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Private-public alliances for export development: the Korean case

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Santiago, August 2010

This background document was prepared by Yoo Soo Hong, Consultant of the Division of International Trade and Integration, Economic Commission for Latin America and the Caribbean (ECLAC), within the activities of the study “Public-private alliances for innovation and export upgrading”, coordinated by Robert Devlin and Graciela Moguillansky, with the financial support of the Government of South Korea, through the project "Building Long-Term Strategies and Public-Private Alliances for Export Development: The Experience of the Republic of Korea".

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United Nations Publications
ISSN printed version: 1680-869x
ISBN: 978-92-1-121730-8
LC/L.3163-P
Sales No.: E.09.II.G.137

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Abstract

The present report explains the development path of Korea, from a country which started its development with a lack of natural resources, industrial facilities, sufficient foreign reserves and business experiences and with human resources as its only productive factor at the disposal, to its successful technological catch-up, export performance and economic development. The study clarifies this development by concentrating on the formulation and implementation mechanism of development strategies and policies with the emphasis on trade; the technological capability building process and institutions, and the innovation and internationalization policies for SME. The study shows the case of a strong government leadership in the early stage of development and the increasing role of market mechanism and public private partnership when the economy becomes more complicated and diversified.

I. Introduction

For the past several decades the East Asian economies have outperformed over the Latin American economies. Although some Latin American countries are doing better in the recent period, there are still wide gaps and differences between the two regions in economic development process. It seems that both regions today pursue outward-looking strategies and well recognize the importance of technological capability building as the core factor for enhancing international competitiveness. Latin American economies have adopted and tried benchmarked institutions and policies from successful economies. However, it seems that there are still some missing factors in their efforts.

This report tries to find some helpful benchmarks for Latin American economies from a case study of Korea, which is known as a successful economy in terms of technological catch-up, export performance and economic development in general. For that purpose, we will focus on the implementation mechanism and capacity of strategies and polices in particular and the process of formulation of strategies and policies in general.

The genuine economic development in Korea started from the 1960s when the government under military power launched the first Five-Year Economic Plan. As economic conditions and political regimes changed over time, the economic development strategies and performance have undergone through unsmooth ups and downs. The past five decades can be distinguished by two periods with different characteristics: the imitative catching-up period and the innovative catching-up period. The former is named as the Phase-I Period and the latter is the Phase-II Period in this study. Because Latin American economies share similar characteristics and conditions of both periods in Korea, it is useful to consider the key factors in each period in Korea to derive more practical and useful implications. The

Phase-I Period in Korea covers approximately the period from the1960s through the 1990s. The Phase-II Period covers the period from the 1990s.

The study deals with three issues: (1) formulation and implementation mechanism of development strategies and policies with the emphasis on trade, (2) technological capability building process and institutions, and (3) innovation and internationalization policies for SME. Literature survey, interviews with experts, government officers and field survey of leading organizations were undertaken for the study. Reflecting these, this report consists of chapters corresponding to the study issues. In addition, a brief review of political regime changes is introduced with the assumption that Development should be understood as a political economic process rather than purely economic process. Perhaps this is the most important fact that any developing country, including Latin America, should realize.

1. Growth and industrial transformation

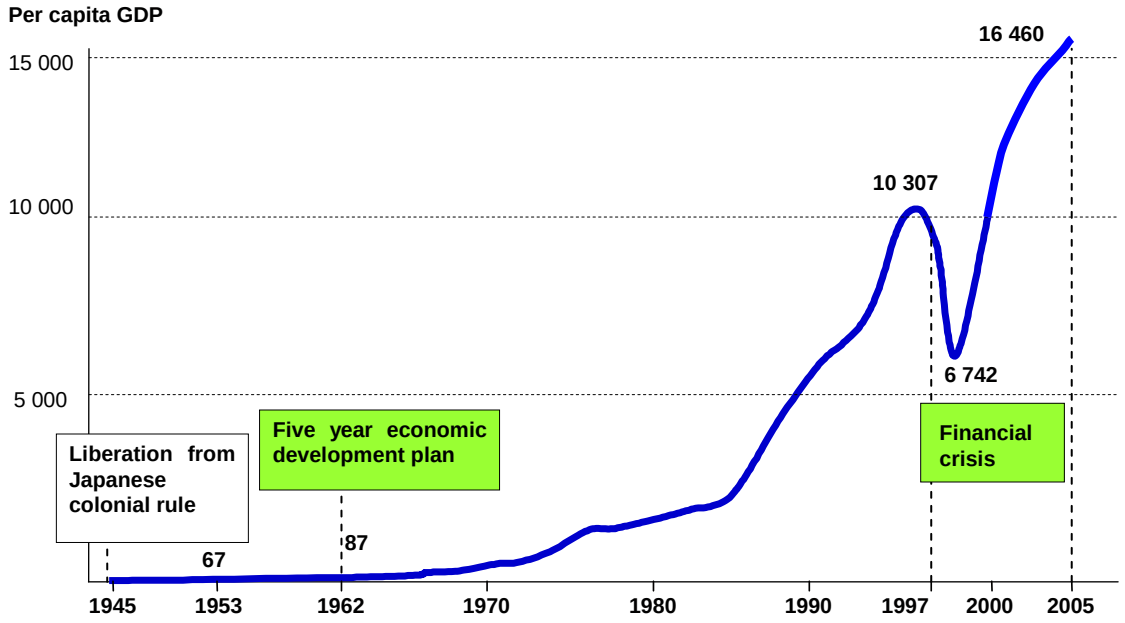
When Korea started its first Five-Year Economic Plan in 1962, the only productive factor at the disposal of the economy was human resources. The Korean economy at that time lacked natural resources, industrial facilities, sufficient land (for extremely high population density), foreign reserves and business experiences. Even worse, the country was divided in two, the North and South Korea. However, through heavy and aggressive investments in education, training, i.e. HRD, and borrowing foreign capital, Korea could overcome the barriers, although the development process has not been so smooth. Human resource was the key factor for the Korea's economic development for the entire period.

The Korean success also benefited from effective institutions. The Korean bureaucracy consisted of high quality university graduates with strong motivation. In the earlier part of the 1960s Korea had already created the Economic Planning Board (EPB), a powerful ministry in charge of planning, coordination as well as public finance. The Ministry of Commerce and Industries took charge in monitoring the export performance and in pushing the relevant parties to achieve the targets. In addition, visionary leadership forming an alliance with the technocrats was another important catalyst.

The Korean economy transformed itself from a poor country to one of the leading high-tech powers in the world within four decades. As shown in Figure 1, the take-off of economic growth in Korea started in the 1960s with the first Five-Year Economic Development Plan. Since then Korea has transformed its industrial structure and caught up with developed countries at a rapid speed. During the past four decades its achievements were remarkable to be hailed as a successful case for economic development. It reached per capita income of 10 000 dollars in 1996 and joined the OECD. It now produces many high-tech products and enjoys highest world market shares of some products.

In terms of GDP, Table 1 shows the trends in GDP since the 1990s. Although the growth performance had been outstanding before the financial crisis in 1997 and 1998, the annual growth rates from 2001 indicate that the Korean economy may lose growth momentum. Considering the level of the income per capita of the country, which has not reached the level of develop countries yet, the annual growth rate around 4 % is undesirable. Table 1 also shows the trends in trade in Korea in the recent period. Korea has enjoyed trade surplus almost every year since 1998.

FIGURE 1
GROWTH TREND IN THE KOREAN ECONOMY : 1945-2000
(GDP per capita, in american dollars)



Source: KDI

TABLE 1
TRENDS IN GDP IN KOREA[a]
(In american dollars)

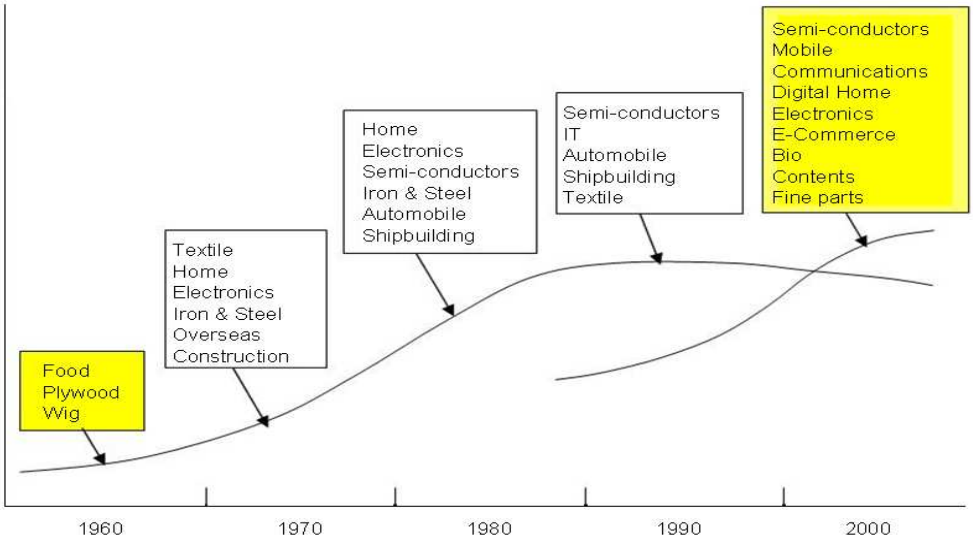
	GDP	GDP Growth Rate	GNI per capita	Exports		Imports		Trade Balance
	($ billion)	(%)	(US$)	($ billion)	Rate of increase (%)	($ billion)	Rate of increase (%)	($ million)
1990	263	9.2	6 147	65 016	4.2	69 844	13.6	-4 828
1995	517	9.2	11 432	125 058	30.3	135 119	32.0	-10 061
1996	557	7.0	12 197	129 715	3.7	150 339	11.3	-20 624
1997	516	4.7	11 176	136 164	5.0	144 616	-3.8	-8 452
1998	346	-6.9	7 355	132 313	-2.8	93 282	-35.5	39 031
1999	445	9.5	9 438	143 685	8.6	119 752	28.4	23 933
2000	512	8.5	10 841	172 268	19.9	160 481	34.0	11 786
2001	482	3.8	10 160	150 439	-12.7	141 098	-12.1	9 341
2002	547	7.0	11 497	162 471	8.0	152 126	7.8	10 344
2003	608	3.1	12 717	193 817	19.3	178 827	17.6	14 991
2004	681	4.7	14 206	253 845	31.0	224 463	25.5	29 382
2005	791	4.2	16 413	284 419	12.0	261 238	16.4	23 180
2006	887	5.0	18 372	325 465	14.4	309 383	18.4	16 082

Source: Korea International Trade Association.

[a] Customs clearance basis.

Figure 2 shows the changes of major export products during this transformation process, which led the economic growth of the Korean economy. Starting from exporting plywood and wigs in the 1960s, the focus of Korean economy shifted to heavy and chemical industry in the 1970s and 1980s and later to high-tech industry such as semi-conductors, telecommunications and digital home electronics. The figure shows that the industrial structure reflected by top export products has shifted to high-tech industries over time. This situation was possible due to the catch-up strategies and R&D efforts largely by Chaebuls and big firms. The country invested in R&D as much as about 3 % of GDP, of which 75% was the contribution of the private sector.

FIGURE 2
TRENDS IN MAJOR EXPORTS IN KOREA



Source: KIET, SERI, etc.

2. Status of the Korean economy in the world

a) GDP

In 2002, the growth rate of GDP was 7,0 percent and in 2003, 3,1 percent, and 4,6 percent in 2004. In 2003, Korea's GDP was 605,2 billion U.S. dollars and ranked 11th in the world. The share of the Korean GDP of the world total was 1,7%.

GNP per capita was 12 030 dollars, 50th in the world. Boosted exports and increased investment in plant and facilities over the years, had become Korea the world's 11th largest economy in terms of GDP size in 2004, reaching 680,1 billion U.S. dollars.

b) Trade

Commodity export volume of Korea in 2003 was 193,8 billion U.S. dollars, shared 2,7% of the world total, and ranked 12th in the world. Import volume was 178,8 billion dollars, shared 2,3% of the world total and ranked 14th in the world. Export surged to 253,85 billion U.S. dollars on a customs-cleared basis in 2004, a 31,0 percent increase from 193,82 billion U.S. dollars in 2003. At the same time, imports rose 25,5 percent to 224,46 billion U.S. dollars. The trade surplus was 29,4 U.S. billion dollars in 2004.

c) Leading industries

Korea's leading export industries have accomplished considerable development and led the world market in these fields through the quantitative and the qualitative growth in recent years. Six leading industries in terms of world market share (rank): Shipbuilding (1st), Motor Vehicle (6th), Steel (5th), Petroleum-Chemistry (5th), Textile (5th), IT (Semiconductor 3rd, Digital Home Appliances 5th).

In the shipbuilding industry, Korea recaptured the world's top title in 2003, with exports of 11,1 billion U.S. dollars and a ship manufacturing volume of 7,2 million compensated gross tons. In 2004, exports jumped to 15,3 billion U.S. dollars with a ship manufacturing volume of 8,3 million compensated gross tons, maintaining first place. The total number of car exports stood at 1 509 546 units in 2002, while 1 814 938 units were shipped in 2003 and 2 379 563 units in 2007.

Major export items for the Korean IT industry include memory semiconductors, mobile telephones, monitors, liquid crystal displays (LCDs), personal computers and satellite broadcast receivers; while major import items include nonmemory semiconductors, transmission equipment and large computers. Korea's semiconductor industry has shown remarkable growth in the past 20 years and now ranks third in the world in terms of total production. For example, Korea has been the largest D-RAM manufacturing country in the world since 1998, emerging as the second–largest manufacturer in total memory semiconductor production, of which D-RAM constitutes a major portion.

In 2004, semiconductors, automobiles and wireless telecommunication devices expanded their share in exports more than 30 percent compared to 2003. Information and communications technology exports amounted to 46 billion U.S. dollars in 2002, up 20,2 percent from the previous year, with imports worth 30,7 billion U.S. dollars, an increase of 10,5 percent, resulting in a trade surplus of 15,3 billion U.S. dollars in the sector. Exports of IT products, which have grown every year since 1998, accounted for 29,4 percent of total exports in 2004, or 74,7 billion U.S. dollars.

The proliferation of wireless Internet services and the introduction of third-generation mobile communication services are contributing to growth in domestic sales of mobile phones. By the end of 2004, there were 36.59 million cell phone subscribers out of a population of 48 million. Despite late-comers' catching up such as China, Korea will be able to maintain its competitiveness in these areas for the time being by technological innovation.

d) Science and technology

Korea's prowess in science and technology has been growing steadily since the 1980s, as the country's rapid economic development has demanded more advanced and dynamic research and development activities.

Investment in technology have increased 20-fold from 480 million U.S. dollars in 1980 to 10 billion U.S. dollars in 2000, while technology investment per gross domestic product has soared from 0,84 percent to 2,68 percent during the same period. This growth has led to an increasing number of research papers registered with the science citation index and international patent applications.

In addition, Korea ranked 5th in the world on the science and technology achievement indicators developed by the U.N. Development Program, which takes into account patent registration, technology exports and overall education levels.

Korea's R&D investment in 2002 was 13,8 billion U.S. dollars, ranked 7th in the world. The ratio of R&D investment to GDP in 2002 was 2,5% and ranked 8th in the world. Furthermore, the number of researchers in 2002 was 190 000 which ranked 7th in the world. In 2004, R&D investment amounted to 19,3 billion U.S. dollars. The number of specialists engaged in science and technology has surged from 18 500 in 1980 to 210 000 in 2004.

To promote an economic upsurge by emphasizing science and technology, the Government promoted the Minister of Science and Technology to Deputy Prime Minister in October 2004 and launched the Science and Technology Innovation Office as a center for establishing a national technology innovation system.

II. Political regimes and achievements

1. Korea's political development and regime changes

Liberated from the Japanese colonization in 1945 and divided by the North and the South since then, South Korea (hereafter, Korea, otherwise distinguished) has experienced not only trial errors but also progress in political arena. Each regime is an outcome of the time and reflects people's aspirations in that time. In theory this is more so if the regime is democratic. However, this is not the case in reality. The recent history of Korea shows that a good political leader and the regime he or she represents could read people's aspirations even if they are not democratic, and a democratic regime and leader may not able to read people's aspirations correctly. In the following, each political regime since the 1960s is reviewed as the background, the evolution and development of the Korean industry and economy.

a) Push for industrialization and Park Jung Hee regime (1961-1979)

President Park's commitment to economic development was significant. Starting from the establishment of EPB and launch of Five Year Economic Plan, the government focused on building up efficient administration structure to support the ambitious plan for economic growth. The president every time emphasized the statistical goal for achieving substantial economic growth in production, export and construction to government technocrats, and allotted praise and punishment according to their

performance. The main policy that the regime put overriding priority and the management system for national administration is summarized as follows.

TABLE 2
PARK JUNG REGIME (1961-1979)

Main policy	Impact
National goal	Initiating industrialization and strong drive for economic development
Basic policy direction	Growth-first policy for national development
	Government-led policy implementation
	Export-oriented policy and the importance of trade performance
Reform of Bureaucracy	
• Expectation to Bureaucracy	• Entrepreneurial agent in executing economic development policy
• Stereotype bureaucrats	• 'Aggressive' entrepreneur
• Personnel Management	• Based on actual results and achievement
• First priority value	• Efficiency
Achievement	• Miraculous economic achievement
	• Entry into transition toward open/democratic society
Shortcoming	• Disminishing marginal utility
	• Misdistibution of wealth and power
	• Side effects from government-led development

Source: Han, Young Whan. (2007).

b) Liberalization reform and Chun Du Whan government (1980 – 1987)

One of the important missions for the government is to concern for the quality of the growth rather than the growth in size. At the end of Park Chung Hee regime, the Korean economy accumulated structural problems and destabilizing problems such as mounting external debts and inflationary pressure as a result of the HCI drive in the previous era.. Therefore, the government prioritized the rationalization and maturity of industrial structure, and, more importantly, made efforts on the liberalization so that firms can survive by fair competition in the market. However, the liberalization process is so complex and politically complicated work. President Chun Du Whan appointed an outstanding economic expert bureaucrat, Kim Jae Ik, as the key player, Minister of EPB, responsible for the economic reform. The president delegated him exclusive power to drive for the reform and protected him form the political pressure. As a result, the regime achieved stabilization of prices and improvement of saving rates, and had attained first trade surplus ever. The main measures for liberalization reform and the management system of national administration is like follows.

TABLE 3
CHUN DU WHAN GOVERNMENT (1980-1987)

Main policy	Impact
National goal	• Improve the quality of national economy
Basic policy direction	• Liberalization
	• Rationalize and enhance the industrial structure
	• Improve endogenous growth capability

(continues)

TABLE 3 (Concluded)

Reform of Bureaucracy	• Trustee for bureaucracy reform
• Expectation to Bureaucracy	• Commited bureaucrats
• Stereotype bureaucrats	• Professional expertise
• Personnel Management	• Efficiency
• First priority value	
Achievement	• Price stabilization and improvement of economic structure
	• Peaceful turn over of political power
Shortcomings	• Short of legitimacy in accession to power
	• High officials' moral hazard

Source: Han, Young Whan. (2007)

c) Democratization and Roh Tae Woo government (1988-1992)

In this period the prioritized concerns for the government were the introduction of the democratic idea in national administration and transition from growth-oriented policy to welfare enhancing policy. Therefore, Roh administration tried to expand decentralization by fostering grass-roots politics and enhance welfare system for people. However, Roh Tae Woo was not capable enough to efficiently manage the two national priorities. Frequent labor disputes and strong demand for wage raise together with deterioration of industrial competitiveness occurred. Roh Tae woo regime can be summarized as follows.

TABLE 4
ROH TAE WOO GOVERNMENT (1988-1992)

Main policy	Impact
National goal	• Transition to democratic society
	• Expansion of welfare system
Basic policy direction	• Democratic reform of national administration
	• Enhancement of welfare
Reform of Bureaucracy	
• Expectation to Bureaucracy	• Reduced role of bureaucrats as administrative leader
• Stereotype bureaucrats	• Hard working professional bureaucrats
• Personnel Management	• Expertise
• First priority value	• Principle of democracy and equity
Achievement	• Peaceful turn over to civilian government
	• Expand welfare benefits to lower class
Shortcomings	• Dilemma between welfare expansion vs improvement of growth potential
	• High officials' moral hazard

Source: Han, Young Whan. (2007)

d) Globalization and Kim Young Sam government (1992-1996)

The election of President Kim, Young-Sam ushered in a new era of civilian rule. Since taking office he worked hard to reform the widely criticized regulatory system through his "New Economy" and "Globalization" programs. The implementation of the Real-name Financial Transaction Act put a curb on financial corruption. Abut 2,000 rules and regulations were abolished or amended during President Kim's term.

Trying to create a more favorable environment for economic growth and foreign investment, the government liberalized many of the existing economic policies. Korea joined OECD in 1996 as a full member. By 1996, Korea boasted the world's 11th largest economy, with a per capita income of $10,000.

Yet despite the many contributions he made, Kim Young Sam government did not prevent the dismal economic situation in the last part of his term. With the accession to WTO and OECD, outside pressure on Korea to open its domestic markets to competitors had been increased. Finally, in 1997, Korea became the third Asian nation after Thailand and Indonesia to become a ward of the International Monetary Fund to escape from the Asian financial crisis. Kim administration's policy direction can be summarized as the following.

TABLE 5
KIM YOUNG SAM GOVERNMENT (1992-1996)

Main policy	Impact
National goal	• Establishment of "New Korea"
	• Responding to Globalization
	• Settling down the democratization
Basic policy direction	• Audit and inspection reform for launching "New Korea"
	• Globalization programs such as reform in election system and Chaebols, introduction of the real-name financial transaction
Reform of Bureaucracy	
• Expectation to Bureaucracy	• Passive role
• Stereotype bureaucrats	• Strong loyalty to the administration
• Personnel Management	• Political loyalty
• First priority value	• Principle of political morality
Achievement	• Progress in democratization
	• Extension of political morality
Shortcomings	• Financial Crisis in 1997

Source : Han, Young Whan. (2007)

e) Overcoming the financial crisis and Kim Dae Jung government (1997-2002)

Kim Dae-jung took office in the midst of the economic crisis that hit Korea. He vigorously pushed economic reforms and restructuring recommended by the International Monetary Fund, in the process significantly altering the landscape of the Korean economy. In effect, his policies were to make for a fairer market by holding the powerful chaebol (conglomerates) accountable, e.g., greater transparency in accounting practices. State subsidies to large corporations were dramatically cut or dropped. His administration is credited by some with overseeing a recovery from the Asian Financial Crisis although many believe that a recovery was inevitable and he actually hampered a full recovery. The main achievements are as follows.

TABLE 6
KIM DAE JUNG GOVERNMENT (1997-2002)

Main policy	Impact
National goal	• Overcoming the financial crisis
	• Drive for reunification
	• Expansion for welfare society
Basic policy direction	• Restructuring process in public, finance, business and labor sector
	• Promote détente mood between North and South Korea
	• Expansion of social safety net and insurance system
Reform of Bureaucracy	
• Expectation to Bureaucracy	• Subject for reform
• Stereotype bureaucrats	• Politically and regionally related bureaucrats
• Personnel Management	• Political loyalty and regional connection
• First priority value	• The principle of equity and innovation
Achievement	• Successful overcoming of the crisis
	• Significant achievement in restructuring process
	• Easing tensions between North and South Korea
	• Progress in welfare expansion
Shortcomings	• Dilemma between improvement of national competitiveness vs. unividdation and welfare
	• Lack of initiative organization for policy implementation

Source : Han, Young Whan. (2007)

f) Government-business relationship and economic development

In the earlier stage of economic development in the 1960s and 1970s, the Korean government claimed to stand 'guided capitalism,' which refers to government direct and indirect interventions in the economy. The Korean government initiated many of the economic policies such as development of strategic industries, export-oriented growth, foreign loans and control of foreign direct investment. In a nutshell, Korea formed a giant Korean Inc. Government-led growth strategies can be summarized as follows:

- Growth first, distribution later.
- Focus on selective strategic industries and supplement the shortage of domestic savings by foreign capital.
- Aggressively promotes export growth by supporting it in every aspect.
- For successful implementation of the strategies mentioned above, the government manages different incentives and regulations. In fact it commands and directly intervenes in the national economy.

TABLE 7
GOVERNMENT INTERVENTION SCOPE, TOOLS AND COMPARATIVE STRENGTH

Area	Tools for intervention	Comparison with United States and Japan
Intervention in resource allocation	Decide the investment and interest rate	Very Strong

(continues)

TABLE 7 (Concluded)

Government ownership in means of production	Share of State-owned enterprise and nationalization of key industries	Strong
Regulation on scope of business	Regulation on merger and abolition, authorization and permission	Very strong
Regulation on business integration and business activities	Restriction on monopoly and oligopoly	Weak
Regulation of business management	Regulation on price, wages, labor union	Strong
Support for business sector	Fund, tax incentives, information	High
Tax/Distribution Polity	Tax rate for business; Levies of quasi-tax	Weak Strong

Source: Han, Young Whan. (2007)

The close relationship between government and business sector was successful to achieve fast economic growth. It was possible owing to the following circumstances:

- The basis for business growth was the increasing, efficiency through economies of scale. Social infrastructures such as electricity, telecommunication, harbor, and road as well as heavy industries are good examples for taking advantage of economies of scale. Therefore, government can easily justify its intervention either through barriers of entry regulated by it or through protection of big firms to secure monopolistic position.
- Industries that highly contributed to economic growth in the 1960s~1970s were big business, which required government-guaranteed foreign capital and imported facilities and technologies rather than in-house innovation.
- Under the circumstances that Korea was in short of basic commodities for living, standardized products for mass production were enough for the Korean market.

However, the government-led policy started to reveal its weakness from the late 1970s. It caused unbalanced growth between large enterprises and small- and -medium enterprises, and unbalanced wealth distribution. In addition, the private sector more focused on lobbying activities to strengthen the connection with the government rather than technology development activities, which later resulted in the withering business innovation, deteriorating consumers' benefits, and increasing burden to the government.

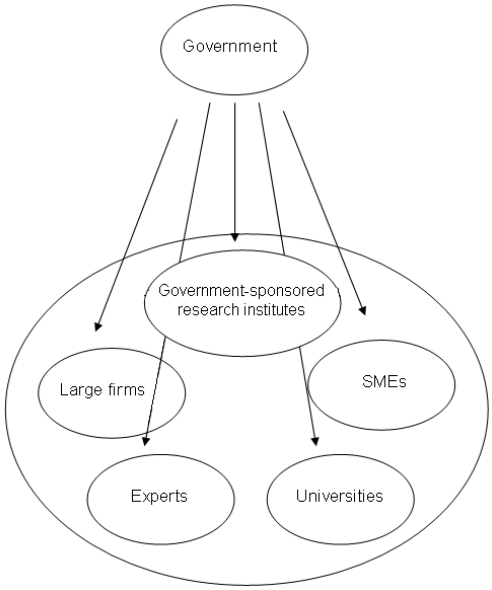
III. Development strategies, institutions and trade

1. The process of formulating national strategies and policies

Although Korea reached the income level of US$20,000 per capita recently, it is still catching up with developed countries. The entire catching up period in Korea can be distinguished by two: the Phase –I Period and the Phase-II Period. The former period is characterized by the factor-based growth and the latter is characterized by the efficiency-based growth (Porter). Reviewing both periods is more relevant for the derivation of implications for Latin America where some countries are in the earlier stage where as some others are in the later stage and the rest have characteristics found in both stages.

