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Industrial Upgrading of Korea: Process and Prospect

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Industrial Upgrading of Korea: Process and Prospect

December 2000

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Foreword

In the course of managing the financial crisis in 1997, the upgrading of Korean industry as a whole emerged as a hotbed of debate. As many of Korea's traditional thrust industries slid into a deep slump, their potential for future growth came to be seriously questioned, and many came to see Korea's future as bleak. Most agree that traditional interventionist policies that artificially funnel resources are neither desirable nor feasible, and that Korea should find new comparative advantages in high value added technology- and knowledge-intensive industries. Although the need is urgent, there is no clear vision or cogent view about how to upgrade the competitiveness of Korean industries.

What are the potentials of Korean industry and what policies are needed to realize them? This work by Cheonsik Woo and Kwang-Eon Sul makes an important contribution by providing partial answers to these questions together with an new insight on how these questions themselves need to be addressed. The potentials, limits, and prospect of Korea's industrial upgrading in the future need to be characterized and assessed from a dynamic, comprehensive perspective. Accumulation of knowledge and technological capabilities is essentially a cumulative and gradual process, and so is an economy's evolution toward a more knowledge- and technology-intensive, advanced structure. Considering the chronological lag in Korea's industrialisation, it may be quite natural for a substantial qualitative gap to exist between Korea and the most advanced nations in the world for now. However, the present gap implies that there is still room for the traditional type of industrial upgrading to take place in Korea. Given the far-reaching and ever-deepening impacts of globalisation and information and

communications technology (ICT), upgrading in Korea will take place in a more complex and volatile dynamic context than it did in these advanced economies. Regardless of the exact mechanism and process, however, one thing is clear. There is no tectonic shift in industrial structure and advancement. The thrust and focus of Korea's industrial upgrading need to be on, not off, the existing mainstream industries. These are the central messages of this work.

I hope that this work will appeal to scholars and policymakers interested in the prospect of Korea's industrial upgrading as well as the requisite policy direction and measures.

Jin-Soon Lee

President

Korea Development Institute

Abstract

After five decades of industrialization, Korea now resembles the major advanced economies in its basic industrial profile. But with industrial activities heavily concentrated in low to medium value added industrial activities such as processing and production, Korea remains behind these economies in the quality of its industrial structure. Except for a few elite firms that belong to Chaebols in select fields such as semiconductors and automobiles, Korean firms lack their own basis of competitiveness that is adequate to ensure their survival in the ever-accelerating wave of open, innovation-based, global competition.

Korea must surmount huge obstacles to retain growth momentum in the medium term and to become a competitive, knowledge-based economy with sound fundamentals in the long term. What are the potentials of Korean industry and what policies are needed to realize them? Addressing these questions, this paper briefly reviews Korea's industrialization process to date and suggests that Korea's industrial basis today need to be characterized and assessed from a dynamic, comprehensive perspective. It diagnoses the limits and potential of Korean industries in the context of the rising trends of global competition and co-operation and discusses the basic direction of industrial upgrading as well as the requisite policy measures. Stressing the importance of promoting small- and medium-sized companies in particular, the paper suggestively sets forth a practical proposal for establishing a cluster of firms in the machinery industry—both to upgrade this core industry to compete in the environment of the twenty-first century and to provide a new model of industrial and regional development for other Korean industries to follow.

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*"... no time to be wasted. The window of opportunity
would not be open for long"*
(MOST/STEPI, OECD Review of Korea's S&T, 1995)

I. Introduction

For more than four decades the Korean economy expanded at a remarkable rate, dramatically transforming from a poverty-ridden agrarian base into a modern industrialised economy with OECD membership.¹ Since its initial take-off in the early 1960s, reform and restructuring programs appropriate to different stages of development more or less succeeded in facilitating Korea's industrial transition to sustain high growth. The 1997 Asian financial crisis rekindled debate over the extent of Korea's past success and raised doubts over whether Korea can sustain its growth momentum with continuous industrial upgrading in face of the formidable challenges of the "knowledge-based economy." Indeed, despite a dramatic recovery from the nearly debilitating impact of the crisis, the Korean economy is still highly vulnerable, with many remaining structural problems. The traditional source of Korea's strong economic growth—successful mobilization of capital and labor—is depleting fast, while learning from or adopting foreign technologies is

¹ The conventional view that Korea's success in attaining rapid and equitable growth was somehow 'miraculous' has been challenged recently by a cadre of so-called 'contrarian scholars', who contend that Korea (and Singapore) simply experienced Soviet-style, input-based growth driven by massive state-led mobilisation of labour and capital over a protracted period. The conventional view is well represented in *The East Asian Miracle* (World Bank, 1993), and the contrarian view by Krugman (1994).

For a comprehensive discussion of the issue of the role of the Korean government, especially the debate over Korea's trade regime in theoretical and empirical literature, see Rodrik (1995). A lucid review can be found in Yoo (1996).

becoming increasingly difficult.²

After five decades of industrialization, Korea now resembles the major advanced economies in its basic industrial profile. But with industrial activities heavily concentrated in low- to medium- value added industrial activities such as processing and production, Korea remains behind these economies in the quality of its industrial structure. Except for a few elite firms that belong to Chaebol in select fields such as semiconductors and automobiles, Korean firms lack their own basis of competitiveness that is needed to survive in the ever-accelerating wave of open, innovation-based, global competition.

Korea must surmount huge obstacles to retain growth momentum in the medium term and to become a competitive, knowledge-based economy with sound fundamentals in the long term. Although the need is urgent, there is no clear vision or cogent view about how to upgrade the competitiveness of Korean industries. Most agree that Korea should find new comparative advantages in high-value added technology- and knowledge-intensive industries, but there is no consensus about which those industries are and what the government needs to do. Most agree that the traditional interventionist policies that artificially funnel resources are neither desirable nor feasible, but Korea lacks the institutional mechanisms, policy guidelines, and incentives to help the majority of mediocre, non-innovative firms escape the ‘incompetence-trap’.

² The contribution of capital and labour inputs to growth is destined to disappear over time, and a stage of relatively weak growth will naturally set in due time. According to the base-scenario of KDI’s long-term growth projections, Korea’s growth potential will slow down to 5.5 percent for 2000-10 period, and it will decline further to 4 percent in the following decade (See Appendix Table 2).

In order to make headway toward an innovation-based, high-productivity economy with a solid and robust industrial and innovation base Korea needs to capitalise on its existing strengths. What are the potentials Korean industry and what policies are needed to realise them? These are the central questions of this paper.

The rest of this paper is made of two parts. The first part is a brief review and assessment of Korea's industrialization process to date. Following typical period-classification, we will proceed by dividing the entire period into three: 1). the take-off phase of 1961-1972, 2) the heavy-chemical industry(HCI) promotion phase of 1973-1979, and 3) rationalization and liberalization phase since 1980.³ The second part characterizes and assesses Korea's industrial basis today from a dynamic, comprehensive perspective. The limit and potentials of Korean industries in the context of new rising trend of global competition and cooperation are highlighted, with the basic direction of industrial upgrading as well as the requisite policy measures discussed. The analysis especially stresses the importance of promoting small and medium-sized enterprises (SMEs). It concludes with a practical proposal for establishing a cluster of firms in the machinery industry—both to upgrade this core industry to compete in the environment of the twenty-first century and to provide a new model of industrial and regional development for other Korean industries to follow.

³ Classification of the Korea's industrialization process differs among scholars. This classification, which we found most suitable for the purpose of presenting this paper, is supported by many including Park(1994).

II. Review of Industrialization Process

1. The Take-off Phase: 1961-1972

The liberation and unexpected partition in 1945, and the Korean War created extreme disorganization in the Korean economy. With virtual no economic resources to draw on inside, the reconstruction and stabilization programs before 1960 were largely financed by foreign aids. Industrial policy was mainly inward-looking, encouraging import-substitution in non-durable consumer-goods industry.

With the launching of the First Five Year Development Plan in 1962, however, Korea abruptly switched to so-called outward-looking, export-oriented industrialization and growth strategy. The growth rate soared up immediately in 1963 (9.1%), and a prolonged period of high growth and rapid industrialization ensued. Under this strategy, most other policy objectives were aligned or subjugated to the basic goal of export-promotion, and in order to achieve this goal, the government undertook a package of policy reforms, one after another, regarding exchange rate, currency, budget, and tax system.⁴ Trade regime was not neutral. Protection of domestic market was high in industries without strong export prospects, and it was low in industries with international competitiveness. Also the government introduced a complex system of 'incentives', all designed for export promotion. An important aspect of Korea's industrial success in this phase was its concentration on industries where capital requirements were relatively low. Korea had deliberately concentrated on exporting some labor-intensive products such as

clothing and wigs, which had favorable and rising international demand. All these strategy and programs turned out to be highly successful. Exports rose sharply, while the basis of industry and exports kept being solidified and diversified into such light-manufacturing industries as clothing, footwear, and electronics.⁵ Due to such successful exports performance, Korea was able to overcome much of the constraints imposed by the relatively narrow domestic market. The average growth rate during this period (1963-72) reached 8.9 percent. The path toward high growth was discovered and requisite measures were enacted

2. The Heavy-Chemical Industry (HCI) Promotion Phase: 1973-79

Despite pervasive government interventions, there had been little sectoral bias in Korea's development strategy prior to the early 1970s. The shift from general export promotion to the heavy-chemical industry(HCI) drive was announced in 1973 (The HCI Development Plan).⁶ The objective of deepening the industrial structure around HCIs such as chemicals, basic metals, general machinery, shipbuilding and electronics had been seen as a logical response to rapid increase in domestic wage rate, increased global competition in traditional export market, and adverse changes in global, political and economic environments.^{7,8}

⁴ The won was devalued from 130 to 255 won per US dollar in 1964, inaugurating a sliding-peg system of continued adjustment. Price stabilization and tax-reform programs were carried out to control inflation and raise the ratio of tax revenue to GNP.

⁵ Still in this phase, Korea's predominant export items consisted of the light-manufacturing products such as textiles, garments, footwear, wigs, electronics, and plywood, which added up to about 75 percent of total manufactured exports.

⁶ As mentioned already, the heavy-chemical industry promotion was already an important policy priority in the Third Five-Year Development Plan.

⁷ Park(94) points out three major external factors/environments that might have motivated the HCI drive: (i) the imperative for nurturing defense industries, possibly triggered by the Nixon Administration's plan (announced in 1971) of gradual withdrawal of the US army in Korea; (ii) the increased protectionism in the global market, that followed the collapse of the Bretton Woods

The government, presumably under the conception that the required large-scale, risky investments of HCIs would not be undertaken by private firms without decisive government leadership, introduced a broad range of interventionist policy instruments, including special tax treatment and most notably, preferential access to credit via various forms of policy loans.⁹ As a result of this policy, especially, the special credit support, fixed capital formation expanded drastically in those select industries: nearly all of the investment projected by the Third Five-Year Development Plan(1977-81) in the HCIs had been completed by 1979, while the investment planned in other industries was less than half completed. Also those HCIs could exhibit a rapid growth and high profitability, despite their relatively low rate of return. Under the HCI drive, the government took the initiative in

system; (iii). the first oil crisis (quadrupling of oil prices between 1973 and 1974) and the subsequent deterioration in external accounts.

