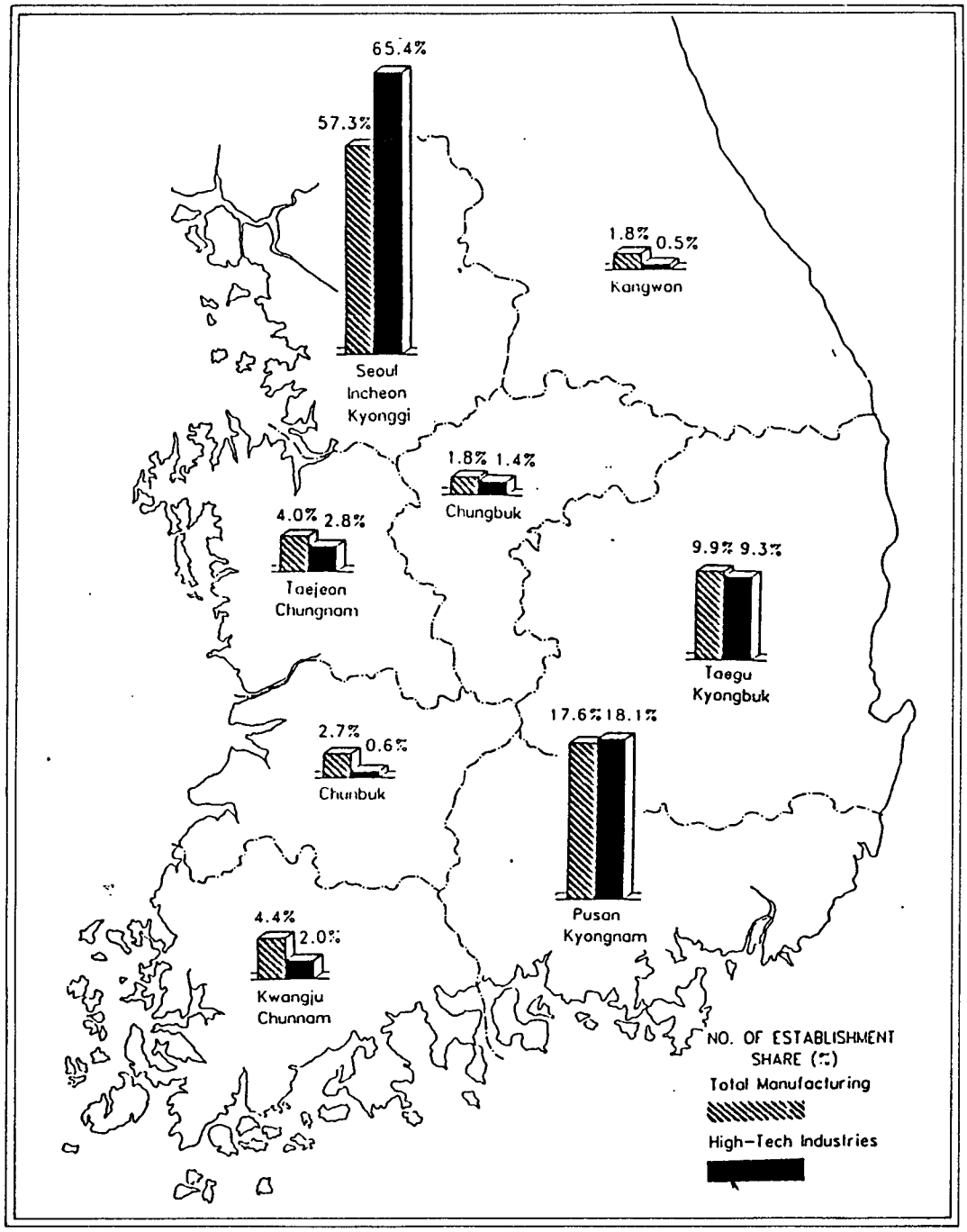
Region	Total Manufacturing No. of Establishments	High Tech Industries No. of Establishments
Nation	73,506(100.0)	6,206(100.0)
Capital Region	42,155(57.3)	4,057(65.4)
• Seoul	17,504(23.8)	1,114(18.0)
• Incheon	4,934(6.7)	463(7.5)
• Kyonggi	19,717(26.8)	2,480(40.0)
Pusan	7,524(10.2)	536(8.6)
Taegu	4,145(5.6)	271(4.4)
Kangwon	1,341(1.8)	34(0.5)
Chungbuk	1,288(1.8)	88(1.4)
Chungnam	2,937(4.0)	172(2.8)
Chunbuk	1,998(2.7)	35(0.6)
Chunnam	3,222(4.4)	125(2.0)
Kyongbuk	3,147(4.3)	301(4.9)
Kyongnam	5,411(7.4)	587(9.5)