Under the Phase-I Model, the relationship and interactions between the public (government) and the private (business) in Korea were characterized by a top-down (hierarchical) system where the government directed and guided major economic agents, for the implementation of the Five-Year Economic Plan, which were formulated by the government with the joint-work of government bureaucrats and civilian experts. Thus, the horizontal interactions among major economic players were not developed, and the authoritative government treated the private sector on the basis of the 'divide and rule' method.

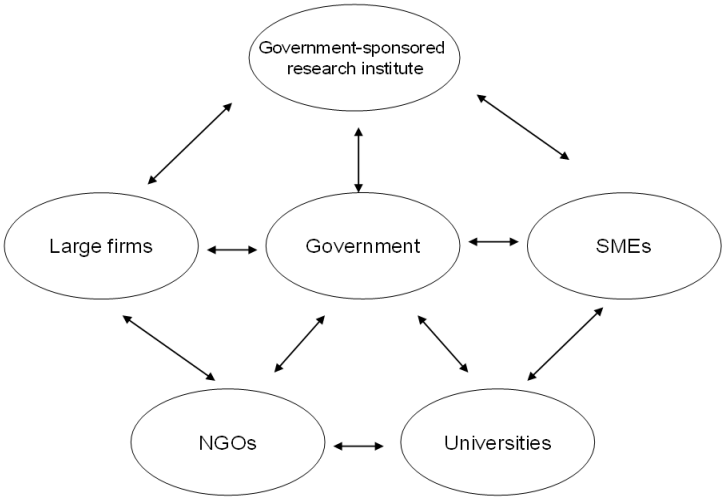
FIGURE 3
HIERARCHICAL RELATIONSHIP



Source: Author

Under the Phase-II Model, the horizontal relationship between the major players is expected. However, the ideal cooperative horizontal relationship has not been fully developed yet. Korea is now in a transition period.

FIGURE 4
HORIZONTAL RELATIONSHIP



Source: Author

Is there a stable and institutional public-private cooperation partnership mechanism in Korea? Except for the short-period of the tripartite coalition committee that was established during Korean financial crisis in the late 1990s, and ad-hoc basis special task teams for some national agendas, there is

no such a formal partnership mechanism in Korea today. This close relationship between the government and Chaebols in the Phase-I Model period of the 1970s, was not such a partnership in the true sense, but an imposed one by the authoritarian government.

Today the scale of the Korean economy and the diversity of the Korean industries do not make it easy to form such an ideal partnership. In this sense, there is a big difference between Korea and Japan. Japan still maintains its world-famous 'consensus-making' practice between the government and the business sector. The Korea economy, especially the trade sector, is still dominated by Chaebols and large enterprises. Although SME are gaining their importance and strengthening competitiveness, they are not the leaders but followers.

In Korea, there is no stable formal public-private partnership mechanism, but only ad-hoc partnership activities. For example, delegates from the Federation of Korean Industries (FKI), the Korea Chamber of Commerce & industry (KCCI) and industrial associations are asked to form or join in a task force such as FTA feasibility study team. For the formulation of a long-term industrial development strategy, some experts or delegates from the private sector organizations participate in as planning committee members. These participants are invited by the government. The government selects and recruits them according to the recommendations of government officials or by searching. In most cases, these experts or delegates from the private organizations act passively in the task force meeting.

This fact does not necessarily imply that the private sector organizations themselves are passive in policy or strategy formulation. Rather, they voice their opinions and put great efforts to influence the policy formulation process of the government. The point is that these efforts do not necessarily imply the partnership relations with the government or the public sector. Rather, it means there are interest groups that put more weights on their members' interests. Thus, the interaction among organizations and between the public sector and the private sector are more of competition rather than cooperation.

Figure 5 shows those organizations or agents in Korea that influence trade activities and policy. In the case of the public sector, only three ministries among 17 ministries are included in this report because these are relatively more important ministries in terms of trade and innovation. Government-sponsored research institutes or corporation-type organizations are also included in this category. In the case of the private sector only those associations that are not individually industry oriented, such as FKI, KCCI or KTA are treated. The academic sector or NGOs are excluded from the case study.

An example of interactions among these organizations can be shown for the current trade policy regime in Korea as follows:

Main directions of Korea's trade policy

- Active participation in the DDA negotiations,
- strengthening regional economic cooperationn
- expanding free trade arrangements,
- maintaining sound bilateral trade relations,
- trade policy coordinating bodies.

Trade Policy Coordinating Bodies

- Individual ministries (executive branches of government),
- Minister of Trade (Ministry of Foreign Affairs and Trade),
- Council for Foreign Economic Policy Coordination.

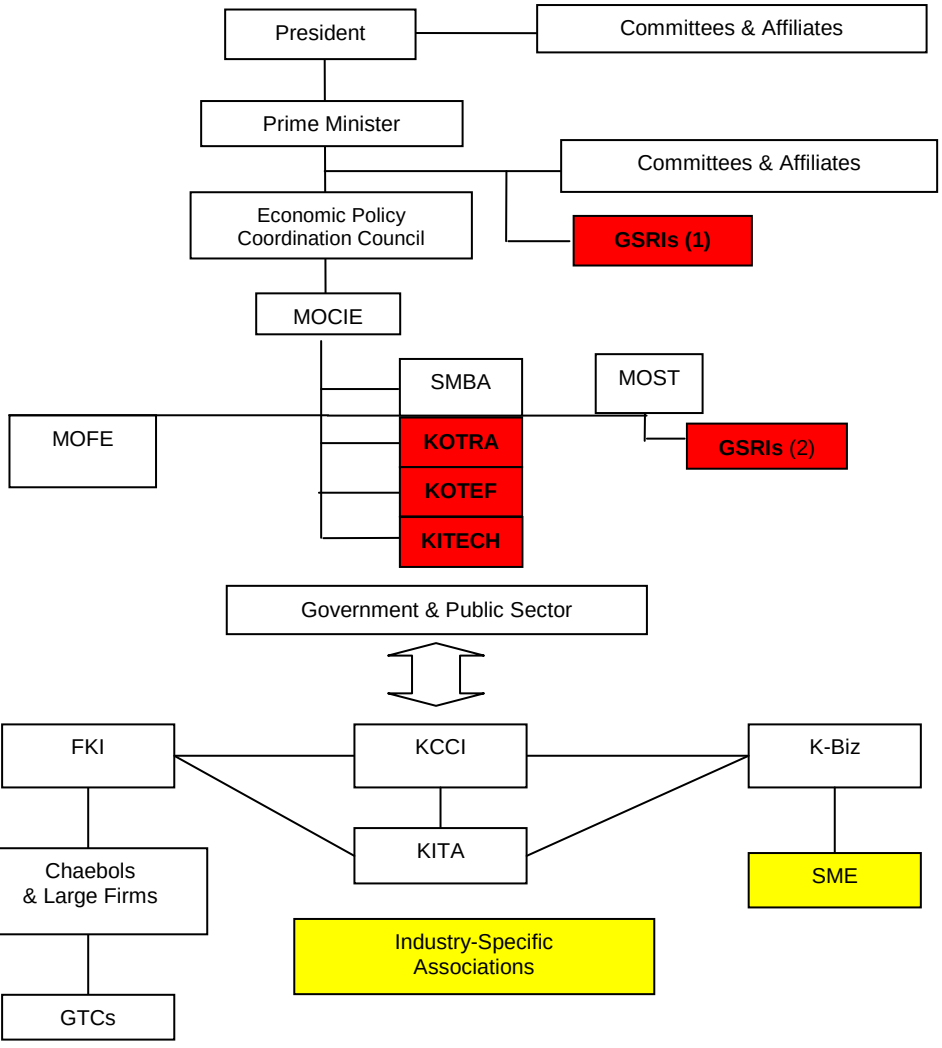
Trade Policy Advisory Agencies/Groups

- Government-funded research institutions (KIEP, KIET, KDI, etc.),
- private economic research institutions (Samsung, LG, Hyundai, KERI, etc.),

- business associations (FKI, KITA, KCCI, etc.),
- NGO (farmers, environmentalists, workers, consumers, etc.),
- universities.

Park Jung Hee regime employed the most qualified technocrats in the Economic Planning Board, who are equipped with expertise and authority in the field. They were in charge of planning and executing economic development as well as coordinating and controlling the overall economic policy. They were completely protected from external pressure from politics and various interest groups by the government. The Economic Planning Borad's authority rights with regards to economic policy made possible the efficient work that precede the economic development policy. Meanwhile; however, they interrupted the coherent execution of economic policy by making sudden changes and got into troubles because of hasty policy implementation without thorough preparation.

FIGURE 5
AGENTS AND ORGANIZATIONS INCLUDED IN THE CASE STUDY [a b]



Source: Author, based on official information
[a] The yellow colored are not reported in the report.
[b] The red colored are government-sponsored public organizations.

During Park regime, many presidential consultative bodies were created. The Council for Economy and Science was one of them. It was established in 1963 with the mission to advise on policies related to economic development and science promotion. The Council for Economy and Science was organized by permanent committee members as well as non-permanent members having similar functions to the Council of Economic Advisor in the U.S. The meeting was hosted by the president himself, which caused some conflicts with each economic ministries and offices because of the different policy direction.

Another example is the Policy Evaluation Faculty Group, which was created the year before the five-year Economic Plan was launched in order to objectively examine, analyze, and evaluate the government's policies. Initially, in 1966, the group consisted of 14 professors increasing its members up to 90 in 1972. Experts on Economy, Engineering, Natural Science, and Agriculture were gathered to work together, and later on professors of Politics, Law and even Literature were added. The Policy Evaluation Faculty Group had checked out the stages of economic development and devised solutions for various problems caused in the process of economic development. Since 1972, the group had even touched various side effects resulted from the fast economic growth, such as administration management, social welfare, and education.

Responding to the withdrawal of one U.S. Army stationed in Korea according to Nixon Doctrine and oil crisis in 1973, President Park, firstly, urged to promote heavy industry as a base for self defense, so in 1973, the president created the Heavy Industry Promotion Committee. In addition, the president commanded the establishment of the Committee for Long-term Measures for Resources, which had provided advisory sources for long-term resource policy, resource utilization, and resource exploitation.

a) The president chaired meetings

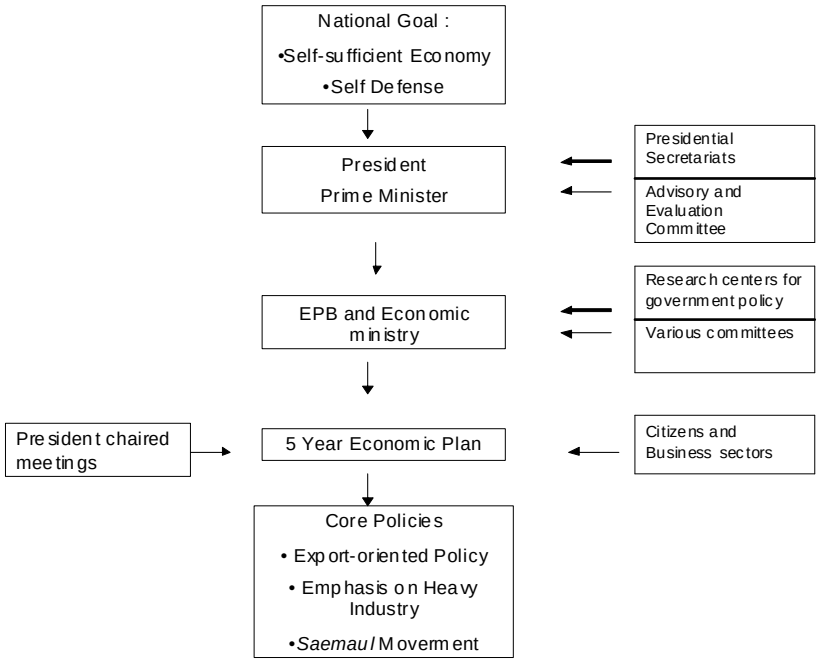
During the Park regime, the president himself chaired various meetings. For example, the president chaired most of the monthly meetings of the Trade Promotion Committee. The main agenda for the meeting was the trade promotion strategies, trade goal, and trade trend analysis as well as the trade barriers. The president's strong drive for export-oriented policy and trade expansion encouraged collaborations among ministries and between public and private sectors.

In 1964, the meeting aimed to evaluate economic policy was chaired by the president. During the meeting it was discussed how to revise and complement the five-Year Economic Plan in which the president had often directly commanded cases of urgent issues. Policy Evaluation Faculty Groups reported the suggestion and the result of the examinations on economic policies directly to the president. Thereafter, the professors gave special lectures followed by Q&A sessions between its members and the president. It is important to remark the fact that the professors' group had direct discussion with the president which allowed them to give critical or even opposite comments on certain policy directions.

In addition, the president held the Meeting for Economic Trends Review. Issues on domestic industry, construction, finance and currency were covered in the meeting, and global economic trends were also added in the meeting from 1973. Since Saemaul Movement was actively executed in 1973, the good examples of the movement were also put on agenda. As the president held the meeting and participated in the meeting, he easily kept abreast of the economic trends and controlled the works done by each ministry. Based on the feedback from the meeting, the president was able to effectively manage the economic policy.

President Park Jung Hee showed excellent ability in managing economic organization. The graphic below shows the management structure of President Park's administration where the arrows are unidirectional; however, it is more precise to say that the relationship was bidirectional. President Park abolished some old administrative organizations and merged others. In addition, he established new organizations that innovated the whole administrative process. However, it can be argued that Korea's fast economic growth was due, in part, to Park Jung Hee's management skills that effectively gathered resources and helped to contribute to the Korean economic success.

FIGURE 6
NATIONAL ECONOMY MANAGEMENT STRUCTURE OF PARK JUNG HEE ADMINISTRATION



Source: Cho, Lee-Jay and Eckert, Carter J. (2005)

2. The Korean economic development policy in historical perspective

A change in policy from import substitution industrialization to export-oriented growth occurred through the five-year plans that were designed to increase wealth in Korea and make it politically and economically stable with dramatic competitiveness. In addition, government propulsion has made tremendous transformations of the Korean economy. (See Table 9)

TABLE 8
ECONOMIC DEVELOPMENT POLICIES BY STAGE IN KOREA

	Aim	Keynote Policy	Characteristics
1st, 2nd Five Year Economic Plan (1962-1971)	- Establishment of self reliant economy - Growth and self support	- Export leading type - Concentration on light-industry and import-substitution	- Diversification strategy propulsion, participated by companies in government-led planned project
3rd, 4th Five-Year Economic Plan (1972-1981)	- Modernization of industry structure - Import-substitution effect	-Foster heavy and chemical industry -Expand SOC investment	-Preferential finance and tax favor on top 6 heavy and chemical industry
5th, 6th Five-Year Economic Plan (1982-1991)	-Enforcement of industry competitiveness, establishment of developed economy basis	-Stabilization and open-economy	-Technology intensification inducement such as government-led R&D support with increased attention of cutting-edge technology

(continues)

TABLE 8 (Concluded)

The Five-Year New Economic Plan (1992-1996)	-Globalization and liberalization	-Reform and transformation (finance, real-name system of real-estate) -Announcement of internationalization	
Since 1997	-Solve up-coming issues -Overcome economy crisis	-Restructure of companies and finance -Reinforcement of market competition	

Source: Author

National strategies of Korea in the earlier period were government-led industrialization strategies. They included: export oriented industrialization, chabol-centered economic growth, foreign fund-dependent capital accumulation and growth-prioritized development policy.

a) Economic and industrial policy

Export-oriented economic policy in the 1960s

The export oriented economic policy that was started in the late 1960s has contributed in many ways to the strength and competitiveness of Korean industry in general. Due to this policy, the overall industry started to react to the change in demand caused by international trade. Every company tried to build up its competitiveness in the overseas market. International trade was rapidly increasing its role in the Korean economy. Major tools for export promotion policy were implemented. There was allowance for retaining foreign exchange earnings as well as exemption from import controls and tariffs, financial support for exporters at preferential rates, tax concessions, fiscal policy in favor of key industrial firms, a sliding-peg system of exchange rate adjustment, and export targets set by the government and awards from the president.

Major industries were developed in 1960s when unskilled and cheap labor forces supported labor-intensive industries such as wigs, artificial eyelashes, clothing and plywood. They were not pre-selected by the government but by entrepreneurs themselves that were responsive to international market conditions. What is more, export promotion became the priority in economic policy via various measures, which led to a dramatic change of export structure from a traditional-based economy to a manufacture-leading economy.

Developing heavy and chemical industries (HCI) in the 1970s

The economy has also become more vulnerable to external shocks as the development of HCI required heavy borrowing from abroad and the large consumption of imported energy. The two oil shocks which took place during the period hit the Korean economy harshly. Its external debts grew in leaps and bounds from $4.3 billion in 1973 to $20.3 billion in 1979.

With higher rates of economic growth than planned in the 1960s, Korea began to place major policy effort on upgrading the industrial structure from light industries to heavy and chemical industries for sustainable export and economic growth. Strong incentives were provided to a wide range of HCI through the so-called financing policy. In addition, the complex combination of vigorous industrialization, export promotion, import substitution, and the fostering of domestic entrepreneurship by keeping foreign investment distant seemed to offer many significant lessons for other LDC's.

The government-led HCI drive brought about a business-government nexus, monopolistic industrial structures, and large family-owned and family-operating chaebol groups. Discretion rather than rules worked in any important economic and business decisions in the late 1970s.

Structural adjustments in the 1980s

The subsequent years of the 1980s constituted a period of a second round of structural reform. By the end of the 1970s, however, Korea began to realize that extensive and excessive government interventions in

resource allocation could be counter-productive due to its inefficient nature and consequent economic complications. Thus, in the 1980s, major policy priorities were given to anti-inflationary economic stabilization, economic liberalization and partly to decentralization. Industrial incentives were reformed, while regulations on the financial sector were relaxed. In addition, the competitive market was emphasized and promoted with reduced restrictions and regulations, along with decreased international trade barriers. However, much of this changed policy was partly due to foreign pressure.

The government pursued price stability, market liberalization and balanced growth. In order to achieve price stability, government expenditure was cut substantially and the growth of money supply was restrained. As a result of tight fiscal policy, the overall government deficit dropped from 5.6% of GDP in 1981 to 1.5% of GDP by 1985. Income policy was introduced to contain wage inflation while the price support for rice was lowered.

A wide-range market liberalization package introduced along with the price stabilization program represented a radical shift away from the active government intervention. The shift in policy also reflected the realization that the Korean economy had become too large and complicated to be managed by bureaucratic intervention. The government stopped intervening and instead opted to allow the market forces to steer the allocation of resources. On the other hand, the Anti-monopoly and Fair Trade Act was enacted in 1981 and the Fair Trade Administration was established as a bureau within EPB to ensure fair competition in the market.

Under the liberalization program, all subsidized 'policy' loans have been eliminated. The package also includes de-nationalization of the five major banks and lowering the entry barriers for foreign banks. Also, a floating exchange rate system was introduced. The most important element of the liberalization program was import liberalization.

The Korean economy began to face new challenges in the late 1980s. In the course of rapid economic growth, there was a growing perception that distributive equity had been aggravated. In addition, investment in social infrastructure also turned out to be inadequate to support continuous economic growth, since production costs, especially the cost of logistics began to soar up in consequence. Furthermore industrial restructuring became an urgent task since the competitiveness of Korean exports began to lose its ground to a substantial degree due to rapid increases in wages and the appreciation of the won.

The 1980s was the period when Korea began to realize the importance and necessity of market-competition oriented economic policy instead of a government-led regulatory one. Thus, the basic policy principles were set at shifting from government-led to private sector-led economic operation, promoting market competition through deregulation and termination of strategic credit allocation, and expanding trade liberalization in order to cope with the monopolistic concentration of the domestic market, inflation and to enhance international competitiveness.

Liberalization and internationalization in the 1990s

The Kim Young Sam government, through the five year "new economy" plan introduced in 1993, aimed at deregulation to make the country more hospitable to business activities, to make Korean firms more competitive in the international market place, and to expand the growth potential of the economy. The plan also highlighted the need for strengthening international cooperation and for assuming more responsibilities in the international community. This drive culminated in 1996 as Korea joined the Organization for Economic Cooperation (OECD).

The performance of the Korean economy in the 1990s features ups and downs. Growth of real GDP fell from 9.6% to 5.0% per annum between 1990 and 1992, bounced back to 9.0% in 1995, then slowed down again in 1996. However, Korea finally achieved a per capita income of $10,000 in 1995. Inflation had been kept moderate since 1992, but the current account balance has deteriorated substantially since 1994, raising concern among policy makers.

In the 1990s, the rapid development of information and communications technology and the birth of the WTO brought about increased competition and deepening integration of the world economy. In order to survive and prosper in this environment, Korea had to step up its self-motivated globalization efforts (also required by the WTO) to promote competition through deregulation, harmonize domestic institutions with international rules and regulations, and to accelerate industrial restructuring. Nevertheless, the Korean economy was hit by financial crisis in 1997, due to insufficient and belated structural adjustment.

Korean economic crisis in 1997

Before Korean Economic crisis in 1997, domestic demand and exports had a virtuous cycle that achieved stable growth. However, after the IMF crisis the link between domestic demand and exports broke and economic growth plunged. As a result, the stability of the macro-economy was hugely devastated. In particular, a low birth-rate, an aging society and poor investments led to a decrease in labor- and capital-input, which deteriorated the supply capability of the Korean economy. To a large extent, structural reforms were forced by the IMF.

The root cause of the crisis has not been resolved yet. While progress has been made in certain areas in reforming and restructuring the economy, there still remains a large unfinished agenda not only for the private but also for the public sector. What is essential at this time is that Korea should maintain its commitment to reform and restructuring.

Towards a more diversified trading country since the 1990s

To promote trade, infrastructure has been building due to no more direct assistance for promoting trade and more dependency on trade. E-commerce has been taking advantage of world class broadband network. Trade fairs have promoted exhibition industries and support participation in world top level fairs such as COMDEX and Cebit. Trade training professionals are from universities and the Korea International Traders' Association. R&D activities have been supported. By actively participating in globalization, there are overseas economic cooperation activities and trade negotiations such as DDA and FTA. Trade partners between developed and developing countries has become more diversified and export products have shifted to more high tech and IT products.

At present Korea is at a crossroad. It has been highly successful in the development of the IT industry as indicated by its number one position in DRAM and CDMA-based mobile phone manufacturing in the world. It was the second country to join OCED in Asia, after Japan. However, Korea is losing its growth momentum and the unemployment has reached a serious level among both young and old populations. Most of all, business investment is decreasing. Social tensions and conflicts are mounting, while restructuring and reform efforts have been inadequately implemented. Korea, at the moment, is searching for and evaluating new visions to spur the Korean economy. There are several ambitious and visionary plans for the transition toward knowledge-based economy, science-technology development, IT development, industrial technology development and HRD.

In order to achieve these goals, Korea has adopted four strategies. Basically, Korea is maintaining the strategy of extensive economic engagement with China and focused on related technologies. Secondly, for more flexible movement of capital and human resources inward and outward, Korea has promoted an openness strategy. This strategy might involve diversification of its economic and trade relationship, which is currently dependant on China. Third, the new R&D strategy of Korea emphasizes a build-up of R&D, commercialization capabilities and accumulation of higher knowledge stock. Lastly, in terms of education, Korea has focused on advanced education to create a more abundant and innovative human resources pool.

Korea’s economy has grown based on export-led economic policy. Needless to say, trade policy is at the center of the Korean economy, and it has evolved according to the Korean economic development level and the world economic situation. In the rapidly changing global economic environment of the 21st century, it is imperative for the Korean government to set up proper trade policy.

b) Trade policy

Trade policy in the 1960s

Korean trade policy began since the 1960s when the Korean government decided to transition economic policy from import substitution policy, which was the mainstream in the 1950s, to export promotion policy. In the 1960s, Korea started to perform according to the 5-year economic development plan and establish export-led economic growth policy which showed characteristics exemplified below.

In late 1961, the EOI (Export-oriented industrialization) strategy was established as a core international trade policy in accordance with the first five-year (1962-1966) economic development plan. First, the EOI strategy was selected instead of the ISI (Import-substituting Industrialization), which was considered inadequate for economic growth in a small economy. Second, the EOI principle was also backed up by the supply of a large high-quality low-wage labor force and by borrowing foreign capital. Third, the basic idea of the EOI principle was based on the dynamic mechanism of economic growth of increasing exports with borrowed capital and high-quality manpower. Fourth, the government established an incentive system to provide all possible supports for the EOI policy, such as the creation of more opportunities for higher education and human development, the expansion of investment in social overhead capital, the introduction of a unitary exchange rate system and the elastic operation of it, and various financial and tax benefits for exports.

In the case of the exchange rate system, a unitary floating exchange rate system was adopted to replace the old multiple exchange rate system. It was a crawling pegged exchange rate system. The Korean currency was devalued from 130 won to 255 won to the dollar, reflecting the real market rate, in an effort to increase exports. Such an all-out government effort to support the EOI policy achieved a higher growth rate of exports than was planned. Comprehensive export support policies were prepared in May 1964 the details of which are summarized in the table below.

TABLE 9
EXPORT SUPPORT POLICIES IN KOREA IN THE DECADE OF 1960

Means	Major Contents
Promotion of export industry	- Construction of industrial complexes - Specialization of export industry - Selection of and support for export-goods producing companies - Security of raw materials for export - Export records linking import-licensing - Import promotion of production facilities for export industry, and financing its needed capital
Financial support	- Export subsidy - Increased export financing - Lower interest rates for export financing - Maturity extension of export financing
Tax incentives	- Special allowance of depreciation period for export industry's facilities - Tariff exemption and commodity tax cut for raw materials of export industry - Substantial reduction of corporate tax and income tax that are related to foreign exchange earning - Reduction of domestic tax on exports and its intermediate inputs - Reduction of tariff and indirect tax for domestic suppliers of intermediate goods for export - Allowance of wearing out of imported raw materials - Allowance of accelerated depreciation of fixed assets of major export industry
Administrative support	- Reform of foreign exchange and international trade systems such as simplification of trade administration and establishment of banks that specialize in foreign exchange dealings - Establishment of Korea Trade Association (KTA) and KOTRA to strengthen marketing and information gathering for exports - Special financial benefit of long-term loans to those who accomplished yearly export targets - Monthly export meetings with President attendance, to promote exports and to eliminate export bottlenecks - Establishment of export promotion fund - Expansion of deferred-payment exports - Strengthening of export inspection - Discount of railroad freight fare for mining products

Source: Source: Lee, Jong Won (2004)

Several institutional arrangements were introduced. First, Korea structured a 'trade management system' such as Trade Law in 1967. Second, 'Export-Driven policy' was formulated through several policies like the establishment of Korea Trade Promotion Agency (KOTRA). Third, the government expanded the export supporting system and tried to make the import management system more efficient.

In the 1960s Korean industry was focusing on manufacturing and exporting light industrial goods, which processed imported raw materials. It was the beginning of imitating industrialization which Korea could do without substantial technologies or abundant natural resources of its own.

Trade policy in the 1970s

In the 1970s the external economic environment was fluctuating due to changes in the international currency system, world oil shocks and rising new-protectionism. The Korean government tried to strengthen and improve the export support system. Korea participated in the Tokyo Round of GATT.