⁸ Yoo(1996) succinctly characterizes the different policy orientation of the HCI derive from the general export-promotion policy of the 1960s as follow:

"The main policy emphasis in the 1960s was to encourage the private sector's exports through a variety of incentives (which was) *result-oriented*. Under the policy it was the private sector that made the efforts to achieve the result, i.e., the better export performance. In contrast, the policy in the 1970s was *process-oriented*. The government attempted to achieve the policy goal by promoting certain industries. Under this approach, the government was deeply involved in picking the 'right' industries, supplying them with the 'right' amounts of investment and complementary factors such as skilled workers at the 'right' time and places, and so on. In effect, it was the government that tried to achieve the result, replacing the private sector in making the efforts."(pp 14-5; italicized and parenthesized texts by the present author)

⁹ A new Tax Exemption and Reduction Control Law(1975) gave five year tax holidays, investment tax credits, and accelerated depreciation to designated industries. Other industries faced higher taxes. Agreeably the most powerful tool the government employed during this phase was 'policy loans'. After establishing National Investment Fund in 1974, the government financed numerous large scale HCI investment projects by directing then-government-owned commercial banks regarding which projects get how much of the policy loans. Policy loans accounted for 47.5 to 60.2 percent of total domestic credit during the 1970s. In addition, the loans also carried interest rates lower than the inflation rate during the most of this period, making the selected HCIs build up with secured negative interest-rate funds. For a general evaluation of all these fiscal and credit policies, see The World Bank(1993).

introducing sector-specific, import-substitution, while reinforcing and modifying the existing export incentive programs in favor of the selected HCIs.¹⁰

In consequence, comparative advantage emerged through the 1970s in industries with higher physical and human capital intensity. The export ratio of the heavy-chemical industry rose substantially from 7.4 to 19.3 percent in 1970-80. The heavy-chemical industry's share of total output almost doubled during 1970-75 and rose significantly again by 1980. The heavy industry thus surpassed the light industry in its share of total output by 1980.¹¹ Nevertheless, neglected industries like textiles managed to survive, and indeed continued to carry the brunt of export performance in the latter half of 1970s, whereas many of the heavy-chemical industry were lumbered with excess capacity. Between 1973-79 the growth rate of exports slowed down to 8.4 percent. Despite the slowdown in export growth, the

¹⁰ The commodity tax exemption previously available to all exporters was withdrawn. Also, important export preferences were reduced, including wastage allowances (1973), public utility subsidies, and the scope of export credit. An interesting characterization of the nature of the Korea's trade policy during the HCI phase is provided in Yoo (96). Asserting that the economic policies in the 1960s worked much better than the policies in the 1970s, Yoo states:

"In the 1960s, export promotion policies were pursued while the protectionist measures of the 1950s were still in place. The incentives provided to exports must have had the effect of offsetting the anti-export bias of the protectionist measures. A study concludes, after quantification of the effects of protectionist and export promotion policy measures at the time, that the incentives for firms to sell their products in the domestic market or to export were almost equal in the late 1960s. In other words, Korean exporters were operating in a free-trade-like environment. If this was the case in the 1960s, the incentive system could not have remained neutral under the 1970s when the industrial policy strongly encouraged import substitutions. It must have had a bias in favor of domestic sales. (pp 15-16)"

¹¹ There were, however, some differences among heavy industries. Chemical industry and primary metal manufacturing, after recording a substantial gain in the 1970s, lost ground slightly in 1980s, whereas metal products and machinery continued expanding their share even in the 1980s. The increase in the composition share has been particularly substantial in general machinery, electrical machinery and transportation equipment. Especially, in electronics and transportation, the ratios were even higher than those in textiles at the early 1980s.

Korea's economy had achieved the average annual growth rate of 8.9 percent in the 1973-79 period.¹²

It is now widely accepted in Korea that the HCI drive was an over-ambitious project, causing myriad serious economic problems such as inter-sectoral resources misallocation, external debts, and serious distortion of private sector's decision process. Granted that HCI drive was costly in the medium term, however, it must be observed that many of the original policy objectives of the drive were in fact achieved.¹³ The industrial structure markedly shifted toward the heavy-chemical

¹² As widely agreed, this high growth was not due to the immediate success of the HCI strategy, but largely due to expansionary aggregate demand policies and heavy foreign borrowing.

¹³ A comprehensive and rigorous study of the HCI drive can be found in Stern. et al (1995). An elaborate view affirming the positive role of the HCI drive can be found in Park(1994):

" From a comprehensive, dynamic perspective, the evaluation of the heavy-chemical industry promotion policy calls for in-depth analyses. However, it is hard to demonstrate that an alternative strategy would have brought better results. ... This indicates that the heavy-chemical industry was promoted in such a way that it was highly integrated with the global economy. The strategy had been effective in some industries, but ineffective in others. It may be true that some of the successes could have been attained at lesser cost, but it may be argued that disappointments in some industries were due to external causes, and that the variance in outcomes was inevitable in view of the inherent risk assumed by the heavy-chemical industry program. It may also be argued that private firms would not have been willing to bear the risks without the virtually unlimited government support."

The opposite view that the HCI drive was a greatly misdirected policy that costed the Korea's industrialization process is provided in Yoo(96). After cogently proposing that the primary source of the Korea's apparently mythical economic success lies in the effective utilization of the global economic conditions highly propitious to rapid industrialization of all Asian NICs, Yoo states:

"... The effects of the HCI policy on the economy should have been predictable. On the one hand, the new investments in the HCIs could not promptly add to the flow of goods available to the economy as they required long gestation periods. ... On the other hand, insufficient investments in the rest of the manufacturing industries meant absolute or relative reductions in their capacity and productivity. Export growth started to sharply decelerate in real terms in 1977 and the export volume declined absolutely in 1979. Consequently, the economy was suddenly slowing down and registered a negative 4.8 percent growth in 1980. ... "

Possibly answering the tall counterfactual question of what might have happened had the HCI drive not been followed, Yoo further expounded:

industry. Exports of heavy-chemical industry products fell short of their target by 1980, but eventually exceeded the target only a few years later. Indeed, under the new impetus of the HCI drive, the Korean economy made a strong progress in upgrading its export structure from labor intensive to capital and skill intensive products, with capital intensive products like ships and steel gradually replacing the light manufacturing products as its major export portfolio.¹⁴

3. Rationalization and Liberalization Phase: 1980s

By 1979, the Korean economy came to face grave structural and macroeconomic problems such as escalating inflation, faltering exports, and over-capacity in the HCIs. The new government in the early 1980s started various institutional and structural reform programs,¹⁵ also establishing new directions for the industrial policy concentrating on technology- and skill-intensive rather than capital intensive industries. These new policy efforts, effectuated with the enactment of a series of requisite laws, led to important steps toward major reforms in four areas, including financial liberalization(Deregulation in '84 and '88), realignment of the industrial

" It is instructive to compare Taiwan's and Korea's export,... (whose product composition was most similar in the mid-1970s.) Taiwan, similar to Korea in other respects such as the stages of economic development and the resource-poor characteristics, the cultural background, did not employ the kind of interventionist industrial policy that the Korean government did with its HCI policy. Korean exports' market share in the OECD imports of manufactures declined in the late 1970s, while the Taiwanese share continued to increase,.... It is highly significant that those industries discriminated against by the (Korean HCI) policy were losing competitiveness in the OECD markets vis-a-vis Taiwan. The poorer export performance of light manufactures, compared to Taiwan, was not made up for by a better performance of heavy and chemical industries compared to Taiwanese counterparts, both light manufactures and heavy and chemical products were showing poorer performances. (pp 17-18; italicized and parenthesized texts slightly rearranged by the author)"

¹⁴ though textiles and garments still occupied the largest share of exports.

¹⁵ The basic tenet of this rationalization program was laid down by Comprehensive Stabilization Program, announced in 1979 under President Park.

incentive system (Industrial Development Law[1986]), promotion of competition among domestic and foreign firms (Fair Trade Law[1981]), and trade and capital market liberalization (Import Liberalization Program[1983] and Revised Foreign Capital Inducement Act[1984]).

The policy shift toward greater industrial neutrality and market-oriented approach was clearly articulated in the Fifth Five Year Development Plan (1982-86). Through an array of financial and import liberalization programs, government gradually reduced its role in credit allocation, terminating policies that awarded the HCIs large scale preferences in interest rate and credit access. Flexibility in interest rate management, introduced in 1984 and reinforced by 1988 deregulation, allowed financial intermediaries to determine their own lending rates within a given range. The tax reform of 1981 also greatly reduced the scope of special tax treatment for key industries.

Despite the general thrust toward neutrality, however, the government bypassed competitive solutions for the most part. Instead, the government continued to take an active role in restructuring of distressed industries, support for the development of technology, and promotion of competition. In its rationalization efforts, for instance, the government would not let troubled firms go bankrupt for fear of enormous financial losses to the banking sector and their grave social and economic repercussions. Numerous rationalization programs were thus staged under the initiatives and tight supervision of the government via forced mergers, mandatory capacity reduction, and a general support for commercial banks. These massive government-directed restructuring operations engendered many serious side-

effects, particularly the serious moral hazard problem among private businesses.¹⁶ Surely it is too early to assess the overall effect of the rationalization programs during this period, but some argue that they may be economically justifiable given the huge market imperfections which prevailed that time.¹⁷

The reorientation of industrial policy that began in 1979 have taken roots by the mid-1980s. Most troubled businesses in shipbuilding, shipping and overseas construction, plagued badly by over-capacity and financial distress, have been successfully bailed out or rationalized without leaving grave repercussions on the economy. Also there was a big turnaround in Korea's external balance around 1986, to which the fortuitous change in external conditions (known now as 'the 3-lows') were pivotal.¹⁸ By the end of 1980s, considerable improvement has been made with trade liberalization efforts. With the successful completion of the five-year liberalization program(1984-88), protection was significantly lowered.¹⁹ The direct foreign investment from abroad, one of the most tightly controlled areas of Korea,

¹⁶ The government interventions reduced incentives for positive private adjustment programs and encouraged firms to wait for public rescue. Distressed companies could postpone adjustment until the rescue, hoping that their share in the final merger or cartel would be an improvement over scaling down or a private merger proposal.

¹⁷ Park(1994), for instance, contends:

" ... Failure of major commercial banks would have undermined confidence in Korean finance with serious repercussions for access to foreign capital. Korean banks had little experience with workouts of financially distressed firms. Non-financial firms could not be counted on to finance mergers or buyouts of other troubled firms, since they were highly leveraged. The government had also believed that letting firms defend for themselves would have increased private perceptions of investment risk and undermined its ability to implement policy in the future, since the investment programs that generated financial distress had been encouraged by past government policy."

¹⁸ The '3-lows' means: low interest rate, low Yen (appreciation of Yen against US \$), and low oil price.

¹⁹ With the completion of the program, the import liberalization ratio has increased from 80 percent in 1983 to over 95 percent. About three quarters of the remaining items under restriction were primary products, foods and beverages. Together with the reduced quantitative import restrictions, the average nominal tariff rate was gradually lowered from 24 to 13 percent between 1983 and 1989.

also began to increase sharply since 1984. Through the mid 1980s, Korea regained its growth-momentum, and helped greatly by the resounding exports performances in the second half, could leave this critical period of the 1980s with the average growth rate of 9 percent.²⁰

During this period Korea made a great progress in enhancing overall technological capacity. Intervention in technological development put emphasis on the establishment of institutions to train scientists and engineers and to conduct basic and applied research. Under the Fifth Five Year Development Plan(1982-1986), national science and technology investment was to be increased from 0.9 to 2 percent of GNP over the designated five year period. The sixth plan was designed to further raise the S&T spending ratio to a 2.5 percent by 1991, the level roughly paralleling OECD spending. The government budget supported general research and scientific training, as well as special research centers for energy and resources, machinery, electronics, telecommunications, and chemicals. In addition, the National Project for Research and Development (1982) was established to fund public as well as public-private joint R&D projects in the high-technology fields of electronics, fine chemistry, and engineering. With the help of these programs, and new tax incentives under the Technology Development Promotion Act, -- strengthened in 1981 -- private R&D expenditures expanded rapidly, and a number of private research centers were established.

In sum, over the four decades from 1960 Korea transformed in stages from emphasis on light industry to heavy and chemical industries and to a greater technology base. Strong capital accumulation and growth in labour inputs, in

²⁰ Most SMEs, however, were short of funds for such in-plant-training programs. This skill shortage, together with rising wage, came to make SMEs less and less competitive after the mid- 80s. For a critical review of Korea's VET policy including in-plant-training, see Gill and Ihm(1997).

which the government played a pivotal role as manager and nation wide resource mobiliser, underpinned this transformation. Toward the mid 1990s, the limits of such an input-driven, statist model of development began to loom in symptoms such as mounting trade deficits, rampant credit growth by financial institutions, and overextended, highly leveraged chaebols. Nonetheless, Koreans seemed optimistic about the future of their economy until 1996.²¹ This attitude changed drastically in the turmoil and virtual collapse of the economy that followed the onset of the financial crisis in 1997. With the faltering of the mainstay industries and chaebols many came to see Korea's future as bleak. Korea's development paradigm is now at a crossroads. Korean industry must continue its transformation to provide a solid base for an innovation-based, high-productivity economy. This upgrading will take place in the context of rising trends of global competition and co-operation. In the remainder of this chapter we examine Korea's industrial structure from a comprehensive, dynamic perspective to identify the future direction of transformation and recommend policy measures appropriate for Korean industry to realise its potential.

III. Industrial Upgrading: New Challenges and Prospect

²¹ Despite some reservations voiced from inside and outside Korea and especially remarks by the group of so-called 'contrarians' demystifying the East Asian Miracle (see, for instance, Krugman (1994)) the prevailing sentiment until 1996 was that Korea had made all requisite adjustments and preparations to stay on a super-growth track for a prolonged period. Such optimism appeared to be justified by Korea's astonishing industrialisation history itself and further vindicated by the extraordinary economic performance in 1994-95, which most Koreans belatedly came to acknowledge was due to the worldwide boom in the semiconductor market, especially DRAMs.

