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Technology-Related FDI Climate in Korea

Yoo Soo Hong



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I . Introduction

Technology-related investment is crucial not only for overcoming the current economic crisis but also for the sustainable development of the Korean economy. During the period of currency and financial crisis, when foreign portfolio investments and capital flows are drastically curtailed, the importance of the role of foreign direct investment (FDI) grows.

In Korea, technology-related FDI is more important than in other countries for several reasons. First, Korea's heavy dependence on short-term borrowing was a leading cause of the current crisis. As technology-related FDI is associated with long-term capital inflows, increased FDI inflows will mitigate the short-term foreign capital shortage. Second, a more fundamental cause of the crisis is the weakened national competitiveness of Korea. This weakness, in turn, is partially a result of Korea's weak indigenous technological capability. As strategic technological alliances become more influential throughout the world, FDI from partners providing strong technological capability are likely to become commonplace in Korea. Third, Korea recently adopted the realization of a knowledge-based economy as its national goal for the 21st century.

The adverse effects of the current economic crisis have spilled over into the realm of science and technology development. The changes in the field of science and technology development occurred in the aftermath of the crisis can be broadly summarized as the following. First, domestic R&D investment by the private sector has been substantially reduced. Second, the implementation of the newly launched Five-Year Science and Technology Innovation Plan is likely

to be suspended. Third, international cooperation in science and technology is expected to be encouraged in line with efforts to induce more FDI.

This paper will review recent trends of technology-related investment in Korea and assess the efforts made by the government and the private sector to improve the overall business and investment climate. Section II begins with a general discussion regarding the relationship between FDI and national- and firm-level competitiveness via technological capabilities. Section III and Section IV explain the recent trends of FDI, and technology imports and strategic technological alliances in Korea. Also included is a discussion on FDI policy changes. The main body of this paper is Section V, which discusses the current situation and the future prospects of technological capability and technology-related FDI inflows into Korea. Emphasis is placed on the importance of the realization of a knowledge-based economy. Section VI summarizes and concludes.

II . FDI, Technological Capability and Competitiveness

There is a historically close relationship between FDI received and technological capacity. This relationship is, in fact, two directional in the sense that MNCs usually have technological advantages and look for counterparts with technological complements or needed assets. Thus, a host country which has a well-developed technological infrastructure or strong technological capability is in a better position to induce FDI.

Table 1 lists four types of FDI in terms of motivation: ① resource seeking, ② market seeking, ③ efficiency seeking, and ④ strategic asset seeking. In general, MNCs initially invest in foreign countries in order to utilize local resources or penetrate local markets. However, in later stages, investment purposes graduate to exploitation of global production efficiency and securing complementary assets. These latter cases often involve the exchange of technologies.¹⁾

This behavior bears an important implication for a country in a financial crisis, which wants to induce more FDI. During a financial crisis, it is hard to realize greenfield FDI or new sources of FDI. Instead, any new FDI will likely come from MNCs and other foreign firms already present in the market. Inducing increased investment from these companies will likely involve improving the quality and access of complementary assets, notably, technological capabilities of firms and the infrastructure conducive for a knowledge-based economy.

1) Dunning, J. H., *Alliance Capitalism and Global Business*, 1997, pp 213-222.

〈Table 1〉 Four Main Types of FDI

1. (Natural) Resource seeking • Physical resources • Human resources	Mainly motives for initial FDI
2. Market seeking • Domestic markets • Adjacent (e.g. regional) markets	
3. Efficiency seeking (Rationalization of production to exploit economies of specialization and scope) • Across value chains (i.e. product specialization) • Along value chains (i.e. process specialization)	Mainly motives for sequential FDI
4. Strategic (created) asset seeking (To advance regional or global strategy) • Technology • Organizational capabilities • Markets	

Source: Dunning (1997), p.219.

Often FDI takes the form of strategic alliances. Conversely, the creation of strategic alliances often induce FDI. Thus, there is a virtuous circle between FDI and strategic alliances. Among various reasons for forming alliances, the following are the most frequently cited:²⁾

- To acquire new products, process technologies or organizational competencies.
- To spread the risk of high capital outlays or reduce the time of product development.
- To capture economies of synergy or scale.
- To gain access to new markets or distribution channels.

2) Dunning(1997), pp. 48-49.

These are closely related with the motivation of strategic-asset-seeking MNCs in Table 1.

FDI and the technological capability of a host country tend to reinforce each other. Host countries perceive or regard the major contribution of FDI to be the improvement of national competitiveness at a low cost. FDI tends to boost R&D, technological innovation, transfer technologies and organizational techniques intentionally or unintentionally to local firms. Further, FDI often creates additional markets for local firms and may encourage the formation of alliances and inter-firm networking.

III. FDI Trends and Policy Changes in Korea

Prior to discussion of the details of the FDI environment in Korea, it is useful to establish a general understanding of the role of FDI in Korea. FDI inflows into Korea began to grow rapidly in the mid-1980s. Following a cyclical downturn in the early 1990's, investment inflow again began growing from 1993 and has since steadily increased.

Contrary to expectations of the financial crisis scaring investors away, an upward surge late in the year will see 1998 FDI inflows into Korea surpass that of 1997, which had previously posted the highest FDI in terms of the total amount(USD 7.0 billion) and the number of cases(638).

The portion of technology-related FDI has increased over time as Korean corporate structure has become increasingly dominated by technology-intensive industries, including a knowledge-intensive service sector. As show in Table 2 and Table 3, FDI in the service sector began exceeding FDI in the manufacturing sector from 1994. Investment in labor-intensive industries decreased whereas that in capital-and technology-intensive industries substantially increased. However, the upturn in FDI began to reverse course in the first half of 1998, mainly due to the impact of the financial crisis.

The U.S. and Japan have traditionally been the two largest investors in Korea. However, Japanese investment began to decline in 1995. Losses due to the lower Japanese investment were replaced by expansion of investment in Korea by the European Union(EU). Meanwhile, in the last year Japanese investment as a share of FDI inflows into Korea has again began to grow.

<Table 2> FDI Flows into Korea

(USD million, number of cases in parentheses)

Year	Total	Manufacturing	Services
1990	802.6(296)	584.4(136)	218.7(159)
1991	1,396.0(286)	1,069.2(108)	325.6(178)
1992	894.5(233)	648.0 (82)	244.3(150)
1993	1,044.3(273)	526.8 (80)	517.3(192)
1994	1,316.5(414)	401.7(136)	914.5(277)
1995	1,941.4(556)	883.5(195)	1,057.5(359)
1996	3,202.6(596)	1,930.2(196)	1,254.3(398)
1997	6,970.9(638)	2,347.9(186)	4,567.8(444)
1998 1/2	2,461.2(361)	1,485.6(125)	820.6(233)

Notes: 1) On a permitted or notified basis.