The government intensified export promotion system such as the establishment of Free Export Zone and established the Korean Export-Import Bank in 1969. Also, the internal improvement of export promotion policy was pursued. Simplification of export and import process and concentrated support for strategic export industry could be good examples of this.

During this period, the government needed to transform the industrial pattern from the light industry to the heavy and chemical industry (HCI) since it was essential to establish a similar industrial structure to that of advanced countries. At the same time, it tried to promote export-oriented industrialization of the heavy and chemical industry in order to have a highly developed export structure.

The HCI drive started with the establishment plan of six major industries, such as steel, non-ferrous metals, machinery (including automobile), shipbuilding, electronics and chemicals. The HCI drive was intended for the shift of major export industrial sectors, and upgrading of industrial structure. Since 1982 the HCI products has become a leading export sector.

The government provided policies to globalize Korean industries and to enhance international competitiveness. The trade policy was mainly involved in securing strategic export markets and diversification of export markets.

Trade policy in the 1980s

In 1980s, the fifth five-year economic development plan was to solve major complications brought about from the HCI drive. In order to solve the weakened international competitiveness of the HCI caused by excessive and overlapped investments in times of global stagflation, the government cut down additional investment plans on the one hand and carried out investment restructuring through M&A.

In addition, the 1980s is symbolized by the liberalization of the Korean economy. It definitely brought a major transition in Korean trade policy and the Korean economy changed from government-led economy to a market economy. The protectionism of trade became prevalent in the world economic environment due to the decrease of GATT influence. Thus, the government had to deal with the pressure of a market open from outside meaning it needed to strengthen the international competitiveness of Korea through active competition. As a result, the Free Import Plan was announced in 1984.

During this period the trade policy had several special features. First, to survive in the world economy, mass production export method was converted to the qualified and diversified export method. In addition, the government attempted to secure raw materials for export products stably and settle product price. To lower import dependency, Korea also improved its industrial structure with diversification of technological innovation. Upgrading export marketing capability was also encouraged. It was a significant systematic change in the Korean trade policy. During this period, the government fully concentrated on export expansion through liberalization and simultaneously tried to be an active member of international society as evidenced by the case of the Seoul Olympics in 1988.

Trade policy in the 1990s

In the 1990s, the concept of globalization became a new and key trend in the Korean economy. It was caused by the Uruguay Round, the WTO and the collapse of communist society. Korea had to adjust its trade and industrial policies accordingly. Since any direct financial and fiscal support for specific industries was no longer allowed following the start of the WTO system, Korea had to seek such support from alternative industrial policies rather than traditional ones. Also, Korea joined the OECD in 1996, which positioned it at the center of the global economy. However, the financial crisis in 1997 led to big turbulence in economy from which it took several years for Korea to recover.

The keynote of Korean trade policy during this period changed from 'competition' to harmonizing or paralleling 'competition and cooperation'. Thus, its policy focused on 1)trade promotion and industrial cooperation, 2)performance of fair trade as a better developed country 3)expansion of external economic cooperation 4)advancement of big enterprises to foreign countries 5)international economic cooperation with countries in diverse economic stages. In a new five-year economic plan, the government put macroeconomic indicator oriented and government-led economic planning to an end. It executed economic reforms through globalization, decentralization and deregulation policy principles.

Trade policy in the 2000s

In the 2000s, the Korean economy has been confronted with various difficulties. The decline of exchange rate gave a huge shock to Korean exporting companies and the growth of developing countries, especially China, became a big threat to the Korean economy. Recently, Free Trade Agreements (FTAs) became current issues and have created a whole new trade environment.

Trade policy by the government in a new trade environment will focus on a medium and long term strategy through: preparing a measure to counter the exchange rate, diversification of strategic products and industries, establishing soft trade infrastructure to support global competitiveness of exporting companies such as strengthening intellectual property rights.

Korea is upgrading its national status as a leading country in science and technology in the world and as an innovator country. In the 2000s, Korean trade policy is based on the fact that the main exporting products are high value-added products which have more competitiveness.

3. Korean economic development models[1]

As reviewed, Korea's economic and industrial development has been achieved through export-oriented strategies. During the 1960s and 1970s, Korea accomplished the development of major industries, export growth outpaced GDP growth. In order to effectively accomplish economic growth based on the export-oriented industrialization strategy, the Korean government utilized supplementary policies, such as investments in social overhead capital and key industries, the financial, fiscal and foreign policy reforms for capital formation and the unitary exchange rate system and tariff exemption.

Korea's industrial development is characterized as government-led development. It has been government-led in the sense that government mobilized various measures to support industrial development. However, Korea has been pursuing its economic development by fully respecting the conditions of comparative advantage that have been imposed by international economic environment. Since the earlier stage when the government played an important role in supporting industries, Korea has gradually enhanced the role of the market mechanism. The country has moved from an authoritarian regime to a country with a liberalized and open market system.

The economic development model of Korea has changed over time. The first phase of the model, hereafter, Phase-I Model, was formulated in the 1960s and fully developed in the 1970s. The model was

[1] This part draws heavily from Song (1990). In the final report the borrowed part will be revised.

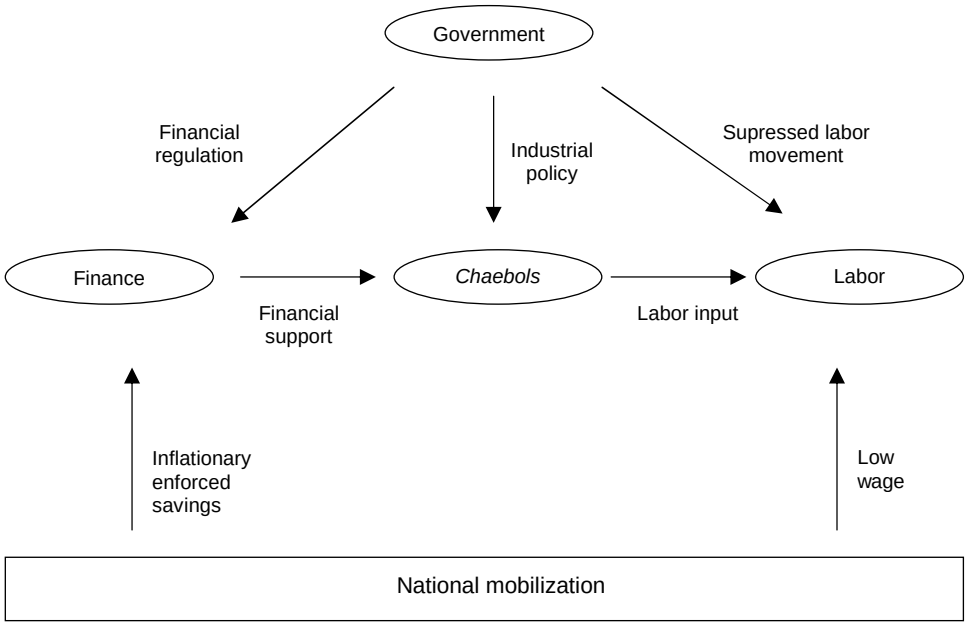
characterized by the mobilization of financial and human resources by the government and by the system for industrial capital (National Economic Advisory Council. 2005. p.9).

As shown in Figure 7, the state played the role of CEO for formulating and implementing a development strategy, whereas Chaebols played the core role for economic growth under the regulation and protection of the state. The financial sector and the labor sector served as resource supplies for economic growth by enforced savings and low wages.

The Phase-I Model was changed substantially after the 'Korean foreign exchange and financial crisis' in 1997. However, the Phase-I Model was gradually changed during the 1980s as the Korean economy became more diversified and liberalized and the 1997 financial crisis, i.e. so- called 'IMF crisis' in Korea, completely dismantled the model. As shown in Figure 4, the Phase-II Korean Development Model adopted the Anglo-American Model that emphasizes the role of market and stock-investors' interests in corporate governance. As many Korean banks were merged by foreign financial institutions, foreign capital emerged as a new player in the Korean economy.

In the Phase-II Model, the integrative and cooperative relationship among the major economic players has been weakened, as each has prioritized its own interests.

FIGURE 7
PHASE-I ECONOMIC MODEL



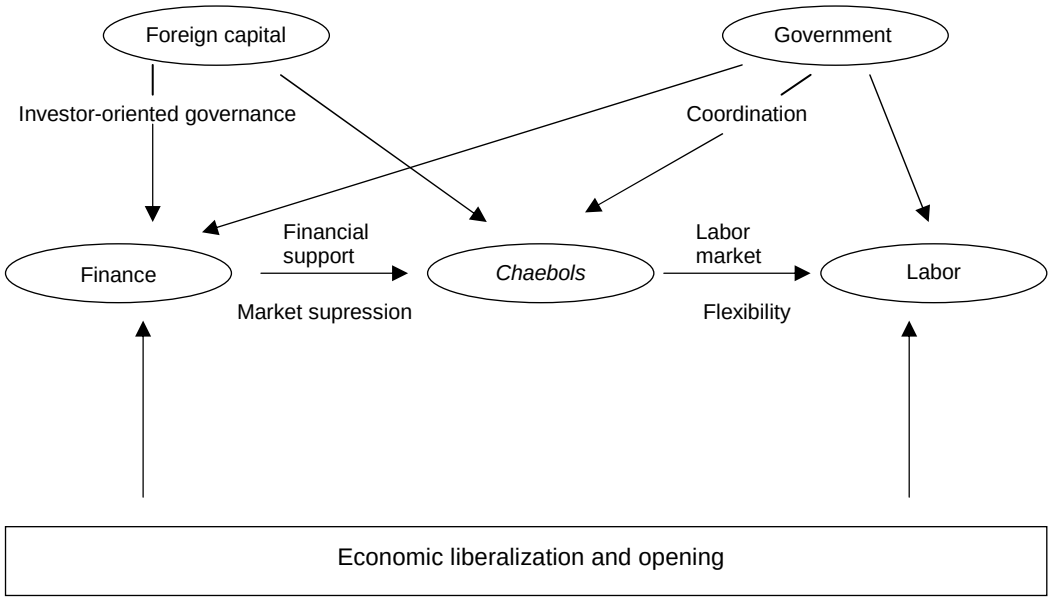
Source: NEAC (2005)

The characteristics and role of the Korean Models can be summarized as follows:

- Roles of state in the developmental stage of East Asia nations are as follows:
  - Mobilize and integrate the people: State gathers the energy of the people for economic development and resolves the conflicts of interest within society.
  - Establish economic development plans: State sets either import-substitution or export-oriented economic development plan and fosters selected strategic industries.

- Allocate resources by state authority: State allocates extensive resources in the selected strategic industries and control finance sector to make the financial support easy for the industries
- Regulate capital by state authority: The state directly intervenes with the restructuring process of the ill-performed industries or enterprises.

FIGURE 8
PHASE-II ECONOMIC MODEL



Source: NEAC (2005)

- It is assessed that Korean government successfully performed the function of 'developmental state' from 1960s to 1990s.
  - Korean government pursued government-oriented economic development, and initiated seven Five-Year Economic Development Plans for 35 years from 1962 to 1997.
  - Korean government fostered strategic industries (i.e. heavy industry) through financial support and investment.
  - Korean government directly regulated capital. (i.e., the liquidation of the insolvent firms and the industry restructuring process led by the government in 1980s)
- The role of 'developmental state' reached its limits in the era of globalization and liberalization of 1990s.
  - Chaebols came to prefer autonomous business management rather than the direct government regulation. Chaebols are able to get finance from domestic or international markets under the globalization and liberalization of finance sectors without help of government.
  - The alliance based on the interest relations of the state and capital began to dismantle. Except for specific occasions like the 'Financial crisis in 1997,' state control of capital can not be justified.
  - People's strong demand for reform against income disparity resulted from development and political suppression, and the demand for political participation has been escalated as a means of resistance against authoritarian government.

– Coordination function of the state has been diminished as the Anglo-American market economy was introduced after the 'Korean Financial crisis.' Resource allocation and capital regulation is done by market mechanisms.

4. The five-year economic development plans

a) Background and purpose

We cover here six plans out of seven. Although the plans were Five-Year Economic Development Plans, they were usually referred to as 'Five-Year Plans'. The objectives of Korea's successive Five-Year Plans (FYP) have changed over time with the rise in income, shifts in economic structure, and changes in economic issues and priorities. The main objectives of Korea's first FYP (1962-66) were to break the vicious circle of poverty and to build a foundation for self-sustaining growth.

The objectives of the second plan (1967-71) aimed mainly at vitalizing the microeconomic functions of the government such as promoting the efficient allocation of resources through agricultural, industrial, trade, and social infrastructure policies. The rapid growth of the economy caused increasing disparity between income classes, between export and domestic industries, between firms of different sizes, and between regions.

As a consequence, the promotion of equity emerged as an important policy issue in the third plan (1972-76). The promotion of a more equal distribution of income was given even higher priority among the policy objectives of the fourth plan (1977-81). Since the fourth plan the government's key goals shifted from the quantitative aspects of economic growth to the qualitative aspects of life. The fourth plan placed much more emphasis on social development, and was even officially named the Five-Year 'Socio-economic' Development Plan.

As Korea's rural-agricultural economy began to change into an industry-oriented economy, the economy became increasingly complex and subject to business fluctuations and inflation. In this environment, economic stability emerged as a new policy issue. The fifth plan (1982-86) specified achieving economic stability as its major policy objective. In 1988, stability emerged as one of the most important policy objectives. Both policymakers and the Korean people consider economic stability, especially in the face of growing labor-management friction, as a key policy goal.

The relative degree of importance of the government and private sectors has also changed substantially since the first plan. During the early planning periods, the government sector played the dominant role since the market system was not well developed. It was only as the urban-industrial sector expanded that market activities and the function of the market system began to modernize. As a consequence, the function of the private sector market system expanded greatly relative to that of the government. Since the fifth plan, particular emphasis has been put on enhancing free competition. The enhancement of market economic functions and the promotion of creative potential and an innovative spirit became the major economic policy goals. In the sixth plan (1987-91), it was listed as the most important objective.

The broad outline of the Sixth Plan (1987-91) was set by the Cabinet Council in the presence of the President, the Prime Minister, and the ministers of all functional ministries. Based on this broad outline, an Economic and Social Development Council was convened to determine specific guidelines for the plan. The Prime Minister served as chairman of the Council, while the vice-chairmanship was filled by the Deputy Prime Minister in his concurrent role as head of the Economic Planning Board. The Council had a total of 50 members, including all cabinet ministers and other appointed members.

One notch below the Council, the Economic and Social Development Coordination Committee oversaw the integration of the various sectoral plans. The Committee's 40 members included all the Vice-Ministers and other appointed members. The drafting of sectoral plans was carried out by 40 separate Sectoral Planning Committees and subordinate Working Groups. The sector-specific plans were, in turn, coordinated by nine Sectoral Coordination Councils. In overall, more than 500 Korean

experts in various fields participated in the plan's development. The preparatory work for the Sixth Plan started in early April 1985 and was finalized by the President in late June 1986. The document was published, distributed, and publicized during the four-month period from July to October 1986.

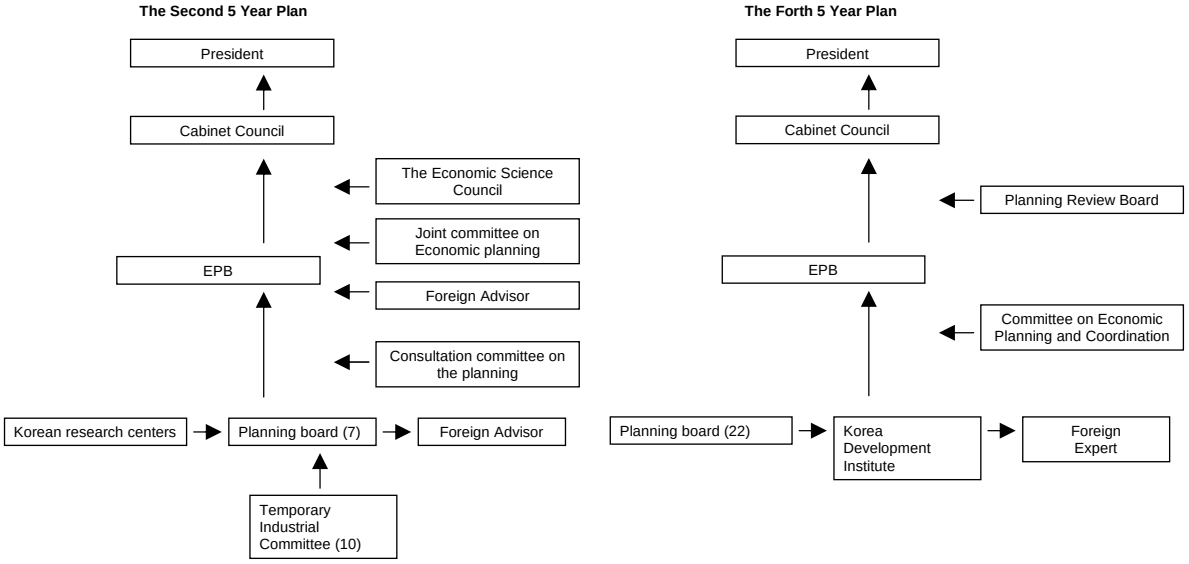
The main institution in charge of preparing, coordinating and writing the actual Sixth Plan document was the Korean Development Institute, which was the research institute of the Economic Planning Board. The authority of the planning machinery has decreased with each successive plan; however, it is still regarded by the Korean people as having considerable power. As development in the country continues, it is more likely the decline of directed planning in relation to continuous economic management through macroeconomic policy instruments

b) Planning and formulating process and mechanism

The most important characteristic of the decision-making process involved in formulating and implementing economic plans and policies in Korea is that it is headed by the President, and as such is a nationwide apparatus. This characteristic allows this nationwide apparatus to mobilize any institution or policy instrument in order to facilitate the formulation and implementation of such economic plans and policies. Secondly, this nationwide apparatus has been managed by leaders who were fully committed to economic development in the Phase-Model period such as Park Chung Hee (1961-79) and Chun Doo Hwan(1980-8).

The plan went through changes in participatory organs and procedures. In particular, the second and fourth Five-Year Economic Plans are so contrasting in terms of the implementation procedure and the participating actors (Figure 9). First, the president of United States Agency for International Development (USAID) participated in the second plan, but not in the fourth. Second, the Economic and Science Committee had an approval authority for plans, whereas the consultation procedure had been much simplified as indicated the figure below. Third, foreign experts and advisors were actively participating in the second plan, but domestic experts and researchers were the main part of the consultation in the fourth. Lastly, the Consultation committee in the second plan was replaced by Committee on economic planning and coordination in the forth maintaining the organization structure and functions. The planning procedures, for example, between the second and fourth Five-Year Plans are compared in the Picture below.

FIGURE 9
PLANNING PROCEDURE IN THE SECOND AND FORTH FIVE-YEAR PLANS



Source: Cho, Lee-Jay and Eckert, Carter J. (2005)

Economic decision-making has been overwhelmingly a 'top-down' process. In the 1960s many government offices, including the economic ministries, were staffed by retired army generals and colonels. Because the President himself was a retired army general, Korea's economic decision-making process was very close to a 'General Headquarters' (GHQ) style, in which the President himself made all major decisions and settled policy disputes among his senior officials. Many Koreans complained that Korean economic policy in the 1960s was managed by command. Nevertheless, the GHQ style turned out to be very effective in initiating development and achieving the Park government's top priority goal of rapid growth.

As the level of economic development increased and the economy became increasingly complex, the top-down style of decision-making was being subject by increasing disadvantages. This was especially so with the massive investment in heavy industries and the over expansion of the shipbuilding industry on the eve of the second oil crisis in the late 1970s. The narrowness of the decision-making process was heavily criticized towards the end of the Park government by both bureaucrats and businessmen. The Chun Doo Hwan government quickly proclaimed its intention to open up and decentralize the economic decision-making process in Korea.

In the case of Korea, the influence of politicians and political parties has been rather small. Under the Park regime it was almost negligible since Park's approach to managing the economy relied on using a handful of capable technocrats and bureaucrats. Politicians were largely despised or ignored by the President. The influence of politicians and political parties increased somewhat under the Chun Doo Hwan government, and to a much greater extent with the beginning of the Roh Tae Woo administration.

The hierarchical order in the policy-making process is from the President to the Deputy Prime Minister who heads the Economic Planning Board(EPB), and then to the head of the concerned ministry, whether this is the Minister of Trade and Industry, the Minister of Energy and Resources, or the Minister of Agriculture and Fisheries. A particularly notable aspect of the Korean decision-making process is the role played by the President's Economic Secretary. Although this position is only of a vice-ministerial rank, the Economic Secretary's influence on economic policy and the staffing of various economic ministries often has been equal to or greater than the influence of the Deputy Prime Minister, especially in the 1960s and early 1970s.

The Economic Planning Board (EPB) has played a central role in preparing and implementing Korea's various economic plans and policies ever since the EPB was established in 1961. As soon as Park Chung Hee took power, he created the Economic Planning Board. The Minister of the EPB was given the concurrent title of Deputy Prime Minister and authorized to control, coordinate, and adjudicate among other ministries on economic matters. The DPM presides over the fortnightly Economic Ministers' Meeting attended by eleven economic ministries and the Minister of Foreign Affairs.

The EPB has been quite successful in its planning function. The EPB clearly has had strong support from the President, encouraged participation of important decision makers in the preparation and implementation of economic plans, and was able to control and coordinate the decisions of various economic ministries through its control of the national budget.

The Korean decision-making machinery has been particularly effective at policy implementation. In the case of trade policy, the monthly Export Promotion Meeting was institutionalized by the President to implement export expansion. The personal attendance of the President, economic ministers and other high-ranking organizations, and heads of economic research institutes and selected academic economists underscored the high priority given to trade matters. The meeting provided a forum for government officials, businessmen, economists, and policy makers to exchange views and to examine and improve trade policy.

Korea's decision-making machinery also has been highly outward-looking in the sense that economic technocrats and bureaucrats have sought to learn from the suggestions of foreign experts and studied the experiences of other countries through Korea's involvement with international organizations such as the World Bank and the International Monetary Fund.

The decision-making machinery has relied also on formal and informal communication channels. Informal channels have traditionally had an important part in bureaucratic communications in Korea, as in

other East Asian countries, and provide a means of circumventing the rigidity of formal hierarchical arrangements. Informal communications are highly democratic and perhaps as influential as formal channels. Typically, technocrats and bureaucrats gather needed information, data, expert's views, and public opinion through various informal meetings before formalizing their policy proposals. Once policy objectives and directions are given formal sanction by the decision-making machinery, they are officially handed down as virtual 'orders' to the economic ministries and other institutions in charge of implementation.

c) Contents and results

The main contents and results of the six FYPs are summarized in Table 11. The Plans were implemented to result in better outcomes and performance of the economy, so that the Korean case together with East Asian economies were highly hailed by the World Bank as a success example of economic development in the Post-War period. (World Bank. The East Asian Miracle. 1993)

TABLE 10
AN OVERVIEW OF KOREA'S FIVE-YEAR ECONOMIC DEVELOPMENT PLANS

Plan	Period	Growth Rate (%)	Objectives	Major Policy Directions
1st FYP	1962-1966	7.1[a] (7.9)[b]	1. Breaking the vicious circle of poverty 2. Establishing the foundations for self-sustaining economic development	1.Securing energy supply sources 2.Correcting structural imbalances 3.Expanding basic industries and infrastructure 4.Effective mobilization of idle resources 5.Improving the balance of payments position 6.Promoting technology
2ndFYP	1967-1971	7.0 (9.7)	1.Modernization of industrial structure 2.Promotion of self-sustaining economic development	1.Self-sufficiency in food, development of fisheries and forestry 2.Laying the foundation for industrialization 3.Improving balance of payments position 4.Employment creation, family planning and population control 5.Rasing far household income 6.Improving technology and productivity
3rd FYP	1972-1976	8.6 (10.2)	1. Harmonizing growth, stability, and equity. 2. Realizing a self-reliant economy 3.Comprehensive national land development and balanced regional development	1.Self-sufficiency in food staples. 2.Improving the living environment in rural areas 3.Promotion of heavy and chemical industries 4.Improving science, technology, and human resources 5.Development of national land resources and efficient spatial distribution of industries 6.Improving the living environment and national welfare
4th FYP	1977-1981		1.Achievement of self-sustaining economy 2.Promoting equity through social development 3.Promoting technology and improving efficiency	1.Self-sufficiency in investment capital 2.Achieving balance payments equilibrium 3.Industrial restructuring and promoting international competitiveness 4.Industrial restructuring and enhancing international competitiveness 5.Employment expansion and manpower development 6.Improving living environment 7.Expanding investment for science and technology 8.Improving economic management and institutions
5th FYP	1982-1986	7.5 (8.7)	1.Establishing foundations for price stability and self-sustaining economy 2.Technology improvement 3.Improving quality of life 4.Restructuring government's economic functions	1.Eradicating inflation-oriented economic behavior 2.Increasing competitiveness in heavy industries 3.Improving agricultural policy 4.Overcoming energy constraints 5.Improving financial institutions 6.Readjusting government functions and rationalizing fiscal management 7.Solidifying competitive system and promoting open-door policy 8.Manpower development and promotion of science and technology 9.Establishing new labor relations 10.Expanding social development

(continues)

TABLE 10 (concluded)

6th FYP	1987-1991	7.3 (?)	1.Establishing socio economic system promoting creative potential and initiative 2.Industrial restructuring and improvement of technology 3.Improving national welfare	1.Expanding employment opportunities 2.Solidifying foundation for price stability 3.Realizing balance of payments surplus and reducing foreign debt 4.Industrial restructuring and technology improvement 5.Balanced regional and rural development 6.Improving national welfare through improved social equity 7.Promoting market economic system and readjusting government functions

Source: Economic Planning Board (1961, 1966, 1971, 1976, 1981 and 1986)
[a] Planned growth rate
[b] Achieved growth rate

d) Implementation and the public-private interactions

One of the most important characteristics of the Korean plan-implementation style is its extensive use of both incentive and disincentive mechanisms. Particularly during the highly centralized and growth-oriented development strategy pursued by the government of President Park, the government made extensive use of discretionary authority in manipulating incentives such as subsidies, tax differentials and loans, and in using command procedures such as tax differentials, loans, and the termination of infrastructure services. Whenever incentive procedures were not effective the government was quick to employ disincentive mechanisms or command procedures to secure compliance by private firms. These disincentive mechanisms usually took the following forms.

Tax audits

Systematic and detailed investigation of tax returns by the Office of Tax Administration was used to control firms which did not comply with government economic policies. Such audits were usually very time-consuming, sometimes lasting as long as six months. Korean firms came to see these investigations as near lethal punishment, and many firms were, in fact, driven into bankruptcy due to a protracted audit and investigation.

Suspension of bank credit or recall of loans

The debt-equity ratio of most Korean firms was very high, usually exceeding three-to-one as a result of massive borrowing for finance expansion typically at artificially low interest rates. Such high levels of indebtedness made firms dependent on bank credit even for their operating funds and for their very survival. If the government cut off the supply of credit to a firm or recalled its loans, it could mean a lethal blow to any highly leveraged firm.

Disconnection of infrastructure services

There are basic infrastructure services such as electricity, water, roads, and telephones without which most firms cannot function. The government denied providing such services to punish firms that do not comply with the government economic policies. For example, the MTI (Ministry of Trade and Industry, at that time) often disconnected electricity to firms that did not meet the export target set by the government.