1. Profile of Korean Industries and Direction of Upgrading

In the course of managing the crisis, the upgrading of Korean industry as a whole emerged as a hotbed of debate. As many thrust industries of Korea including her flagship electronics and automobiles slid into a deep slump in the wake of crisis, the growth potentials of these 'traditional' industries came to be seriously questioned, and the interest in the more cutting-edge technology industries such as bio-engineering, aerospace, and new materials, as well as a group of other 'new' promising industries were heightened.

In view of the historical experiences of major advanced nations, however, it may be claimed that the focal industries that will lead or underpin the process of overall industrial upgrading of Korea will be the six 'traditional' mainstay industries of the world today, consisting of electrics/electronics, transport vehicle, chemicals, machinery, textiles/ apparel, and scientific equipment. The new cutting-edge technology industries, all at their infancy stage now in Korea, will gain their share gradually just in line with the overall upgrading of these mainstream industries. As Figure III-1 shows, these 6 industries have long been the the major industrial branches of six leading nations of the world - US, Germany, Japan, France, UK, Italy (G-6 hereafter).²² As of 1994, these industries together account for around 55-60% of total manufacturing value-added and employment of G-6 nations, and 70-90% of their total manufacturing exports. The cutting-edge technology industries such as bio-engineering and new materials play a vital role of precipitating technological innovations in the major industries either by providing new

²² In Figure III-1, four of 6 major industries - electricals/electronics, transport equipment, machinery, and scientific equipment – are grouped together into the 'machine and equipment' category.

intermediate goods or through huge technological spillover. But the value-added and employment shares of these high-science industries remain quite minute even in their worldwide leader nations such as the U.S. and the U.K.

Korea, as a result of the continued industrialization process in the past, came to have an industrial profile quite similar to those of the major advanced countries. As Figure III-1 shows, in 1976 there was a pronounced discrepancy in output composition between Korea and G-6 nations, but by 1994 such discrepancy is completely gone.²³ Focusing on the 6 major industries, the value-added and export shares of the 6 major industries in Korea rest in the normal G-6 ranges (62.3% in value-added share, and 82% in export share). One noteworthy observation in respect of Figure III-1 is that the present industrial profiles of the G-6 nations are virtually isomorphic to those prevalent in 1976. In view of the rapid and drastic changes in today's techno-economic environment, it is well predictable that the future trajectory of Korea's industrial evolution will be quite different from the historical paths the G-6 nations have followed to date. Considering the substantial gap in Korea's development stage, however, the fact that the overall industrial profile of all major advanced nations have remained quite stable over the past two decades or so leads us to speculate that Korea's industrial structure in the coming decades would not be that much different from what it is today.

²³ Industriwise, the major force underlying this assimilation process was rapid expansion of three of the 6 major industries - elctrics/electronics, transport vehicle, and machinery. In terms of the high-, mid-, and low-tech classification of industires, both the mid-tech and high-tech industries have substantially gained in their shares(especially the high-tech since the mide 1980s), all in place of the low-tech industries. When following the OECD S&T classification into five product groups, the specialized-suppliers industry has gained most markedly, while there has been commensurate decline in resource-intensive industry and the labor-intensive industry alike. Judging from the output mix according to the OECD S&T classification, the structural profile of Korean industries is quite similar to those of US, Japan, and Germany, except for a discernably low share of sicience-based industries.

Despite the similarity in output structure, Korean industries exhibit serious ‘qualitative’ gap against other advanced nations, as well indicated by the labor productivity and trade structure. In terms of labor productivity, the Korean manufacturing sector on average stands at about the half the level of Japan, also falling behind US, Germany, and France by substantial margins. At the individual industry level, the gap between Korea and the best performing country marks in the range of the lowest of 37% in electrics/elctronics and the highest of 71% in clothing/textile.²⁴

<Table 1> Labor Productivity of Major Industries (1995)

	(US Manufacturing=100.0)						
	Korea	Japan	Germany	France	Italy('94)	UK('94)	US
Manufacturing	62.2	122.6	99.7	107.3	68.0	57.2	100.0
6 Major Industries	59.7	119.2	104.0	109.2	64.9	55.6	106.4
Textile/Apparel	19.9	39.5	58.2	67.2	45.5	36.5	48.2
Chemicals	87.1	174.1	160.3	169.0	93.6	88.6	155.4
Machinery	49.9	123.9	84.1	85.6	75.2	50.2	98.7
Electrics & Electronics	79.4	125.2	85.5	106.3	74.7	44.5	123.0
Transport Equipment	63.3	146.1	109.4	98.5	67.0	53.9	107.3
Scientific Equipment	42.3	123.4	69.9	106.6	72.9	51.2	85.4

Note: Data for Italy and UK are 1994.

Source: OECD, The OECD STAN Database, 1999.

In terms of export structure, export share of apparel/textiles is unusually high in Korea compared to other nations. Although Italy is akin to Korea in this aspect, Italy exports mainly high-quality, fashion-intensive items whereas Korea exports

²⁴ As widely known, international productivity comparison is a very tricky task, especially when it comes to level comparison. In order to deliver the key message of this paper clearly based on a consistent data set, the numbers presented here are obtained in a straightforward fashion, using nominal exchange rate, nominal value-added and without controlling labor hours etc.

low-end commodity items. Likewise, export share of electrics/electronics is unusually high in Korea, the pattern paralleled by Japan only. But again, Korea's exports in this category largely consists of technologically less-sophisticated final assembly products.

Korea's gap in trade structure may be better captured by the specialization pattern. Although chemical products and machinery respectively account for 6.5% and 6.0% of Korea's exports, Korea is in a notable deficit position in these two industries where all G-6 countries post substantial surplus (except Italy in chemicals). Actually, the industries in which Korea run trade surplus such as computers/office machine and telecommunication equipment are where all G-6 nations are in deficit position except Japan.

<Table 2> Export Shares of Major Industries (1994)

	US	Japan	Germany	France	UK	Italy	Korea
Textiles & Apparel	3.6	1.8	4.9	6.2	5.1	18.0	18.9
Chemical Products	16.3	10.3	18.5	20.4	21.1	13.2	12.4
Machinery	19.1	21.0	16.9	10.8	17.4	18.2	7.5
Electricals & Electronics	15.5	23.7	11.2	9.9	11.9	8.2	28.9
Transport Equipment	20.3	26.5	21.5	20.5	15.0	10.4	13.6
Scientific Equipment	5.0	5.9	3.8	1.3	4.3	2.0	1.1
6 industries total	79.9	89.1	76.9	69.1	74.9	70.0	82.5
Manufacturing total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: OECD, The OECD STAN Database, 1997

<Table 3> Patterns of Trade Specialization (1995)¹⁾

	US	Japan	Germany	France	Italy	Korea
Chemical Products	0.20	0.17	0.24	0.11	-0.29	-0.21

Rubber & Plastic Products	-0.04	0.63	0.17	0.13	0.27	0.43
Drugs & Medicines	0.07	-0.45	0.21	0.11	-0.04	-0.44
Basic Metal	-0.31	0.45	0.12	0.05	0.17	0.06
Machinery & Equipment	0.02	0.72	0.44	0.06	0.45	-0.51
Electrics & Electronics	-0.18	0.55	0.13	0.06	0.10	0.32
Office & Computing machinery	-0.28	0.39	-0.26	-0.19	-0.12	0.16
Communication Equipment	-0.30	0.51	-0.00	-0.01	-0.23	0.49
Motor Vehicles	-0.37	0.72	0.31	0.07	0.01	0.68
Aircraft & Shipbuilding	0.52	0.58	0.21	0.50	0.23	0.16
Scientific Equipment	0.02	0.42	0.20	-0.08	-0.10	-0.47
Textiles, Apparel & Leather	-0.64	-0.59	-0.28	-0.16	0.45	0.53
Others	-0.27	-0.65	-0.20	-0.13	-0.56	-0.53

Note: All numbers denote trade specialization coefficient, defined as (export-import)/(export+import)

Source: OECD, Foreign Trade by Commodities, 1995

The qualitative gaps of Korean industries mentioned above eventually translate into gap in the knowledge-intensity, which in turn can be explained in terms of the composition of various activities comprising value-creating chain. [Figure III-2] is designed to illustrate the fundamental difference in the value-creation structure between Korea and an advanced nation. For the purpose of exposition, products are divided into the high value-added (high-end) and the low value-added (low-end). For each product, the value-creation chain is broken down into five areas from the most knowledge-intensive (product design) to the least (production).²⁵ The figure shows that the activities of Korea are more concentrated on the low-end products and low knowledge-intensive activities such as production and simple adaptation or improvement of product and/or process.

²⁵ product design, advanced research (Generic/applied research and advanced engineering), product development, adaptation/modification, and production.

Figure III-2 may be just a pedagogical representation of a stylized pattern of development gap. Yet, in combination with the fact the overall industrial profiles of the G-6 nations have not changed that much for long, it delivers a crucial implication for the essential meaning and direction of Korea's industrial upgrading lying ahead. The position of Korea in the figure may be viewed as corresponding to the position of the advanced nation about two or three decades ago. What has occurred among the advanced nations over long period of time was a gradual upgrading of the traditional mainstay industries, characterized by the stage-after-stage shifts toward more knowledge-intensive, high value-added activities within and across the industries. Accumulation of knowledge and technological capabilities is essentially a cumulative and gradual process, and so is an economy's evolution toward a more knowledge- and technology-intensive advanced structure. Considering the obvious chronological gap in Korea's industrialization stage, it may be then quite natural that Korea exhibits substantial qualitative gap as against the G-6 nations for now. The present gap, if any, implies that there still remains a huge room left for the traditional sense of industrial upgrading to take place, until Korea reaches some stage of development comparable to today's global leaders. Given the far-reaching and ever-deepening impacts of globalization and ICT, there is no doubt that such upgrading will take place in a more complex and volatile dynamic context. Regardless of the exact mechanism and process, however, one thing stands robust: There is no tectonic shift in industrial structure and advancement. The thrust and focus of Korea's industrial upgrading endeavor need to be placed on, not off, her present mainstream industries.

2. Korean Industries in the Global and Dynamic Context

The process and outcome of upgrading of Korean industries will vary across industries, depending particularly on the competitive base of domestic firms and the competitive structure of the global markets. As concerns the latter, it is convenient to divide the industries into two groups: i) the global, high-tech industries such as electronics, fine chemicals, and automobiles, in which a few leading MNEs maintain substantial oligopoly power, and (ii) the local, medium-tech industries such as machine and textiles/apparel, in which a number of innovative SMEs lead the market by producing highly differentiated or specialized products.²⁶

In response to vehement trend of market integration, accelerating technological change, and intensifying competition, the leading MNEs in global industries have escalated ‘globalization’ efforts, extending important dimensions of their business activities into all prospective territories around the globe. The strategic thrust of these MNEs is to locate each functional element of business in the most suitable site/firm and to tap on and globally link all tangible and intangible assets available there, so that they can attain the optimal mode of ‘intra-firm, global division of labor’. In that vein, inter -regional FDI has increased sharply both in number and volume, and so have the inter-regional M&A and strategic alliances among leading companies. As a result, the locational decisions of the MNEs concerning R&D, production, marketing, outsourcing, etc. came to bear on huge and direct influence on the overall performance of a national economy.

In contrast, there has not been that much of globalization going on with the mid-tech industries to date, with traditional form of products trade remaining as the

²⁶ The high-tech and mid-tech classification here does not accord with the usual OECD classification. The global, high-tech industries of this paper correspond to the high & medium-high tech industries of OECD classification, while the local mid-tech industries corresponds to medium-low tech industries.

dominant mode of international transactions. Basically, R&D requirements for these industries are relatively low and the markets are segmented along highly differentiable product line. Accordingly, there is no impending incentive or pressure for an individual firm to pursue scale-economies (in R&D and production) through globalization. Typically, a large number of innovative SMEs leading the markets are concentrated in some European regions with unique regional innovation system, and collectively maintain their competitive position in high value-added market segments, producing highly differentiated fashion or specialty products.²⁷ Because their competitiveness stem from some collective assets integrated into a specific region, these industries tend to remain ‘local’, with all core dimensions of innovative activities regenerated within the same regional boundaries.