2) Figures for the number of cases denote new investments only.

Source: Ministry of Finance and Economy, *Trends in International Investment and Technology Inducement, 1998*.

The recent upward spiral in FDI does not necessarily mean that the regulatory environment for foreign investment in Korea has been improved. Foreigners point out that there are still impediments to investment in Korea, including:

- Overall inefficiency prevalent in the economy
- An inefficient financial sector
- Lack of transparency in policy-making and its implementation
- Disarray in bureaucratic services
- Prolonged deregulation

〈Table 3〉 FDI inflows into Korea by Industry and Investor

(%)

	1990	1991	1992	1993	1994	1995	1996	1997	1998 1/2
Industrial Distribution									
<u>Manufacturing</u>	72.7	76.6	72.4	50.4	30.5	45.5	60.3	33.7	60.4
Food	4.1	6.6	5.2	3.7	1.4	0.8	7.9	12.2	3.7
Textile&Clothing	1.5	0.9	2.7	0.4	0.5	3.0	0.7	1.2	0.7
Chemicals	27.1	11.5	24.6	23.1	8.1	9.0	12.1	3.4	11.4
Medicine	4.4	3.3	6.9	2.2	2.9	3.4	1.0	0.6	2.8
Petroleum	0.0	33.8	0.0	2.0	0.6	2.3	6.7	0.0	0.0
Machinery	9.9	6.1	4.3	4.8	3.7	5.2	5.0	2.4	11.7
Electricity&Electronics	11.1	8.9	7.4	4.3	4.8	11.7	13.6	4.2	5.1
Transport Equipment	9.3	3.6	4.5	4.2	5.0	3.7	8.5	5.7	3.3
<u>Services</u>	27.2	23.3	27.3	49.5	69.5	54.5	39.2	65.5	33.3
Wholesale&Retail	0.1	2.8	0.5	6.1	1.6	7.1	9.3	12.8	7.8
Trading	5.9	4.6	9.4	8.8	7.7	5.5	3.9	3.3	4.7
Hotel	3.0	2.2	3.6	9.8	22.3	11.1	7.1	37.2	3.1
Financing	9.7	5.6	4.4	5.5	22.3	19.5	7.1	3.8	4.5
Insurance	5.8	5.4	0.4	0.8	0.6	2.9	4.7	0.2	1.7
<u>Country of Origin</u>									
<u>America</u>	41.8	22.3	48.5	32.9	24.6	34.3	28.9	49.0	45.5
United States	39.6	21.2	42.4	32.6	23.6	33.2	27.4	45.7	38.7
<u>Asia</u>	32.1	17.8	19.0	37.5	43.2	40.7	38.0	16.3	24.1
Japan	29.4	16.2	17.3	27.4	32.5	21.05	7.9	3.8	14.9
<u>Europe</u>	25.8	59.1	31.6	29.4	30.9	24.5	33.0	34.6	29.5
EU	23.4	53.7	27.1	28.7	29.8	23.8	27.9	33.1	29.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: MOFE, *op. cit.*

The recent financial maelstrom in Asia has prompted drastic changes in the attitude and government policy toward FDI. The Korean government came to the understanding that FDI plays a pivotal role in boosting the domestic economy, especially in ensuring its long-

term sustainable growth, not to speak of overcoming the current financial difficulties. The rationale behind this expectation in giving a boost to the economy is that increased foreign investment alleviates external financing difficulties, provides capital to domestic firms, creates jobs, and leads to economic efficiency in the long run.

The Korean government took several important measures for promoting FDI. First, the Korean government stepped up its effort to liberalize the inflow of foreign direct investment. This included ending all restrictions on foreigners attempting to undertake mergers and acquisitions in Korea beginning May 1998. The Foreign Investment Promotion Act was established in November. Under the act, as shown in Table 4, all types of businesses were opened in principle to foreign investors. In particular, foreign participation in equity transactions was allowed in almost all large public enterprises.

Secondly, the Korean government offered various incentives to promote FDI. The tax concession period was extended up to 10 years and the range of tax exemption was widened to include high-tech and value-added service industries. At the government level, greater autonomy was delegated to local governments, especially in dealing with the matters regarding tax exemptions.

Thirdly, the Korean government liberalized the real estate market by lifting restrictions on foreign acquisition and use of real estate. Also, the government allowed foreigners to freely purchase, rent, and sub-divide residential and non-residential buildings.

Finally, the office of One-Stop Service was built. The provisions on streamlining laws and regulations concerning FDI went into effect, introducing an automatic approval system and reorganizing KOTRA to be an integral part of foreign investment.

Taking into consideration the depth and scale of the Asian financial

〈Table 4〉 Major Points of the 1998 Foreign Investment Promotion Act in Korea

Objectives	Measures
Simplified Procedures	<ul style="list-style-type: none"> • Streamline the investment notification system. • Expand the number of institutions accepting notifications and applications. • Abolish the notification requirement for the arrival of induced foreign capital and mandatory requirement of using a resident agent.
Transparent and Liberalized Regulations	<ul style="list-style-type: none"> • Reduce the number of provisions regulating FDI from 66 to 36. • Proclaim no restrictions on FDI in principle unless the preservation of national security, public order, public health, environment, or social morals are threatened. • Announce each year all laws and regulations relevant to investment.
Expanded Incentive System	<ul style="list-style-type: none"> • Increase tax incentives—tax reduction and exemption periods. • Provide greater autonomous power to local governments in the fields of local tax and rent reduction and tax exemption. • Expand the number of high technology manufacturing and service industries where tax reductions are available for foreign investors from 265 in seven sectors to 516 in nine sectors. • Expand the rental period for national and local government activities to promote FDI by providing funds and public subsidies.
One-Stop Service System	<ul style="list-style-type: none"> • Establish the Korea Investment Service Center to assist foreign investors with each facet of the investment process. • Expedite approval or authorization procedures by establishing a "Comprehensive Process System" where, if the main points of a process package is approved, approval is then given and supplemental items are reviewed afterwards. • Introduce the Automatic Authorization System where, if there is no response to an investment application for approval or authorization within a given period, approval or authorization shall be automatic.
Free Investment Zones	<ul style="list-style-type: none"> • Establish Free Investment Zones(FIZs) to induce large-scale FDI. • Give greater autonomy for designating, developing and maintaining FIZs to local governments.