Because of these strong disincentives, Korean firms soon learned that the best way to survive and prosper was to comply with the government's directives. For this type of implementation to work, effective communication and close consultation between firms and policymakers is essential. Moreover, if policy enforcers do not understand economic principles or do not consult with firms to set realistic goals, this type of forceful implementation can lead to widespread corruption and be highly destructive to the economy.

There is no doubt that in an increasingly complex economy such as Korea's, the 'impersonal rule of law' is preferable to the 'personal rule of men'. Non-discretionary measures rather than discretionary measure should be relied on as much as possible. Such thinking has become popular among Korean

businessmen since President Park's death in 1979 and has been accepted by policy makers as a more desirable approach to implementation. This has been one of the important changes in the liberalization of economic management from the early 1980s, representing a major shift towards a more purely market-directed system and the readjustment of government functions.

All in all, the style of policymaking and implementation used in Korea in the 1960s and 1970s is effective only if it is carried out by capable and committed policymakers and only in relatively early stages of development when the market system still functions poorly. As the economy develops and becomes increasingly complicated, greater reliance on market forces becomes imperative, and discretionary enforcement of policy decisions carries significantly negative side effects.

5. The leading public (government) organization

a) The Economic Planning Board (EPB)

The 1960s was a period of substantial institutional change. The government actively intervened in economic planning. More importantly, Five Year Economic Development Plans were implemented by the Economic Planning Board (EPB) established in 1961. The EPB was succeeded by the Ministry of Finance and Economy as Korea's strategic policy shifted from a quasi-planned economy to a market oriented one.

Headed by a Deputy Prime Minister and staffed by business-trained bureaucrats, the EPB allocated resources, controlled the flow of credit, and made all the Korean economic plans. Also in 1961, the financial system was restructured. Commercial banks were nationalized, and state-owned special banks were created by expanding incumbent special banks. The Korean Development Institute (KDI) helped the role of EPB. Finally, in 1962 the First Five-Year Plan was enacted concentrating on export-heavy industrial production and a policy of import substitution with domestic products.

The EPB was assigned in charge of development planning and coordination as well as annual budget preparation, coordination of foreign aid activities, and attracting foreign investment. Thus, EPB was the stronger operational unit than its counterparts in other Asian countries.

Major activities and programs

The EPB was organized as a new ministry absorbing functions of planning and aid-management from the Ministry of Development, budgeting from the Ministry of Finance, and research and statistics from the Ministry of the Interior. Foreign loans and technological development, which were handled at the bureau level, were also added to the role of EPB.

EPB undertook long-term overall economic planning. The roles and functions of the board were expanded in December 1963 when it was decreed that the minister of the EPB shall concurrently hold the position of Deputy Prime Minister. As economic planning got increasingly important, the Office of Planning and Control was established under the Prime Minister.

From its initiation, the EPB had a powerful voice over other ministries regarding budget. EPB's Bureau of Budget prepares the broad guidelines for the annual budget, collects annual proposals from the other ministries and evaluates their feasibility. EPB's power lies in its ability to designate specific projects for which other ministries prepare the budgetary implications.

A capital import bureau was also established in 1961, and the EPB's power was extended to the area of foreign borrowing. European investors refused to lend unless the government extended guarantees on loan repayment. Seeing an opportunity to further expand EPB's powers, the Bureau of International Cooperation, which oversaw aid relations and was the dominant bureau throughout the early sixties, persuaded President Park Chung Hee to established more extensive controls on the import of foreign capital. In July 1962, the ministry was given the power to extend government guarantees to loans and to audit and oversee the activities of the borrowing firms. Finally, EPB was given the power to

select those capital goods imports and importers which qualified for government-aided deferred payment privileges (Haggard, 1990, p. 18).

When coupled with new laws that transferred the power to approve and extend incentives to foreign direct investment from the Ministry of Finance to the EPB, the new ministry effectively gained complete control over Korea's import of foreign capital. These laws naturally gave EPB a strong say over the money supply and industrial policy as well. In 1963, the special status of the EPB within the cabinet was further enhanced when its minister was also given the title of Deputy Prime Minister (Haggard, 1990, p. 19).

A number of reforms were launched to improve bureaucratic performance and implementation. A system of "planning and control offices" (PCOs) was established to monitor and evaluate performance within EPB in July 1961, and the model was gradually extended to other ministries. The system was placed under the Office of Planning Coordination in the Prime Minister's offices. The PCOs, as an independent channel of information, were required to monitor and evaluate the status of implementation of its projects and to provide quarterly reports to the Prime Minister and ultimately the President. The changes in the Korean political system under the military proved to be important for the adaptation and implementation of a coherent economic strategy. The economic reform in the earlier 1960s demanded closer relationship among three actors: the technocrats, the military and the United States.

Performance and contribution

The EPB played a critical role in Korea's economic development. It was the main drive behind the government's orchestration of the nation's outward-looking development strategies. The presidential decree of 1963 had stipulated that the EPB's minister would also hold the position of Deputy Prime Minister along with the title of Minister of Economic Planning; however, it had also established the agency as a virtual "super-ministry."

The EPB not only created long and short-term development plans, but also had far-reaching budgetary, regulatory, and statistical functions. It was also responsible for managing foreign capital. In this way, it was involved directly in implementing and controlling the means to mobilize resources. As Deputy Prime Minister, the head of the EPB coordinated the activities of all the ministries through the EPB's budgetary function. In addition, the Deputy Prime Minister chaired the weekly meetings of the Economic Ministers Council. Another responsibility of the EPB was to promote technical cooperation with industrialized countries to improve the level of technological advancement.

Shortcomings of EPB

Despite its formal powers, EPB initially faced problems. The military government assigned the EPB the task of drafting a new plan while the government outlined a series of quantitative objectives, including annual growth rates and targets for the principal macroeconomic variables. These numbers were derived from the previous plan, but artificially inflated to distinguish the new plan from its predecessor.

The overall philosophy of the plan was "a form of 'guided capitalism' in which the principle of free enterprise and respect for the freedom and initiative of private enterprise will be observed, but in which the government will either directly participate in or indirectly render guidance to the basic industries and other important fields" (EPB, 1962).

From the perspective of the planners, however, a primary goal was to eliminate the range of controls that had permitted corruption and misallocation of resources during the Rhee administration. The ambitious plan targets and projections, for which the plan has been criticized, were secondary to the effort to outline this more general policy thrust. The plan is replete with references linking state intervention not only to economic inefficiency and distortions, but to corruption (EPB, 1962).

b) Ministry of Finance and Economy (MOFE)

By merging the Economic Planning Board and the Ministry of Finance, the Ministry of Finance and Economy (MOFE) was created on December 23, 1994. However, its original structure led to a over-concentration of

policy decision-making which had the tendency to undermine the checks and balances required for effective government. Therefore, its organizational structure was reformed many times since its creation.

The Government Organization Act on February 28, 1998 was promulgated to set up a new national administrative system in response to changes in circumstances, and to lay a solid foundation for further economic growth in the future after successfully overcoming the financial crisis. The former MOFE was, therefore, reorganized into its current structure, where the budgetary authority is under the the Ministry of Planning and Budget and the monetary and credit policy decisions under the Bank of Korea. Following the efforts to reduce the over-concentration of decision-making on MOFE, in 1999, the financial supervision was transferred to the Financial Supervisory Commission and policy on FDI inflows came under the control of the Ministry of Commerce, Industry and Energy.

While distributing roles and responsibility among ministries for effective policy making and implementation, MOFE was empowered to assume the Deputy Prime Ministry in accordance with the revised Government Organization Act in 2001. Hence, MOFE played a pivotal role in coordinating inter-ministerial policy with strengthened authority.

In 2000, the Free Economic Zone Planning Office was newly established in MOFE following to the policy goal of the Participatory Government, which is focused on liberalization and competition. In addition, 'Financial Hub Korea' came to be part of MOFE in 2006 as part of a concrete implementation of the regional financial hub initiative of the Participatory Government.

MOFE covers issues related to medium and long term economic and social development policies which include taxation, drawing of the national budget, finance, national treasury and state-owned properties. Foreign exchange and debt and economic cooperation are also an important part of MOFE's role. The basic direction for economic policy is to renew the economic vitality while establishing the base for sustainable growth at the earliest possible time expanding growth potential and addressing structural issues.

The short term goal is to stabilize the macroeconomic environment and manage risks in order to meet the macroeconomic projection for each year. Expanding growth potential with an emphasis on balanced growth, and advancing and globalizing the economic system are the following tasks. In the long term, MOFE plans to take systematic measures to address key areas in the future such as population aging, low fertility and unification costs, along with maintaining fiscal soundness. To achieve the above mentioned goals, five sub strategies are selected: (1) scientific and technological development, (2) the Northeast Asian business hub plan, (3) balanced national development, (4) structural reform and (5) labor reform.

Major policy

Fiscal management includes government securities, debt position and government accounting, which are mainly operated and managed by the Ministry of Planning and Budget and each responsible division under MOFE. MOFE is responsible for directing all aspects of the central government's cash and debt management programs, coupled with its oversight function of the public money management fund, which comes with the complex nature of fiscal operation and government financing.

As for the financial hub policy, it is planned to be implemented in three phases. First, the groundwork for the financial hub is created. Second, the establishment of a specialized financial hub, and finally, it aims to position Korea as one of the top 3 financial hubs in Asia along with competitors in the region. In particular, to establish a market-driven financial system, MOFE has identified and pursued key policy tasks to upgrade our financial market in line with global standards. They include drafting the bill on Financial Investment Services and Capital Market, softening financial regulations and liberalizing the foreign exchange regime.

c) International Economic Policy Committee (IEPC)

The International Economic Policy Committee (IEPC) is an organization that provides recommendations to the President of Korea on general planning and strategies related to the international economic policies. It was established in August, 2004 based by a National Advisory Council Act.

The working level meeting of the committee is hosted by the vice minister of MOFE, and other vice-ministers from relevant ministries participating in the meeting. The Agendas discussed in the committee are as follows:

- Establishment of overall strategies on FTA
- Guide for opening domestic industries and restructuring in the process of FTA negotiations
- Establishing DDA negotiation strategies and schemes related to FTA negotiations
- Establishing innovation plans for making favorable domestic markets to attract FDI

The IEPC is chaired by the Deputy Prime Minister and Minister for Finance and the Economy. The participatory member of the committee consists of regular members, designated members and appointed members. Regular members are ministers of MOCIE, MOA, MOL, Budgeting & Planning, and Office for Government Policy Coordination, Trade minister, and the Senior Secretary to the President for Economic Policy. Designated members are ministers and chief executives of relevant ministries such as the Deputy prime minister of Education, ministers of the Ministry of Justice, Ministry of Health & Welfare, and Ministry of Culture and Tourism. Advisory members are specialists with extensive knowledge and experience on the relevant matters.

A Working Group Planning Department of IEPC was established in order to help in the process of policy implementation. Under the Working Group Planning Department are also in operation an office of General Affairs, Agriculture and Industry, and Services.

d) Ministry of Commerce, Industry and Energy (MOCIE)

The Ministry of Commerce, Industry and Energy (MOCIE), concerns with regulating economic policy, especially with regards to the industrial and energy sectors. The ministry also works to encourage foreign investment in Korea. However, its role and function have changed over the years in responds to the economic growth of Korea.

The MOCIE was initially established as the Ministry of Commerce in 1948 at the birth of the Republic of Korea. At that time, the Ministry oversaw the young nation's primary industries such as fisheries and mining as well as the secondary and tertiary industries including manufacturing and commercial activities. With rapid industrialization and growing demand for securing energy, the energy and resources sectors created their own independent agency in 1977, the Ministry of Energy and the Ministry of Power and Resources respectively. However, later on, the energy and resources sectors were re-integrated into the Ministry of Commerce to efficiently implement industrial policies.

In the 1990s, MOCIE took the lead to pursue globalization and the improvement of national competitiveness by implementing the “Five-Year Plan for a New Economy.” In addition, MOCIE has helped to strength and expand the industry’s supply, which supported the supply of labor, the liberalization of enterprise regulations, and R&D. It also promoted the development of SME and venture companies while transforming the Korean economic system towards WTO standards.

All these efforts contributed to increase exports up to $100 billion in 1995 and reach a per capita income level of $10,000. In addition, it also helped Korea to become a member of the OECD. However, it is also important to highlight that during 1993-97, Korea had an accumulated trade deficit of $47 billion, an insolvent financial system and in overall financial sectors which contributed to the break out of the financial crisis in 1997. In order to overcome the crisis, the ministry went ahead with bold reforms measures in the finance, corporate, labor and public sectors.

In 1998, the government ministries were reorganized in order to boost efficiency in the public sector and overcome the Asian financial crisis that broke out in 1997. As part of the reforms, trade negotiations were taken over to the Ministry of Foreign Affairs and Trade (MOFAT) from MOCIE. In addition, and even though MOCIE maintains some of the responsibilities in terms of the general SME policy, more detailed policy activities were transferred to the Small and Medium Business Administration (SMBA).

MOCIE had also urged to develop new technology in IT•BT•NT, and advertise venture business and e-business. In terms of energy policy, the energy market was liberalized gradually, for instance, the liberalization of the LPG price has been carried out in 2000. Furthermore, Korea Power Exchange (KPX) was established in 2001 to ensure the reliability of power supply by coordinating the flow of electricity in all regions of Korea.

During 1998-2002, as a result, Korea successfully escaped the trap of the crisis, and achieved trade surplus at amount of $94.4 billion. It also attracted $60 billion foreign direct investment (FDI). However, even though the carried out reforms led to immediate outcomes, they lacked of long-term economic strategies. The quantitative growth did not last long, and economic wealth was heavily concentrated in the metropolitan area surrounding Seoul while local areas lagged behind

Major activities

MOCIE's work involves a wide range of economic activities that stimulates Korea's trade with other global partners as well business activities from small and large companies, and securing the necessary energy and natural resources for Korea. All in all, the main responsibility of MOCIE is to make Korea a great place to do business.

MOCIE tries hard to promote active international trade and investment, help businesses to achieve their full potential, and secure stable supply of energy sources, such as oil, gas, electricity, nuclear and coal, necessary for sustainable economic growth. Its main role is first, to promote the industry, international trade and investment, and in doing so, establish a fair trade order. It also works hard to enhance the industrial competitiveness and promote a balanced economic development for Korea. In addition, it also pays attention to the stable supply of energy and its efficient use.

Internal structure

MOCIE has regular personnel of 1,113 people working for the minister on the head of the organization, one vice minister of commerce and industry and one vice minister of energy.

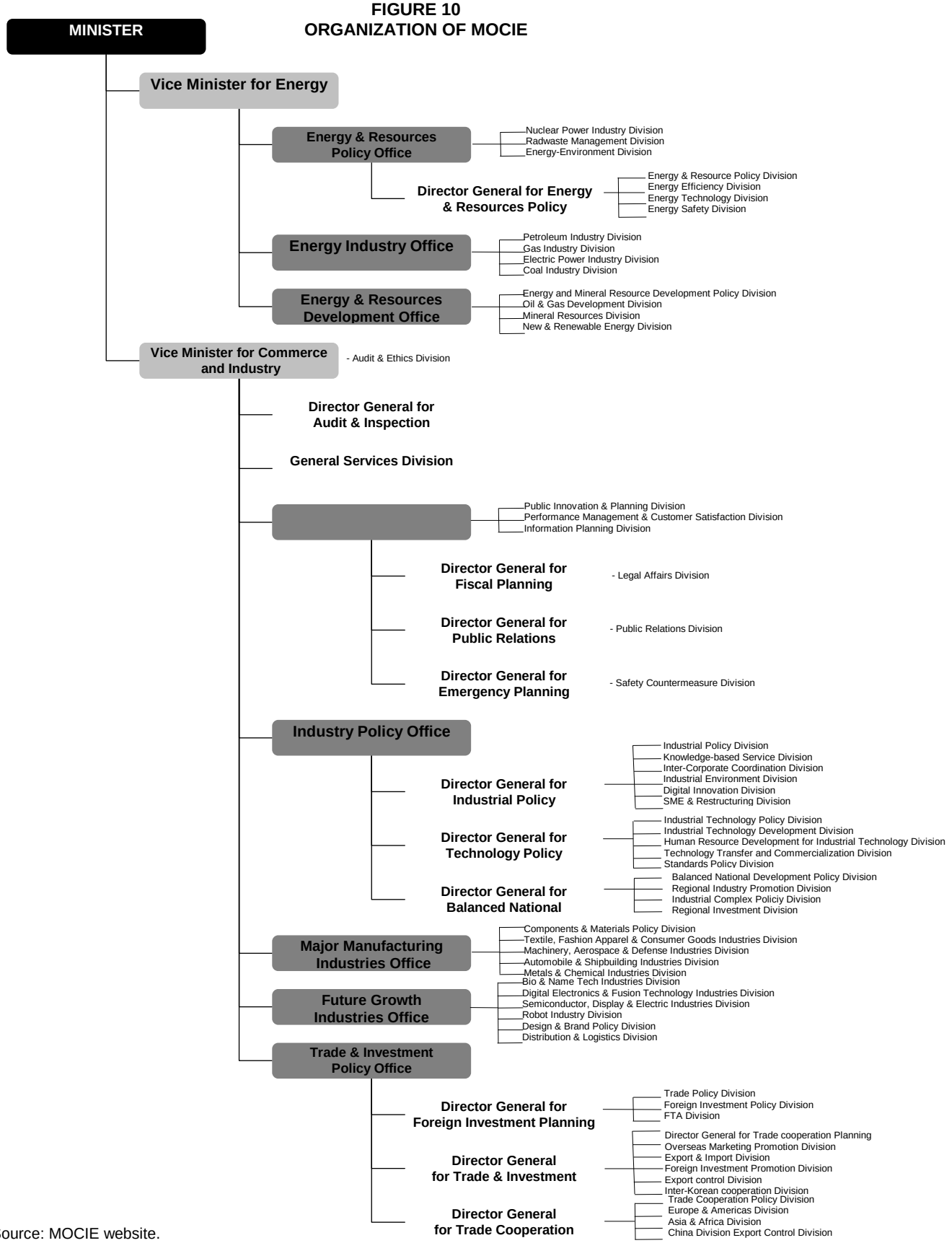
TABLE 11
PERSONNEL ORGANIZATION OF MOCIE (AS OF 2006)

Total	Minister	Vice-minister	Senior Civil Sevice	Grade 3,4	Grade 4	Grade 4,5	Grade 5	Grade 6	Technical official	Research official	
1,113	1	2	27	17	65	76	294	353	164	60	54

Source: MOCIE Home page [online] <http://mocie.go.kr>

MOCIE consists on eight departments distributed between two bureaus, the Commerce and Industry Bureau and the Energy Bureau. The former bureau supervises the Policy Management & Public Relations Office, Industry & Policy Office, Major Manufacturing Industries Office, Future Growth Industries Office, and Trade & Investment Policy Office whereas the latter bureau supervises the Energy & Resources Policy Office, Energy & Industry Office, and Energy & Resource Development Office.

FIGURE 10
ORGANIZATION OF MOCIE

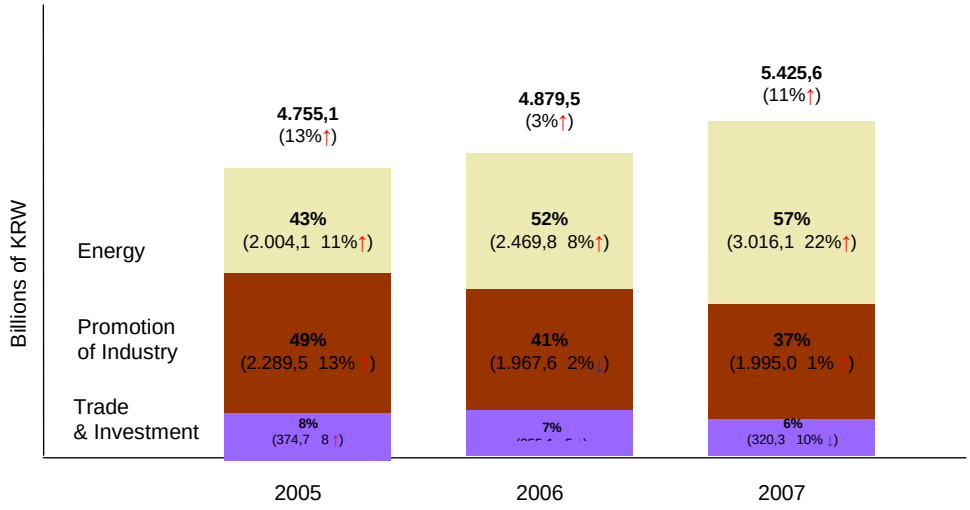


Source: MOCIE website.

Budget

MOCIE's 2007 budget is KRW 5. 4,256 trillion, which is raised 11.2% compared to the one in 2006. This accounts for 3.3% out of the total government budget. MOCIE's budget is mainly spent on energy related work, the promotion of development of industries, and the improvement of trade and investment (Figure 11). Furthermore, as a part of activities to promote the development of the industry sector, more than half of the respective budget is assigned to R&D, which is set to KRW 1,092.9 billion. In addition, MOCIE's budget is aimed to improve the balanced growth such as for the buildup of innovative industry clusters and "Techno parks," which is KRW 6.12 billion and KRW 28.0 billion respectively. This is expected to help the development of specialized industries in local areas.

FIGURE 11
ESTIMATED EXPENDITURE
(billions of Korean Wons)



Source: MOCIE News [online] <http://mocie.go.kr>

The budget is continuously increased, which indicates the government efforts to balance growth between Seoul and the other local cities. As the transportation, energy and environment tax were transferred to MOCIE as a source of revenue in 2006, so MOCIE is able to put more energy to develop oil fields overseas. Hence, MOCIE was planned to invest KRW 712.6 billion on these projects, which increased up to 89.5% compared to 2006 against the high oil prices.[3]

Moreover, there is a special budget on "Economic cooperation project with Algeria" (KRW 2 billion) which is set to establish a bridgehead on energy partnership with African countries. In addition, another special budget of KRW 21 billion is planned to be allocated to support those industries with negative impacts from FTAs and allow them to have a quick response to the changes of the business environment. In 2007, MOCIE had administrated a the total amount of funds of approximately KRW 1,849.2 billion, which shows a 3.6% drop in comparison to 2006. A great deal of funds were used for the development of electricity industry, and the remaining KRW 17 billion was allocated for environment related work, for instance, the control of Freon gas.[5]

[3] MOCIE News. 2006.9.29. http://mocie.go.kr.
[5] MOCIE News. 2007. 5. 11. http://mocie.go.kr.

Interaction with other organizations

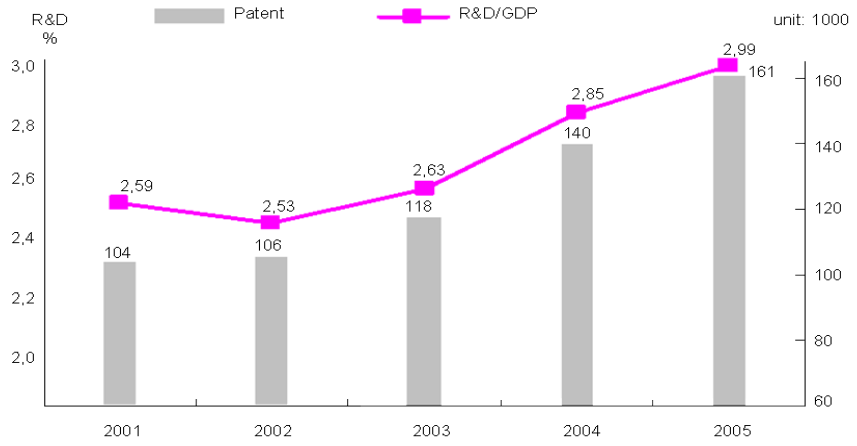
Each ministry pursues their own function and responsibility to effectively execute policies while cooperating one to another if necessary. For example, three ministries usually deal with policy issues regarding trade and environment, although other ministries may intervene for specific issues. The Ministry of Foreign Affairs and Trade (MOFAT) is in charge of all matters related to international agreements or negotiations. It has a specific division specialized in multilateral environmental agreements, which is called the "Environment Co-operation Division". The Ministry of Environment (MOE) is in charge of managing domestic regulations related to the environment. It has a division in charge of the international and domestic environmental relations, which is called the "Global Environment Division". The Ministry of Commerce, Industry and Energy (MOCIE), deals with environmental issues from an industrial competitiveness perspective.

Another example of cooperation is between the Ministry of Information and Communication (MOIC) and MOCIE. The two ministries commit to support the development of artificial intelligence projects as a new industry with the potential to bring a great deal of value added and spillover effects on related industries. MOCIE, on one hand is leading the efforts of the robotic industry, home robot, robots in public service, etc. On the other hand, MOIC is in charge of robots in IT service areas like robotics based on network technology. In addition, the two ministries are supporting RFID projects together. As Korea government is trying to transform the Korean economy towards an innovation driven economy based on advanced IT development, cooperation between the two ministries is expected to expand even more.

Industrial policy

MOCIE aggressively sought out the future growth engine for the Korean economic development while supporting the current major industries in order for them to keep the leadership in world economy. Companies are encouraged to expand the investment on R&D, hence, 2~3% of GDP is spent on R&D, and the number of patents applied for is also increasing (Figure 12). Korea stands on top of the shipbuilding industry, and the semiconductor industry stands as the 3rd largest manufacturer worldwide. The electrical and electronic industry is listed 4th in world ranking and 5th in steel and automobile industry.

FIGURE 12
INCREASE IN R&D INVESTMENT



Source: MOCIE report on operations (2007)

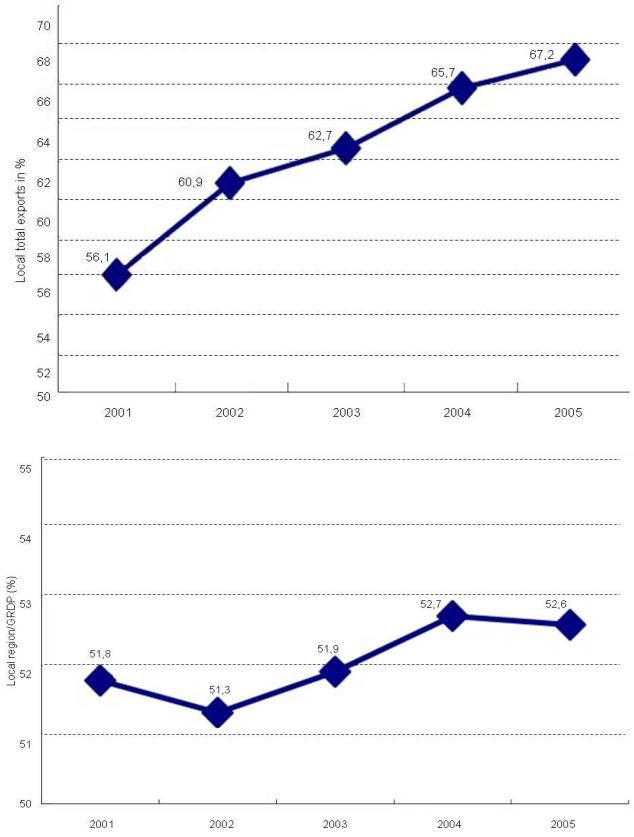
The government listed up 103 action plans to foster the '10 Growth Engine for Next Generation,' and MOCIE is mainly in charge of overseeing 5 sectors: display, brainy robot, semiconductors for next

generations, automobiles of the future, and next-generation battery. Consequently, PDP made in Korea gained the largest market share in the world, and Korea is leading the world in terms of development of next-generation semiconductors as well.