As briefly pointed out, Korean industries exhibit substantial productivity gaps against the most advanced nations. At the individual firm level, most Korean companies do not have solid competitiveness base to withstand fierce international competition. Even a small circle of Korea’s vanguard companies fall seriously behind their global competitors in respect of business portfolio, financial structure, core competence, and globalization. It is indisputable that the industrialization process of Korea to date can be characterized as ‘input-driven’, in which the augmentation of labor and capital served as the primary source of growth. Indeed, many growth accounting studies available indicate the pure TFP portion of growth in Korea was no higher than 40%, with the remaining portion explained by augmentation of either labor or capital.²⁷ Actually, one latest study by Yoon and Lee(1998) suggests that while investment continued to increase as fast as in the 1980s during the early 1990s,

²⁷ The quality and results of these ‘sources of growth’ studies vary, depending on the period covered, methodology, and data set used. Although some studies claim that the TFP growth factor in Korea is as low as 9%, reasonable figure appears to lie somewhere around the 20-35% range.

	Kim-Lau (94)	Young(95)	Collins-Bosworth (96)	Kim-Park(88)	Yoon-Lee(98)
Period covered	60-90	66-90	60-94	66-83	(70-95)
TFP/VA growth	16.0	21.3	26.3*	36	28.4

Note: *) measured in total output. Source: reconstructed from Yoon and Lee(1998)

TFP growth has slowed down sharply, with some industries such as chemicals and home electrical appliances exhibiting negative growth.²⁸

<Table 4> Characteristics of Major Industries

		Global, High-tech Industries (Electronics, Automobile, Chemicals)	Local, Mid-Tech Industries (Machine, Textiles/Apparel)
Characteristics	Market Structure	Oligopoly among leading MNEs - Highly dynamic	Led by innovative SMEs - stable monopolistic competition in the highly differentiated market
	Lead Nations	Auto.: US, Ger., Japan, France, Italy Electronics: US, Japan Chemicals: US, UK, Germany	Machinery: US, Germany, Japan Textile & Apparel: Italy, France
	Source of Competitive Advantage	EOS in R&D and production - Individual core competence - Global R&D network	Economies of agglomeration - Collective innovation in local networks of clusters
Globalization	Globalization of firm	Intensifying and deepening - Intra-firm, global division of labor - Global network of R&D & sourcing - Multi-domestic strategy	Limited - Intricate local division of labor - Local network - traditional export
	Trade Pattern	Intra-firm trade & intermediate products trade increasing Inter-regional trade decreasing	Typical inter-regional product trade some intra-regional trade in intermediate products
	Linkage with Home country	Weakening (low/mid value-added activities out-sourced)	Robust (core activities integrated into a region)
Developing Countries	Overall position	Passive participants - Competition to attract MNEs - Produce low-end product and parts	Import high-quality products Export commodity products & parts
	Prospect of Advancement	Low/modest (Absolute gap in capital & tech.)	Very low (difficulty in building innovative clusters)

²⁸ According to Yoon and Lee(1998), the slowing-down of TFP has occurred in about 2/3 of the entire 27 industrial branches encompassing almost all-major export industries of Korea. The productivity decline was most pronounced in the mid-tech industries such as machinery and petrochemicals.

For a balanced assessment of the potentials of the Korean industries and firms, however, we need to pay more attention to ongoing dynamics, especially the recent efforts and performances associated with accumulation of innovative and technological capabilities.

Largely amiss in the recent criticism of Korea's low productivity is the persistent trend of productivity catching-up under way. Korea's manufacturing productivity, though remaining far lower than the global leading nations, has continued to rise faster than any one of them, resulting in a steady narrowing-down of gap. For instance, although the labor productivity of the Korea's manufacturing sector was just about 30% of US in 1980, it rose up to 46% in 1990 and to about 63% by 1996.

<Table 5> Labor Productivity of Korea Relative to the U.S.(1980-95)

(Unit: %)

Year		Manu- facturing	Textile/ Apparel	Chemical Products	Basic Metal	Machinery	Electrics/ Electronics	Shipbuildi ng	Motor vehicles
1980	PPP	42.7	47.7	42.1	48.6	37.3	36.8	119.3	31.1
	NER	30.3	33.9	29.9	34.5	26.5	26.1	84.7	22.1
1990	PPP	60.8	62.4	39.3	127.2	57.7	57.0	106.4	75.3
	NER	46.2	47.4	29.9	96.7	43.9	43.3	80.9	57.2
1995	PPP	77.7	51.7	70.0	152.1	63.9	80.7	152.2	63.3
	NER	62.2	41.4	56.0	121.7	50.6	64.6	121.8	50.7
Productivity growth rate ²⁾		8.2	4.3	8	9.6	10.1	13.6	8.2 ³⁾	

Note: 1) PPP = Purchasing Power Parity Exchange Rate, NER = Nominal Exchange Rate

2) measured in real value-added terms

3) denotes productivity growth of all transport equipment.

Source: OECD, OECD STAN Database, 1997.

Much of such productivity catching-up is ascribable to capital deepening (input-driven), but not all. Although capital accumulation itself constitutes one important source of TFP growth through the usual learning-by-doing absorption of embodied-technologies, persistent productivity growth requires a more systematic endeavor

directed to enhance technological know-how. In the face of rapidly rising wages, mounting pressure from the second-tier NICs, and increasing difficulty in acquiring foreign technology, Korean companies have stepped up indigenous R&D efforts sharply since the mid-1980s. Although large corporations in Korea's frontier industries led the trend, such elevated R&D efforts were quite universal, involving virtually all modest-sized firms in the entire cross-section of manufacturing sector. Business R&D expenditure, which started to pick up in the early 80s, continued rise steeply throughout the 1990s, and so did the total numbers of R&D persons and corporate R&D centers.²⁹

<Table 6> Evolving R&D Profiles of Korea (1980-1985)

		1980	1985	1990	1995
R&D Expenditure	GDP share (%)	0.77	1.58	1.95	2.61
	Government share (%)	64.0	25.0	19.0	16.0
	R&D/Sales (%)	0.50	1.51	1.96	2.72
Research Scientists & engineers (% in manufacturing sector)*		-	19,000	70,500	100,500
		-	(89.2)	(89.9)	(86.2)
No. of R&D Centers/Labs		54	183	996	2,270

Note: *) data for 1990 and 1995 are for 1989 and 1994.

Source: Ministry of Science and Technology, Report on the Survey of R&D and S&T, various issues.

<Table 7> R&D Expenditure of Major Countries

²⁹ While almost all advanced nations marked a quite stagnant R&D performance in terms of growth in R&D investment during the 1990s, the R&D expenditure in Korea has increased more than 20% a year during the same period at least until the onset of the latest crisis. As a result, R&D-GDP ratio in Korea rose steeply from 2.1% in 1992 to 2.8% by 1996. Another notable aspect of Korea's R&D efforts is the overwhelming role of the private sector. Nowadays in Korea, the proportion of

	R&D (‘91-‘96)	R&D (billion \$)*	R&D/GDP		R&D/Sales		Gov’t R&D Share
			‘92	‘96	All Sectors	Mfg.	
US	2.83	184.7 (13.7)	2.78	2.54	2.8	2.9 ³⁾	33.6
Japan	1.83	138.6 (10.3)	2.94	3.00	2.8	3.4	26.5
Germany	1.39	53.1 (3.9)	2.48	2.26	4.0 ³⁾	-	37.3
France	2.68 ⁴⁾	35.9 ¹⁾ (2.6)	2.42	2.34 ¹⁾	4.8 ²⁾	-	43.6 ¹⁾
UK	3.63 ⁴⁾	22.6 ¹⁾ (1.7)	2.18	2.05 ¹⁾	-	-	36.4
Korea	21.21	13.5 (1)	2.08	2.79	2.4	2.8	22.1

Note : 1)‘95 2)‘94 3)‘93 4)‘90~‘95

*) Number in parenthesis denotes the size of each country’s R&D relative to Korea.

Source : Ministry of Science and Technology, Report on the Survey of R&D and S&T, 1997.

Actually, R&D records and market performances suggest that toward the late 1980s, a significant body of Korean companies started to shift from the typical ‘investment-driven’ stage to ‘innovation-driven’ stage. The most notable were the efforts made by Korea’s leading firms in some select industries such as electronics and automobiles. In the face of accelerating global technological advancement, a host of major Korean corporations began to move from the ‘imitative’ towards ‘defensive’ R&D positions, which makes it imperative for these firms to assimilate R&D-intensive and system-oriented technologies. In that vein, not only extensive networks of in-house laboratories were established, but a more active overseas R&D strategy was pursued. On top of acquiring advanced technology in major industries through FDI, they set up a number of R&D facilities near the ‘pockets of innovation’ in the U.S., Japan and Europe in efforts to monitor frontier technological changes as well as to tap high caliber scientists and researchers. In addition, they resorted to M&A to gain access to cutting-edge technologies.

government-funded R&D investment, which was once as high as 80% by the early 80s, stays in the range of 18-23%.

<Table 8> Overseas R&D Centers of Korea (1995)

	US	Japan	Europe	Russia	Total
Electrical/ Electronics	15	8	7	1	31
Motor Vehicle	4	3	2	-	9
Others	5	1	4	1	11
Total	24	12	13	2	51

Source: reproduced from Table 5-4-3 STEPI (1998).

As a result of such vigorous efforts, some notable and tangible outcomes started to show up through the mid 1990s. In 1996, Korea ranked eighth in the US patents registrations, and seventh in the number of foreign-owned R&D laboratories in the US. In automobiles, all major Korean car makers came to possess the capabilities to design and develop their own mid-sized models. In electronics field such as DRAM and TFT-LCD, success cases of new product development increased, with the gap against the world leader in the timing of commercialization reduced substantially, or reversed even. Most of all, the cases of strategic alliances between Korean companies and leading foreign companies became quite frequent, which vindicates that Korean companies have grown sophisticated enough to enter the global market based on their own technological assets.

Despite all these considerable feats, both the level and scope of Korea's technological capabilities are still far behind advanced countries. In industries such as machinery, heavy equipment, shipbuilding, and petrochemicals, technological gains made to date have been largely confined to the production or process improvement, while the level of product design and basic project engineering remains in infancy stage. Even in Korea's technological vanguard field like electronics, the technological capacity of Korean leaders stands just at level of

developing a commercial product (commercialization), whereas global leaders are equipped with more advanced capabilities extended to applied research and generic research even. Actually, what happened during the continued technological upgrading of Korean industries is the increased technological dependency. As more Korean companies moved onto production of more technically-sophisticated products, Korea had to import more advanced and expensive foreign technologies, resulting in an persistent increase in the deficit in technology trade.

<Table 9> International Technology Transaction of Korea (1990-1997)

(10 million dollars, %)

	Trade Volume			Major Import Products			Major Source Countries		
	Im	Ex	Im-Ex	EE	ME	CP	US	Japan	EU
Total Value (% share)	1,200	630	-1,137	601 (50.1)	232 (19.3)	138 (11.5)	633 (52.8)	360 (30.0)	177 (14.8)
CAGR(90-97)	12.1	33.3	11.3	15.3	10.7	-0.7	16.2	5.8	8.3
CAGR(94-97)	23.7	13.7	24.5	17.8	31.3	24.1	28.4	14.2	33.8

Note: EE= Electronics & electronics, ME=Machinery & Equipment; CP = Chemicals & Petroleum products
Source: Korean Industrial Technology Association(KITA), Annual Report on Industrial Technology, 1998
(reconstructed from Tables II-62 and II-63).

The backward technical standard of Korean firms may partly reflect some serious shortcomings in their basic business orientation and strategy in the past. But it may be more a problem of the late-comers' disadvantages who are still in the middle stage of corporate evolution. Just as technological progress is a continuous and cumulative process, so is a firm's evolution toward a more advanced stage of technological development. It may be fair to say that Korean firms have accumulated some set of technological assets commensurate with their own stages of development and evolution under the regime of nationalistic industrialism. Now

with the advent of the age of global competition and alliance capitalism(Dunning 1997), the meaning of a single firm's or nation's technical standard has changed fundamentally, as well as the paradigm of its technological evolution. The adequacy or deficiency of Korea's technological assets is just to be tested out in conjunction with Korea's other indigenous assets, where the central theme is how much strategic values they would fetch in the global market, especially in relation to the globalization strategies of the world leaders

3. Locational- Advantages of Korea

(1) context and hypothesis

Despite the severe setback spawned by the recent financial crisis, many experts predict that the East Asia as a whole will resume typical growth momentum, emerging as one of the largest market of the world by the early 21st century.³⁰ Not merely the size of the market enlarges, the mode of international and intra-firm interactions in the region will change as well. The share of Asia in global trade and investment flows has increased drastically over the past 20 years or so. More notable is a sharp increase in the trade flows within Asia. An increase in intra-regional trade in lieu of traditional inter-regional trade is a global trend continued

³⁰ In its latest forecast of the world economy until 2020, WEFA(1999) predicted that Asia, excluding Japan, will continue to lead the world growth with the average annual growth rate of 5.8% (5.3% for Korea), which is followed by Latin America(4.2%), Europe(2.2%), US(2.2%) and Japan(1.9%). Taking the 10 year period until 2010 in Asia, WEFA further predicted that China and India will lead the growth(7.4%), followed by the ENIEs group (Indonesia, Thailand, Philippine; 6.0%), and four Asian tigers(Korea, Singapore, Taiwan, Hong Kong; 5.6%).

since the early 1980s. But intra-regional trade in Asia has surged markedly, with its global trade share more than doubling during 1980-95.³¹

<Table 10> Patterns of World Trade Flows by Regions

(unit : %)

	1981-85				1991-95			
	EU	NAFTA	Asia	Import Total	EU	NAFTA	Asia	Import Total
EU	18.1	3.4	1.9	34.0	24.1	3.3	3.4	33.8
NAFTA	3.6	7.1	3.5	18.5	3.4	7.3	4.4	17.8
Asia	2.3	5.3	6.4	18.2	4.5	6.8	12.0	26.0
Export Total	35.7	20.9	17.6	100.0	39.1	20.0	23.8	100.0

Note : Asia refers to 38 countries excluding Middle East area

Source : IMF, Direction of Trade Statistics, Yearbook.