Source: Ministry of Finance and Economy(Arranged by KEI).

FDI inflows into Korea in 1998 (see Table 17) are regarded as a success that was made possible only through heavy FDI promotion.

Be that as it may, most of the current and prospective foreign investors are by no means satisfied with the investment climate in Korea. This suspicion is even on the rise due to the slow pace of restructuring the financial and corporate sectors.

IV. Technology Imports and Strategic Technological Alliances

1. Technology Imports

There are various ways for a developing country to acquire foreign technologies, such as through technology licensing, formal or informal technology transfer by FDI, strategic technological alliances and joint R&D. These activities are interrelated. In order to absorb imported technologies, a developing country should possess at least a minimal level of technological capability. Thus, the characteristics and volume of technology imports are good indicators of the technological level of the country and the direction of technological change.

Korea imported USD 2.4 billion in technology in 1997. The major trading partners were the U.S. and Japan providing 60.8% and 20.9% of total Korean imports respectively. Imports from European countries, although increasing, remain far behind.

Korea's technology imports have increased over time. Technology trade among developed countries shows a pattern of increase over time, which implies that development of an economy not only depends on exports of technologies but also that a technology-exporting country produce technology worthy of importing. Only when the amount of technology exports exceeds the amount of technology imports is a country generally regarded as self-sufficient in technology. Korea remains heavily dependent upon imported technologies and its exports of technologies are negligible compared to imports. This implies that Korea has so far pursued an imitation strategy rather than an innovation strategy and that its technological capability remains weak

〈Table 5〉 Korea's Technology Imports & Royalty Payment by Country
(USD million)

	Total	U.S.	Japan	Germany	France	Others
1977	58.1(168)	17.3 (45)	25.4 (82)	2.6 (16)	5 (3)	12.3 (22)
1981	107.1(247)	48.0 (75)	35.4(108)	2.5 (15)	2.7 (10)	18.5 (39)
1986	411.0(517)	191.6(157)	129.5(264)	19.1 (23)	17.2 (19)	53.6 (54)
1991	1,183.8(582)	622.2(165)	372.5(276)	60.1 (34)	48.9 (26)	80.1 (81)
1995	1,947.0(236)	962.0 (95)	694.8 (69)	78.8 (18)	30.5 (11)	180.9 (43)
1996	2,297.2(189)	1,160.0 (98)	723.9 (41)	94.7 (13)	48.4 (5)	270.2 (32)
1997	2,414.6(n.a)	1,468.9(n.a)	505.2(n.a)	105.5(n.a)	69.8(n.a)	265.2(n.a)

Notes: 1) Figure in parenthesis is the number of cases.

2) After 1994 only reported cases are counted.

Sources: Ministry of Science & Technology, Korea Industrial Technology Association, Ministry of Finance and Economy

As shown in Table 6, electricity and electronics is the main category under which technology imports are included. Machinery and chemicals, including oil refineries, are next in terms of the portion of technology included. This reflects the capital-intensive industrial structure and level of technology by sector in Korea. Korea has gained substantial indigenous technological capabilities that have enabled the absorption of imported technologies. Technology imports in the communication sector have not been very active. This does not imply weakness in the telecommunications sector. Rather, instead of being included under the communications service sector, telecommunications equipment imports are classified under the electricity and electronics category.

〈Table 6〉 Technology Imports by Selected Industry

	(USD thousand, %)									
	1990	1991	1992	1993	1994	1995	1996	1997	1998 1-5	
Agriculture	3,119.7	1,724.0	1,204.1	2,331.1	1,967.7	1,769.6	3,411.5	3,223.5	1,433.2	
Food Processing	9,483.4	14,399.1	8,846.5	8,335.8	13,960.4	23,299.3	39,990.6	43,530.9	10,790.4	
Synthetic Fiber	13,169.8	21,364.1	23,775.5	25,268.2	28,207.8	48,140.6	49,909.0	35,832.8	4,979.3	
Ceramics Cement	15,575.5	18,241.9	24,323.9	11,046.2	9,352.1	24,015.2	12,501.1	15,453.6	2,710.0	
Oil Refining Chemicals	210,321.6	177,482.0	104,134.5	113,925.9	104,738.5	191,161.9	275,184.6	200,124.2	60,521.5	
Pharmaceuticals	6,799.7	9,692.7	6,743.6	5,088.5	4,234.6	6,676.4	7,027.9	18,415.4	6,138.1	
Metals	8,631.8	6,918.7	9,201.2	18,225.1	10,767.7	7,728.8	10,817.0	25,126.5	28,314.4	
Electricity & Electronics	461,265.8	471,159.6	439,932.2	492,004.8	765,527.1	1,038,408.6	1,090,737.8	1,250,910.5	417,553.1	
Machinery	216,370.2	323,953.7	126,135.3	186,719.1	234,984.9	398,147.0	525,664.4	531,415.3	159,647.9	
Shipbuilding	16,183.6	34,065.1	5,037.8	22,269.9	40,477.8	23,437.2	10,386.1	21,305.0	179.2	
Communication	6,493.6	1,439.1	10,716.6	21,711.2	19,524.0	29,157.0	43,540.3	19,033.4	24,380.0	
Electric Power Generation	79,875.2	65,981.0	68,179.3	10,124.1	6,119.2	38,385.4	19,939.3	25,401.9	9,545.9	
Construction	4,027.2	3,877.3	7,349.6	14,467.0	15,693.2	59,338.1	86,692.2	68,735.7	56,009.4	
Total	1,086,990.1 (22.3)	1,183,786.9 (8.9)	850,632.9 (Δ 28.1)	946,419.7 (11.2)	1,276,567.4 (34.9)	1,946,932.9 (52.5)	2,297,279.2 (18.0)	2,414,654.8 (5.1)	855,762.5 (Δ 20.9)	

Note: Figure in parenthesis is the rate of increase.

Source: Ministry of Finance and Economy (1998), p. 81.

2. Strategic Technological Alliances

Strategic alliances are normally part of a firm's attempt to improve competitiveness by combining its own assets with those of partner firms. It is a method of transaction on a spectrum somewhere between market transactions and mergers. Technological collaboration, joint ventures, joint sales, and manufacturing on an OEM basis are but a few examples of strategic alliances. Table 7 summarizes the motives of developed and developing country's firms to form a strategic technological alliance.