Note : 1) High tech industries include Microelectronics (SIC 38322, 38323, 38342, 38251, 38341), Optical industry(SIC 38512, 38521), Mechatronics(SIC 38321, 38296), Aerospace industry(SIC 38432, 38451, 38452), Precision Chemicals and Bioindustry(SIC 3522, 3516, 35131, 3521, 35233, 35299), and New Materials.

2) Output is measured by the value of shipment.

Source : EPB(1991)

Figure 1. Regional Distribution of High Tech Industries in Korea, 1989.



According to the theory and reality of high technology industrial location, large metropolitan areas are good places for high technology sectors. The regional distribution pattern of high technology indutries in Korea follows a general tendency(Jin and Park, 1990).

Table 2 and Figure 1 show spatially concentrated pattern of high technology industries to Seoul and its vicinities. In 1989, the Capital region including Seoul, Incheon, and Kyonggi province has 65.4% of high technology industrial firms out of national total. The level of concentration of high tech industries is much higher than that of total manufacturing. The Capital region plays a role of an incubator for small and medium size high tech industries.

On the other hand, the accumulation level of high technology industries of other part of country is not considerable except Pusan, Taegu, and Kyongbuk and Kyongnam provinces where mass-production of high tech products takes place in recently built large scale industrial complexes such as Kumi, Ulsan, and Changwon.

Regional change of high technology industries on the basis of no. of establishments shows that 58 percent of new high technology firms in the nation have been established in the Capital region between 1985 and 1989(Table 3). In particular, vicinity region of Seoul-Kyonggi-is found to be the best place for high technology sectors. The second best place is found to be Kyongnam region which has been one of principal promoters of national industrialization during the last two decades.

Table 3. Regional Change of High Tech Industries(No. of Establishments)

Region	1985	1989	1985~'89
Nation	4,030(100.0)	6,206(100.0)	2,1776(100.0)
Capital Region	2,796(69.4)	4,057(65.4)	1,261(58.0)
• Seoul	1,048(26.0)	1,114(18.0)	66(3.0)
• Incheon	277(6.9)	463(7.5)	186(8.5)
• Kyonggi	1,471(36.5)	2,480(40.0)	1,009(46.4)
Pusan	453(11.2)	536(8.6)	83(3.8)
Taegu	163(4.0)	271(4.4)	108(5.0)
Kangwon	9(0.2)	34(0.5)	25(1.1)
Chungbuk	29(0.7)	88(1.4)	59(2.7)
Chungnam	97(2.4)	172(2.8)	75(3.4)
Chunbuk	21(0.5)	35(0.6)	14(0.6)
chunnam	51(1.3)	125(2.0)	74(3.4)
Kyongbuk	158(3.9)	301(4.9)	143(6.6)
Kyongnam	253(6.3)	587(9.5)	334(15.3)

Source : EPB(1987, 1991)

The empirical analysis of spatial pattern of high tech industries in Korea clearly shows that these industries have preferred to locate in Seoul and its vicinities. The spatial concentration is mainly attributed to the location of the region for high tech firms. Table 4 shows that the Capital region has the greatest potential of high technology industrial growth. On the basis of several criteria such as capacity of higher education, registration of patent, and agglomeration of engineering college and research institutions, the Capital region exhibits the best locational condi-

tions. Empirically regional distribution of high technology industries are very closely related to regional extent of growth potentials. Simple regression equation is as follows.

$$Y = -0.096 + 1.014X \qquad R^2 = 0.97$$
$$\text{(Std. Err : 0.060)}$$

where, Y = no. of new establishments in high tech industries for each region between 1985 and 1989
X = extent of total growth potentials for high tech industries in each region in 1988