The trend increase in the intra-regional trade in Asia indicates that the Asian market has grown mature and diverse enough to develop a more intricate and sophisticated form of intra-regional division of labor, involving a greater variety of goods and services geared for region-specific demands. Insomuch as the local presence of a firm within the region becomes more important and rewarding, MNEs, especially the US and European MNEs engaged in the 'global' industries will be situated to reinforce and upgrade their Asian strategy so that they can better respond to and capitalize on the new challenges and opportunities of the Asian market.

By and large, the competitive advantages of Western MNEs in respect of their Asian manufacturing business overlap in highly knowledge-intensive activities

³¹ Forecasting the world trade flows by regions until 2020, one research institute in Japan predicted in 1996 that East Asia will grow into a single largest trading region of the world by 2020, surpassing EU in both export and import shares. In addition, the study forecasted that the intra-regional trade share in East Asia will keep growing to take up about 20.4 % of global trade flows, the shares of inter-regional trade involving Asia will dwindle eventually than now.

such as advanced research or engineering of technologically sophisticated products. Most of these activities will continue to be performed at the global 'centers of excellence' located in the triadic zones. The optimal pattern of 'intra-firm, global division' of labor of each MNE is then to combine these activities with some medium value-added activities within the region, encompassing production, A/S, and local adaptation.

As mentioned already, most Korean firms are not competitive enough to survive a direct head-to-head competition with the leading MNEs. But they have a parcel of indigenous assets that can be of high complementary value to the Asian strategy of the MNEs. Setting aside the issue of who will control those indigenous assets, Korea as a single national entity commands a fair degree of locational advantages in East Asia for wide range of industrial activities under the interest of MNEs. The exact areas of Korea's locational advantage as against all other East Asian nations including Taiwan, Singapore, and ASEANs surely will differ from industry to industry.³² But focusing on medium to high-tech industries, and business services as well, Korea may be said to have considerable advantage over all the ASEANs and neighboring nations, owing to her relative strength in the region in skilled manpower including R&D personnels, related and supporting industries, and the

³² One rough, but indicative method to tell the locational advantages of East Asian nations across industries may be to compare the distribution of each nation's R&D persons across industries. When adopting this criterion, we could claim the following patterns of locational advantages: food products, wood/paper/textiles products, and chemicals for Indonesia; food products, electricals/electronics for Malaysia; electricals/electronics and services for Singapore; services for Thailand; chemicals, electricals/electronics, transport equipment for Korea.

size of ‘relevant’ markets.³³ In addition, physical proximity to China’s colossal market (northeastern coastal area) may be one important factor that places Korea in a naturally advantageous position.

<Table 11> R&D Personnel in East Asia and Other Economies, 1997

	US	Germany	Japan	Korea	Taiwan	Singapore	China	Malaysia
Total Numbers (1,000s)	962.7	459.11	891.8	135.7	98.6	12.1	588.7	4.4
Ratio to Korea (Korea=1)	9.37	2.25	6.62	1.0	0.59	0.07	5.73	0.02
Number per Capita	37.29	56.24	70.93	29.80	45.65	32.26	N/A	2.05

Note: Korea is for 1996; Number per Capita indicates the number per 10,000 population.

Source: IMD, The World Competitiveness Yearbook, 1999; Andersson(1999) for China

Of course, as long as the importance of the Chinese market is concerned, the proximity to China could be Korea’s greatest liability as much as her greatest asset. For now and for a considerable while, Korea can hardly match China either in accessibility to China’s main market or in labor costs. But with her longer history of industrialization at the backdrop, Korea has advantage in some mid-to-high valued-added areas in which quality and reliable provision of skills, parts and institutional support count more.

Korea seriously lag behind Japan in the quality of technicians and engineers, let alone in the endowments of other S&T and industrial resources needed for highly advanced industrial activities such as advanced research and engineering. Yet, the

³³ Concerning the overall R&D capacity, Andersson(1999) for instance states: “looking at the level of research and development, especially Korea, but also Taiwan are well on par with the most

prices of the mid-level technicians and engineers are substantially lower in Korea, making Korea a advantageous place for some mid level, relatively cost-sensitive activities.

<Table 12> Locational Advantages of East Asian Three: Illustration

	Japan	Korea	China
Advanced research (generic/applied)		×	×
Commercial research & basic engineering		× /	/×
Product-process adaptation-improvement	/	/	×
Production (mid to high-end product)			
Production (low to mid-end product)	×		

Source: strong advantage, advantage, neutral, × disadvantage,

The locational advantages and disadvantages of Korea as against Japan and China may be roughly sketched as in <Table 12>. Identifying the exact functional areas of advantages in connection with specific industrial branches needs more extensive, in- depth research. Yet it may be conjectured that Korea has the most pronounced advantage as the production site of mid-to high-end products of virtually all 'global' industries covering electronics, automobiles, petrochemicals, and heavy machinery/equipment. In addition, Korea may have modest degree of advantage for some skill- and experience-intensive activities such as local adaptation of product or process, which also applies to most global industries.

(2) Recent Inbound FDI Trend in Korea

The latest trend in inbound FDI partly testifies the Korea's locational advantages discussed above. Although on a steady increase since 1993, FDI inflows to Korea

developed countries in the world, whereas the other Asian countries lag behind. ... In absolute terms, China is a major player in several respects."

have remained quite limited until lately. But moving into the second half of 1998, FDI inflows started to surge up. The total inflows in 1998 reached 8.89 billion dollars³⁴ -- exceeding the half of the total volume during 1991 to 1997. The trend continued in 1999, with the final figure expected to reach 15 billion dollars or so.

Not merely the volume, but the composition of FDI in respect of source countries and the recipient businesses exhibits progressive change too. Although the investment from the U.S. and Japan have been predominant for long, investments from EU region, especially those from Netherlands, Germany, and France, has been on a sharp increase. In 1998, the combined investment share of all EU countries came to exceed 50%. Japan's share of FDI into Korea has been falling since the mid-1980s, with a marked decline in 1998. Entering 1999, however, investment from Japan bounced back sharply.

<Table 13> Amount and Composition of Korea's Inward FDI by Source, 1981-98

(Unit: million \$, %)				
	1981~1985	1986~1990	1991~1997	1998
U.S.	375.9 (45.17)	1005.2 (27.14)	2182.0 (20.88)	1450.3 (28.13)
Asia	304.7 (36.62)	1996.3 (53.89)	3288.9 (31.47)	877.2 (17.01)
Japan	263.2 (31.63)	1850.2 (49.95)	1733.3 (16.58)	413.6 (8.02)
Europe	109.0 (13.09)	598.3 (16.15)	4615.9 (44.16)	2662.5 (51.64)
Germany	24.2 (2.91)	165.2 (4.46)	761.5 (7.29)	643.8 (12.49)
France	9.1 (1.09)	63.5 (1.71)	814.3 (7.79)	352.7 (6.84)
Netherlands	8.8 (1.06)	107.2 (2.89)	1338.4 (12.81)	1218.3 (23.63)
Total	832.1 (100.0)	3704.2 (100.0)	10452.0 (100.0)	5155.6 (100.0)

Source: reconstructed from S. Kim (1999).

³⁴ In terms of the notified volume. The executed volume was 5.16 billion dollars.

Sectorwise, the FDI into Korea has become more diversified and nuanced. The share of the services sector has risen steadily, making once manufacturing-centered structure more on balance. While consumption-oriented businesses like restaurants and hotels once led this trend, the focus is shifting toward finance, telecommunications, and other business services. In the manufacturing sector, chemicals, electrics & electronics, transport equipment, and machinery continues to absorb a majority portion of incoming FDI. A notable new trend is a prominent increase in FDI in the food processing, paper/lumber, and machinery.

Overall, the motives behind inbound FDI into Korea appears to become more matured and variegated. Until recently, so-called 'market-oriented FDI' to penetrate Korea's domestic market has been dominating.³⁵ After the Asian crisis, however, a growing number appears to be of a more strategic nature, with a host of leading MNEs, including the Japanese firms, considering Korea as platform for their Asian or even global strategies.

Of course, it is too early to tell whether these changes herald a new long-term trend. The upsurge in FDI volume over the past two years could prove to be transitory, induced only by the sharp depreciation of the won as well as severely depressed asset prices. Indeed, with the portfolio of businesses for sale (M&A targets) in Korea running out, inbound FDI may level off eventually. On the other hand, the recent upsurge could prove to be the start of a longer-term trend in FDI. If so, the legal and institutional shake-up regarding inbound FDI will have been the critical reason for the change. Once one of the most closed economies in the world, Korea is now free of obvious barriers to incoming FDI, thanks to the thorough liberalisation measures taken in the course of managing the crisis. Most legal

³⁵ Until the mid-1980s, low-cost labor was the main advantage of investing in Korea. As wages increased after the mid-1980s, an increasing proportion of FDI was made to penetrate into attractive domestic markets

barriers were removed or eased (restrictions on ownership share and business area, for instance), administrative procedures were simplified, and even hostile M&As by foreigners were legitimised.

<Table 14> The Sectoral Distribution of Inward FDI

	(Unit: million \$, %)			
	1981~1985	1986~1990	1991~1997	1998
Agriculture and Fishing	2.5 (0.31)	20.4 (0.55)	35.8 (0.34)	162.8 (3.16)
Mining and Quarrying	1.4 (0.17)	4.5 (0.12)	19.9 (0.19)	21.3 (0.42)
Manufacturing	593.0 (71.26)	2277.6 (61.49)	6104.0 (58.40)	2831.6 (54.92)
Food	42.6 (5.12)	154.9 (4.18)	663.9 (6.35)	629.8 (12.22)
Textile and Clothing	8.2 (0.99)	53.6 (1.45)	199.8 (1.91)	6.7 (0.13)
Paper and Lumber	15.8 (1.90)	25.0 (0.68)	335.3 (3.21)	446.7 (8.66)
Chemicals	114.1 (13.72)	415.2 (11.21)	1388.8 (13.29)	429.1 (8.32)
Fertilizer	1.2 (0.14)	0.3 (0.01)	0.7 (0.01)	0.3 (0.00)
Medicines	47.3 (5.68)	135.3 (3.65)	234.1 (2.24)	119.6 (2.32)
Petroleum	5.6 (0.68)	49.7 (1.34)	684.3 (6.55)	0.9 (0.02)
Ceramics	3.2 (0.39)	42.0 (1.14)	196.5 (1.88)	243.3 (4.72)
Metals	24.3 (2.91)	39.4 (1.06)	71.3 (0.68)	5.8 (0.11)
Machinery	22.8 (2.74)	265.1 (7.16)	571.0 (5.46)	534.8 (10.37)
Electricity and Electronics	174.7 (21.00)	616.5 (16.64)	865.8 (7.90)	231.7 (4.49)
Transport Equipment	125.9 (15.13)	437.5 (11.81)	825.8 (7.90)	154.0 (2.99)
Other Manufacturing	7.3 (0.88)	43.0 (1.16)	66.6 (0.64)	28.6 (0.55)
Services	235.2 (28.26)	1401.8 (37.84)	4292.2 (41.07)	2139.8 (41.51)
Electricity and Gas	0 (0.00)	0 (0.00)	26.1 (0.25)	0.0 (0.00)
Construction	40.2 (4.83)	9.0 (0.24)	101.3 (0.97)	5.4 (0.11)
Wholesale and Retailing	15.0 (1.81)	5.0 (0.14)	690.0 (6.60)	519.6 (10.08)
Trade	0.2 (0.02)	55.5 (1.50)	701.7 (6.71)	243.0 (4.71)
Restaurants	0.1 (0.02)	4.1 (0.11)	67.3 (0.64)	6.2 (0.12)
Hotels	76.6 (9.20)	887.1 (23.95)	573.7 (5.49)	0.0 (0.00)
Transport and Storage	7.0 (0.84)	6.6 (0.18)	160.1 (1.53)	4.2 (0.08)
Finance	78.7 (9.46)	313.6 (8.47)	1191.1 (11.40)	471.4 (9.14)

Insurance	1.0 (0.12)	76.7 (2.07)	181.3 (1.73)	73.1 (1.42)
Other Services	31.4 (3.77)	44.2 (1.19)	597.9 (5.72)	816.1 (15.83)
Total	832.1 (100.0)	3704.2 (100.0)	10452.0 (100.0)	5155.6 (100.0)

Source: reconstructed from S. Kim (1999).