With the advent of the current government, the ministry promoted a balanced economic growth between large enterprises and SME and also between the capital city of Seoul and other regions in Korea. In 2006 was enacted a national law to promote mutual cooperation between large and smaller enterprises. Furthermore, CEOs from different enterprises held a meeting to discuss a mutual survival between large and small enterprises. As a result, the corporate investment between large and smaller companies for mutual survival has been increased from about KRW 1.0 trillion in 2005 to KRW 1.4 trillion in 2006.

In addition, MOCIE strove to assist other regions, except Seoul, to develop based on their own strength and potential. The balanced development is being and will be mainly carried out by various regional development projects such as relocation of government offices, creation of regional industrial clusters and company towns, massive fiscal subsidies targeting depressed regions ('Revitalization project'), and the introduction of a 'special local development zone'[6]. With these continuous efforts for balanced growth between Seoul and other local provinces, it is arguable some of the outcomes. For instance, the weight of other regions, with the exception of Seoul, in GRDP has increased from 51.3% in 2002 to 51.9% in 2003, and to 52.3% in 2004 (Figure 13).

FIGURE 13
THE WEIGHT OF LOCAL REGIONS IN TOTAL EXPORT AND GRDP



Source: Author

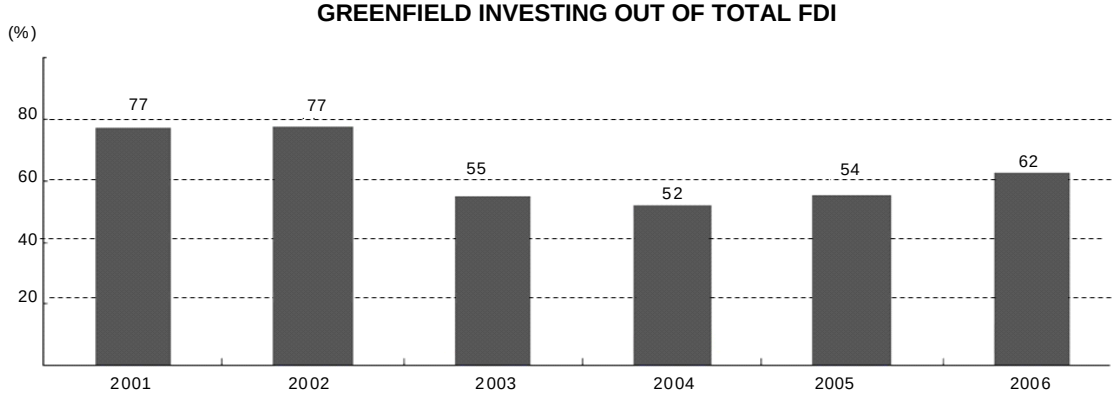
[6] Jeong-Rak Sohn. 2005. 'Korea's National Balanced Growth in Regional Reverse.' A paper presented in 8th International Conference of the Asian Planning Schools Association.

Trade and investment policy

The ministry made continues efforts to make Korea a business friendly country, attract FDI and promote free trade. For example, in 2004 the Korean government elaborated a 'Five-year Plan to Improve Business and Life Environment for Foreigners'.

During 2004-2006, exports increased from $253.8 billion in 2004 to $326 billion in 2006. Moreover, FDI inflow increased over $10 billion since 2004, in particular 'Greenfield investing,' which focus on start-up projects, usually for major capital investment such as production plants, refineries and ports. Greenfield investing accounted for more than half of the total FDI from 52% in 2004 to 62% in 2006 (Figure 14).

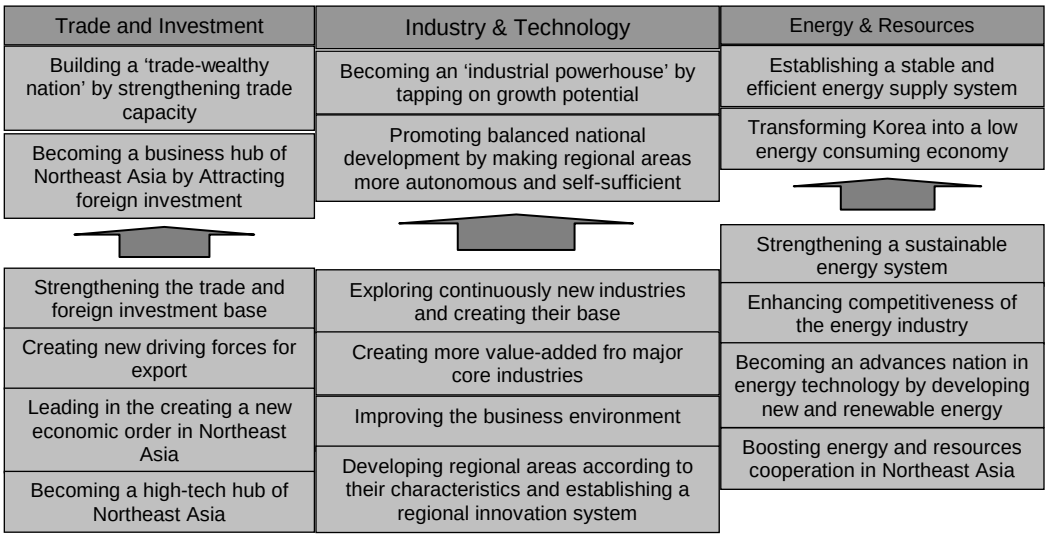
FIGURE 14
GREENFIELD INVESTING OUT OF TOTAL FDI



Source: MOCIE News [online] http://mocie.go.kr.

Since 2003, Korea has stepped forward on 'Business hub of East Asia' by inducing 42 R&D centers and 84 foreign companies' logistic bases. MOCIE has actually set the goal of achieving a per capita income of $20,000 and recognize the establishment of an innovation-driven base for industry, trade and energy as its new mission (Figure 15).

FIGURE 15
ESTABLISHING AN INNOVATION-DRIVEN INDUSTRY, TRADE AND ENERGY TO ACHIEVE PER CAPITAL INCOME OF $20,000



Source: MOCIE website [online] http://mocie.go.kr.

6. Institutional innovation case

a) The General Trading Company (GTC)

The Korean economy has grown rapidly since the early 1960s with the implementation of a series of Five-Year Economic Plans. The strong drive for economic growth was from the Korean government, which used export-oriented strategy as an engine for economic resurgence. As a result, Korean exports, which stood at $44 million in 1962, reached $100 million in 1964, $1 billion in 1971, and $10 billion in 1977, an unprecedented rate of tenfold increase every seven years or less.

This quantitative growth of the Korean exports was the result of numerous government incentives to exporters through financing, tax exemptions, and manipulation of foreign exchange rates. While rapidly expanding exports, these incentive programs caused a huge financial burden to the government. In addition, it generated a number of undesirable effects including the proliferation of inexperienced and small-scale manufacture-exporters, intense competition among domestic firms, and overdependence on government subsidies. In the meantime, dynamic marketing by Korean exporters to tap into new foreign markets was one of the issues to solve under the trends of a global economic recession and growing protectionism of advanced countries followed by the outbreak of the oil crisis in 1973.

The political situation of the ruling party had made Korea find an innovative way to boost exports. The government tried to appease the people by presenting to the people a scheme of continued economic growth which was expressed in a slogan of "export of $1 billion," along with "per capita GNP $1,000 billion" and "my-car age" by 1978. As the actual export volume in 1974 much lagged behind the target set earlier in the same year, the government was desperately looking for a way to catch up the gap between the political goal and economic performance.

Under the complex obstacles that Korea faced in the early 1970s, Korea came up with the concept of "General Trading Company" modeled after Japan. The term "General Trading Company" (GTC) has used among the business circle for decades to describe ten or so Japanese trading companies called 'sogo-shosha.' These Japanese GTCs were so unique in nature that the word GTC became a generic term to identify only these companies.

The prioritized mission of GTCs was to expand Korea's exports, especially of heavy industry products. In addition, it was expected to attain economies of scale in the world market, specialized enough in exportation to gain international competitiveness, self-sufficient and independence from the government, and capable of overseas marketing. The government also expected that a handful of GTCs, which together would handle about half of the total Korean exports, would be much easier to control than thousands of unreachable small exporters. In other worlds, the GTC system had the effect of institutionalizing export activities in Korea.

With the objectives mentioned above, the Ministry of Commerce and Industry announced the ordinance indicating minimum requirements for designation as a GTC in 1975 as follows:

- Paid-in-capital of one billion won (approximately $2.5 million)
- Annual exports of $50 million
- Seven products with an export value of more than $500 thousand each
- Ten overseas branches
- Ten export recipient countries with an export value of over $1 million each
- Public offering of company stock

The necessary conditions indicate government's objectives for devising GTCs. Although designated as "general" trading companies, it is clear that policy makers were primarily concerned that they function as exporters and that these exports be large in volume and diversified in both range and destination of products.

Korean businessmen were, still, eager to have their companies designated as GTCs in spite of quite heavy burdens in satisfying the requisites. Once a company was designated as GTC, it could enjoy the enhanced credibility of the company both in domestic and world markets, and the group companies having a GTC earned privileged position on various national projects such as chemical and heavy industry plants plus access to subsidies. The ownership of a GTC could give the owner-manager a psychological reward and enhance his or her sense of accomplishment in business life. The Korean businessmen, therefore, so longed for obtaining the license of a GTC to take advantage of the benefits attached to the GTC title. Samsung Trading Company was chosen as the first Korean GTC on May 19, 1975, followed by Ssangyong, Daewoo, Kukje, and Hanil in the same year. Eight more companies were added to increase the total number of GTCs to 13 by 1978.

Exports

Total exports for 1975 were valued at $5.4 billion, with the newly created GTCs handling less than 14% of the total. By 1980 exports were valued at $17 billion, tripled the 1975 figure, with GTCs were handling fully one-half of the total, a share they have managed to maintain (Table 13). During 1980s and 1990s, GTCs showed average 12.6% of annual increase in export, which was 4% higher than that of total national figure.

TABLE 12
EXPORTS OF KOREAN GTCS
(Millions of dollars)

GTCs	1975	1976	1977	1978	1979	1980	1981
Samsung	223	335	507	493	769	1 237	1 620
Ssangyong	125	141	176	264	425	650	756
Daewoo	161	301	501	706	1 119	1 415	1 914
Kukje	64	197	328	472	564	745	787
Hyosung	34	113	199	338	585	761	787
Bando	31	134	212	330	471	493	619
Sunkyung	56	114	247	283	334	431	190
Kumho	32	99	204	256	305	357	1 723
Hyundai	-	-	320	260	615	1 028	1 723
Koryo	12	18	24	31	51	67	84
Korean Exports (B)	5 427	8 115	10 475	12 713	15 055	17 055	20 993
GTC's Export (A)	739	1 476	2 884	3 584	5 328	7 183	9 127
(A) / (B) (%)	13.6	18.2	27.5	28.2	34.8	41.0	43.5

Source: Cho, Dong Sung (1984)

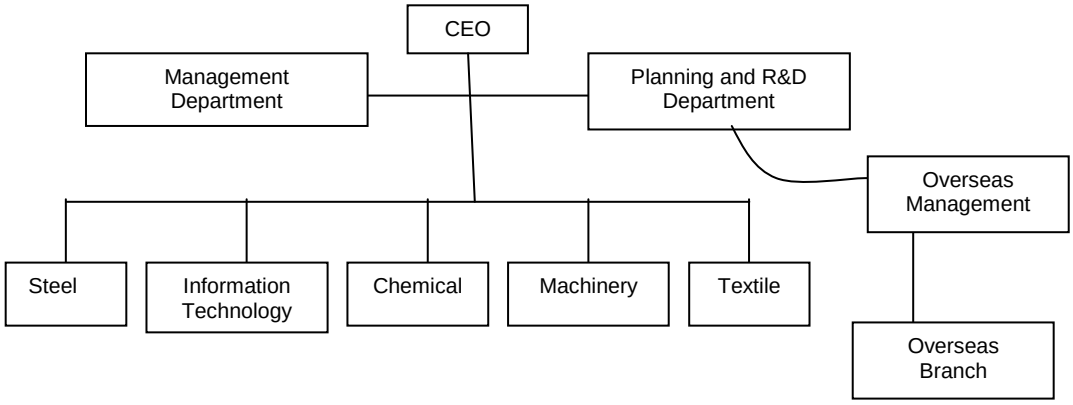
Imports

In contrast to Japanese GTCs that greatly contributed to total Japanese imports, import was not a major business to Korean GTCs. The amount of foreign merchandise and materials imported by Korean GTCs was $1,832 billion in 1981, which accounted for merely 7.0% of the Korean total. Even in 1994, the import of GTCs accounted for 15% of the total import of Korea. It was resulted from the export-oriented economic policy. The major import items were mostly equipments for plant investment, parts of electronic products, metals and oil. Samsung GTC, Hyundai GTC, and Daewoo GTC primarily imported parts of electronics or cars whereas oil was imported mainly by LG GTC, Ssangyong GTC, and Sunkyung GTC.

Internal structure

Since GTCs deal with a variety of products and a great range of functions, most of GTCs have been structured according to the product as depicted in Picture 16. Each product division is in charge of sales and exports of products in charge, and takes full responsibility of its own performance. Entering 1990s, GTCs started to create a separate division that looks for new business plans or marketing initiatives in order to catch up with the rapid changes in society and industries, and tap into the lucrative market at appropriate timing, for example, Hyosung GTC made "Business Development Team," and Sunkyung GTC formed "Project Department" for developing new source of business.

FIGURE 16
PRODUCT DIVISION AND ORGANIZATION OF A TYPICAL GTC



Source: The Advisory Board of Korean GTCs (1989)

The headquarters is positioned in the center of the overall operations of a GTC while the overseas branches are under the control of the headquarter assisting the development of the company. GTCs increased local branches in highly promising markets such as China, Latin American and East Europe whereas offices in North America and Africa has been reorganized or reduced because of high export barriers in the areas in the 1990s (Table 13).

TABLE 13
THE NUMBER OF OVERSEAS BRANCHES OF GTCS IN KOREA (BY REGION)

Area	1990	1995
Asia	106	174
China	6	63
Middle East	41	44
Africa	20	14
The Americas	79	72
Latin America	27	32
Europe	66	85
East Europe	11	40
Oceania	7	8
Total	**318**	**397**

Source: Cho, Pil Ho, et al. (1995)

Meanwhile, with the trend of globalization and localization, headquarters are tending to give an independent control to overseas branches, and are increasing the number of local employees. Management department including Human Resource, IT, Finance, Accounting, and Legal division also function mainly

to support sales and coordinate among divisions. Planning and R&D department are in charge of making short and long-term strategies and business roadmap, PR functions and devising business innovation.

GTCs' interaction with other organizations

Interaction with Government: Subsidies

To promote the export performance of Korean GTCs, the Ministry of Commerce and Industry (MCI) has been offering the following subsidies to Korean GTCs.

- Trade Administration
  - Priority in international tenders of over $500,000, offered by the government agencies
  - Relaxation of the requirements for joining various commodity export associations
  - The right to import major raw materials for the Korean GTCs' own use
- Financing
  - Export financing
  - Inventory financing for finished goods
  - Imports financing for raw materials
- Foreign Exchange Administration
  - Allowing the use of revolving L/Cs
  - Special treatment in controlling GTCs' overseas branches
  - Increase in the limit of foreign currency holdings by GTCs' overseas branches

Besides the subsidies cited above, the government once contemplated waiving the operating taxes levies on export commissions, but this was not actually implemented.

Interaction with the Chaebols

The Korean government intentionally set the minimum requirements for GTC designation high enough to limit the bulk of the substantial incentives to only the largest trading concerns. The only firms large enough to qualify were giant business groups or chaebols, who combined the trading arms of their group manufacturers into the group-wide GTCs. Already much larger than their domestic competitors and able to draw upon the financial strength and support of the entire group, these newly-formed trading companies grew rapidly as recipients of the generous incentives. All but one of Korea's nine GTCs in the 1980s were affiliated with chaebols and as the exclusive exporters for their respective groups, they have been assured a stable source of products for export from group manufacturers.

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With diverse functions from export to finance and information and strong human pool scattered around the world, GTCs have positioned respectively important role in Korean business groups. The revenue of GTCs tremendously contributed to the revenue of the whole group. Meanwhile, GTCs also showed high degree of dependence on its business groups, and GTCs belonged to bigger groups showed greater dependence on the group. While the top GTCs in Korea such as Samsung GTC, Hyundai GTC

and LG GTC showed more than 70% dependence on the group, the relatively small GTCs like Ssangyong GTC, Sunkyung GTC and Hyusung GTC showed less than 50% dependence on the group.

Moreover, Samsung GTC and Daewoo GTC were appeared in Big Five Korean Companies as they were licensed as GTC in 1975, and their significant position in Korean economy has been maintained up until 1990s.

Interaction with SME in Korea

GTCs provided export channels for small and medium sized companies (SME) in Korea. The degree of SME's products out of the export amount of GTCs had increased, which means that SME focused on manufacturing while the export was the role of GTCs (Table 15).

TABLE 14
PERCENTAGE OF SME'S PRODUCTS IN EXPORT AMOUNT OF GTCS

	1976	1977	1978	1979	1980
Products of SME (%)	21	27,8	30,7	32	27,4

Source: Cho, Dong Sung (1983)

However, compared to the cooperation between Japanese GTCs and their SME, the cooperation between GTCs and SME in Korea is insignificant. Some of GTCs own manufacturing sectors within the company, or they are more focus on the exporta of their affiliated companies within the group.

SME received funding and subsidies from GTCs since most of Korean GTCs belong to chaebols. About $29million in 1976 was flown from GTCs to SME, and it rose to $52 million in 1979. However, after 1990s, GTCs themselves are having trouble in funding, so the financial support for SME is also being threatened.

In addition to the financial support, some of the large GTCs had separate departments in charge of supporting SME and seeking cooperative relationship with them. For example, Hyosung GTC assisted SME's business management by sharing sales information, and developed new overseas market in cooperation with SME. Daewoo GTC also helped SME's technological development and business management through e-consulting and sharing market information. However, as some SME that received various support and help from a GTC cancelled the contract and moved to other partner who presented better conditions and reward, there was conflicts between GTCs and SME.

On the contrary, there is also a severe criticism on how large GTCs encroach on SME by hostile M&As and immoral way of business. For example, GTCs selected the delivery time and place at their convenience, and avoided to issue local letters of credit (L/C), or extended the currency of a bill from 3 months to 6 months. The number of subsidiary companies of GTCs was increased by M&As with SME or by taking SME's business territories (Table 15).

TABLE 15
THE NUMBER OF SUBSIDIARY COMPANIES OF GTCS

	1976	1977	1978	1979	1980	1981
Subsidiary companies	95	139	164	208	170	170

Source: Cho, Dong Sung (1983)

In 1990s, GTCs tried to devise various ways to strengthen the cooperative relations with SME. For example, Samsung GTC and Daewoo GTC made a separate team called "SME Support Team" to collect fund for SME. LG GTC set up a hotline to hear the suppliers' complaints. Ssangyong GTC, Sunkyung GTC, and Hyundai GTC also created various channels to improve the relationships with SME.

Performance and contributions

GTCs are driving forces for expanding exports in Korea. The amount of exports in 1975 was $2.6 billion, which increased 15.7 times up to $41.8 billion in 1994, while the total exports of Korea surges only 7.5 times during the same period of time. And their relative importance in Korea's export increased from 21% in 1978 to 44% in 1994.

GTCs also contributed to Korea's industrialization by leading the export of heavy industries. Heavy industries such as Electronics, Machinery, Steel and Metal, and Chemicals accounted for a large portion of export items handled by GTCs, and its share increased from 46.1% in 1977 to 75.8% in 1987 (Table 16). The share of heavy industries increased up to 90% out of GTCs' exports in 1994. The portion of primary industries in GTCs' exports was less than 10%, but fishery and minerals has been steadily increased, and textile and shoes has been loosing its comparative advantages due to the loss in cost competitiveness.

Looking at the major export items by company, Samsung GTC and LG GTC relatively concentrated on electronic products, Daewoo GTC on ships, cars and consumer electronics, Hyosung GTC on textiles, meanwhile Hyundai GTC more focused on ships and cars, which has been closely related to the key industries of the group. These reflected the specialization and strengths of each group.

TABLE 16
THE PROPORTION OF HEAVY INDUSTRY IN EXPORT ITEMS OF GTCS

GTCs	1977	1980	1983	1987
Samsung	37,9	53,2	64,9	73,1
Ssangyong	81,1	81,3	80,5	69,9
Daewoo	25,0	47,3	70,1	67,6
Hyosung	47,5	41,1	51,2	43,9
Gumsung	57,2	58,6	81,8	83,1
Sunkyung	13,2	32,3	44,8	56,7
Hyundai	94,1	89,2	95,4	96,1
KGTCs Average	**46,1**	**58,4**	**75,5**	**75,8**
Korean Average	**36,1**	**43,9**	**55,7**	**50,6**

Source: Cho, Dong Sung (1989)

GTCs also pioneered to diversify the export markets. The overseas market that GTCs penetrated, 69.5% of exports in 1980 were toward North America, West Europe, Japan and Asia, a bit lower from the 78.8% in 1977. Along with the efforts of GTCs to extend global network, new markets such as the Middle East, Latin America, Oceania, and Africa contributed approximately 25% in average to GTCs' exports in 1980s (Table 17). GTCs gradually expanded the overseas branch offices up to 276 offices in 1987 (Table 18).

TABLE 17
EXPORT MARKETS OF KOREAN GTCS
(in percentages)

Market	1977		1980		1983		1987	
	Korea	GTCs	Korea	GTCs	Korea	GTCs	Korea	GTCs
North America	35,9	38,3	28,7	25,0	38,5	30,5	39,5	31,9
Europe	17,3	15,1	17,9	16,1	15,5	17,3	14,8	15,6
Japan	19,5	15,1	17,4	10,6	13,9	11,0	15,0	11,1

(continues)

TABLE 17 (concludes)

Asia	8,4	10,3	14,9	17,8	13,4	16,2	13,9	17,4
Sub Total	81,1	78,8	78,9	69,5	81,3	75,0	83,2	76,0
Middle East	14,5	14,3	14,5	20,9	9,9	17,6	9,5	13,3
Latin America	1,4	1,7	2,8	3,9	4,2	3,2	3,6	5,9
Oceania	1,4	1,4	1,6	1,5	1,4	1,2	1,5	1,1
Africa	1,6	3,3	2,6	4,3	3,1	3,0	2,2	3,6
Sub Total	**18,9**	**20,7**	**21,5**	**30,5**	**18,6**	**25,0**	**16,8**	**23,9**

Source: Cho, Dong Sung (1989)

TABLE 18
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East Europe	11	40
Oceania	7	8
Total	**318**	**397**

Source: Cho, Pil Ho, Kim, Hyo Jin, and Lim, Hong Kyun (1995)

Sunkyung GTC established a branch in China before official diplomatic relations with them. The economic exchange helped to expedite the diplomatic relations between two countries. As Korea formed a friendly diplomatic relations with China, the amount of export to China had been dramatically increased. Cars and Electronic products were major export items to America and Europe, meanwhile Japan and China showed strong demand on steel and chemicals.

In terms of employment, export expansion led by GTCs generated a full of job opportunities. The employment generated by exports in 1975 was 1.7 million, which increased up to 2.5 million in 1981, a 39.7% increase.

TABLE 19
THE EFFECT OF EXPORT ON EMPLOYMENT

Effect on Employment	1975	1976	1977	1978	1979	1980	1981
Contribution on overall employment (%)	13,9	14,2	15,1	15,0	14,2	15,0	17,0
Employment per $1 million	324	232	194	159	128	117	117

Source: KOTRA (1982)

Exports contributed to increase employment as well as the qualitative improvement of productivity. As Table 8 shows, the employment per $1 million aroused from export has actually decreased from 324 in 1975 to 117 in 1981. It is partly because of improvement on productivity. The pool of good human resources working in GTCs contributed to the improvement of productivities.

The employees that GTCs hired could build global sense and capabilities necessary for sales person through frequent opportunities of business trips to overseas and various training programs. Most of the GTCs sent out resident sales persons to overseas branches, and get them returned and replaced by new persons every 3, 4 years.

Achievements and shortcomings

Since 1978, GTCs have achieved as much as almost 25times growth until the mid of the 1990s. It is incredibly fast growth in contrast to that Korean GNP grew only 12 times during the same period of time. In 1994, the total revenue of GTCs was about $50 billion, which accounted for 18% of the total GNP. In addition, the representative 7 GTCs such as Samsung GTC and Hyundai GTC were all listed up in the Korean Big 30 Companies. The majority of the GTCs' revenues were from trade, but they are tending to increase the share of domestic transactions.

Critics have pointed out; however, that GTCs grew at the expense of numerous smaller firms, contributing to Korea's widening dual economy and social bifurcation, and squandered valuable foreign exchange (Fields, 1989).

Other critics argue that the driving forces for new export records and larger market shares in order to obtain the increased sales, subsidies, and prestige, led to excessive competition among GTCs and an attitude of expansion at all costs, with little regard for accounting accuracy or economic efficiency (Fields, 1989, p. 1078). In addition, Korea's policy success of large-scale trading companies has also entailed tradeoffs. The Korean state's ability to effectively intervene in the market and establish large trading companies, as Fields (1989) argues, has come at the expense of market efficiency. Policy successes do not always achieve optimal results.

In spite of the criticism, the GTC program has been generally praised as one of the policy success in the process of Korean economic development. GTCs have used their comparative advantages of specialization, integration, and scale to improve the nation's exports as the government perceived the need to expand and diversify to achieve these objectives. The government effectively implemented the policy.

IV. Technological capability building and evolution of the national innovation system

1. Science and technology policy during the decade of 1960 and the decade of 1970

The epochal measure within the science and technology (S&T) policy was the establishment of the Department of Science and Technology in order to develop R&D in the field of S&T, foster technical experts, and promote international cooperation. The department formulated the "Five Year Plan for S&T Development", in line with the Five Year Economic Plan, in coordination with other related departments. In order to assist the Department's efforts, the government also established the Science and Technology Review Board. The head of the Board was the prime minister, who was assisted by many experts from business and political sectors. The Department of S&T; however, was more focused on bold measures regarding S&T development that in some extend were harder to implement. On the other hand, other ministries like MOCIE were more focused on short term goals like achieving annual trade records rather than long term investments like S&T development.

Followed by the establishment of the Department of S&T, the government made some important S&T related laws and regulations. In this regard, the S&T Promotion Act was enacted in 1967 in order to facilitate the import of necessary equipment for technology development by tariff reductions. The Technology Development Promotion Act of 1972 and the Technology Management Promotion Act of 1973 provide incentives to companies trying to develop technology and supports the improvement of industrial technology,

respectively. However, the tariff reduction and financial incentives were not enough to highly motivate companies to devote for S&T development.

Another important measure was the government's efforts to encourage the construction of infrastructure for S&T development. Large scale research complexes such as Daeduck and Hongnung were built. In Hongnung, the Korea Institute of Science and Technology (KIST), the Agency for Defense Development, and the Korea Science and Technology Information Center were opened. Daeduck Science Complex became the base for high-tech R&D centers encouraging for cooperation between university and research centers.