Table 4. Regional Growth Potentials of High Tech Industries, 1988

Region	Performace of tech. guidence ①	Agglomeration of engineering colleges ②	Supplying capacity of higher education ③	Location of research institutions ④	Location of researchers ⑤	Employment of high-tech industries ⑥	Registration of patent ⑦	Total growth potential ⑧
Nation	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Capital Region	55.2	37.9	42.2	68.7	64.2	57.7	74.9	57.3
• Seoul	20.2	19.4	20.5	28.6	19.2	25.9	65.4	28.5
• Incheon	1.5	4.0	5.4	6.5	7.9	7.7	1.2	4.9
• Kyongi	33.5	14.5	16.3	33.5	37.1	24.1	8.3	23.9
Pusan	10.8	8.9	11.5	3.0	0.7	7.4	4.8	6.7
Taegu	3.0	6.5	7.8	3.3	0.7	3.8	0.9	3.7
Kangwon	1.3	4.8	2.5	0.3	0.1	0.4	0.6	1.4
Chungbuk	1.3	3.2	2.7	1.1	0.5	1.8	0.6	1.6
Chungnam	5.0	11.3	11.8	5.7	15.5	2.0	3.5	7.8
Chunbuk	1.3	5.6	4.8	0.1	0.2	0.8	0.8	1.9
Chunnam	4.6	10.4	7.6	2.6	2.4	1.8	1.7	4.4
Kyongbuk	11.9	4.0	3.5	4.9	2.8	5.8	5.4	5.5
Kyongnam	5.4	5.6	5.6	9.5	12.9	18.5	5.4	9.0
Jeju	0.1	1.6	0.8	–	–	0.1	0.3	0.4

Note : Individual index exhibits regional proportion of national total in the following indicator.

① No. of activity for technology Guidence of Small and Medium Business Promotion Association between 1980−1989
② No. of engineering and science colleges
③ No. of annual graduates from the engineering and science colleges
④ No. of research institutions
⑤ No. of researchers
⑥ No. of employees in high tech industries
⑦ No. of registered patent stock
⑧ (sum of proportion in each indicator)/7

Source : KRIHS(1988)

The Capital region has now more favorable conditions than local region. The capital region has better technological infrastructure, and it has greater potential of high technology industrial growth.

This situation will probably make the Capital region a self-sustaining economy. However local region outside the Capital region will increasingly receive benefits of national high speed transportation and telecommunication facilities in the future, at least by 2001. Disparities in getting information and mobility among regions will decrease. Furthermore local autonomy may give spurs to take initiatives of local governments in making reasonable high technology parks. As several regions outside the Capital region may be successful in attracting high technology firms, high technology industries are likely to spread to peripheral region through the mix of pattern of urban hierarchical diffusion and wave-like pattern.

4. Opinions of High Technology Firms and Policy Implications

It is important to get opinions of enterprises who founded and are operating high technology firms in drawing policy implications of regional development. In October 1986, 100 high technology firms of computer, semiconductor, telecommunication industries in Korea were surveyed by author(KRIHS, 1987). Some distinct facts are as follows :

Motivation of founding high technology firms very related to their founders' background of engineering education and to their adaption to national policy prediction of industrial development.

Necessary technologies are heavily dependent upon the import from some advanced countries such as Japan, U. S. A., and Germany. Some high technology firms are also helped by Korean Scientists who live in the U.S.A. and foreign engineers invited.

Raw materials and parts are purchased through both foreign market and domestic market. In particular, core parts are imported from U.S.A. and Japan. In the case of domestic purchase, some parts from the specialized market developed in Seoul-the Cheongkye-Chun market. Most of initial capitals tend to be supplied by the founder's own asset including savings. Only a few firms are successful in getting loan from venture capitals which are scarce in Korea.

Important factors of location of high technology firms include the availability of highly skilled labor force, the proximity to R&D institutions, and the agglomeration of the existing firms.

Some of spin-off phenomena are seen in the Capital region. Some scientists or engineers who have been engaged in R&D activity tend to establish successfully their own high technology firms.

High technology enterprises criticize current bottlenecks in establishing and operating their firms-the complex and bureaucratic process in establishing firms; location regulation in the Capital region; very weak cooperation and links between business and universities/R&D institutions; underdevelopment of venture capitals and credit loan system.