(3) Remarks

Even if Korea's locational advantages do attract investment in a broad range of business activities, the economy's prospects also depend on who will manage and control those activities. It is reasonable to expect foreign MNEs to control a substantial part of these activities, in which case Korean firms will assume a subordinate or supporting role. But a more reciprocal partnership relation should develop in areas where Korean firms possess some independent technological or managerial assets that complement the global strategy of foreign MNE's. In Korea's technological frontier fields such as semiconductors and displays (TFT-LCD, PDP, and the like) the engineering acumen and commercialisation ability of Korean firms will be a main attractive factor and various forms of strategic alliances with foreign MNEs will continue to spring up. Korean firms should also retain some autonomy in other industrial fields such as automobiles and heavy equipment, although the specific types of relationships with MNEs will differ (Figure III-3).

In the automobile industry, for instance, no Korean company, including leader Hyundai, has the ability to cope with the escalating global competition on its own. In their desperate search for survival strategies Korean automobile companies need to note that besides their well-regarded production techniques, they possess a unique set of managerial assets and know-how that can perfectly complement the strategies of foreign MNEs, especially in emerging markets. These assets could be highly valued by global leaders such as GM, Ford, and Volkswagen, which lack a

competitive position in emerging markets, especially China and India, comparable to that of their Japanese counterparts (Table 15). Despite the strategic value of establishing a presence in the emerging markets, the global leaders are not likely to attempt full-scale penetration of these markets independently, because the overall business environment is too challenging. As alliance partners with the MNEs, Korean automobile makers would bring the substantial volume of investment they already have in place in the region and, more importantly, their managerial know-how and determination to maintain a physical presence for the long term.³⁶

<Table 15> Asian Market Shares of Major Automobile Companies (1995)

	(unit : %)							
	China	India	Taiwan	Thailand	Indonesia	Malaysia	Philippine	Sum*
Japanese Total	24.4	36.2	58.0	89.9	95.3	92.3	87.9	54.3
Toyota	0.7	0.3	17.0	27.9	25.5	7.7	29.1	10.7
Nissan	-	0.7	11.9	15.4	0.5	6.0	14.7	4.9
Mitsubishi	1.7	0.8	18.7	12.5	19.2	51.4	24.9	11.5
Honda	-	-	7.2	4.8	1.3	3.9	9.2	2.4
Mazda	-	0.5	1.0	4.1	0.8	1.0	6.0	1.2
Suzuki	9.9	33.9	1.2	0.6	18.5	1.0	-	11.0
Isuzu	4.1	-	-	20.8	11.2	3.2	1.7	5.9
Daihatsu	8.0	-	0.2	0.7	6.5	17.5	0.5	-
US Total	1.8	--	--	2.0	1.2	2.5	-	4.9
Ford	-	--	--	0.9	0.7	2.1	-	3.0
Europe Total	15.7	--	--	6.1	3.2	5.1	0.8	9.0
VW/Audi	14.1	--	--	0.6	-	0.1	-	5.4

Note: Asian share is combined share in seven nations.

Source: Abrenica (1997).

³⁶ The alliance between Hyundai and Renault for joint venture production in Malaysia may be a case in point. The unique managerial advantage of Korean carmakers in the emerging market was pointed out by McDermott (1996).

4. The Challenges and Policy Responses

(1) Prospect and Challenge

The basic strategy and policy goals of Korea's industrial upgrading around the post-crisis can be laid down in two stages. Over the the period of coming 10 years or so, Korea first needs to solidify her present competitive advantages and to expand the competitive areas gradually, drawing on her present 'core' competences and locational advantages within a system of intra-regional devision of labor in the East Asia. After securing the position not only as a regional production platform for high-end products but also as a regional innovation site for an array of the advanced activities such as advanced engineering and some basic research beyond commercialization, Korea then may advance forward for the ultimate goal of building another 'center of excellence' that can support and self-regenerate the most advanced scientific and technological tasks such as applied research and advanced system engineering.

Although Korea may have some potential to attain these goals, it is hard to expect that Korea could actually attain them easily. Focusing on the coming ten years or so, the principal hindrances and challenges boil down into two. Feeble market and framework conditions, and uncompetitive SMEs(Small and Medium-sized Enterprises), especially those in the machinery industry.³⁷

³⁷ From a mid- to long-term perspective, we may point to backward S&T infra of Korea as another principal hindrance. To stay focused and short, this paper will not address the S&T issue.

As the latest IMD report points out, framework conditions concerning labor market, financial market, corporate governance, public sector and regulatory system are where Korea most seriously lag behind other advanced nations. The latest financial crisis, for all the turbulence and turmoil inflicted, drove Korea into a highly fortuitous situation under which Korea could greatly upgrade its much outdated framework conditions through the across-the-board type reform efforts geared for all major trouble areas. At this point it is hard to predict how successful the ongoing reform efforts will be. But if the 'closedness' of the Korean society was the ultimate cause of all major institutional problems, the post-crisis Korean society definitely will be institutionally more sober and robust, once its door opened to foreign MNEs including those in the financial sectors

<Table 16> Top Problem Areas of Korea (IMD 1998)

	Weakest Areas		Weakest Areas
Internationalization	Protectionism(46), culture(46) Government procurement (45), Incentives for inbound FDI (42)	Finance	Presence of foreign institutions(46) Access to foreign markets(45) Capital cost(45), Central bank(44)
Government	Regulation (46), Legal frame(45) Transparency(43), Policy-making (40)	Corporate	Governance (46), Venture firms(43) Labor relations(43), Image(42)

Note: Rank is Korea's ranking out of 46 nations surveyed with higher ranking indicating greater weakness
Source: IMD, *The World Competitiveness Yearbook*, 1998.

Although a considerable improvement in framework conditions is well expected, it is not sufficient for the Korea's successful transition to an innovation-driven advanced economy with solid self-regenerating industrial ground. Foreign MNEs will surely play a vital role in re-invigorating and re-orienting the Korean economy

by bringing in capital, technology and an invaluable packet of core soft assets such as managerial know-how, work practices, and new rule of the games in accordance with 'global standards'. But with the continued upgrading of the Korean economy and others in Asia, the focal activities of MNEs in Korea will gradually move onto technologically more demanding, higher value-added areas such as advanced research and production of state-of-art products, which essentially implies that a much more advanced S&T infra and a substantive pool of SMEs up to some high technical standards are called for. Despite some notable progress made recently, however, the SMEs with innovation potentials are relatively small in numbers in Korea, and their R&D capabilities are quite limited. As the table below shows, R&D efforts in Korea are highly concentrated among the large-sized firms and around her two pillar industries: electronics and automobiles.

<Table 17> Korea's R&D Investment by Industry and Size

	Total	Types of Establishments (Numbers of Employees)			
		5-99	100-299	300-999	1000 +
All sectors	100.0	3.5	5.4	9.7	81.4
Manufacturing	84.5	2.8	4.6	7.3	69.8 (82.6)
6 Principal Industries	77.9	2.5	4.2	6.3	64.9(83.3)
·Electric/Electronics	36.6	0.9	1.5	1.6	32.6(89.1)
·Transport Equipment	25.9	0.1	0.5	1.9	23.4(90.3)
·Precision Machinery	0.7	0.2	0.3	0.1	0.1(14.3)
·Chemical Products	10.0	0.7	1.1	1.8	6.4(64.0)
·Machinery	3.6	0.5	0.5	0.7	1.9(52.8)
Construction	5.0	0.0	0.0	1.0	4.0(80.0)
TST	3.7	0.0	0.1	0.5	3.1(83.8)

Note: TST denotes 'Transportation, Storage, and Telecommunication' services.

Number in parenthesis denotes the R&D share of the '1000+ establishments' within each industrial group.

Although the present technical capacity of Korea's SMEs may be adequate enough to support themselves and MNEs for a while, it will be subjected to a serious challenge in time. Even when the ongoing structural reforms end up with an ideal success, a marked improvement in SME's performance is hard to expect, given the grave market failure elements intrinsic in the SME sector.

The structure and patterns of locational advantages in Asia are extremely volatile, especially due to the presence of a rapidly maturing and industrializing China. Korea's proximity to China could be her greatest fortune, or misfortune, depending on the temporal context and the readiness of Korea. Unless Korea greatly improve in this critical deficiency area in the upcoming 10 years or so, Korea's attractiveness factor to the foreign MNEs will decline fast, most of new FDI into the Far East will head toward China, and worst, a substantial part of core industrial activities residing in Korea now and for a while will be reallocated into China, including those activities undertaken by Korea's indigenous flagship companies themselves.

(2) Promoting SMEs: General Problem

The employment and output shares of SMEs in Korean manufacturing have persistently increased over the past two decades. There also has been some considerable structural upgrading of the entire SMB sector, with the shares of low-tech, labor-intensive products reduced in place for a mid to high tech products with more technology and skill contents. (Annex Table III-1).³⁸

³⁸ The structure of manufacturing SMEs in respect of their product composition is quite similar to that of the entire manufacturing sector. In 1995, for instance, 'machinery and equipment' occupied

<Table 18> Evolution of the Manufacturing SMEs in Korea

	1980	1985	1990	1995
No. of Establishment	29,779 (96.9)	42,950 (97.5)	67,679 (98.3)	95,285 (99.0)
Employees (thousand)	1,000 (49.6)	1,368 (56.1)	1,864 (61.7)	2,034 (68.9)
Value-added (Billion Won)	4,168 (35.2)	10,059 (37.6)	31,432 (44.3)	73,808 (46.3)
Productivity Differential	55	47.2	45.8	39.4

Note: Number in parenthesis is the percentage share of SMEs in total manufacturing sector in each category. Productivity differential indicates productivity of SMEs as a percent of productivity in companies with 300 or more employees

Source: National Statistical Office, Basic Survey on Korea's Manufacturing Sector, 1998

In line with such structural upgrading, the number of firms conducting some forms of R&D has increased explosively, and so have the numbers of their in-house R&D facilities and research personnel. Though small in number yet, an increasing number of innovative and proactive SMEs with technical competence started to emerge.

<Table 19> R&D of the Manufacturing SMEs in Korea

	1980	1985	1990	1993	1996
No. of firms Conducting R&D	2,982	5,630	6,758	5,645	7,084
(% share)	10.0%	13.1%	10.0%	6.4%	7.4%
R&D/Sales	0.13	0.22	0.25	0.42	0.34

the largest share of the SMEs' total valued-added (35.7%), which was followed by textiles and clothing (16.0%), chemicals (14.7%), and food processing (10.3%). Overall, just like the entire manufacturing sector, heavy and chemical industries far outweigh the light manufacturing in SMEs activities (62.4% vs. 37.6%) --- though the margin is somewhat smaller compared to the entire manufacturing sector (73.4% vs. 26.6%). The SMB sector has undergone a discernible structural change toward HCIs over 1985-1995. Over this period, the shares of relatively high value-added sectors such as 'machinery and equipment' have increased substantially while the shares of traditional SMB sector such as textiles and clothing have dwindled to a commensurate degree. It appears, however, such structural progress of SMB sector still fall short of that of the entire manufacturing sector both in speed and level. Taking the machinery and equipment for instance, while its share in the total manufacturing value-added has increased from 30.6 percent to 45 percent, its share in manufacturing SMEs' value-added has increased from 25.4 percent to 35.7 percent. This implies that SMEs have somewhat lagged behind the large firms in their structural transition to high value-added industries.

Source: Small and Medium Industry Promotion Corporation, Major Statistics of SMI, 1996.