In response to the upward pressure on technology protectionism by advanced countries, Korean firms have strengthened strategic technological alliances with foreign firms in the 1990s. The case of technology licensing from Han-Mi in Korea to Novartis in Switzerland in 1998 is the likely beginning of such a strategic technological alliance. As in the case of technology imports, increasing strategic technological alliances implies the fact that Korea has accumulated substantial technological assets or complementary assets, although its technological basis remain generally weak.

As shown in Table 8, the number of new strategic alliances of Korean firms in 1996 was 265, a substantial increase from 209 in the previous year. Many Korean firms in the electronics industry have sufficient international competitiveness and technological competence and, therefore, they have actively pursued strategic alliances with firms in the U.S., Japan, and Europe. Korean firms' strategic alliances in the form of OEM ventures numbered 104 cases(39.2%), joint sales - 57 cases(21.5%), and joint ventures - 34 cases(12.8%). This distribution indicates that Korean firms' strategic alliances remain in the incipient stage. However, the fact that there were 27 cases of joint R&D(10.2%)

〈Table 7〉 Motives for Inter-Firm Strategic Technology Cooperation

Motives of developed country firms	Relevance for involvement of developing country firms
1. Basic and applied research-related motives	
Increased complexity and inter-sectoral nature of new technologies, cross-fertilization of scientific disciplines, and technological synergies	Low cost of human capital in developing countries
Reduction and sharing of R&D uncertainty	
Reduction and sharing of R&D costs	
2. Motives related to specific innovative projects	
Capturing partner's tacit technological knowledge, technical transfer and technological leapfrogging	Relevant, as these partnerships are mainly asymmetrical relationships where one partner has more to learn. Mainly one-way flows. TT requires fewer and simpler capabilities from the recipient than two-way technical partnership
Shortening of product life cycle (shorter span between invention and market introduction)	Useful to extend product life cycle in a new(developing country) market through minor variations and adaptations to local taste and consumers' preferences. Respond to MNE strategies to transfer "technology for lower end" to firms in developing countries, retaining control and concentrating on high-end products
3. Market access related motives	
Monitoring of changes in the market environment	Related to the choice of the form of internationalization
Internationalization of activities, and entry into foreign markets	To favor entry into a third market experiencing regional integration
New products and markets, market entry, wider product range, and increased number of varieties	"Niche" market products for developing countries with large home markets

Source: United Nations(1996), p. 34.

〈Table 8〉 Newly Contracted Strategic Alliances of Korean Firms (1996)
(Number of cases)

Partner Country	Tech Imports ¹⁾	Joint R&D	OEM ²⁾	Joint Venture	Joint Sales ³⁾	Other	Sum
Korea	7	9	23	5	33	5	82
USA	5	10	16	6	3	3	43
Canada							0
Japan	4	2	21	2	4	1	34
U.K.	2	1	4	1		1	9
Germany		2	1		2		5
France	2		2		1	1	6
Netherlands			3		1		4
Denmark			1				1
Sweden							0
Finland							0
Switzerland					2		2
Italy							0
Other Europe		1				1	2
Central Europe	2	1	7	6			16
Russia					2		2
China	1	1	6	2	1	1	12
Taiwan			5			1	6
Singapore							0
Malaysia				2			2
Indonesia			4		1		5
Philippines			1	2			3
Other Asia	1		3	3	2	1	10
Oceania	1		1	1	2		5
Latin America			2		1		3
Others	3		4	4	2		13
Total	28	27	104	34	57	15	265

Note: 1) Includes licensing technology exchanges, technology partnership, technology transfer, etc.

2) Includes production by order, sub-contracts, etc.

3) Includes sales by order

Source: Compiled from newspapers

indicates that they have sufficient potential to upgrade such alliances.

As emphasized before, there is a close relationship between strategic technological alliances and FDI. Concerns over the stark imbalance in terms of trade in technology and the need for international cooperation add up to the shared interests for strategic technological alliances and international science and technology cooperation. Against this backdrop, large firms have actively pursued global sourcing of R&D resources and participated in cooperative R&D projects jointly conducted by foreign research institutes and universities. There were about 60 research centers affiliated with Korean firms in the U.S., Japan, Russia and European countries according to statistics of 1995. Fully recognizing the increasing importance of international science and technology cooperation, the Korean government actively pursues both bilateral and multilateral cooperation with foreign governments as well as international organizations.

3. Promotion of SMEs and Venture Business

Korea's industrial structure has been transformed from a concentration of light and labor-intensive industries(1960s) to one of heavy- and capital-intensive industry(1970s-1980s). The 1990s is a transitional period from the dominance of capital-intensive to a high value-added technology-intensive industry. The problem is that the speed of transformation into a technology-intensive industry is so slow that the Korean economy is sandwiched between second-tier developing economies with low labor costs and developed economies with advanced technology and high-quality products.

One of the characteristics of the Korean economy is its extremely high concentration of industrial power under only a handful of large

conglomerates(chaebol). From the close link between the government and conglomerates, a rent-seeking society has emerged, characterized by waste of valuable resources and unfair competition. The concentration of wealth and market share under the chaebol is one of the most controversial issues in Korea today. Most chaebol founders in Korea are very capable and innovative entrepreneurs. Thus, it is natural to expect the chaebol to grow faster than their competitors. However, growth in these companies was unfairly accelerated by government subsidies and other privileges. In the process, other competitors, such as small- and medium-sized enterprises(SMEs), were discriminated against. Making the concentration of wealth even greater are the chaebols' rapidly growing asset portfolios, which are owned and controlled by a few individuals and their family members.

Unlike Japan and Taiwan, SMEs in Korea have developed slowly. They have suffered from insufficient access to credit, high labor turnover, and a low level of technology. In many cases, instead of being supported by large enterprises they were exploited. The relationship between large firms and SMEs can be broadly characterized as one of mistrust. Ideally, such relationships are complementary. However, that is not the case in Korea and this has led to growing inefficiencies of both large firms and SMEs. As the structural problems have become increasingly serious, domestic competitiveness has declined.

As Korea has been losing competitiveness, restructuring the industry to increase high-technology and high value-added production has been high on the national agenda. Thus, the government has emphasized the promotion of SMEs, especially new ventures. Ventures emerged as a promising source of industrial restructuring only from the late 1980s. The presence of venture businesses in the market is

not yet pronounced enough to be regarded as a driving force for industrial restructuring. There are about 1,500 venture enterprises with more than 70,000 employees located in Korea as of 1996 and their financial performance is very impressive and better than most large firms (see Table 9 and Table 10).