The opinion survey on the demand of public policies also revealed the following facts.

Important determinants of high technolgy industrial growth for the future Korea include government's active supports to high technology firms, and adventurous and developmental entrepreneurship. The national large scale high technology projects-telecommunication network, high speed train and aerospace programs would be a critical factor in high technology development.

High technology parks are demanded by enterprisers, because financial supports in locating parks are thought to be beneficial to avoid the problem of firm's capital

shortage in the establishing stage of the firms.

In developing high technolgy parks, leadership from the public as well as private sides is thought to be essential. And enterprisers are optimistic about inducing a regionally decentralized pattern of high technolgy industrial clusters.

From the field voices of high technolgy firms, some policy implications can be derived. To promote high technology industrial development, number of science and engineering colleges and students needs to be increased, so that educational background could be linked to motivation of high tech firm formation by enterprisers. National and regional industrial policy is also needed to induce adaptation of businessmen, to changing industrial structure. To facilitate the spin-off phenomenon, venture capitals should be supported. National projects very related to high technology industrial growth need to be launched to induce long-term enormous demand for high technology sectors. And high technology park will be a good candidate for regional development strategy. However, the park policy should be include financial and administrative support system, and the policy needs to be made and implemented by joint efforts of government and private sides with a harmonized leadership between them.

5. Strategies and Policy Elements of High Technology Parks

1) Strategies of high technology parks

Technology park is now becoming recognized as an important factor in regional development. Its progress is rapid in such advanced countries as U. S. A., France, U. K., Germany, Japan. Almost general concept of high technology park is now existing. It is formally linked to a higher educational institution or to a major center of research, encouraging the formation of knowledge based industries, normally resident on site, with management function actively engaged in the transfer of technology and business skills to the organization on the site(Broadhurst, 1991). Visiblly a high technology park exhibits a form of industrial 'complex', and invisiblly it carries a kind of 'network' among business, research and universities, and government.

During the last 30 year-industrialization period in Korea, a variety of manufacturing estates have been developed. About 70 large or medium scale manufacturing estates are now in operation in the nation, and 170 small scale manufacturing estates have been developed in rural region in the name of "agro-manufacturing estates." The public policy of manufacturing estates has reaped substantial multiplier effects on national economic growth and regional industrial development by creating new employment and transforming regional industrial structure. The Korean government is now attempting to initiate another policy-high technology policy.

In Korea, high technology parks are planned on two premises. One is that they will contribute to inducing national industrial restructuring to adapt to changing global economic war by utilizing opportunities carried by special features of high technology industries. The other is that high technology parks will vitalize regional economic development in the region particularly outside the Capital region, so that they will contribute to making more balanced development across regions.

Several factors have been taken into account in selecting the appropriate location of high technology parks by central and local governments. They include :

- proximity to major cities
- proximity to higher educational institutions and research institutions
- current agglomeration of high technology industries
- national policy direction for balanced