Despite all these progressive changes, the innovative SMEs with independent and sustainable competitive base are rare. Most SMEs in Korea are engaged in the production of technologically unsophisticated parts and components under a passive subcontract relation with larger companies. Accustomed to low-cost competition for undifferentiated products in sheltered market, concern for serious innovation and R&D remains quite low. Only a minor proportion of SMEs conducts any R&D (7.4 % in 1996), and only a tiny amount of resources are invested for systematic R&D.³⁹ Even among the most innovative group, innovations center around minor product or process modification based on imported/borrowed technology, whereas more serious process innovations or product development incorporating new technological concept are rarity

Most Korean SMEs are in great peril indeed. Their ultimate competitiveness bases – ‘sheltered market’ ‘subcontract with leading domestic companies’ and ‘low-cost production’ will erode fast, facing a set of adverse forces such as market liberalization, globalization of parents companies, and relentless catching-up of the NIEs, especially China. Surely, there are some favorable changes for SMEs such as increased demand for differentiated products and availability of new low-cost information technologies. But most Korean SMEs simply lack the abilities to capitalize on them.

³⁹ Even this meager figure itself seriously overrates actual import and intensities of R&D by SMEs. According to one study, less than 2 percent of SMEs have the ability to carry out an independent R&D. Also although more than 8 percent of SMEs are engaged in some R&D reportedly, more than 60 percent of R&D conducting firms spend less than 3 percent of their revenue on R&D. For the SMEs as a whole, total R&D spending is as little as 0.3 percent of total turnovers.

While it is thus imperative to upgrade Korea's SMEs heroically, a new and creative approach is called for; even among the first-tier OECD nations, nurturing innovative SMEs remains a top policy challenge, and no universally-applicable best policy measures have been discovered yet. The backbone of Korea's SME policy at present remains to redeeming or alleviating the undue 'disadvantages' of SMEs against larger businesses through some direct resources support and market protection. As the experiences of many advanced countries as well as Korea's own testify, however, such redemptive and protective measures are not sustainable, and in fact run counter to the long-run interest of the SMEs themselves by undermining their incentives to build up independent capabilities to respond to environment changes.⁴⁰

The crux of the SME policy needed in Korea is to foster business environment conducive to the innovative activities of proactive SMEs, and to develop institutional components and arrangements needed to stimulate co-operative networking among all various parties involved. For SMEs, networking constitutes the best and the most economic mode of absorbing new scientific and technological information. A primary reason for paucity of innovative SMEs in Korea and their limited R&D capacity rests with the lack of formally organized networks and other specialized sources serving the similar function.

A form of networks of the highest relevance to Korea at this point is local networks engaging a school of potential innovators clustered in a specific territorial space ('industrial districts'). Local networking can result in huge efficiency gain

⁴⁰ The populist perception that a direct government intervention is required to rectify the disadvantages of SMEs has long been an ideological cornerstone of Korea's SME policy. The amended 1982 Constitution, for instance, states that the 'protection' and 'promotion' of small businesses shall be the government's 'responsibility' and 'duty'. Although Korea started to switch to more market-logic-oriented policy since the late 80s, emphasizing the selective nurturing of the innovative groups, the very backbone of the SME policy has not changed that much.

when combined with ‘spatial agglomeration’ of innovative firms with inter-related business interests. There are many agglomerated industrial regions in Korea. But with core components and key facilities imported from abroad, they are no more than simply specialized production areas void of intricate local linkages, extensive long-distance connections, and regional developmental dynamics.

(3) Promoting SMEs: the Case of the Machinery Industry

The importance of and the key policy issues related to developing a local network of industrial district may be best illustrated with respect to the general machinery industry. As a result of fast expansion since mid 1980s, the general machinery came to make one of the ‘core’ mid-tech industries of Korea, accounting for 7.8 percent of GDP and 6.2 percent of manufacturing exports in 1996. Technological capacities of domestic firms have been consistently improved as well, due to usual learning-by-doing, stepped up R&D efforts, and effective absorption of advanced technologies from Japan, US and Germany.⁴¹

<Table 20> The Characteristics of Korea’s Machine Industry by Firm Size (1993)

	Numbers of employees			
	5-9	20-99	200-299	300 +
Production share	16.9	30.7	15.5	36.9
Employment share	28.1	37.4	13.6	20.9
Establishment share	72.6	24.8	2	0.6
Productivity differentials	53 (49)	65 (62)	85 (79)	100

Note: Number in parenthesis refers to the productivity differential in 1983.

⁴¹ Moving into 1990s, some leading domestic firms started to make technical alliances with foreign companies to gain on design capability and to localize core parts and components. For instance, Daewoo Heavy Industries made technical alliance with Kawasaki Heavy Industries to develop its own industrial robot model. In collaboration with Toshiba, this company has also developed a sophisticated 32-bit CNC device for its CNC lathes and machining centers, which are currently on sale.

Source : National Statistical Office, Survey on Korean Manufacturing Sector, 1993

<Table 21> The Evolution of Korea's Machine Industry

	(Unit: million US dollars, %)			
	1986	1991	1993	1996
Production	4,948	24.11	25.017	51.921
(domestic manufacturing share)	(5.1)	(8.5)	(7.8)	-
(world production share)	(1.1)	(4.5)	(4.6)	-
Export	1.663	3.838	4.912	10.736
Import	4.847	12.69	11.321	26.463
Trade balance	-3.184	-8.852	-6.409	-15.727
(Trade balance of Korea)	(4.206)	(-6.98)	(1.86)	(-15.306)
Domestic market share	40	61.5	63.9	60.8
Export/production	33.6	15.9	19.6	20.6

Note: domestic market share of domestic makers = (production- export)/(production + import- export)

Source: reproduced from Woo and Lim (1998)

The general machinery industry is in a perilous situation today, however, as the market environment becomes more challenging. Despite considerable progress, the accumulated technological capability of domestic firms is insufficient, and the majority of SMEs are engaged in joint-production of low-end machinery and commodity-type parts and components.⁴² The technology level for R&D, design, and new product development is low by international standards, even among the leading Korean SMEs (Table 22). Many small machinery firms have managed to survive under the shelter of so-called 'Import Source Diversification Program', but

⁴² Export have increased steadily, but as imports of high-end products continued to increase sharply to keep pace with facility investments in the manufacturing sector, the trade deficit in general machinery remains huge and rising. In 1996, the deficit in this industry reached \$13.9 billion, which in turn amounted to 91 percent of Korea's total trade deficit that year.

the recent phasing out of such protective measures leaves them on their own to handle unchecked competition from Japanese producers.⁴³

<Table 22> Comparison of Machinery Industry: Korea and Germany (1993)

Firm Size (No. of employees)	Employment Share(%)		Relative Productivity (%)	
	Germany	Korea	Germany	Korea
20 99	18.9	36.3	59.8	23.9
100 299	24.1	15.5	67.4	30.8
300 499	13.0	6.1	69.6	29.6
500	44.1	42.2	100.0	59.5

Source: Reproduced from J.K. Park(1997)

Although this new market environment poses a grave threat to many individual domestic firms in the machinery industry, it may also present the opportunity for the industry as a whole to pursue a new mode of industrial development. The rapid expansion of the Asian market (ASEAN and China) for those mid-quality machine products in which Korean companies have a comparative advantage is the source of opportunity. Although Korean companies do not have the advanced skills and technologies to compete in the major OECD market for spearhead products such as automation facilities and CAD/CAM, they can stay competitive in lower quality, more price-sensitive products for which there will be increasing demand from many Asian nations. The small domestic market has been a critical constraint to the emergence of specialized machine makers in Korea. The rapid expansion of the Asian market will

⁴³ There also has been a naturally protected low-end market due to proximity to users, cheap cost of production and the language barrier. This market is gradually fading away too. With the advance of transportation and communication, foreign firms are at near parity in terms of speed of getting access to users' needs and the cost of A/S service. Most of all, the low price market which has been dominated by domestic machine producers will be challenged by cheap machines from the second tier NICs such as China and Malaysia as well as those from some transition economies in Eastern European region such as Czech republic, Poland and others.

ease that constraint and create the opportunity for innovative Korean firms to upgrade their competitive base against an ample, yet unoccupied market.

<Table 23> Comparison of Competitiveness of Machinery Industries (Korea = 100)

	Japan	Taiwan
Price	153.6	104.0
Quality	107.2	91.1

A new policy approach and stalwart policy leadership are called for if this opportunity is to lead to the upgrading of Korea's entire machinery sector. Firms in the machine industry tend to interact closely at the local level, exchanging tacit knowledge about production processes and components and also providing markets for each other. Because network externalities at the local level are so crucial, SMEs in the machine industry tend to locate in industrial districts. Countries with a strong machine industry have industrial districts with innovation networks, the representative model of which is Baden-Württemberg, Germany.

Korea has some specialized industrial districts where several firms produce machines and machine components, but neither the resident firms nor the local public sector have taken the initiative to form innovative network linkages.⁴⁴ In principle, the development of innovation networks requires action at the local level, and the initiative to develop a dynamic industrial district needs to be led by some local champion, whether it is an individual firm or public authority. Such a local initiative or leadership is unlikely to spring up in Korea in the foreseeable future.

⁴⁴ Though firms are located in the same district, the linkages and interactions among the resident firms are quite limited because they import most core components and technologies from abroad.

First, the few innovative Korean firms that could be active networking participants are spatially dispersed across disjoint regions. If it is necessary to agglomerate innovative firms in a single industrial district in order to achieve a critical mass, then the central government should take on the task to create such a precondition.

Second, in addition to the spatial agglomeration of existing firms, the new type industrial district is an intricate institutional complex involving diverse modes of business transaction, interest co-ordination, and private-public partnership, but no Korean firm or public authority has a practical vision for such an industrial complex. Rather than Korea attempting to develop such vision by trial and error, it might be less costly to call on established leaders with extensive, in-depth operational experience to set up such an industrial district. Specifically, the complex of machinery industry firms in Baden-Württemberg presents a promising place to find such leaders. Indeed German entrepreneurs would likely find this an attractive opportunity, considering the rapidly growing market in China (and in other Asian NIEs) and the mounting pressure from their Japanese competitors. Given the present locational advantages of Korea as against China discussed earlier, German machinery and machinery-related companies seeking a location for new regional business platforms in East Asia should find Korea attractive.

In order for Korea to get the most out of this situation, it needs to attract not just individual German firms, but an entire cluster of German machinery companies as a collective unit. To accomplish this requires a strong, concerted scheme of incentives. A policy initiative at the local government level would not suffice. The central government, in close consultation with local governments, needs to assume an active role in this precedent-setting endeavor.

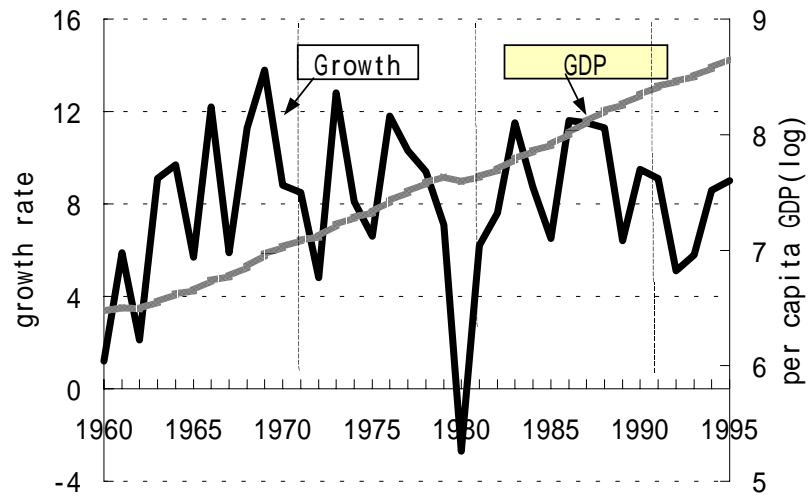
It may take more than a decade to establish a machinery industry complex in Korea. Getting all basic institutions and core interface arrangements in place calls

for collaborative initiatives and coordinated, systematic efforts by the central government, regional authorities, and businesses. In its formative stage the district will surely not be as effective as established ones in other advanced nations due to deficiencies in the quality of participants, external linkages, and collective intangible assets. Nonetheless, successful launching and gradual phasing-in of a machinery industry district could be an epochal event for the entire Korean economy. It would give a big boost to Korea's arduous endeavor to foster a competitive machinery sector. In addition, it could have a huge diffusion effect by providing a model of industrial and regional development that could be emulated by other stagnant industries such as textiles and apparel and fine chemicals.