Among many research institutes, KIST weights greater importance. It was established in 1966 with the support of the U.S. he government spent significant budget on the institute, and the employed scientists were compensated by high salaries. KIST's roles and duties were from technical analyses to process and product development. It also assisted on technology transfer by adjusting new technology to the Korean industry circumstances. In addition, it also assisted on capacity building to improve the Korean enterprises' negotiation skills in the process of technology transfer. One of the most important contributions was that KIST provided companies of capable technicians and researchers by training and fostering them in advance.

The government had also encouraged enterprises to do in- house R&D activities as well. For example, the government supported research expenses to companies in alliance with research institute for S&T development. As a result, the in-house R&D centers in companies had increased from 1 in 1971 to 12 in 1976 and up to 46 in 1979. Since companies were more focused on the advanced manufacturing technology which is easier to imitate and to expect substantial achievement, manufacturing capability advanced faster than the technical capability.

R&D expenditure was a bit over $9 million in 1963, but it increased significantly up to $360 million. The ratio of R&D investment in GDP was 0.25% in 1963, but it also expanded to 0.57% in 1980. And the government was the main actor in R&D investment as it accounted for 97% of it in 1963, 88% in 1970 and 61% in 1980.

2. Science, technology and human resource development policy

Park regime put tremendous efforts in training capable R&D experts and technicians. One exemplifying attempt was to promote S&T education in universities. As a consequence, science and engineering graduates dramatically increased up to 140,000 in 1979 in contrast to only 22,000 in 1962. The qualified human resources were the important pillar that supported the Korean economic growth throughout the 1970s and the 1980s. In addition, the government appointed six national universities as research centers for six strategic industries. Electric industry was assigned to Kyungpook University, the metal precision to Chonbuk University, the machine industry to Busan University, the chemistry to Chonnam University, the civil engineering and construction to Chungbuk University, and science education to Chungnam University. In addition to undergraduate education, the government also supported and encouraged for the improvement of graduate education in the S&T field. The Korea Advanced Institute of Science (KAIS) was established and funded by the government to systemically train masters and Ph.Ds in science and technology.

The government also paid attention to the problem of brain-drain to overseas as well. Well educated professionals in the advanced countries did not return to Korea resulting on 97% of the Ph.Ds in basic science and 87% of Ph.Ds in applied science did not come back to Korea from the country where the degree was conferred. Therefore, the government started to implement measures to attract Korean technical expert who achieved a degree in foreign countries back to Korea from 1966. As a result, the government was successful to get 18 experts back to Korea in 1966, and thereafter, 68 experts in total returned to Korea up to 1975. This number increased to 276 in 1980.

Technical education in high schools was also strengthened. The number of students in the technical school was only 33,000, but it had significantly increased over 200,000 in 1979. Apprenticeship training was expanded in responding to the increasing demand for the skilled labors. In 1974, companies that have over 300 workers must have provided on- the- job training to workers by law. In addition, industrial education curriculum was offered in factories to workers who do not have

opportunities for education with free tuition fee. Through this program, the companies could reduce the turnover rate and improved productivity while workers showed loyalty to the company.

3. Technology catch-up and economic development

Human resource development has played an important role in the process of technology catch-up in Korea. Table 6 shows the evolutionary stages of industrial development in Korea and its relationship with technology development. In the 1960s, the Korean government focused on developing import-substitution industries and expanding export-oriented light industries. The import of technology was an important vehicle for technology development, particularly in the early stage of development in Korea. Along with this selective industrial development strategy, the government made efforts to strengthen S&T education, deepen scientific and technological infrastructure, and promote import of foreign technologies. In the 1970s, the government shifted its industrial emphasis from light industry to heavy and chemical industry. With strong emphasis on technology imports, the government tried to expand technical training in order to encourage human resource development in S&T sectors, to improve institutional mechanism for adapting imported technologies, and promote research applicable to industrial needs.

Through the selective measures for industrial and technological development, per capita GDP exceeded $1.000 in the late 1970s and the industrial structure of the Korean economy had transformed to one of comparative advantage in the 1980s. The government then further expanded its technology-intensive industry and more placed emphasis on education and acquisition of top-level scientists and engineers. Korea was successful in this period in producing and exporting some leading high-tech products such as semiconductors. However, the technology development strategy of the country was more imitative than innovative.

In the 1990s, the Korean economy has undergone a comprehensive industrial restructuring along with institutional reforms and technical innovation. The government reinforced national R&D projects and strengthened the demand-oriented technology development system. As a result, Korea entered into the stage of economic development based on technology and innovation in the 1990s, and since then, it has maintained and expanded its efforts on moving towards a knowledge-based economy through strengthening national and regional innovation systems and internalizing R&D systems and information networks.

TABLE 20
DEVELOPMENT OF INDUSTRY AND TECHNOLOGY POLICY

	Industrial development	Technology Development	Highlight
1960s	• Develop import-substitution industries • Expand export-oriented light industries • Support producer goods industries	• Strengthen S&T education • Deepen scientific and technological infrastructure • Promote foreign technology imports	1960: $79/capita Labor
1970s	• Expand heavy and chemical industries • Shift emphasis from capital import to technology import • Strengthen export-oriented industrial competitiveness.	• Expand technical training • Improve institutional mechanism for adapting imported technology • Promote research applicable to industrial needs	1970: $253/capita Labor and Capital
1980s	• Transform industrial structure to one of comparative advantage • Expand technology-intensive industry • Encourage manpower development and improve productivity of industries	• Educate and acquire top level scientists and engineers • Perform national R&D projects efficiently • Promote industrial technology development	1980:$1 655/capita Capital and Technology
1990s	• Promote industrial restructuring and technical innovation • Promote efficient use of human and other resources • Improve information networks	• Reinforce national R&D projects • Strengthen demand-oriented technology development system • Institutional reforms	1990:$5 890/capita Technology and Innovation
2000 - Present	• Move towards high tech and high value-added industries • Develop IT industry • Search the next generation growth engines	• Strengthen national and regional innovation systems • Internationalize R&D systems and information networks • R&D increase in IT, BT, NT	2000: $9 823/capita Innovation and KBE

Source: Hong (2005)

4. History of government R&D programs and policies

Table 21 summarizes the evolution of government R&D programs since the 1960s. Korea's national R&D programs (NRDP) were first introduced by MOST in 1982. The goal of the NRDP was to develop technology in order to enhance industrial competitiveness. In order to achieve this, the government assumed a very active role in upgrading industry's technological capabilities.

The launch and implementation of the NRDP is closely related to the role of the research institutes. The NRDP offered tremendous opportunities to revitalize government-sponsored research, which was intended to complement research areas that would not be pursued by the private sector alone.

TABLE 21
EVOLUTION OF GOVERNMENT R&D PROGRAMS AND POLICIES

Decade	Emphasis and Initiatives	Remarks
1960s Infant Stage of ST Policy	• Imports of foreign technology • Laws for ST promotion • Established MOST, KIST, etc.	R&D/GDP = 0.3%
1970s Building Institutions	• Imitation and reverse engineering • Laws for R&D promotion • Established 16 GRIs	R&D/GDP = 0.4~0.8% Public : Private= 50 : 50
1980s National R&D Program	• Development of indigenous technology • Started National R&D program • Promotion of private sector's laboratories	R&D/GDP = 0.8~2% Public : Private= 20 : 80
1990s Diversification of Government R&D	• Development of high-tech industries • Promotion of university research • Started Highly Advanced National (HAN) Project	R&D/GDP = 2~3%
2000s Elaboration of Government R&D	• Development of knowledge-based economy • Started Creative Research program, National Research Laboratory Program, The 21st Century Frontier Program, etc.	R&D/GDP = 3~5%

Source: Hong (2005)

In the earlier stage of economic development, the Korean government led R&D, but the private sector took over the leading role as the economy entered the innovative catch-up stage. Table 22 summarizes the development and transformation of the government R&D programs during the 1960s~2000. Starting from the infant stage of S.T. policy with emphasis on the import of foreign technologies, the Korean government has played the major role in investing in R&D sector by establishing R&D institutes and developing its own national R&D programs until the 1980s. Along with the country's economic and industrial transformation, private sector has become increasingly important in R&D sector since the 1980s, while the government R&D programs have been diversified in the 1990s. The size of investment in R&D compared to the size of GDP has been steadily increased during these four decades. Table 23 shows the trends in R&D structure of Korea since the 1980s, with the increasing role of private sector over time.

TABLE 22
TRENDS IN R&D STRUCTURE IN KOREA[a]

	1980	1985	1990	1996	2000	2002
R&D Expenditure (billion won)	282,5	1 237,1	3 349,9	10 878	13 849	17,325
Government	180,0	306,8	651,0	2 398	3 435	4,557
Private	102,5	930,3	2 698,9	8 467	10 387	12,699
Gov:Private	64:36	25:75	19:81	22:78	24,8:75	26m3:73.3
R&D / GNP (%)	0,77	1,58	1,95	2,79	2,65	2,91

(continues)

TABLE 22 (concluded)

R&D Performers (%)						
Industry	28,8	65,4	74,9	73,2	4,0	74,9
Universities	9,2	10,3	7,6	9,4	11,3	10,4
GRIs	62,0	24,3	18,5	17,4	14,7	14,7
R&D by Nature (%)						
Basic Research		16,8	16,1	13,2	12,6	13,7
Applies Research		29,2	24,4	26,9	24,3	21,7
Development		54,0	59,5	59,9	63,1	64,6
Industrial R&D Intensity (%)	0,47	1,23	1,72	2,13	1,98	2,19

Source: MOST, KITA

[a]- Including national labs

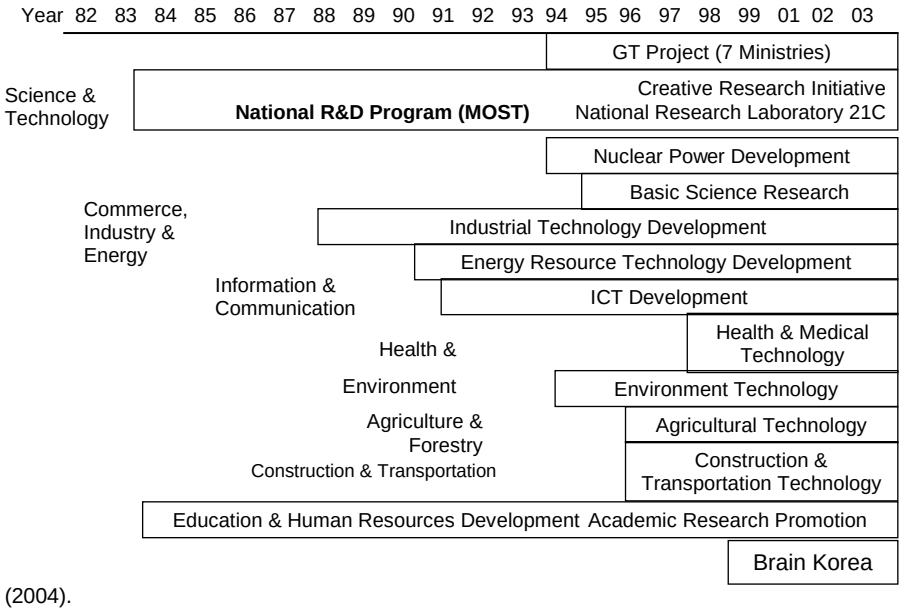
TABLE 23
TRENDS IN R&D IN KOREA[a]

		By Sources of Funds (Billion Won)				
	R&D Expenditure (Billion won)	Gov't & Public	Private	Foreign Countries	R&D Expenditure to GDP (%)	Researchers (Person)
1990	3 350	650	2 699	1	1,88	70 735
1995	9 441	1 780	7 660	1	2,50	128 315
1996	10 878	2 398	8 467	14	2,60	132 023
1997	12 186	2 851	9 323	12	2,69	138 438
1998	11 337	3 052	8 267	8	2,55	129 767
1999	11 922	3 203	8 719	7	2,47	134 568
2000	13 849	3 452	10 397	10	2,65	159 973
2001	16 111	4 187	11 923	76	2,92	178 937
2002	17 325	4 548	12 777	76	2,91	198 888
2003	19 069	4 663	14 405	79	2,64	198 171
2004	22 185	5 446	16 630	108	2,85	209 979
2005	24 115	5 877	18 106	171	2,99	234 702

Source: Ministry of Science & Technology

[a] Excluding military and defense, sciences and humanities expenditure

FIGURE 17
GOVERNMENT R&D PROGRAMS BY MINISTRY



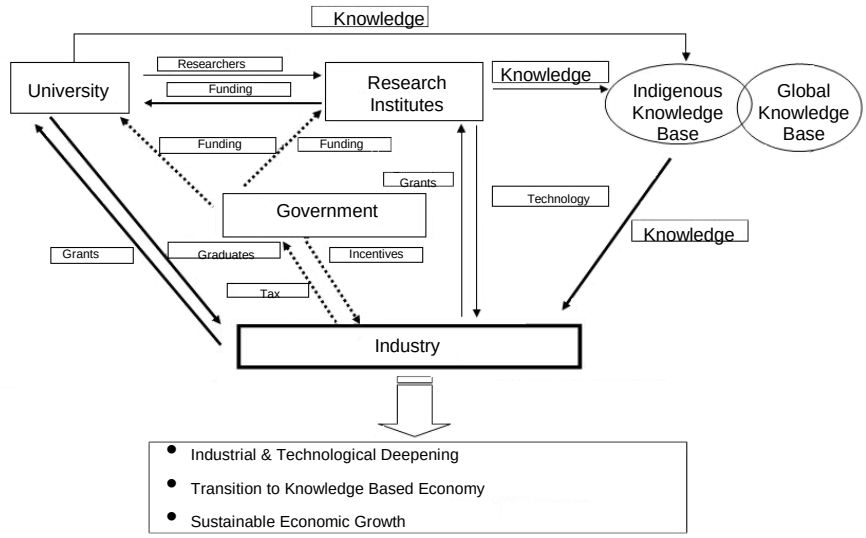
Source: MOST (2004).

5. National Innovation System of Korea

a) Innovation system and governance before the 2004 reform

The National Innovation System (NIS) is a network of institutions in the public and private sectors, whose activities and interactions initiate, generate, modify, and diffuse new technologies (Figure 18).

FIGURE 18
THE NIS STRUCTURE



Source: Suh (2000).

The private sector, in general, had concentrated on the rapid commercialization of outside technologies and imitating global front-runners. The private sector's R&D share of the nation total was 74 percent in 2002, which represent a proportion much higher than the OECD average. However, the Korean NIS had some critical issues to be adjusted in the following areas:

Lack of comprehensive coordination

The fundamental problem of the Korean national innovation system is the non-existence of the function to review and coordinate national R&D programs. Short-sighted projects are prevailing instead of long- term strategic projects. Duplications and uncoordinated priority setting result in inefficient resource allocation.

Weak links between ST policy and government budget

The Ministry of Planning & Budget and the Ministry of Finance & Economy do not have sufficient manpower with the expertise for the review and allocation of the budget to highly specialized ST projects. Since other ministries do not have sufficient expertise either, in general, efficient allocation of budget is not realized.

Excessive competition among ministries

Although the government has tried to establish cooperation among ministries through such institutions as the S&T Ministerial Meeting and NSTC, effective coordination has not been accomplished. Some ministries attempt to seize hegemonic power so that duplicative research institutes and programs have been introduced by them, which have resulted in inefficient R&D investments. Inb addition, the coordination of science technology function within the government is weak, as indicated by the scattered power and division of labor within the government.

Weak function of planning and evaluation of the National R&D Program

Monitoring and evaluation of national R&D programs are not well developed. Superficial evaluations prevail and participation of the private sector in the evaluation process is minimal.

Problems in management of GRIs

The system of GRIs has been changed several times in the last several decades, reflecting economic development of changes in industrial structure and demand. However, autonomous management of GRIs has not been realized despite government promises.

Weak regional innovation systems

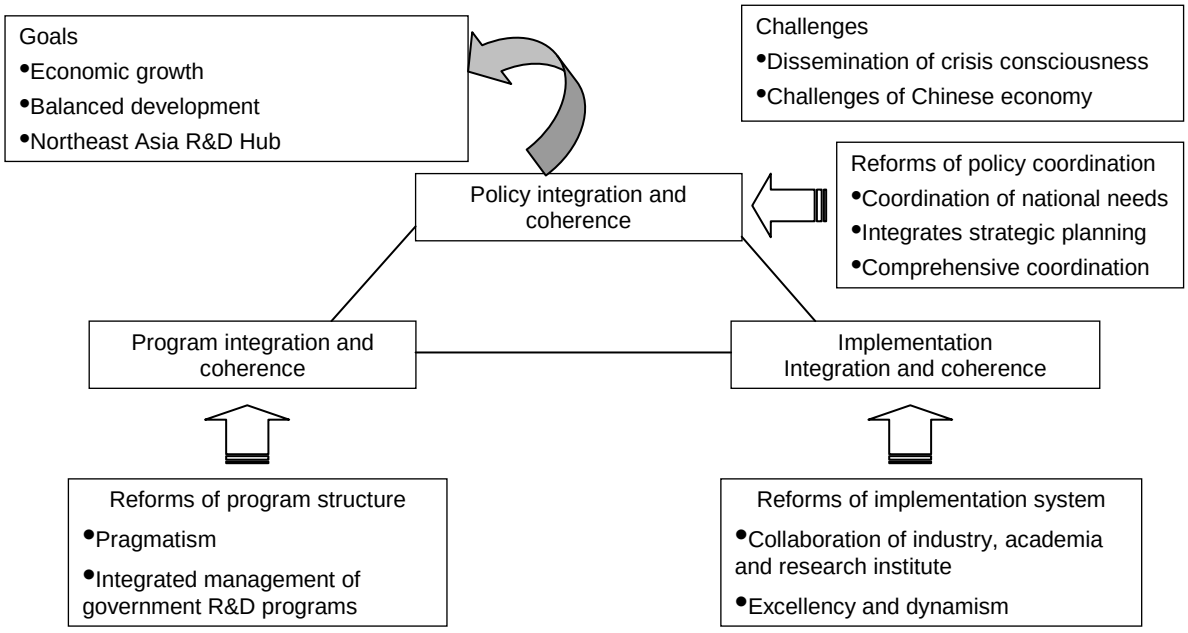
Government R&D budget was allocated mainly to institutes in Seoul metropolitan area so that provincial institutes have not grown much. About 50 percent of the national population lives in the Seoul metropolitan area. S&T resources such as R&D manpower, universities, and research institutes and limited institutions are also centered in the area. Another problem is that competitive regional development plans for technologies, techno-parks, regional innovation centers, etc. resulted in duplicative programs and many infeasible projects. Thus, regional innovation system in Korea has been underdeveloped. As for the governance in Science and Technology Policy in Korea, it can be characterized by the following:

- Strong leadership or intervention from the government and a relatively weak private sector are the main feature of the ST governance.
- The government directly or indirectly affects the major decision process of leading government-sponsored research institutes (GSRIs).
- The participation of scientists, engineers and researchers (the science and technology community) in the ST policy process has been passive.
- The participation of NGOs or the public in the science and technology policy process has been almost nonexistent.

b) Innovation System and Governance after 2004

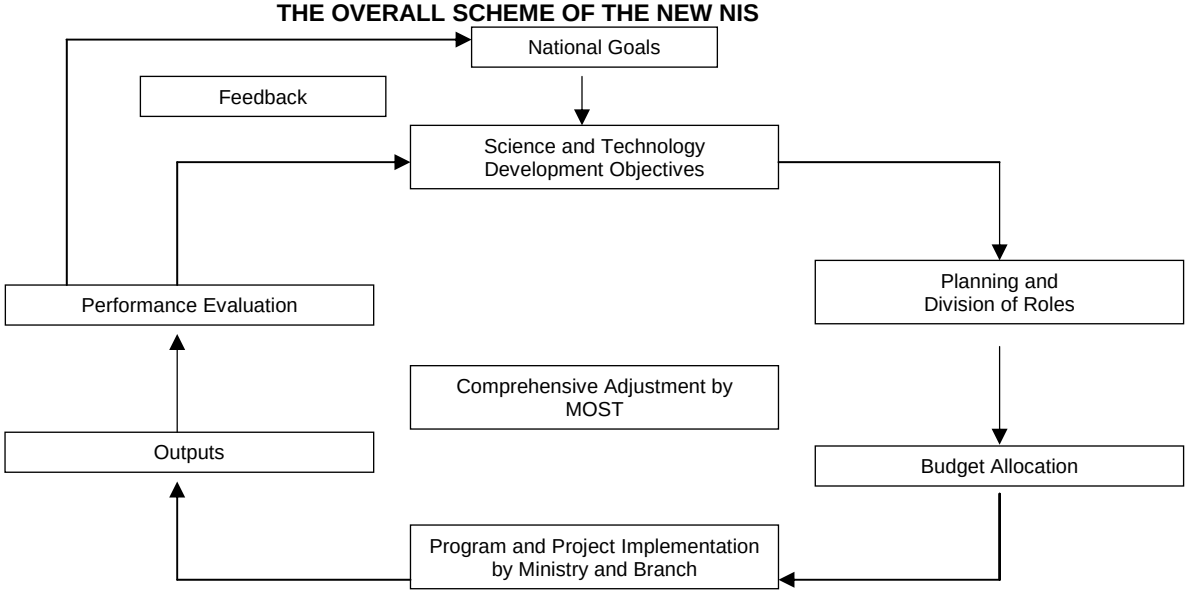
The key concepts for the newly formulated NIS are integration, coherence, increasing efficiency and productivity, selection and concentration, and innovation-driven economy. The basic direction of the new system is described below:

FIGURE 19
DIRECTION OF THE NIS REFORM IN KOREA



Source: NIS (2004).

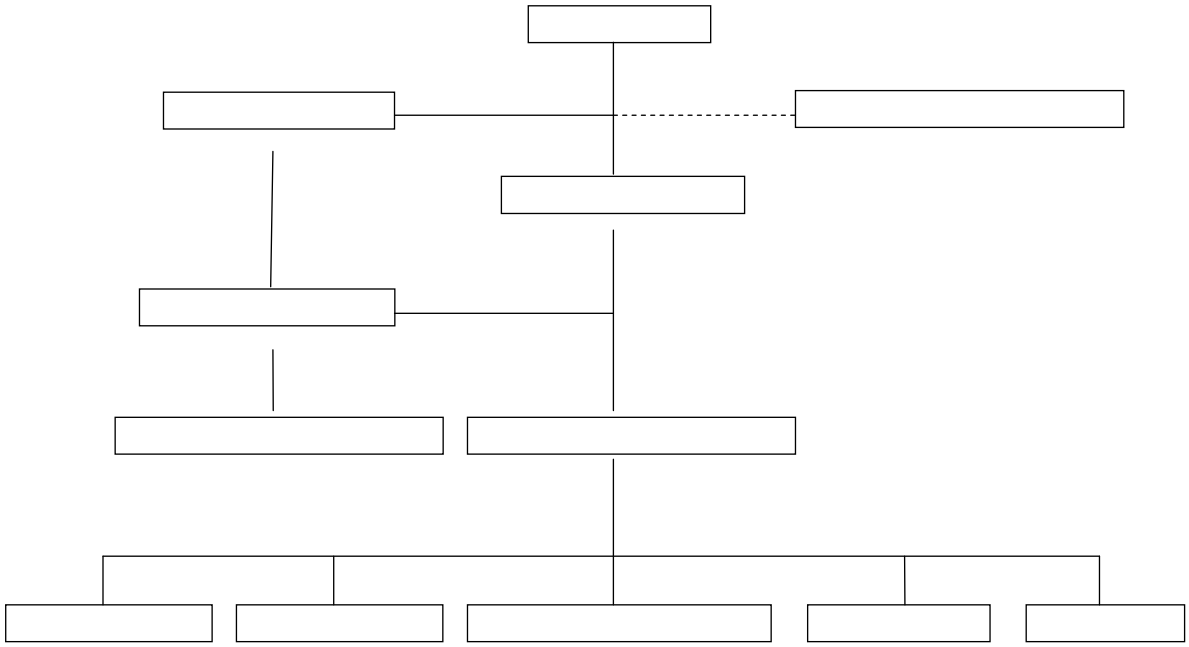
FIGURE 20
THE OVERALL SCHEME OF THE NEW NIS



Source: NIS (2004).

Along with the new NIS, the government plans to strengthen the role and authority of the National Science & Technology Council by monitoring and coordinating strategies for new growth technology development, ensuring the results of NSTC's evaluation and coordination to be reflected in budget-allocation, and enhancing fairness and objectivity of coordination through active participation of experts from the private sector. The new S&T governance structure is depicted below:

FIGURE 21
NEW SCIENCE AND TECHNOLOGY GOVERNANCE



Source: Author.

c) Science and technology policy in Korea

Korea's S&T policy is directed toward the continuous development of the country, concentrating on meeting social needs, and pursuing harmonization of human activities and Nature. This is a drastic departure from the past policy of rapid industrialization. Korea wants to act as a responsible member of the international community, and is ready to play an active role in the global effort to improve human welfare through the advancement of S&T.

In September of 1999, the government launched a long-term strategic initiative: the Long term Vision for S&T Development Toward 2025 (Vision 2025). This initiative includes a series of 40 tasks and 20 recommendations designed to guide the transition to an advanced and prosperous economy through the development of S&T. The goals are grouped in three time frames, spanning a 25-year period each one. Each time frame is defined by a unifying theme that characterizes the primary focus of activities for that period.

- First Step (by 2005): Place the Korean scientific and technological capabilities at competitive levels with those of the world's leading countries by mobilizing resources, expanding industrialized infrastructure, and improving relevant laws and regulations.
- Second Step (by 2015): Stand out as a major R&D promoting country in the Asia- Pacific region, actively engaging in scientific studies and creating a new atmosphere conducive to the promotion of R&D.

- Third Step (by 2025): Secure a scientific and technological competitiveness in selected areas comparable to those of G-7 countries: France, Germany, Italy, United Kingdom (UK), United States (US), and Canada.

In addition, the Vision 2025 plan has several major features including the following:

- Shifting from a government-led to a private sector-led innovation system
- Improving the effectiveness of national R&D investment
- Aligning the R&D system from a domestic to a global network
- Meeting the challenges of the IT and biotechnology revolutions

Furthermore, tn an effort to realize the plan's vision by 2025, the Korean government formulated the Five- Year S&T Plan and National Technology Road Map. Finalized in December 2001, this plan serves as the action plan for reaching the first stage of the development goal set in Vision 2025, and supplements the Five-Year Plan for S&T Innovation. The plan had aimed to place Korea among the ranks of the top ten S&T powers by 2006, and has pursued the following strategies towards this end:

- Investment in S&T development on the principle of "selection and concentration"
- Making the best use of the creativity of scientists and engineers
- Linking Korea's domestic innovation system to the global system
- Enhancing public understanding of and interests in S&T
- Efficient use of R&D resources

To this end, MOST has been seeking to establish a more balanced innovation system that encourages a simultaneously cooperative and competitive tripartite partnership among industry, academia, and public research organizations. As a part of these efforts, the Korean government elevated the position of the Minister for S&T to that of Deputy Prime Minister in October 2004 and established the Headquarters of S&T Innovation in MOST to provide a more balanced, innovative administration system. This system is designed to facilitate drastic domestic and international changes on the horizon, and to plan, coordinate, and evaluate national R&D programs. As for operational improvement, pan-national function of planning, coordination, and evaluation by the MOST is strengthened, and MOST also became to have the review and adjusting power of the government S&T budget. In addition, MOST was endorsed the allocation of the budget to individual projects after reviewing of the total S&T budget by the Ministry of Planning and Budget. The changed S&T policy paradigm in 2004 can be summarized in the Table below.