regional development
- possibility of environmental conservation

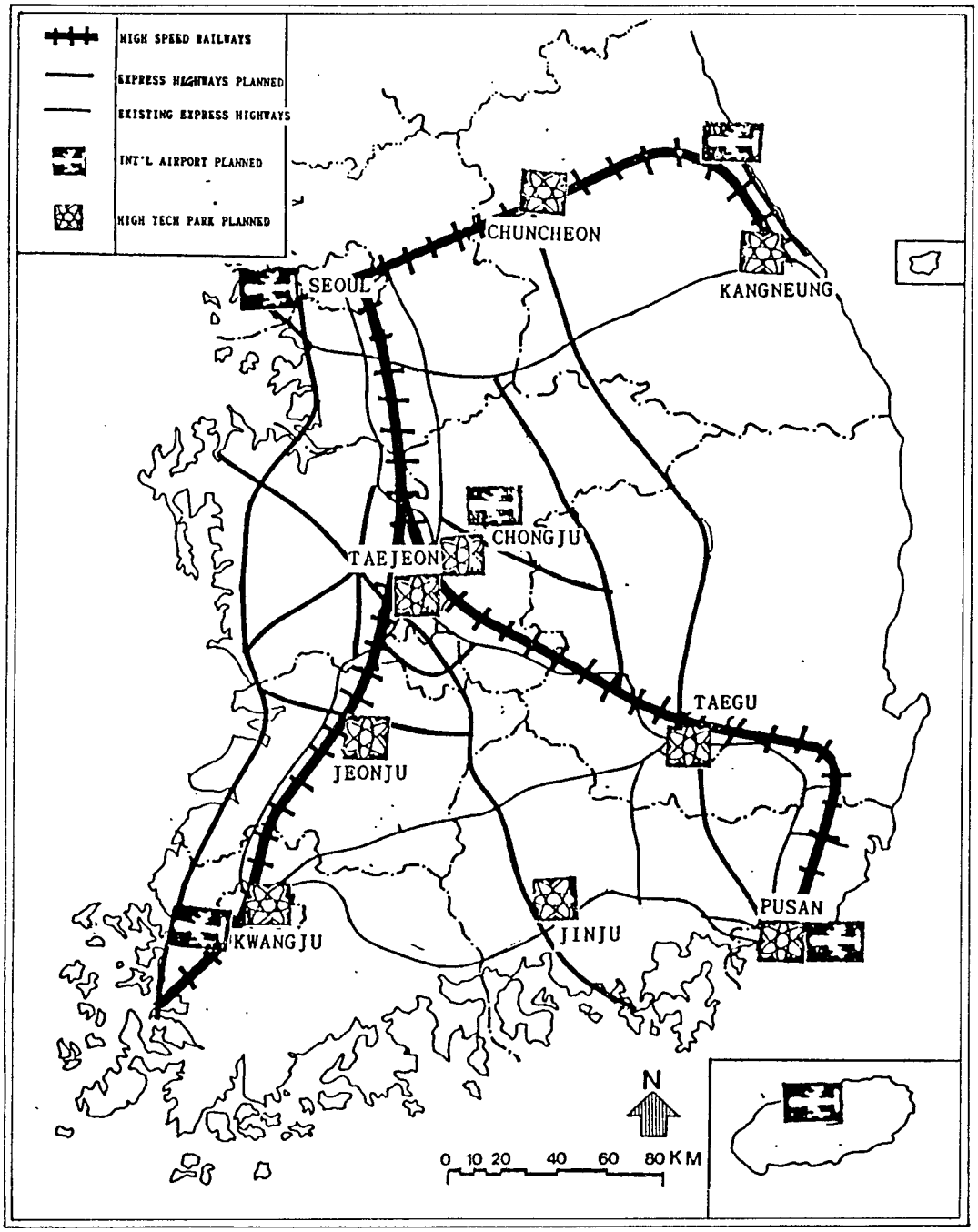
Following the above factors, eight high technology parks are planned. They are suggested in a series of the latest national plans—the third 10 year national physical development plan (1922—2001), the seventh 5 year economic and social development plan (1992—1996), and the industrial location plan. The location(city level)of high technology parks has been determined by consultation between central government and local governments.

Table 5. High Tech Industrial Parks Development Plan in Korea.

Location	Area(㎢)	development period	key industries	Initiatives
Kwangju	9.9 (9.5 in addition)	1989—1995 (1996—2001)	bio—engineering precision chemicals information industry new materials	National
Pusan	6.6	1990—2001	semiconductors industrial robots percision machinery airplane parts telecommunication machinery	Regional
Taegu	3.5	1990—1995	computers, semiconductors precision instruments bio—engineering new materials	Regional
Taejeon	4.5	1990—1995	precision chemicals preicision insturments telecommunications new materials	Regional
Chongju	9.9	1991—1997	semiconductors, computers communication instruments airplane parts precision chemicals	Regional
Jeonju	3.5	1990—2001	semiconductors, computers new materials precision chemicals bio—engineering	Regional
Chuncheon	4.3	1992—1996	semiconductors, computers optical instruments medical instruments	Regional
Kangneung	3.4	1990—2001	new materials precision chemicals telecommunication machinery maritime technology	Regional
Jinju	2.8	1992—2001	telecommunications precision instruments airplane parts	Regional

Souce : Park, 1991

Figure 2 Location of High Tech Parks Planned by 2001



Eight cities are Kwangju, Pusan, Taegu, Chongju, Jeonju, Chuncheon, Kangneung and Jinju(Table 5). They include large cities with population size ranging from 1 million to 4 millions and provincial centers which are medium size cities with population ranging from 0.2 million to 0.5 million. As shown in Figure 2, most of them are located along the major high speed transportation network in plan. All of them have one or more engineering universities. In particular, Taejeon is now a major center of technology research, where 33 science and research institutions are located and more than 30 new additional research institutions will be located in the near future.