〈Table 9〉 Venture Enterprises in Korea

	Venture Enterprises		Small and Medium Sized Enterprises(1996)	Large Enterprises(1995)
	(1994)	(1996)		
Number	1000+	1500+	93,860	960
Sales(trillion won)	0.92	1.15	157.8	171.5
No. of Employees	47,000	70,500	2,171,890	1,070,659

Source: KIET and others

〈Table 10〉 Financial Performance by Firm in Korea

	Ventures (1996)	SMEs (1995)	Large Firms (1995)
Sales Increase	40.4	15.9	22.3
Operational Profit Rate	14.5	4.6	9.8
Equity Ratio	18.8	27.2	20.8
R&D / Sales	11.0	0.4	2.6

Source: KIET and Others

Due to historical and jurisdictional reasons, there are four types of funds available for venture capital in Korea:

- Venture Investment Corporations
- New Technology Business Financing Corporations
- The Korea Technology Bank
- Angels

In addition, financing through commercial banks is also available. The Agency for Small-and Medium Firms, Small Firm Promotion Corporation, and provincial governments also give various types of support to ventures.

Altogether, 1.64 trillion won in financial support was available for the venture business sector in 1997 and in 1998 the amount was estimated to have risen to 2.54 trillion won. However, not all of these available resources are normally utilized. There were 53 venture capital corporations active as of February 1997. Their gross investment amounted to 1.5 trillion won in 1997.

Regarding foreign investment in Korean venture businesses, restrictions on foreign investment in venture capital corporations and venture enterprises were widely reduced under the provisions of the new 'Special Law on Venture Enterprise Promotion' enacted in 1997.

V. Knowledge-Based Economy and Prospects of Technology-Related FDI

The government of Korea recently announced that the establishment of a knowledge-based nation is among the highest priorities of the national agenda for the 21st century. This has many implications for technology-related FDI inflows into Korea in the coming years. Having the greatest impact is the widespread realization that a knowledge-based economy provides the optimal environment to realize FDI that is both sustained and highly beneficial.

In a recent international conference on the knowledge-based economy held in Seoul, a World Bank expert emphasized the role of knowledge capability to overcome the Asian economic crisis and FDI inducement.³⁾ Because the potential benefits of FDI are expected to exceed the costs, many countries compete for more inward FDI and offer various incentives. As a result of fierce competition, these incentive schemes tend to converge. Thus, MNCs are more concerned with complementary assets in a host country. An empirical study undertaken by Dunning(1997) indicates that most MNCs are more concerned with those competitiveness factors which can be easily provided by a knowledge-based economy. As observed in Table 11, MNCs are looking for overseas sources for competitiveness in such categories as Group 2, Group 3 and Group 4 rather than Group 1(see

3) See Dahlman, C., "The New Role of Government in the Knowledge-Based Economy", a paper presented at the OECD-World Bank Seminar on the Knowledge Economy held in Seoul, November 20, organized by Maeil Business Newspaper.

<Table 11> The Sourcing of Competitive Advantages by Technological Intensity of MNCs

	All	HT	MT	LT
Group 1				
Access to resources and assets	3.54	3.46	3.48	3.65
• Natural resources	4.24	3.67	4.44	4.62
• Unskilled labor	3.98	4.10	3.79	3.99
• Skilled and professional labor	2.98	2.98	2.76	3.12
• Innovatory capacity	2.88	2.75	2.71	3.11
• Organizational capacity	3.12	3.21	2.88	3.18
• Managerial expertise	3.24	3.19	3.12	3.38
• Relational skills	3.75	4.00	3.41	3.71
Group 2				
Consumer demand	3.94	4.06	3.37	4.15
• Upgrading of product quality	3.31	3.40	2.94	3.44
• Making for more product innovation	3.44	3.40	3.06	3.71
Group 3				
• Inter-firm competition/rivalry	4.60	4.68	4.56	4.55
Group 4				
• Linkages with foreign or domestic firms and institutions	4.10	4.19	3.68	4.29

Note: 1) HT = high technology, MT = medium technology, LT = low technology

2) Scale 1 = factors most specific to a home country

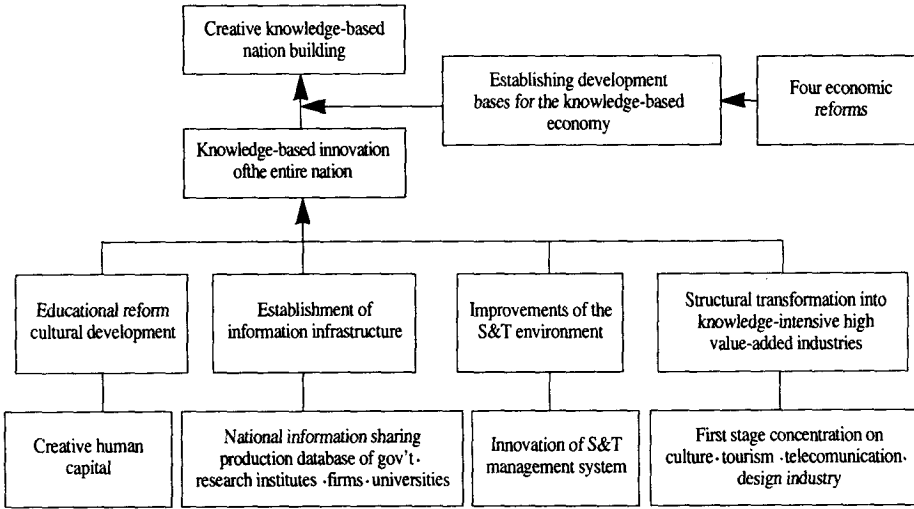
Scale 7 = factors most specific to a host country

Source: Dunning (1997), p.285.

note), clearly demonstrating the fact that MNCs are looking for advantages that can only be provided by a knowledge-based economy⁴⁾.

4) Group 1 = factor conditions advantage

〈Figure 1〉 Conceptual Framework of the Creative Knowledge-Based Nation



Source: Maeil Business Newspaper, 1998. December 3 (3), adapted.

As shown in Figure 1, the knowledge-based nation building agenda of the Korean government combines the current four economic reforms (reforms in the government sector, financial sector, corporate sector, and labor market) and four priority areas for building a knowledge-based nation. As discussed in Section I, MNCs are much concerned with the knowledge basis and technological capability of the host country. If this national agenda is successfully implemented, it is obvious that more MNCs and FDI will be induced to Korea over time.