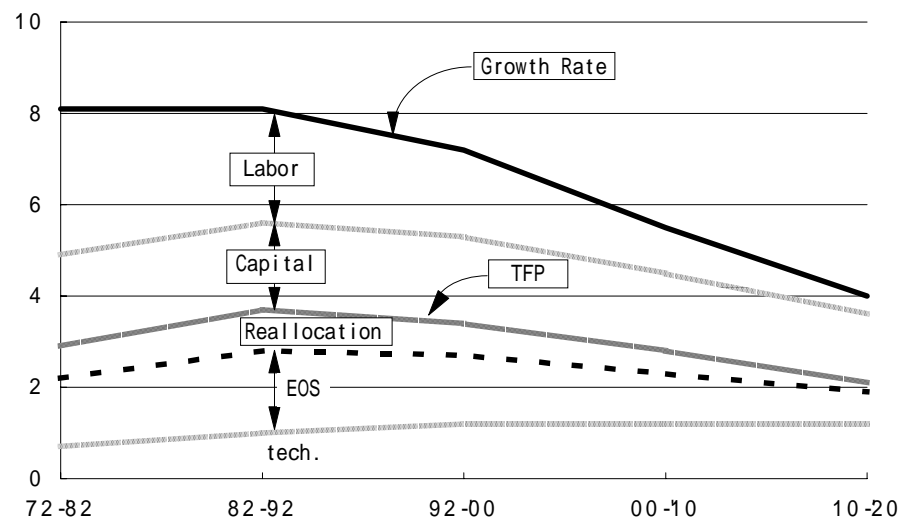
Although 'innovation' has become a buzzword in Korea these days, neither the practical meaning nor the impending policy implications of this word appear to be properly understood. Put bluntly, the gist of 'innovation' is collaborative networking among various parties subjected to common competitive pressure. Accustomed to input-driven growth and input-based competition most Koreans perceive innovation, instead, as a kind of individual output that merely requires more individual ingenuity or more stand-alone R&D effort. Although pouring in more R&D resources will surely make the Korean economy somewhat more innovative, there is a clear limit to a purely input-based model of innovation. Probably the greatest expected payoff of the new model of industrial district would come from the culture of collaborative and synthetic networking that it would create. At the present critical stage of industrial upgrading and evolution the Korean economy badly needs to build this kind of networking environment.

< Figures >

<Figure II-1> GDP and Growth Trend

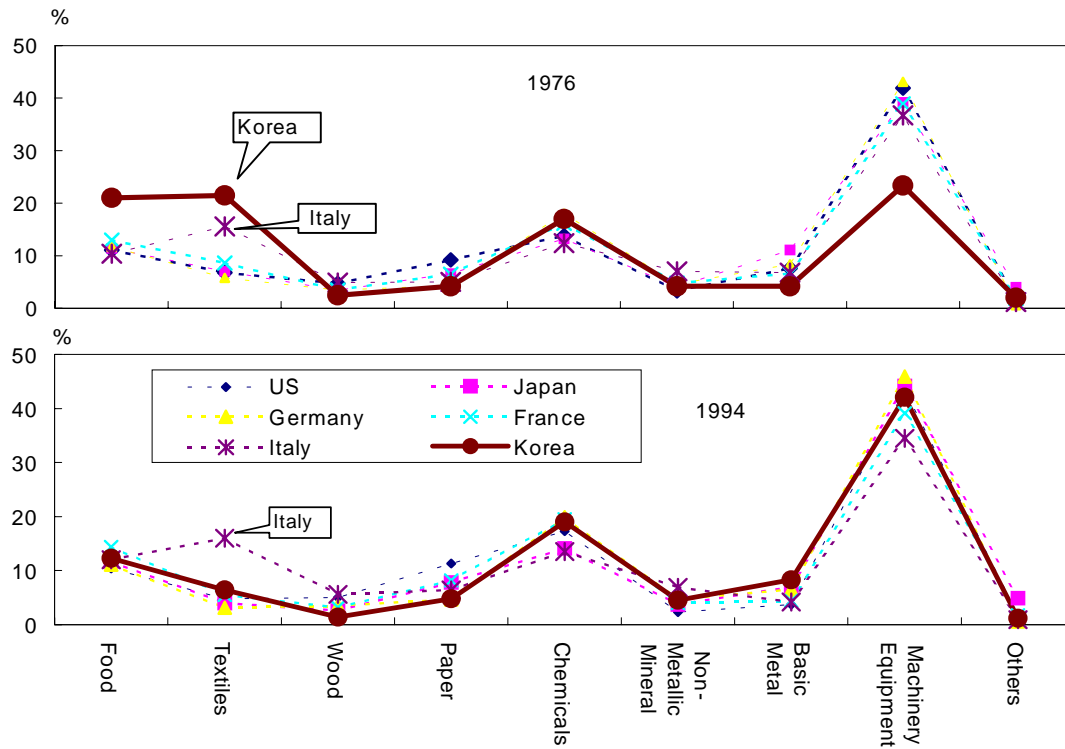


<Figure II-2> Sources of Growth: Korea (1972-2020)

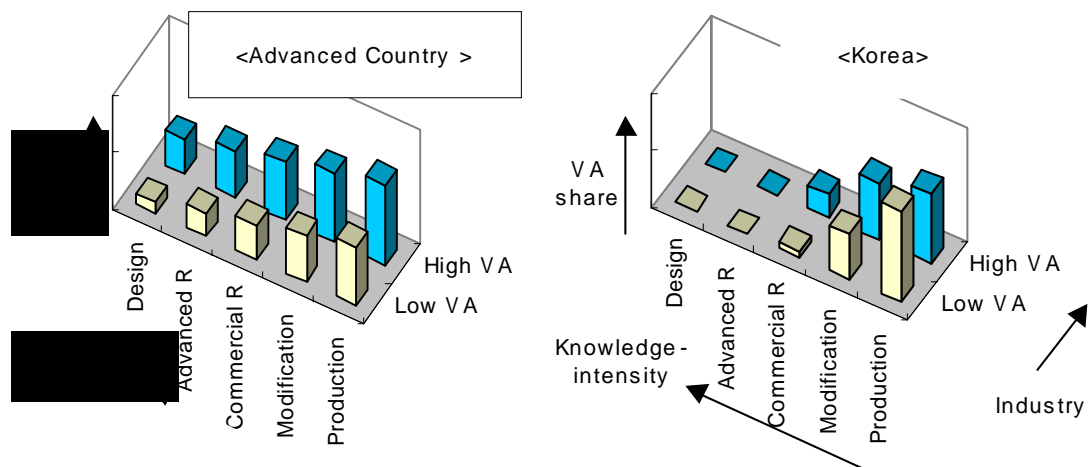


Source: Table 5

<Figure III-1> Value Added Share by Industries and Countries (1976, 1994)

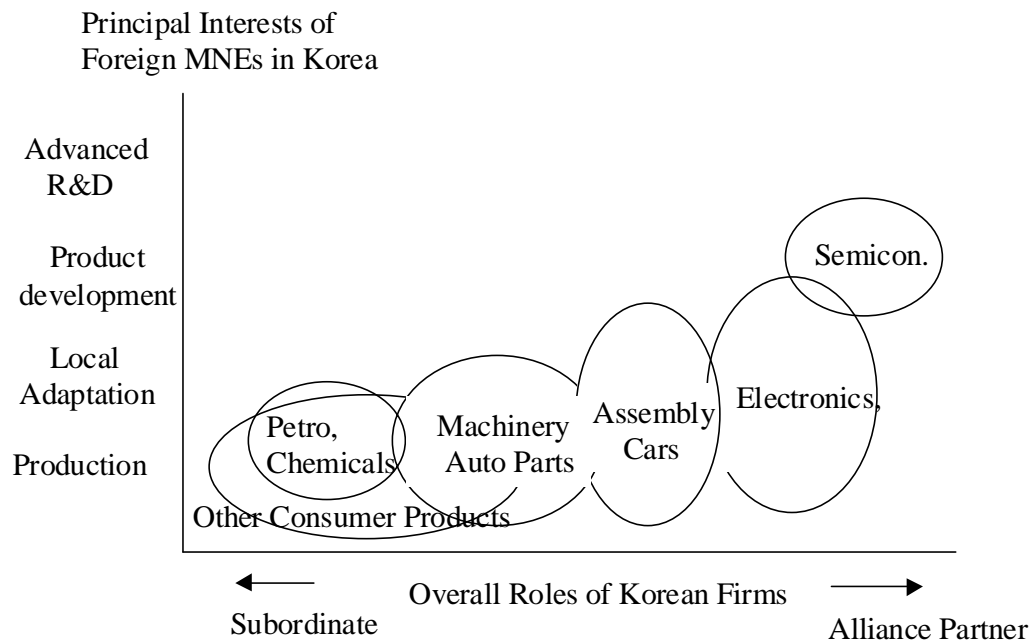


<Figure III-2> Gap in Knowledge-Intensities: Charaterization



<Figure III-3> Positions of MNEs and Korean Domestic Firms:

Conceptual Characterization



< Annex Tables >

<Table A II-1> Growth Rate by Industrialization Phase

(%)

Phase	1963-1972 (Take-off)	1973-1979 (HCI drive)	1980-1989 (Rationalization)	1990-1995 (Liberalization)	1963-1995
Growth Rate	8.93	8.87	9.00	7.48	8.47
(per capita GDP)	6.46	7.14	7.70	6.51	6.79

<Table A II-2> Growth Accounting and Long-Term Growth Projection

(per cent)

	72-82	82-92	92-00	2000- 2010			2010- 2010		
				Base	Low	High	Base	Low	high
Actual Growth	7.1	9.5							
Cyclical factor	-0.7	1.3							
Potential Growth	8.1	8.1	7.2	5.5	5	6	4	3.5	4.4
Inputs	5.2	4.4	3.8	2.7	2.6	2.8	1.9	1.8	2
Labor	3.2	2.5	1.9	1	1	1	0.4	0.4	0.4
Capital	2	1.9	1.9	1.7	1.6	1.8	1.5	1.4	1.6
Productivity	2.9	3.7	3.4	2.8	2.4	3.2	2.1	1.7	2.4
Resource- Reallocation	0.7	0.9	0.7	0.5	0.4	0.6	0.2	0.2	0.3
Scale Economy	1.5	1.8	1.5	1.1	1	1.2	0.7	0.5	0.7
Technology	0.7	1	1.2	1.2	1	1.4	1.2	1	1.4

Note: base = base growth scenario; low = low growth scenario; high = high-growth scenario.

Source: Long-Term Growth Projection of Korea, KDI, 1996 (unpublished internal source)

<Table A III-1> Structural Changes in Korean Manufacturing

(percent share in total value-added)										
	Manufacturing Total					SMEs				
	1975	1980	1985	1990	1995	1975	1980	1985	1990	1995
1. by embodied technology										
High-tech	10.7	12	15.7	19.1	22.7	6.5	10.2	12.6	14.8	13.4
Mid-tech	17.7	22.4	23.1	30.1	30.9	20.2	24	25.7	29.2	31.3
Low-tech	71.6	65.6	61.2	50.8	46.4	71.3	65.9	61.7	56	55.3
2. by OECD S&T classification										
Resource-Intensive	39.6	33.1	28.8	24.9	22.9	39.8	32.1	28.9	25.1	25.3
Labor-intensive	26.3	24.6	22.5	18.8	16	29.1	31.6	31.5	28.8	25.9
Specialized Supplier	9.1	11.5	16	21.3	26.9	8.8	10	12.8	17.6	19.6
Scale-Intensive	21.3	26.9	28.7	30.9	30.3	18.8	21.5	21.2	23	24
Science-Based	3.7	3.9	4	4.1	3.8	4	4.8	5.5	5.4	5.1

<Table A III-2> Industrial Structure by Product Type (1994)

	Korea	US	Japan	Germany	Italy
Resource-intensive	22.9	27.1	26.1	26.9	28.0
Labor-intensive	16.0	13.6	14.8	13.7	26.2
Specialized-suppliers	26.9	19.2	24.0	20.4	16.1
Scale-intensive	30.3	27.2	27.9	31.8	23.5
Science-based	3.8	12.9	7.2	7.2	6.2

<Table A III-3> International Comparison of Manufacturing SMEs

	Korea		Japan		Taiwan		US	
Share in	1991	1994	1991	1994	1990	1994	1886	1992
Establishment	98.5	99	99.1	99	98.3	97.8	98.7	98.6
Employment	63.5	69.1	72.1	71.5	66.7	81.1	63.0	38.2
Production	44.5	46.3	51.8	51.4	54.0	37.1		
SMB Definition	Employee 5-299		Employee 4-299		Capital < 40 & Assets < 120		Employee < 500	

note: all numbers are percent shares of SMEs for each category

source: Reproduced from Woo and Lim(1998)

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