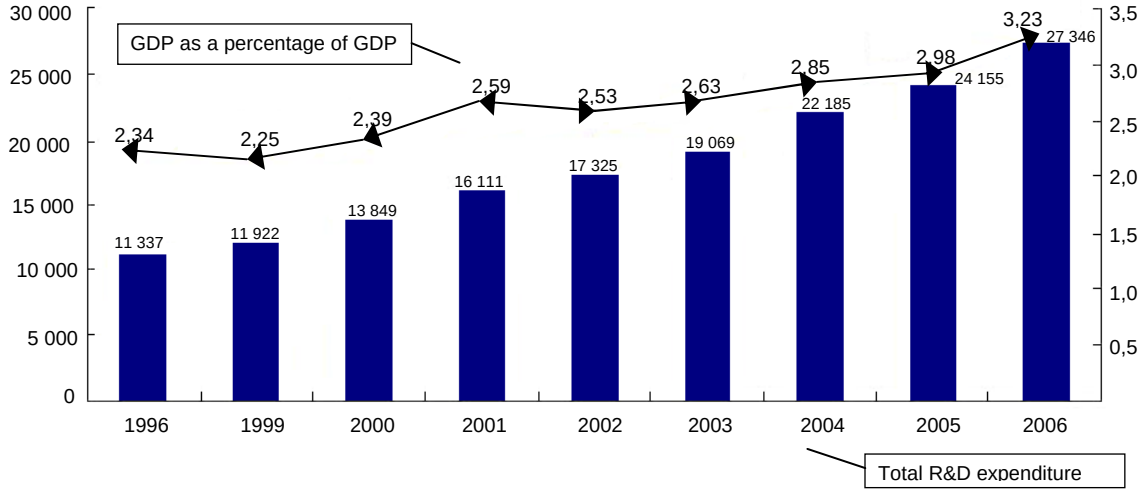
TABLE 24
TRANSFORMATION OF S& T POLICY PARADIGM

	Before Participatory Government	After Participatory Government
Development strategy	Imitation and catch up of advanced model	Technology innovation oriented strategy
Innovation system	Weak coordination among R&D, HRD, industrial growth, regional innovation policies	Strengthen the coordination and cooperation among related policies based on NIS
R&D	Focus on expansion of investment	Importance on investment as well as the efficiency of the investment
HRD	Supply side HRD by ministries	Demand side HRD
Growth engine	Focus on IT industry	Fostering growth engines for next generation
Popularization of science	Diffuse S&T culture	Science culture movement based on people's active participation

Source: Author

Specifically, R&D investment, the basic indicator for national S&T capability, has been increased a lot, eventually; the government R&D budget for 2008 is set at more than 10 trillion won. Now Korea is the 8th country in the world that spends more than 10 trillion won on R&D. The national total R&D expenditure in 2006 was more than 27 trillion won, which is only a half to the U.S. expenditure, but the gap is narrowing down. R&D expenditure per GDP is ranked 5th in the world.

FIGURE 22
THE TREND OF TOTAL R&D EXPENDITURE IN 1998-2006



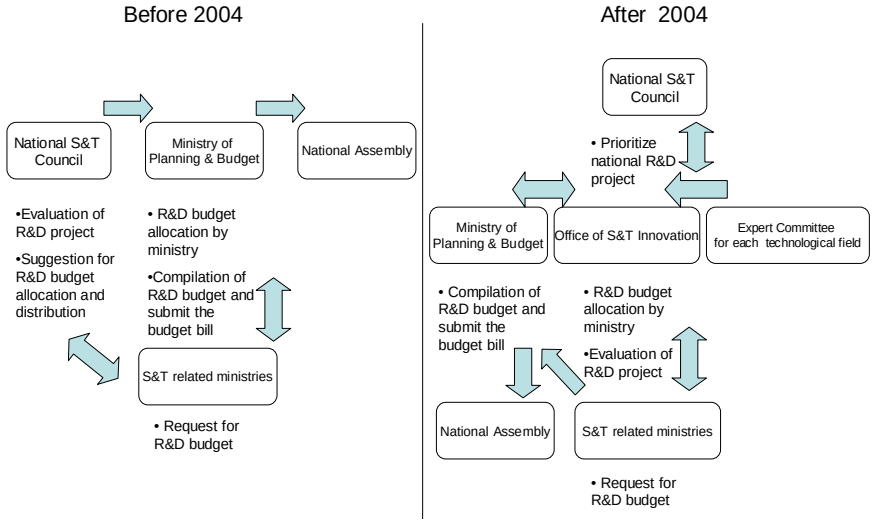
Source: MOST (2006)

MOST's R&D budget in 2006 was expected to be increased to KRW 212 billion, an increase of 17.9% over 2005. In August 2006, the government announced plans to increase the national R&D budget to KRW 9.518 trillion in 2007, which is a 6.8% increase rate compared to 2006. Over the past five years, the average R&D budget rate of increase has been 9.7%. Other Korean government organizations related to S&T are (MOCIE) and the Ministry of Information and Communication (MOIC), since these two organizations are related to Korean R&D programs. MOCIE is oriented to technology commercialization and production and MOIC is oriented to communication technology and product development.

With the quantitative expansion of R&D expenditure, the government made efforts to improve the investment efficiency. Total roadmap for national R&D project has been established, and mid and long-term strategies were presented. Moreover, new projects that require more than 50 billion won have to go through thorough feasibility tests, and an expert committee has been arranged in each technological sector to help R&D budget distribution and arrangement.

In order to set priorities for the allocation of S&T budgets, and to effectively review and coordinate national S&T policies and R&D programs, the government established the National S&T Council (NSTC) in January of 1999. The NSTC is chaired by the President of the Republic of Korea, and deputy chaired by the Deputy Prime Minister of S&T. And it is composed of 13 Ministers of S&T-related Ministries and 9 representatives from the S&T community. The NSTC holds ultimate power over the coordination of R&D programs and budgets within Korea. MOST serves as the secretariat for the NSTC through its newly established Office of S&T Innovation (OSTI), taking responsibility for the overall management and coordination of S&T policies, national R&D projects, industry and human resources policies related to S&T innovations, and regional technology innovation policies.

FIGURE 23
CHANGE IN COORDINATION AND ALLOCATION SYSTEM OF R&D BUDGET



Source: MOST

R&D sectors are reformed in a way to realign the STI policy jurisdictions. For example, machinery, electronics, aero-technology were assigned to MOCIE, while basic programs such as basic science and research, strengthening science and engineering education, enhancing the people's understanding of science and technology culture to MOST.

d) Industrial innovation strategies for 2015

Each ministry tends to formulate long-term strategies for more effective policy activities. MOCIE, for instance, has formulated several strategies overtime and published them as reports or books. The most recent one is the Industrial Innovation Strategies for 2015. This strategy is by no means a binding plan but a kind of vision and perspectives sharing.

Planning and formulating process and mechanism

On March 2005, the basic planning guideline for the '2015 Industrial Development Vision and Strategy' was prepared on the basis of the Industrial Development Act's Clause 4: Formulation of Medium- and Long-term Industrial Development Prospects. In the same month, the 'Planning Corps for a Strong Advanced Industrial Country' and 'Strategy Plan Committee' were established. They consisted of recruited delegates from the government, private organizations and research institutes such as MOCIE, FKI, KIET and KOTEF, altogether 25 public and private organizations.

Between March and November of the same year, workshops for formulating industry-specific strategies were continued. Altogether more than 300 industrial experts participated in the joint work. During the period, the Industrial Development Review Committee was convened to discuss and make opinion convergence on major strategies and policy tasks. The committee, which is one of the advisory committees for MOCIE, consists of middle level officers of MOCIE, civilian experts from the academia, think tanks and associations.

On September 5, the Industrial Innovation Forum was held for opinion convergence of experts and members of the academia over the country. By October 28, policy tasks in the 'strategy' were coordinated through consultations with related ministries. During the period between October and December, public seminars for discussions on strategies for 18 industries were held for public opinion convergence. The final report was written by December 30 and published in three volumes in 2006.

The organization's responsibilities for the working areas are as follow:

- Coordination and Writing the Report : MOCIE (7 officers including Vice Minister), KFI (4 experts), AT Kearney (10 experts)
- General Framework : MOCIE (21 officers), KFI (14 experts), AT Kearney (4 foreign experts), Strategy Plan Committees (18 experts)
- 18 Individual Industries (About 300 experts from industrial associations, academia and research institutes, government officers)

Contents and results

- Industrial Vision : To emerge as one of the world top four industrial superpowers:
  - Semiconductors & shipbuilding: Firmly secure Korea position as a global leader.
  - Automobile & petrochemical industries: Become one of the world top four in terms of production and exports.
  - Digital electronics: Become one of the world top two producing countries.
  - Steel, machinery, parts and materials: Secure global supply capacity.
  - E-business, distribution and logistics: Achieve world class industrialization.
- Major Development Strategies
  - Promote a benign circle of manufacturing and manufacturing-related service industry.
  - Shift capital and external growth-driven strategy to innovation and qualitative growth-driven strategy.
  - Implement development strategies differentiated from each industry group, for example, aiming to be one of global leaders in major basic industries, promoting faster technology development than industrialized countries through selection and concentration, promoting up-scaling, specialization and knowledge information in manufacturing-related service industry.

The strategy was published in three-volume-book and circulated among various kinds of readers, but it is not regarded as a binding plan but a reference book for vision and perspectives sharing.

Interactions between the public and private sectors

As shown in the above description of participants of working groups, the 'strategy' was an outcome of close cooperation between the public and private sectors. However, this kind of interactions or partnership does not actually happen after the 'strategy' was published. In fact, there is no even the necessity of implementation since the 'strategy' is not in nature of obligatory implementation. It covers too long period and too wide range and issues to be a binding plan. Furthermore, Korea is no longer a country under strict planning or authoritarian regime. Rather, the market mechanism mainly allocates resources and governs economic activities. Although individual ministries in Korea such as MOCIE and the Ministry of Information and Communication (MIC) produce their own long-term strategies, most of these are not binding today but rather for vision and perspective sharing. The public-private cooperation for the strategy formulation is task-specific and, in that sense, of ad-hoc nature, which lives only for the joint work period for strategy formulation.

e) Science and technology framework plan

Since the 1960s, Korea has transformed its industrial structure and caught up with developed countries at a rapid speed. During the past four decades, its achievements were remarkable to be hailed as a successful case for economic development. Table 8 shows the evolutionary stages of industrial

development in Korea and its relationship with technology development. Import of Technology was an important vehicle for technology development, particularly in the earlier stages of development in Korea. The process of industrialization of Korea was very similar to Japan.

Korea has not yet reached the level of advanced economies in terms of overall technology level. However, it has achieved very impressive technological advancement in some high-tech areas such as information and telecommunications, semiconductors, LCDs, steel, shipbuilding, and automobiles. In addition, Korea has the largest market shares in the world, especially, in high-tech industries such as DRAM semiconductor, TFT-LCD and CDMA cellular phone.

However, the S&T policy coordinating function of MOST or any of these organizations was rather week during the entire period from the 1960s through the 1990s. The People's Government' (the slogan of Kim Dae-Jung Administration) inaugurated in 1998 took several measures to solve several problems in the S&T policy. The government raised the status of the Science and Technology Agency to the Ministry of Science and Technology (MOST). In 1999, the Special Law for Science and Technology Innovation (Science Technology Framework Law) took effect and the National Science and Technology Council (NSTC) was established on the basis of the law in the same year. The main goal of NSTC is to strengthen science and technology coordinating function instead of the previous coordinating organizations. However, the coordination problem had not been completely resolved until the recent reform.

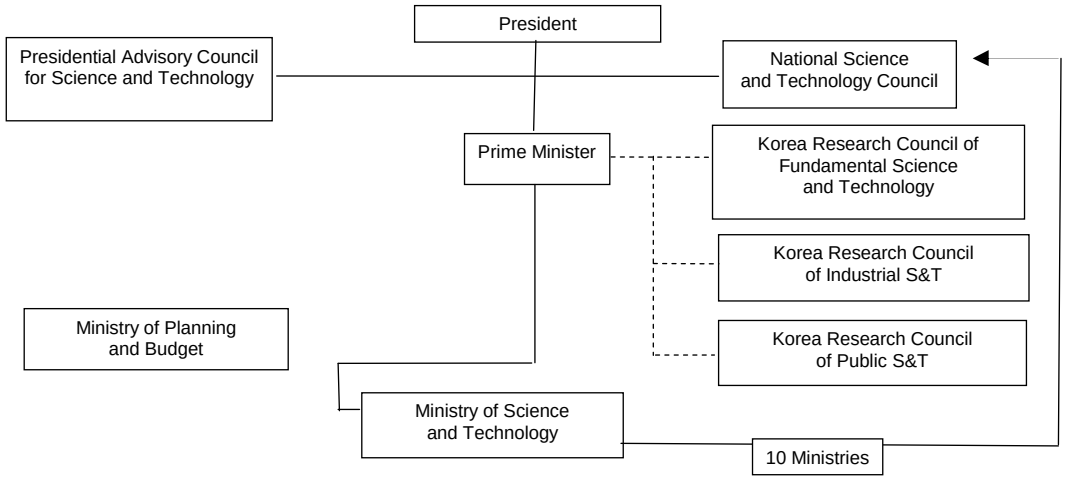
In line with the Five-Year Economic Development Plans, Korea has formulated long-term S&T plans. It is interesting to see that each ministry related to science, technology and innovation has formulated their own long-term plans, especially MOST, which made the most comprehensive plans. The time horizon for a plan is usually five years, but sometimes plans for 10 or 30 years are also formulated.

The Science and Technology Framework Plan (STFP) was first made in 2001 for the period of 2002-2006, on the basis of the Science and Technology Framework Law enacted in 2001. However, the plan was revised in 2003 in order to reflect the visions and policy goals of the new government inaugurated in February 2003. There are no substantial changes between the original plan and the revised one, except that the new one covers from 2003 to 2007.

Planning process and mechanism

Since the introduction of the Science and Technology Framework Law, the basic direction and framework of the STI Policy in Korea has been formulated by the Five Year Science and Technology Framework Plan as mentioned above. The STI administration system in Korea is depicted below.

FIGURE 24
STI ADMINISTRATION SYSTEM IN KOREA (BY 2003)



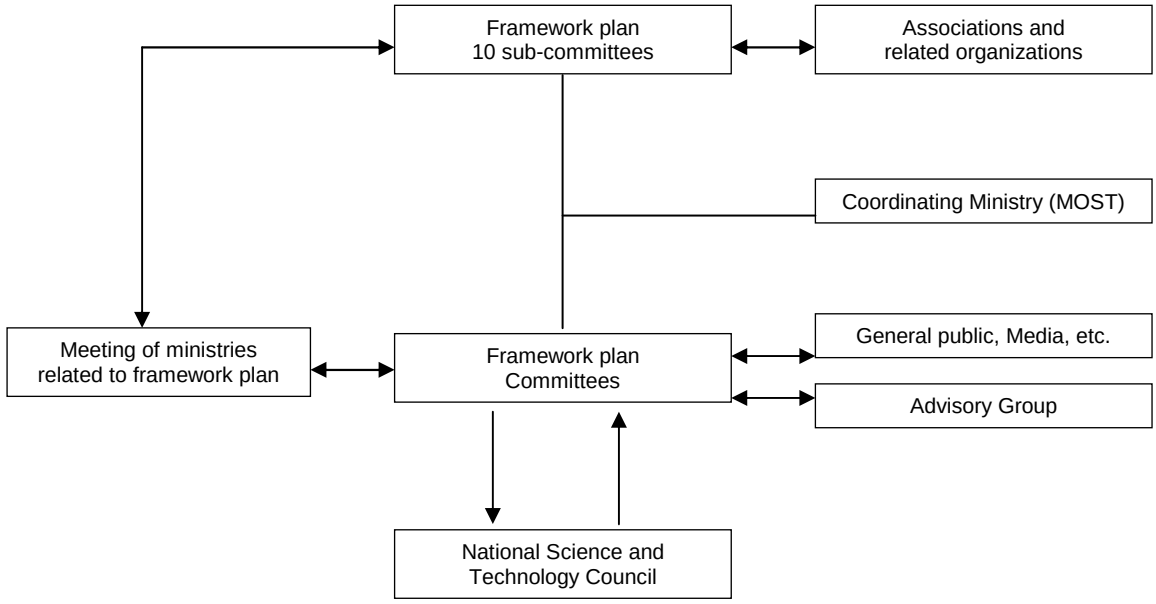
Source: Author

The plan is formulated by a plan committee working closely with ministries, advisors and experts. Thus the basic strategies, policy priorities, agenda and responsibilities are all set by the plan. However, it is not necessary to follow the Framework since each ministry can initiate own plans.

The planning system and procedure is described in Figure 24. The NSTC prepares guidelines for planning and approves formulated plans. And the planning committee (Framework Plan Committee) actually makes a plan with the feed back and advice several experts and leaders in the science and technology community and from various organizations. The committee consists of 10 sub-committees for each policy area. At least in principle, related ministries are expected to participate in the planning meetings and dispatching delegated officers to sub-committees. In the process, there are also public hearings to reflect their opinions.

A total of 16 ministries participate in the planning process. Delegates from the ministries work together with civilian experts for each priority policy area. The role of delegates is to submit ministry's proposal and to report the result of the reviews and discussions by the planning committee to the ministry. The committee decision is basically made by consensus, in which voting has often become unusual.

FIGURE 25
S&T FRAMEWORK PLANNING SYSTEM



Source: MOST

Contents and results

- R&D Investment: Government R&D budget had planned to increase from 4.8 percent of the total government budget ($4.49 billion) in 2003 to 7 percent ($8.35 billion) in 2007. Accordingly, R&D budget on key new growth-engine technologies will increase from 28.5 percent in 2004 to 50 percent in 2012. The share of basic research in the government's R&D budget of $4.5 billion in 2003 was 19.5 percent ($877 million).

- National Projects for the New Growth-Engine Technologies: The new government in Korea has adopted not only the Science and Technology Framework Plan, but also a package program for the 'next-generation technologies' or 'new growth-engine technologies.' For the selection, the size of global market, strategic importance, trends of change in the market and technology, the possibility of securing competitiveness, and the effects on the economy and industries were considered. The 10 new growth-engine industries/technologies include digital

TV/broadcasting, digital displays, intelligent robots, high-tech future automobiles, next generation semiconductors, next generation mobile telecommunication, intelligent home networking, digital contents and software solutions, next generation batteries and new biomedical products. New growth-engine industries/technologies will be promoted through developing some 80 key technologies under the coordination of the National Science & Technology Council. Among these, the development of core and generic technologies is the responsibility of MOST, while Ministry of Commerce, Industry and Energy (MOCIE) and the Ministry of Information and Communication (MIC) will focus on applied technologies.

TABLE 25
THE NEXT-GENERATION GROWTH-ENGINE TECHNOLOGIES

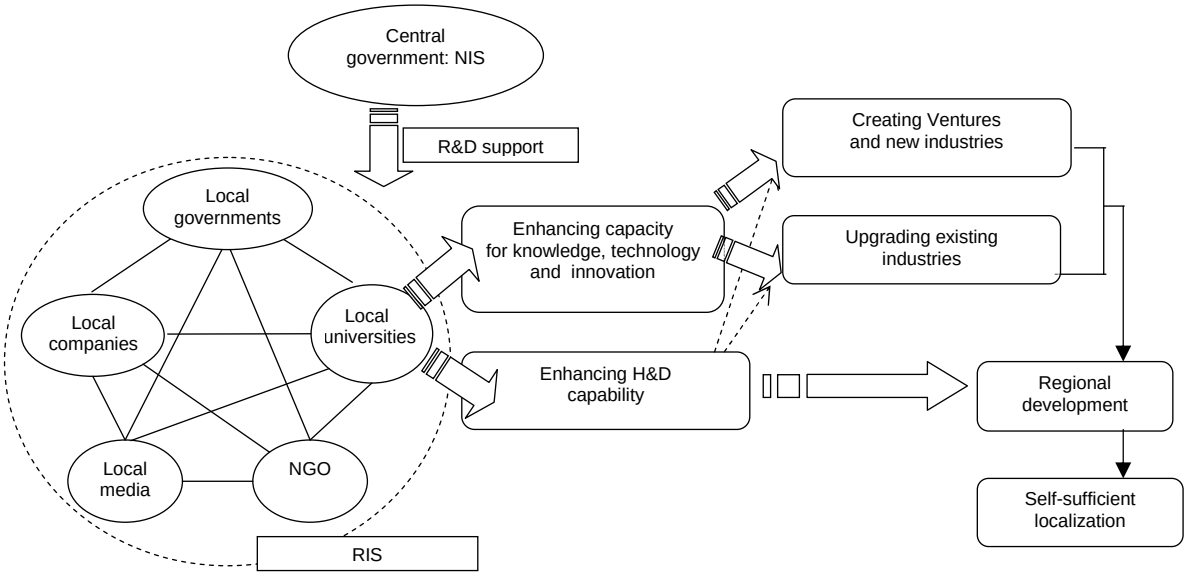
Industry	Product/Technology (Non-Exhaustive)
Digital TV/Broadcasting	Broadcasting system, DTV, DVM, set top box, multi-equipment
Display	LCH, LED, PDP, glass EL, electronic paper, related material
Intelligent robot	Home service robot, IT-based robot, micro work robot, metal robot
Future automobiles	Intelligent automobile, Environmental friendly automobiles
Next-generation semiconductors	Next-generation memory, SoC, nanoelectronic chips, related material
Next-generation mobile communications	4G terminal equipment/system, telematix
Intelligent home network	Homer server/home gateway, home networking, intelligent information home electronics, ubiquity computing
Digital content/software	Digital content provision use distribution system, cultural content, embedded software and intelligent total logistics system.
Next-generation batteries	2nd batteries, fuel batteries, related material
Biomedial products	New medicine, bio-internal organs, biochips

Source: MOST.

- Development and Provision of Creative and Qualified Researchers: the government plans to cope actively with future demand for the development of new technologies by establishing master plans to bring up 10,000 researchers in promising high-tech areas. The government will improve the supply of university manpower by establishing innovative education models for colleges of science and engineering. More attention will be paid to strengthening science education at school, training science laboratory teachers, and keeping up-to-date laboratory and teaching materials
- Promotion of Regional Science and Technology: the Five-year Regional S&T Promotion Plan (2000-2004) was established to expand local growth potential and to realize balanced national development. It includes six projects aiming at developing local strategic and specialized technologies, creating local technological innovation bases and nurturing local S&T manpower in strategic and specialized fields.

To improve local innovation capabilities, the government plans to allocate substantial portions of the national R&D budget to local government and at the same time to induce local governments to invest a certain portion of their own budgets in S&T. The government plans to establish new high-tech science complexes and upgrade existing complexes like the Daeduck Research Complex. Regional R&D cluster projects plan to launch aiming to support local governments in integrating research centers with industries, universities and research institutes.

FIGURE 26
STRENGTHENING REGIONAL INNOVATION CAPACITY



Source: Author

- Support of R&D in the Private Sector: the Technology Development Promotion Law established in 1972 supports various kinds of private industrial research organizations, such as industrial R&D centers, industrial technology research associations, industrial research clusters, etc. As of 2002, there are 9,705 industrial R&D centers, and 65 industrial technology research associations to activate mutual cooperation in R&D. The "Industrial Research Cluster Support Program" was initiated by MOST in 2002. It supports small and medium scale enterprises and research institutes grouped to about 10 research clusters to identify and develop together common key technologies

Interactions between the public and private sectors

In Korea, the public participation in the process of policy making and evaluation has been limited. Although the public participation has been emphasized, the actual institutionalization for that is still slow. The most effective way is the civilian experts' participation as committee members or advisors in policy making process. Korea is in a transition period to redesign its NIS and STI policy governance.

Korea is regarded as a model country for successful technology catch-up. Started as an imitator in the 1960s, Korea transformed itself to be a leading innovator in several high-tech areas within a generation. The Korean case shows that catch-up through imitation require conscious efforts and well-designed policies. Imitation and learning are path-dependent which means that it is influenced by the accumulated technological capabilities and supportive policies and institutions.

In summary, to secure national competitiveness, Korea should acquire World-top-class Technologies by pouring more R&D efforts to core technologies and emerging technologies on the basis of strong basic science. In addition, since a world class education for Human resource development is strongly required for enhancing competitiveness, the Korean education system should be reformed as quickly and broadly as possible. Through a balanced and efficient NIS, Korea also should realize an innovation- driven economy ahead of China.

6. Ministry of Science and Technology (MOST)

The Economic-Science Council suggested President Park Jung Hee to revise the process of economic administration and science technology administration in 1965 and again in 1967. As a result, the Science and Technology Promotion was enacted in 1967 with the purpose of contributing to the industry development, stabilization and promotion of the living standards of the people by stipulating necessary matters to build up a working system and get financial support. It specifies the responsibilities of the government to work out a plan regarding to science and technology promotion and to protect and foster scientific and technological activities. After three months, the Department of Science and Technology was established.

The Ministry of Science and Technology inherited the earlier Ministry of Science and Technology in 1967, and reorganized as the Ministry of Science and Technology in February 1998. In 2004, the Korean government promoted the position of the Minister for the Ministry of Science and Technology (MOST) to that of Deputy Prime Minister and instituted the headquarters of Science and Technology innovation. And to offer a more balanced innovative administration system to satisfy a drastic change domestically and internationally, the Office of Science and Technology Innovation was built in Most to design, coordinate, and estimate national R&D programs.

The Ministry of Science and Technology (MOST) is mandated to provide central directions, planning, coordination and evaluation of all science and technology activities in the country and formulate Science and Technology policies programs, and projects including technology cooperation, space technology, and atomic energy in support of national development priorities.

Major activities and programs

MOST has the legal power to coordinate other ministries. In addition, MOST is in charge of reviewing and adjusting the government S&T budget. Therefore, tt has also the power to allocate S&T budget to relevant ministries after the reviewing of the total S&T budget by the Ministry of Planning and Budget. The policy coordination and infrastructure business of other ministries were also transferred to MOST.

MOST is also responsible for planning, coordination, and evaluation activities regarding science and technology. This, however, does not mean all R&D programs of MOST were reallocated. Some programs such as big science and fusion technology programs would continuously be under the jurisdiction of the MOST. And, basic programs such as basic science and research, strengthening science and engineering education, enhancing the people's understanding of science and technology culture remain as the responsibilities of MOST.

Policy formulation and implementation

A policy process consists of policy formulation and adoption, policy implementation and policy evaluation. When the implementation of a policy is accomplished, the whole process including the policy termination is regarded as a policy cycle. Three STI policy schemes under the current government are reviewed with the focus on the coordination mechanism and process in order to identify and evaluate the integrative nature of the new NIS.

In the first quarter of every year, each ministry reports the yearly plan for policy activities (business) to the President. The report is documented and open to the public after the reporting. The 2005 Major Business Report of MOST clearly shows the changed role of the Ministry as the coordinator of the entire national STI policies and the efforts of the government to realize an innovation-driven economy.

In 2004, the institutional basis for STI was established and the framework for pan-ministerial cooperation and coordination was prepared to start 'innovation.' The goal of the Ministry in 2005 is defined as 'leading innovation as the ministry in charge of overall management and coordination of national micro-economic policy'.