Setting the goal to achieve a knowledge-based economy is one thing; achievement is another. In order to assess the ability for and

Group 2 = demand conditions advantage

Group 3 = strategy, structure and rivalry advantage

Group 4 = related and supporting industry advantage

the constraints to achievement of the goal, it is necessary to review the current status of factors that support knowledge accumulation and utilization in Korea. Table 12 shows the evaluation of the Korean economy by the International Institute for Management Development (IMD) in 1997 and 1998, from which we can obtain a general idea of the competitiveness and knowledge capability of Korea. Korea's overall rank was 30th in 1996 and 35th in 1997 among 45 of the world's advanced countries. Although the overall rank was low, Korea's relative strength in science and technology, and human resources is higher than other factors.

〈Table 12〉 IMD Evaluation of Korea's Competitiveness

Criteria	Rank	
	1997	1998
Domestic Economy	13	34
Internationalization	45	46
Government	32	34
Finance	43	45
Infrastructure	34	31
Management	26	34
Science & Technology	22	28
People	22	22
Overall Rank	30	35

Note: The years are based on the reporting year. The actual years that were evaluated were the previous year.(1997 included 45 countries; 1998 included 46 countries.)

Source: IMD (1997, 1998)

In contrast to the IMD evaluation, Korea's position in the world markets is very impressive. Table 13 shows that it already ranked among the top six countries in terms of market share of electronics, semiconductors, cars, shipbuilding, iron and steel, petrochemicals, and

textiles in 1994.

At a glance, these two observations seem to render contradictory implications. However, they merely confirm the fact that Korea needs to realize stronger fundamentals and a sound economic environment including an infrastructure conducive to development of a knowledge-based economy. In order to predict the future behavior of FDI inflows into Korea, it is necessary to assess Korea's potential to achieve a knowledge-based economy.

〈Table 13〉 World Positions of Korean Industries (1994)

	Market share (%)	World rank
Electronics	6.4	5
Semiconductors	11.5	3
Cars	4.6	6
Shipbuilding	22.2	2
Iron and Steel	4.7	6
Petrochemicals	4.6	5
Textiles	7.6	5

Source: Korean Development Bank.

One of the most important elements of infrastructure that support a knowledge-based economy is telecommunications. Although Korea's telecommunications infrastructure is much better than other developing countries, it lags far behind the standards of developed countries, as indicated by Table 14.

The Korean government and the private sector have made great efforts to increase R&D expenditure. As shown in Table 15, aggregate Korean R&D expenditure amounted to USD 12.2 billion, 2.71% of GNP in 1995. The budget for science and technology took up a dominant USD 2.8 billion or 2.2% of the total government budget. Of the total national R&D expenditure, 81.1% was budgeted by the private sector

<Table 14> Selected Indicators of The Information Age

Per 1000 persons	High Income Group	Korea	Middle Income Group	China	India	Low Income Group Excluding China and India
Telephones	540	430	105	45	15	11
Telephones in Largest City	569	466	305	140	80	56
Daily newspapers(1994)	303	404	94	23	..	13
Televisions	611	326	224	252	64	47
Mobile phones	131	70	10	6	0	0
Fax machines(1995)	47.5	8.9	1.5	0.2	0.1	..
Personal computers	224.2	131.7	21.6	3.0	1.5	..
Internet hosts(July 1997)	203.46	28.77	4.21	0.21	0.05	0.07

Note: All data are for 1996 unless otherwise noted in brackets.

Source: World Bank (1998). pp. 290-294.

and the rest by the public sector. In order to strengthen science and technology, a broad range of measures have been undertaken:

- Special Law for Scientific and Technological Innovation (1997)
- Five-Year Science and Technology Innovation Plan (1997~2002)
- Highly Advanced National Project
- Creative Research Initiative

Unfortunately the ambitious Five-Year Science and Technology Innovation Plan is lying largely dormant due to the financial crisis. Already public and private research institutes have substantially curtailed their R&D expenditure and employment this year. This across-the-board cutback in R&D expenditure bodes ill for the successful launch of Korea's Innovation Plan.

Korea's strength in science and technology is compared with some

developed countries and competitors in Table 16. While ahead of most Asian competitors, the level of utilized technology of most sectors in Korea is between 30% and 50% of that of advanced countries. The only areas where Korean technology approaches that of advanced countries are semiconductors, telecommunications, new chemicals, automobiles, and atomic power, as shown in Figure 2. However, the level of most areas by 2010 is expected to be above 70% of advanced countries.

〈Table 15〉 R&D Expenditure and Researchers in Korea

	1976	1981	1987	1993	1995	1996 ³⁾
R&D Investment (billion won)	60	293	1,878	6,153	9,441	10,878
Government	39	121	383	1,039	1,781	2,398
Private	21	171	1,495	5,114	7,660	8,467
Govt. vs. Private (%)	64:36	42:58	20:80	17:83	19:81	22:78
R&D/sales	0.36	0.67	0.83	2.06	2.19	2.13
Gross National Product	13,881	45,126	109,276	263,861	348,284	387,117
R&D /GNP (%)	0.44	0.65	1.81	2.33	2.71	2.81
No. of Researchers (1,000s) ¹⁾	11.7	20.7	52.8	98.7	128.3	132.0
Govt/Public Institutions	3.6	5.1	9.2	16.1	15.0	15.5
Universities	4.8	8.5	17.5	28.6	44.7	45.3
Private Sector	3.3	7.2	26.1	54.1	68.6	71.2
R&D exp./researcher (million won) ²⁾	5.2	14.1	35.6	62.3	75.3	82.4
Researchers/1,000 pop.	0.3	0.54	1.27	2.24	2.86	2.90
No. of Corporate R&D organizations	12	47	449	1,690	2,152	2,610

Notes: 1) These figures do not include research assistants, technicians, and other support personnel.

2) Won 1,000s.