These parks are planned to be developed by initiatives of government. Some other high technology parks are also planned by private side. For example Pohang Steel Corporation has also an ambitious plan of technopark in Pohang which is widely known as steel industrial city. Korea university(one of private university) recently announced the plan of science park within its campus. In the capital region, science park is also planned to be developed in 1990s, where more than 300 engineering firms and research institutions may be concentrated in 6㎢ site.

Table 6. Development Strategies by High Tech Park Model

Model Characteristics	Integrated Model	Production-Oriented Model	Specialized Model
Functions	research(basic & applied) production residence	research(applied) production	research(applied) production(specialized industry)
Site Size	large scale	medium scale	medium or small scale
Location Conditions	• large cities • high speed transportation • engineering university • high agglomeration of industries	• large cities or medium cities • high speed transportation • engineering college • agglomeration of industries • small or medium cities • express highways • engineering college	

Source : The Korean Government(1992)

In general, high tech park strategy is different from the conventional manufacturing estate strategy. In the case of the manufacturing estate, much emphasis was put on production function and social overhead capital supports. By contrast, high technology park strategy emphasizes a close triangle inter-connection among firms, research & academic institutions, and governments. Futhermore, most of high technology parks will be developed by the initiatives of local government with active participation of private sides. A central government will take only limited

role in park formation by encouraging and supporting a variety of local efforts. Central government will take active initiatives only in making large scale high technology park which may be able to induce substantial effects on more balanced national development. Among 8 high tech parks, only Kwangju park will be developed by central government investment and through inter-ministerial coordination.

National plans suggest that the high technological parks be constructed and operated principally with three models-① the integrated park model, ② the production-oriented park model, ③ the specialized park model. These models are classified according to major function, size of site, and location conditions of the parks (Table 6).

The model of integrated park will have function of both basic research and applied research, production, and residence. The park will be large scale and its location will be within or nearby large cities outside the Capital region. It will be developed at the location with good accessbility of high speed transportation facilities, engineering universities, and relatively high agglomeration of the related industries.

The model of production-oriented park will primarily have functions of applied research and production. It will be medium scale and its location will be within or nearby large cities or medium cites. The proximity to high speed transportation and engineering college will be also an important factor of the location of this park model.

The model of specialized park will have functions of applied research and specific industry out of high technology industries. The park size will be medium or small scale. It will be located mainly in small or midium cities which can utilize engineering educational institutions and proximity to express highways.

2) Public Policy Elements

Generally most successful development of high technology parks in the USA experiences tends to have common traits. They include : active participation of an higher eductional institution with a strong science base, availability of supporting services, incentives and finance, provision of "incubator space" in multi-occupancy buildings to accommodate start-up companies, strict control of building design, land use, and density etc(Broadhurst, 1991).

In the Korean case, there are some critical policy elements which should be sincerely considered in the process of making high technology parks successful.

First, in order for a high technology park to be successful, public policy needs to create and utilize "dynamic competitive advantage" rather than "static competitive advantage" of regions and cities. The rise and fall of regions on competition in high technology industrial development will depend on effective utilization of dynamic competitive advantage. Chalmers Johnson(1984) has pointed out the importance of new concept of comparative advantage.

The classical or static notion of comparative advantage referred to geographical differences and various natural endowments among economies that were supposed to produce a global division of labor. The newer dynamic concept of comparative advantage replaces the classical criteria with such elements as human creative power, foresight, a highly educated work force, organizational talent, the ability to choose, and the ability to adapt. Moreover, these attributes are not conceived of as natural endowments but as qualities achieved through public policies such as education, organized research, and investment in social overhead capital.