3) Projected

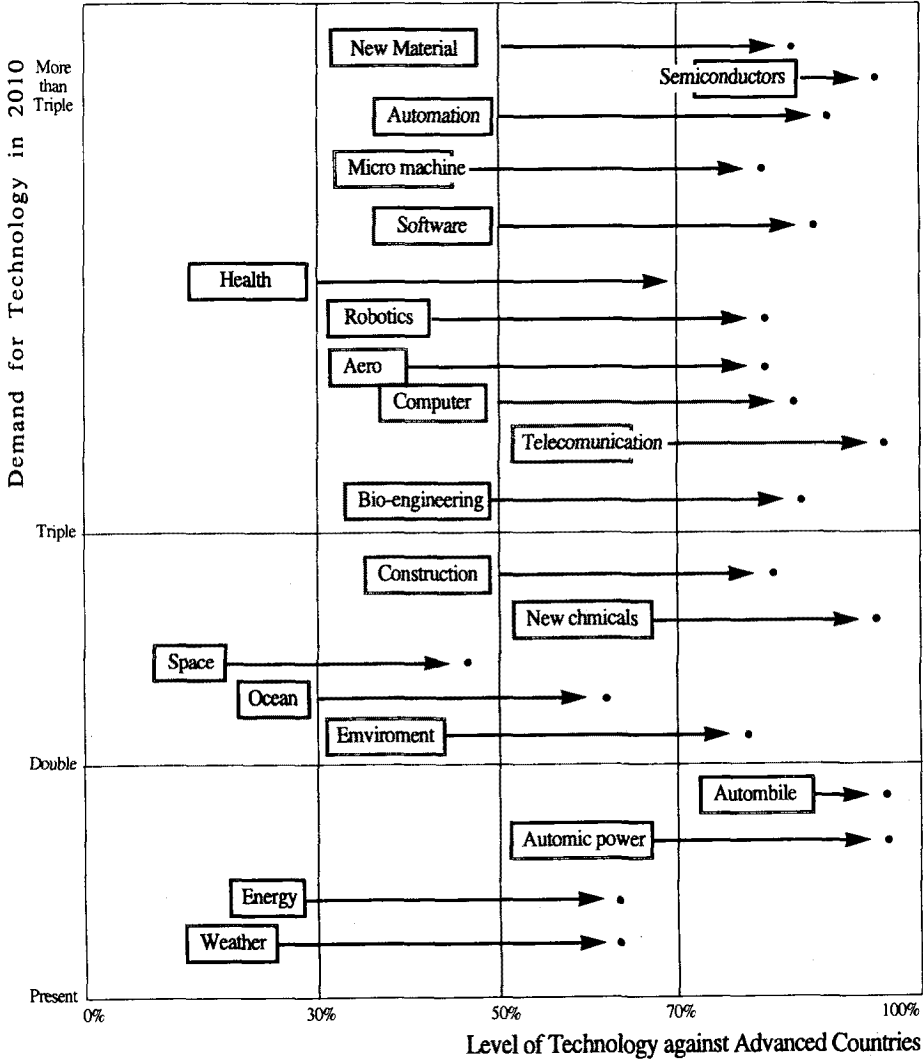
Source: Ministry of Science & Technology, *Science and Technology Annual*, various years.

〈Table 16〉 Science and Technology Indicators

	Scientists and engineers in R&D	Technicians in R&D	Expenditures for R&D	High-technology exports		Royalty and license fees				Patent applications filed	
				per million people	% of GNP	\$ millions	% of manufactured exports	Receipts \$ millions	Payments \$ millions	Residents	Non-residents
	1981-95	1981-95	1981-95	1996	1996	1990	1996	1990	1996	1995	1995
United States	3,732	..	..	198,000	44	16,635	29,973	3,138	7,322	127,476	107,964
United Kingdom	2,417	1,019	2.2	85,035	40	2,540	4,725	2,992	3,625	25,355	90,399
Germany	3,016	1,607	2.6	110,000	25	1,987	3,320	3,797	5,866	51,948	84,667
France	2,537	2,926	2.5	68,655	31	1,295	1,860	1,629	2,627	16,140	73,626
Australia	2,477	943	1.4	6,226	39	162	251	827	1,089	9,325	28,156
Japan	5,677	869	3.0	151,000	39	2,866	6,683	6,051	9,834	335,061	53,896
Korea	2,636	317	2.8	44,433	39	37	185	136	2,431	59,249	37,308
China	537	187	0.6	26,938	21	0	..	0	..	10,066	31,707
Singapore	2,512	1,524	1.1	73,701	71	..	..	..	..	10	11,871
Thailand	173	51	0.2	14,746	36	0	25	170	717	..	..
Malaysia	87	88	0.4	39,448	67	0	0	0	0	141	3,911
Mexico	95	27	0.3	24,179	32	73	122	380	360	436	23,233

Source: Compiled from World Bank (1998).

〈Figure 2〉 Changes in the Level of Technology by Industry in Korea



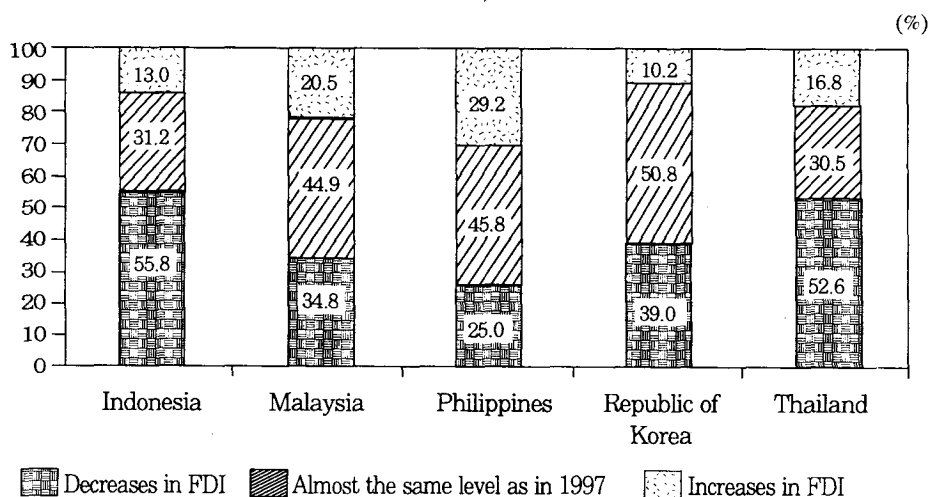
Note: 1) □ Present (1995), • Future(2010)

2) Scales are not accurate.

Source: Adapted from MOST, Long-Term Development Plan for 2010 Science and Technology, 1994.

From the above observations and discussions, we may cautiously conclude that Korea's overall technological capability and potential for a knowledge-based economy are more promising than other Asian countries. One of the points made in Section II is that sequential FDI considers technological advantages and potential of the host country. In this context, we can expect that FDI inflows into Korea during the current economic crisis is in a better position than its Asian competitors. This can be confirmed in many ways. According to Figure 3, which concerns a survey result undertaken by UNCTAD, Korea appears likely to retain a larger share of Japanese FDI than other Asian countries struck by the crisis. This supports findings of a survey by UNCTAD in April 1998 that concluded that foreigners are optimistic about the investment environment in Korea from a long-term perspective.

<Figure 3> Investment Plans of Japanese MNCs in the Next Years in the Most Affected Asian Countries, Compared to the FDI Level in 1997, 1998



Source: World Bank, *World Development Report 1998*.

Rather than contracting, as most expected in the wake of the financial crisis, FDI inflows into Korea in 1998 increased from the previous year. After a slow start, FDI dramatically increased in the later part of the year and shows no signs of abating.

<Table 17> Foreign Investment Trends in Korea in 1998

(USD million, %)

	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Total (1-10)
Amount	130 (-85.1)	199 (-45.2)	243 (-72.6)	567 (-63.8)	659 (170.1)	663 (24.9)	1235 (203.4)	407 (128.7)	534 (23.3)	894 (147.6)	5,531 (n.a.)
Number of cases	86 (6.2)	87 (38.1)	135 (20.5)	107 (28.9)	137 (57.5)	126 (48.2)	100 (16.3)	96 (5.5)	145 (79.0)	88 (2.3)	1,107 (n.a.)

Note: Figure in parenthesis is a rate of increase over the previous month.

Source: Ministry of Finance and Economy.

Much of the FDI coming into Korea recently is related to technology or other complementary assets for foreign MNCs. For example, from investment of USD 136 million in 1995, FDI in Korean telecommunications areas increased to USD 390 million in 1997 and USD 1,400 million in 1998.

Instead of being scared away, many high tech foreign firms seem intent on taking advantage of the opportunity created by the financial crisis in Korea. Table 18 shows that a number leading foreign high-tech firms are expanding their operations in Korea, particularly in the area of research.

Considering all of these trends and factors, we can conclude that FDI inflows into Korea will continue to increase in the future as long as the country continues to make progress in realizing a knowledge-based economy.

〈Table 18〉 New Research Institutes of Foreign Firms in Korea

Firm	Name of Institutes	Research Manpower (Persons)	Remarks
Motorola-Korea	CDMA Engineering	50	
	Cellular Phone Development Institute	50	To be increased up to 200 researchers in the long-run
Lucent Technology	Bell Laboratory	10+	To be expanded formally in 1999
IBM-Korea	Asia-Pacific Tiboly Software Development Center	N.A.	Officially to be opened in 1999 with USD 15million investment

Source: Chosun Daily, September 26, 1998.

VI. Concluding Remarks

In the immediate aftermath of the Korean financial crisis, the investment climate in Korea was decidedly negative. However, intensive efforts exerted by the government and the private sector to induce more foreign direct investment and technology transfer along with liberalization and deregulation drive have resulted in a series of positive outcomes.

The recent financial crisis has pressed the Korean government to further accelerate liberalization of investment in order to improve the local financial and business environment. FDI inflows into Korea have decreased in the first half of 1998 to USD 2.5 billion, a 44.9% decrease from the same period in 1997. However, the recent trend has shown substantial month-to-month increase. As of November 1998, the aggregate FDI has roughly equaled the total amount of FDI in all of 1997.

Not all news is promising, however; Korea's R&D investment in 1998 has been falling and the government may not be able to implement the ambitious Five-Year Science and Technology Innovation Plan as planned. On top of that, the private sector has already begun reducing R&D investment. However, the medium- and long-term prospects for technology-related investment in Korea are bright rather than bleak.

Despite the still existing barriers to technology-related investment and foreign joint ventures, the recent measures taken in both the public and private sector to boost foreign investment are expected to induce more cooperation from foreign partners in various forms, such as FDI, M&A, joint R&D, etc. In the short-term, the negative effects of the

current crisis are likely to dominate any positive forces. However, it is possible to be optimistic about the medium–and long–term development, supposing the government and private sector make every effort to put the economy back on the right track.

Korea now needs a new competitive strategy to guide economic adjustment toward a more sophisticated industrial structure. The new strategy should be based on technology and innovation. The strategy must promote a competitive advantage based on differentiation of output quality to replace the input–cost–based advantage of past Korean production. To this end, a strong technology policy, placing more emphasis on commercialization of technologies rather than on scientific breakthroughs, should be implemented. This policy should assist and encourage private firms to adopt an efficient R&D strategy, supplemented by active inducement of FDI for the transfer of technology, and for marketing and customer services.

In this context, the recent announcement of the Korean government to adopt a knowledge–based nation building as the national agenda for the 21century is timely. Together with the restructuring of the financial and the corporate sectors, such promotion will favorably affect FDI inflows in the coming years.

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Executive Summary

The recent financial crisis has pressed the Korean government to further accelerate liberalization of investment in order to improve the local financial and business environment. Foreign direct investment (FDI) in Korea has decreased in the first half of 1998 to USD 2.5 billion, a 44.9% decrease from the same period in 1997. However, the recent trend has shown substantial month-to-month increase. As of November 1998, aggregate FDI had already equaled 1997 total FDI of USD 7.0 billion.

Korea imported USD 2.4 billion in technology in 1997. The U.S. and Japan contributed 60.8% and 20.9% of the imports, respectively. The government of Korea has promoted international cooperation in R&D in various forms. At the governmental level, the International Joint Research Program, which started in 1985, has played the major role. So far, 906 joint projects have received a total of USD 41 million in support from this program. The government-sponsored research institutes are also involved in boosting cooperative international R&D efforts. Large firms have actively pursued strategic technological alliances with leading multinational corporations (MNCs).

As Korea has been losing competitiveness due to rising labor costs, restructuring the industry to improve the competitiveness of Korea's high technology and high value-added production has become an increasingly important part of the national agenda. In order to implement this agenda and to provide alternatives to those workers displaced by financial and corporate restructuring, the government has emphasized the promotion of small and medium-sized firms,

especially new ventures. While beginning in the 1960s, venture business only began to emerge in the 1980s as a viable concern. There were about 1,500 venture enterprises with more than 70,000 employees in Korea as of 1996. Both public and private organizations are involved in the promotion of venture businesses.

The most ambitious national agenda adopted by the new government is the knowledge-based nation building for the 21st century. According to the plan, a substantial amount of new investment will go towards information infrastructure, development of new knowledge-based industries, improvement of the science and technology environment, and education reforms.

Many barriers and problems hindering technology-related investment and joint ventures with foreigners still need to be overcome. However, the recent efforts of the government, such as the enactment of the Foreign Investment Law, as well as actions by other public and private organizations to reform the economy and improve the investment climate, promise to induce more active involvement of foreign partners. The strategy to build a knowledge-based economy will also render a favorable environment to induce increased FDI.

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