Second, there are no significant difference in the key industries among parks as

shown in Table 5. It indicates that every high technology park seems to have "almost all or nothing strategy", indicating disregard of competitive advantage in selecting key industries for each region. As Michael Porter(1990) suggested recently in his book entitled "The Competitive Advantage of Nations", the best regional policy identifies cores of industry strength and builds on them to encourage geographically concentrated clusters. One industry——backborn industry which can have most competitive advantage creates sophisticated demand or impacts for others. This is far superior to encouraging a diverse and random group of firms and industries. Successful high technology parks may emerge, if the most competitive group of industry is selected for each park (in particular for production oriented park model and specialized park model) and government supports are concentrated on that industry by taking such forms as specialized information center, specialized local university, specialized research and incubator space related to that industry. In this situation, competitive advantage of each technology park may be achieved and great effects may be taken nationally and regionally. In this case, every park may be able to become self-sustaining park.

Third, high technology industries tend not to grow in every region. They generally grow only in selected regions where favorable factors of location exist. One of key location factors is found to be an access to universities and research institution. What is important is an intensive interconnection between university, research institutes and high tech companies, rather than mere geographical proximity to university or research institutes. Through very intensive ties between them, information and technologies are able to be transferred from prodcution companies to university as well as from university to companies. But more accessibility will bring about higher probability of interactions between two. A kind of "coproduction network mechanism" should be introduced and strengthened in high technology park system.

Fourth, in growing high tech industries, a strong and creative leadership is important. Without leadership, high technology park is difficult to be successful. Leaders in education, government, and private sector should actively participate in consturcting the high tech park and attracting high tech firms. In the case of the Silicon Valley, professor Frederick Terman of Standford University was a key leader in sowing high tech seeds and in accumulating high tech electronic industries.

Lastly, we know that trees take their time to grow and mature, no matter how much fertilizer is used. In a similar fashion, the development of a high tech parks takes time to be successful. It indicates that a "long-term" strategy should be made and aim at providing a variety of supportive and favorable conditions for the creation and growth of successful high tech parks. It also implies that the Korean government needs much more sophisticatedly-designed grand policy which will be able to guide various ministrial policies and local policies in relation with high technology industries and parks. And legal support mechanism is also needed for inducing maximum success of high technology parks and fruitful participation of business and university side.

References

Bell, Danial, 1990, "The Third Technological Revolution and Its Possible Socioeconomic Consequences," Manuscript of Lecture, Seoul.

Broadhurst, Tom, 1988, "Setting up a Science Park," The Proceedings of the U. K Science Park Association's Seminar, Univ. of Manchester, pp. 5-11

Drucker, Peter, 1986, "The Changed World Economy," *Foreign Affairs*, Spring.

Economic Planning Board, 1987, 1989, The Report

on Mining and Manufacturing Industries, Seoul.

Hall, Peter and Markusen, Ann, 1985, *Silicon Landscapes*, Boston: Allen & Unwin.

Hall, Peter and Preston, P. 1988, The Carrier Wave, London : Allen & Unwin.

Jin, Young-Hwan and Park, Yang-ho, 1990, "Development Strategies for High-Tech Industrial Parks," The Proceedings of the Korea U. K. Joint Seminar on High-Tech Center & Urban Development, Seoul, pp. 1-22.

Johnson, chalmers, 1984, "The Idea of Industrial Policy", in Johnson, c.(ed.), *The Industrial Policy Debate*, San Francisco: ICS Press, pp. 3-26.

The Korean Government, 1992, The Third 10 Year National Physical Development Plan, Seoul.

KRIHS, 1987, *High technology Industries and Regional Development*, Korea Research Institute for Human Settlements, Seoul.

KRIHS, 1988, Regional comparison of Development Levels, Korea Research Institute for Human Settlements, Seoul.

Mensch, Gerhard, 1979, *Stalemate in Technology*, Boston: Ballinger.

Park, Sam-ock, 1991, "Development of High Technology Industrial Parks:Stratagies and Policy Issues," Proceedings of Int'l Seminar on Development Experience of High-Tech Industrial Park, Seoul, pp. 23-48.

Park, Yang-ho, 1988, "Technology Innovations and Urban Economy," *Urban Affairs*, Vol. 23, No. 6, pp. 54-66.

Porter, Michael, 1990, *The Competitive Advantage of Nations*, London: The Macmillan Press.

Rostow, Walt, 1977, "Regional change in the Fifth Kondratieff Upswing" in Perry, D. and Watkins, A.(eds.), *The Rise of the Sunbelt Cities*, Beverly Hills: SAGE, pp. 83-103.