The major policy tasks for 2005 are very comprehensive including not only components of the NIS Establishment Measures Program, the Science and Technology Framework Plan and the Next Generation Growth Engine Program, but also other on-going and new STI policies that were selected as priority tasks during the year. Since the Ministry has two main functions (overall policy coordination and implementing own traditional science and technology policies), the report covers all of the functions. The policy agendas related to the overall STI policy coordination list involved ministries. This reveals the changed role of the Ministry as the genuine coordinator of the entire STI policies.

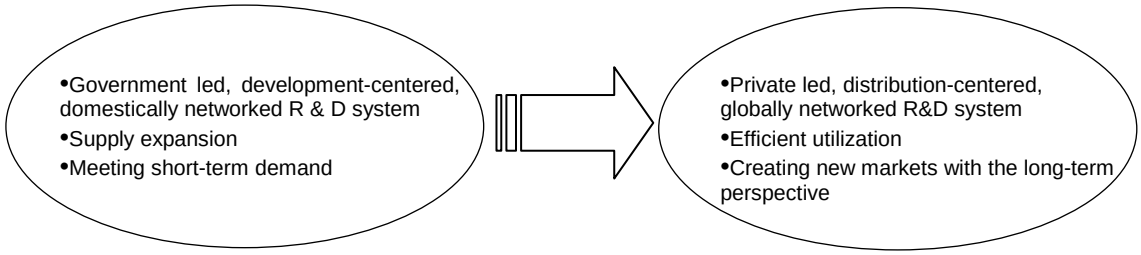
Public awareness of science and technology

Science and technology development critically relies upon the extent to which the general public understands science and technology. It is very important to raise awareness of science and technology. In order to improve the general public's recognition of scientific achievements, the Korean government launched the Korea Science Award Program in 1987. The program is designed to publicly recognize the scientists who have made notable contributions for the improvement of science. The Engineering Award Program, furthermore, was established in order to encourage engineers. In 1991, the IR52 Award was established in order to stimulate industrial technology development. In 2003, the government introduced the 'National Research Fellowship' program in order to notice and award scientists and engineers with distinguished research performance records.

The long-term vision for science and technology development towards 2025

The major directions for S&T development set out in Vision 2025 include; shift the national innovation system from government-led to private-led, improvement of the efficiency of national R&D investments, alignment of the R&D system to global standards, meeting the challenges, and harvesting the opportunities presented by new technologies

FIGURE 27
POLICY GUIDE LINES FOR S&T POLICY FOR THE 21ST CENTURY



Source: MOST

In an effort to achieve the goals of vision 2025, MOST launched various national R&D projects. For example, the Highly Advanced National (HAN) Project was launched in 1992 as an inter-ministerial program to help product-technology development such as ISDN, HDTV and biomedical as well as fundamental technology development such as next-generation semiconductor and environment technology. The 21st Century Frontier R&D Program was also launched to elevate the nation to the rank of most advanced nation in the strategic field by 2010. The government plans to support 20 projects at a total cost in excess of US$3.5 billion under the program. Eight projects in the areas of biotechnology (BT), three in nano-technologies (NT), and five in environment and energy are currently underway, for a total of 16 projects. The government budget for this program in 2006 is KRW 144billion.

The Creative Research Initiative (CRI) was launched in 1997 to strengthen the nation's potential for long-term growth through creative basic research, which symbolizes the policy shift in S&T development in Korea "from imitation to innovation."It aims to strengthen the national potential for technological

competitiveness through creative basic research. Therefore, it focuses on exploring various phenomena that occur in nature, developing new fields of scientific research, and making technological breakthroughs. Grants are awarded to researchers on the basis of creativity and originality of their proposals. Thirty-seven CRIs are already under way, and ten new CRIs were selected this year ($600,000-700,000 per year for 10 projects through 2016). Five CRIs that showed remarkable achievements were renewed in 2006 ($500,000 per year for five projects through 2011.) A total of 32.5 billion won has been allocated for this initiative for 2006.

The National Research Laboratory (NRL) Program was launched in 1999. It aims to explore and foster research centers of excellence, which will play a pivotal role in improving technological competitiveness. Annually, the government will fund $250,000 per laboratory for a maximum of five years, with special emphasis on strengthening core technology in relevant fields. From 1999 to 2006, a total of 666 NRLs were funded at a total of US$580 million. Basically, the selected NRL receives funding for five years, and depending on the NRL's research achievements, it can be funded for an additional five years. About 175 NRLs are expected to receive funding in 2006, totaling KRW 37.4 billion. The NRLs have produced over 12,300 technical papers and over 3,600 patents.

Establishing the first five-year S&T framework plan

This plan establishes the framework for managing S&T development, including measures for action in S&T investment, national R&D, enhancing public awareness of S&T, S&T human resource development, promotion of technology transfer and commercialization, and globalization of S&T activities.

This plan, which was finalized in December 2001, serves as the action plan for reaching the first stage of the development goal set in Vision 2025 and supplements the Five-year Plan for S&T Innovation. The plan aimed to place Korea among the ranks of the top ten S&T powers by the year 2006.

The Korean government set up a National Technology Road Map (NTRM), which describes target technologies for development, timetables for development, and their anticipated effects. About 800 experts from industries, academia, and research communities joined in the process of formulating the NTRM. The NTRM will be renewed periodically to take into consideration the new changes taking place in science and technology.

Regional Science and Technology Promotion

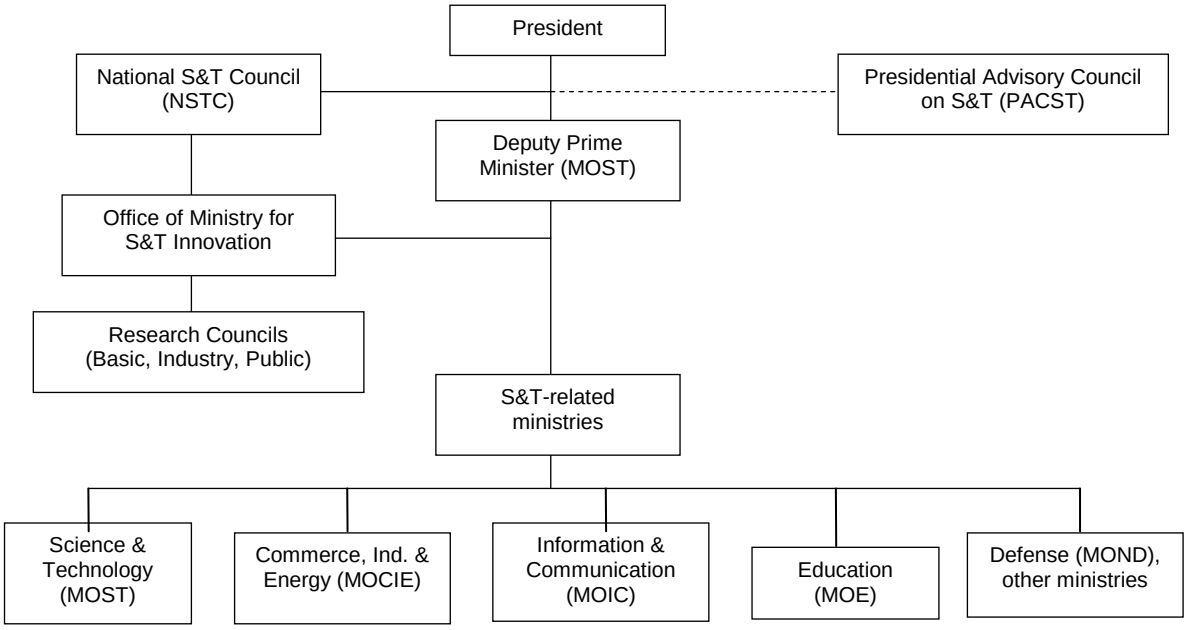
Promotion of regional science and technology is crucial to the sustainable development of the nation. The government has set up a Five-year Comprehensive Regional Science and Technology Promotion Plan. This plan includes six programs: development of local competences in strategic technologies, creation of regional centers for technological innovation, development of local S&T human resources, establishment of regional S&T information systems, nurturing a culture conducive to S&T innovation, and increasing R&D investments of local governments.

Internal structure

MOST is the central agency for formulating and implementing national STI policy, administrating ST affairs and coordinating national R&D programs. MOST (in fact, STIO) is the Secretariat of NSTC. The role of MOST as a core coordinator of the entire national STI policy is shown in Figure 27.

The role and mission of MOST have changed and strengthened through the reform of 2004. MOST experienced drastic changes. Now the Ministry consists of two different functional groups: the new functional group, the STI Office (STIO) and the group in charge of remnants among traditional functions after the restructure. Both groups are lead by vice ministers: the Vice Minister of STI and the Vice Minister of ST, although the titles are somewhat confusing. The former is the coordinator of NSTC so that the STI office within the Ministry plays the executive role of the entire national STI policy coordination. Of course, the Deputy Prime Minister of Science and Technology is representing MOST so that the minister is above the Vice Minister of STI in terms of authority and power.

FIGURE 28
STRUCTURE OF S&T ADMINISTRATION IN KOREA



Source: MOST.

Performance and contribution

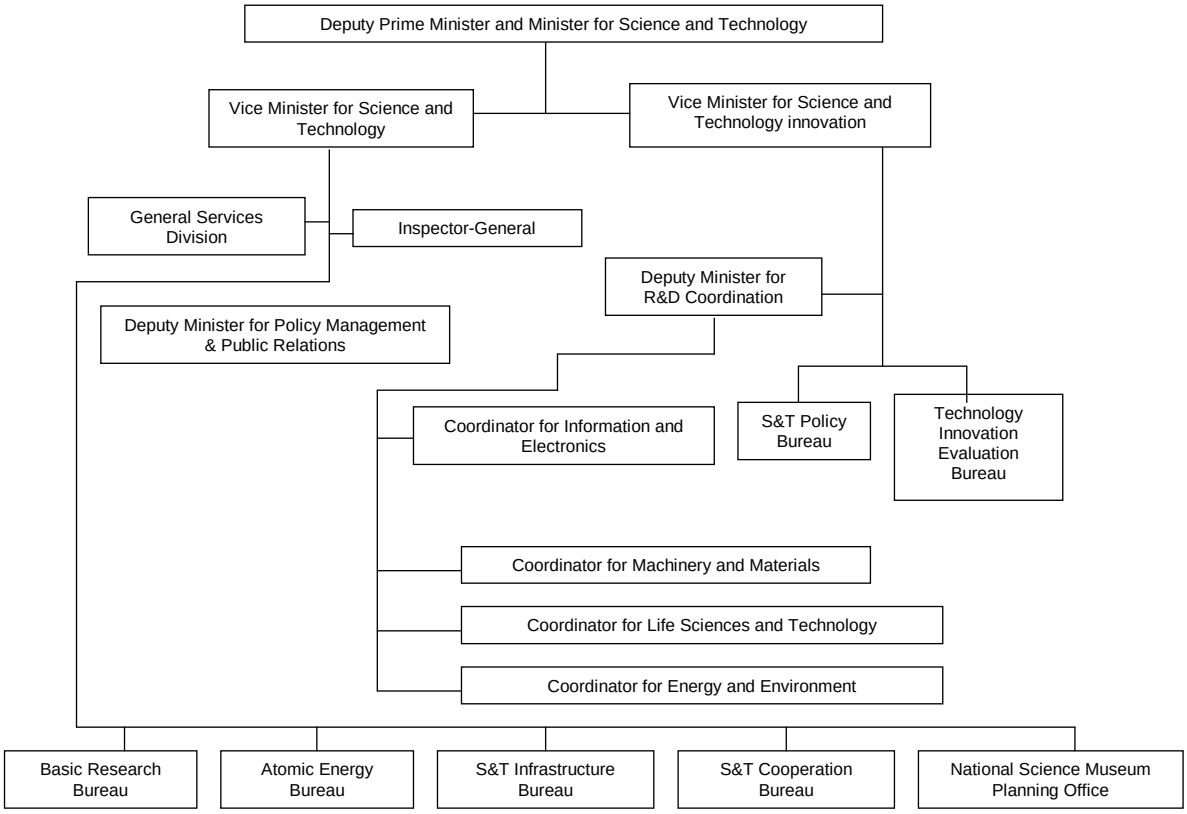
With the establishment of the Ministry of Science and Technology (MOST), the Korean government has perceived the importance of Science and Technology and devised a long-term plan for the promotion of Science and Technology. The government has also enacted the law of Science and Technology and created an administration system for it. As a result, government's research budget has sharply increased and the investment for source technology has been boosted to support future potential power. Along with this, MOST has prepared medium- and long term strategy for fostering scientific technicians.

These efforts obtained an excellent result. To be more specific, Korea was ranked 14th from 19th in the section of science infrastructure and ranked 2nd from 8th in the section of technology infrastructure on the statistical yearbook of international competitiveness issued by International Institute for Management Development in Switzerland in 2005.

Future directions and strategies

Korea's S&T policy should be directed in a way to meet societal and environmental needs, and the policy needs to be compatible with humanity and the natural environment. Korea wishes to play an active role in the international efforts to contribute to human welfare through the advancement of science and technology. This is a drastic transition from the past policy of industrialization.

FIGURE 29
ORGANIZATIONAL STRUCTURE OF MOST



Source: MOST.

a) Affiliated organization under MOST

There are a number of councils under the office of MOST, such as the Korea Research Council of Fundamental Science and Technology, the Korea Research Council for Industrial Science & Technology, and the Korea Research Council of Public Science and Technology. A brief description of each council's function is as follows:

The Korea Research Council of Fundamental Science and Technology

The Korea Research Council of Fundamental Science & Technology (KRCF) was established in March 1999 under the Office of MOST, with the mission to handle and encourage the activities of the government-supported research institutes engaged in the fields of fundamental science & technology. This Council is aimed to promote, foster and support government-supported research institutes in the arenas of fundamental science and technology. Also, KRCF defines the fundamentals of responsible management of member research institutes; promotes the national R&D system by streamlining and developing government-supported research institutes; and contributes to advancing the knowledge-based industries in the 21st century.

Korea Research Council for Industrial Science & Technology

The Korea Council for Industrial Science and Technology (KOCI) motivates researchers with a sense of mission and self-confidence in accomplishment of their national tasks, and will provide with autonomy and responsibility for the innovation in result-oriented research development systems. Also, KOCI will expand its research foundation by strengthening its research capacities and by innovating in the research fields-place towards fusion and specialization through fostering predominant research groups. This

council will lead the promotion of all innovative tasks to implement an environment, which is closely linked to the financial organization towards the technology commercialization as well.

Korea Research Council of Public Science and Technology

The Korea Research Council of Public Science and Technology (KORP) works under the office of MOST. Its mission is in accordance to laws and regulations for the establishment, operation, and promotion of government-sponsored research institutes. The mission of KORP supports, fosters and systematically gives guidance to government-sponsored research institutes and undertakes scientific and technological research and knowledge-based industries in various sectors of national importance. The function of this council furnishes research planning in the area of public science and technology, and coordination of future strategies for institutes under KORP and reviews, improves functions of institutes under KORP.

V. Innovation and internationalization of SME

1. SME innovation policies

The Korean SME were defined through the 'Small and Medium Enterprises Act' which was enacted and executed in 1996. According to the SME Act, manufacturing companies that have less than 300 employees or a valued capital of KRW 8 billion are classified as small and medium enterprises. Table 28 describes different requirements for different sectors.

TABLE 26
DEFINITION OF SME IN KOREA

	Scope	
Sector	Employees	Capital or sales (KRW won)
Manufacturing	Less than 300	Capital worth KRW 8 billion or less
Mining, construction, transportation	Less than 300	Capital worth KRW 3 billion or less
Large general retail stores hotel, computer-related business	Less than 300	Sales worth KRW 30 billion or less
Seed and seeding production Fishing Electric gas and waterworks	Less than 200	Sales worth KRW 20 billion or less
Assorted services such as tour, warehouse, telecommunication, engineering, medical, film, etc. Wholesales, product intermediation, science service, sewage, etc.	Less than 100	Sales worth KRW 10 billion or less

Source: Kim Joo-Yong [online] http:// www.apec-smeic.org/news/down.jsp?file=741.

During the 1960s, the Korean government had created traditional SME polices, which had protected SME from large enterprises during the industrial period in the 1970s and 1980s. The turning point was the inauguration of WTO in 1995. Since then, Korea has shifted its policy focusing on autonomy, opening and competition. Against this backdrop, there is an increasing demand to shift the focus of SME policies from the protectionist policy to the policy of increasing SME competitiveness by promoting competition and enhancing technological and management innovation capacity. The Korean government reflected the trend on its SME policy since the 1960's as seen in the Figure 27.

TABLE 27
TRANSITION OF SME POLICIES IN KOREA

1960s: Created SME Policies

- Established a legal Framework for assisting and fostering SME
- Small and Medium Enterprise Association Act ('61) Private Contract with SME Associations ('65), Basic Act on Small and Medium Enterprises ('66)

↓

1970s – 1980s: Protected and fostering SME

- Fostered SME as a player of supplying parts to the heavy chemical industries
- SME Exclusive Industry ('75) , Interrelated SME to Large Companies ('80)
- Created Credit Guarantee Fund ('76), Small Business Corporation ('79), Technology Credit Guarantee fund

↓

1990's: Pursued structural improvement of SME

- Shifted policy focus to autonomy, opening and competition with the inauguration of WTO (Jan. '95)
- Announced removal of SME-exclusive Industry ('94), Reduced Private Contract with SME Associations ('95)
- Enacted the Act on Structural Improvement and Management Stabilization of Small and Medium Business ('95), Established Small and Medium Business Administration (SMBA) ('96)

↓

Financial Crisis – 2002: Fostered venture businesses and promoted start-ups

- Emphasized venture policy as a growth engine such as It and NT and established measures to complement weak areas such as Small and Women's business
- Opened KOSDAQ ('96), Special Act on Venture Business ('97), Small Business Act ('97), Women's Business Act ('99)

↓

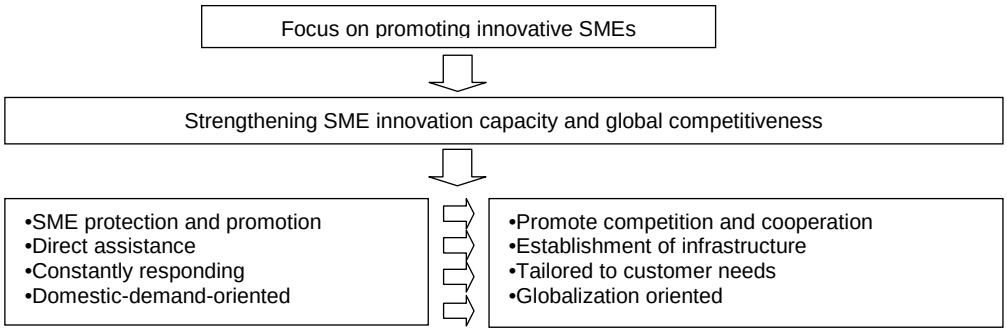
2003 -: Strengthen Self-Sustaining and Innovation Capacities

- Implemented the strategy to secure SME competitiveness suitable for the innovation-driven era
- Comprehensive plan to enhance S<E competitiveness ('04.7), Plan to visualize venture businesses ('04.12), 12 tasks for policy innovation ('05.1), Comprehensive plan for self-employment ('05.5), Revision of financing policy ('05.6)

Source: Kim Joo-Yong [online] < http:// www.apec-smeic.org/news/down.jsp?file=741>

The strategy that is more in line with the innovation-led economic structure can be depicted below.

FIGURE 30
SME INNOVATION POLICY DIRECTION



Source: Innovative SME Advisory Committee (2006)

The objective of the SME Technology Innovation Program is to promote technological innovation of SME, accumulate R&D capacity and improve technological competitiveness by supporting the development of new products and processes. In this regard, the program is divided in two subprograms, a year project for general tasks and a three-year project for strategic tasks. The SME received financial support through the central government and local governments, which accounts for 50% and 25% of the costs respectively. At the end of the program, the government receives back 30% of its contribution in the form of technology fees for five years in installments. The program was initiated in 1997. Table 28 shows the results of the program per year since 1997.

TABLE 28
SME TECHNOLOGY INNOVATION PROGRAM
(Billion Won, each)

	1997-99	2000	2001	2002	2003	2004	2005	Sum
Budget	107.2	60.0	86.1	99.3	110.1	130.6	142.2	735.5
SME	2 147	996	1 301	1 532	1 654	1 883	1 912	11 425

Source: Kim, Joo-Yong

As of 2005, there were 37 central & regional government bodies and a total 38 369 supporting personnel involved to support SME as exposed in the table 29.

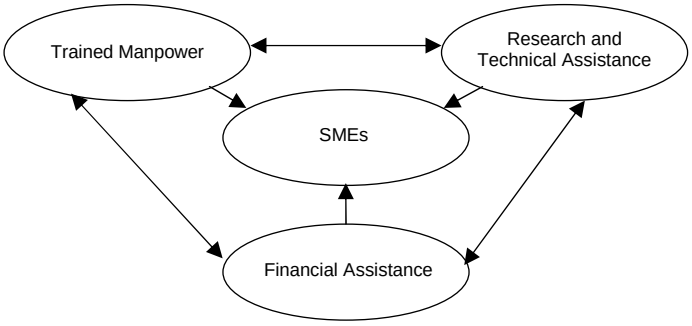
TABLE 29
ORGANIZATIONS AND PERSONNEL PARTICIPATING IN THE SME TECHNOLOGY INNOVATION PROGRAM (2005)

	Number of organizations	Supporting personnel (persons)
Central-regional government bodies	37	2 794
Related organizations	462	31 753
NGOs	26	3 822
Total	525	38 369

Source: Presidential Commission on Small and Medium Enterprises (2005)

The government policies to promote SME's technology innovation are categorized on pecuniary policy and non-pecuniary policy. Pecuniary policies include monetary measures and fiscal measures, which have direct influence on the technology innovation activities, while non-pecuniary policies include human resources and information policy, which have supporting influence. The government policies in promoting SME's innovation are formulated as depicted figure 31.

FIGURE 31
FRAMEWORK FOR SUPPORTING SME



Source: Sreedhar Srikant [online] < http://www.cherry.gatech.edu/sim/students/papers97S/srikant.PDF.

Many of the pecuniary assistance are focused on R&D and technology development while policies for technology transfer and technology commercialization were relatively weak. However, the government sponsored many research institutes, universities and firms to promote technology development projects. These initiatives were initiated by government ministries such as the Ministry of Information and Communication (MIC) and the Ministry of Agriculture and Forestry (MAF) that supported projects like "Project for enhancing the competitiveness of telecommunication industries" and "Project for agricultural technology development" respectively.

In addition, the Korean government supports local SME that have lack of innovation capacity to enhance their technology innovation and resolve technical problems by encouraging them to use new equipment and personnel of universities or research institutes. To this end, the industry-university-research consortium program was established in 1993 where the central government provides 50% and local governments 25% of the costs for technology development for up to one year. The program resulted in 5,026 patent applications, 13,600 cases of prototyping, and 10,446 cases of process improvement during 1993-2004. Table 32 shows the results of the Industry-University-Research Institute Consortium program by the year since 1993.

TABLE 30
INDUSTRY-UNIVERSITY-RESEARCH INSTITUTE CONSORTIUM BY YEAR
(Miillion Won, each)

Year		1993-99	2000	2001	2002	2003	2004	2005	2006	Sum
Grant		49 265	21 000	35 000	38 102	34 120	39 120	42 100	42 600	301 307
Consortium		433	146	182	197	206	218	222	135	1 739
SME		6 997	1 870	2 554	2 787	2 757	2 876	2 788	2 276	24 905
Task		6 286	1 795	2 327	2 611	2 593	2 743	2 690	2 276	23 321
Performance	Patent	1 257	654	731	787	761	836	-	-	5 026
	Prototype	3 692	1 160	2 029	2 184	2 284	2 251	-	-	13 600
	Process	2 611	739	1 536	1 648	1 806	2 106	-	-	10 446

Source: Kim, Joo-Yong

In addition, the Korean government has established fiscal measures for technology innovation that has a range of action from R&D, technology transfer/commercialization to entering markets. In this regard, "SME's venture companies' start-up fund," "Tax deduction for technician and technology development," "Income deduction on incomes from technology transfer" is some of the examples.

Furthermore, the government encourages the commercialization of new technologies developed by SME, government agencies, public institutions including Korea Electric Power Corporation, Korea Gas Corporation, and Korea Railroad Corporation, and private large businesses with the assurance that they will purchase the new technological products. The government also supports financing of the technological development, if public institutions purchase the products for a certain period of time. The program started in 2003 by supporting 49 projects for one government agency. As of 2006, the government supported 120 projects for 45 demanders including government agencies, public institutions and private large businesses. The fiscal assistance, however, mostly focused on the initial R&D stage.

The government has been conducting the Korea Small Business Innovation Research (KOSBIR) program since 1998 in an effort to offer government-wide support for SME technology innovation activities. In the KOSBIR, 16 agencies including 10 government agencies with massive R&D budgets and 6 government investment institutions are recommended to provide more than 5% of their R&D budget to SME. Since 2000, when 13.2% of the national R&D budget was poured for SME technology development, the proportion has continuously increased up to 20.6% in 2005. This indicates that the 16 participating agencies allocated more R&D budget for SME technology development and improved their institutional process to support SME in response to the promotion policy of innovative SME.

The government also provides direct and indirect financing support either by promoting venture capital markets or by providing credit guarantee services for SME ineligible for bank loans due to a lack of collateral. As a result, the government created a $500 million worth of venture investment funds in 2006 by setting up 102 venture capital firms and 366 venture capital partnerships as shown in the Table 33 and 34.

TABLE 31
STATUS OF VENTURE CAPITAL FIRMS BY YEAR
(Billion KRW)

Year	2000	2001	2002	2003	2004	2005	June, 2006
Firms	147	145	128	117	105	102	102
Fund	2 139	2 219	1 965	1 865	1 653	1 537	1 518

Source: Kim, Ju-Yong

In terms of credit guarantees, it aims to evaluate the level of technology, its commercialization and marketability, and to offer financial assistance, and finally to foster and develop SME with excellent technology and promote technical financing. It is managed by the Korea SME Credit Guarantee Fund and the Korea Technology Guarantee Fund created in 1976 and 1989 respectively.

There are three types of innovative SME in Korea. Adventurous and challenging venture business is one example. It is likely to bring high profit and high risk as venture capital investments increase. The second type of SME is Innovation business (Inno-biz), which has high growth potential and is capable to secure technology competitiveness through technology innovation. The third type of SME is management innovation driven SME, which currently carries out management innovation-related activities or has made innovative achievement after implementing management innovation activities within the past three years. Once a business is certified as innovative SME (either a venture business or inno-biz business), diverse benefits such as the standard reduction of issued capital, higher priority and additional scores for a patent, and special benefit when listed on the stock market are accessible to SME. In addition, employees in a certified venture business can

have tax benefits when they receive stock option. In particular, inno-biz companies can take part in various technology development support programs on preferential basis.

The government has also promoted to establish and operate Business Incubators (BIs) at universities and research institutes. Entrepreneurs of technology-based start-up firms and potential SME starter are the main beefier of the program since it provided SME with periods of 2 to 3 years in BIs, management, technology, or marketing consulting services, and bridging financing. In 1998, the government also started to help funding for the establishment of BI centers at university, national and public research institutions. The fund was used for operational costs and the expansion of BI's facilities; however, the beneficiaries were stopped if an incubator shows poor performance. As of June, 2006, 268 BI centers were operating with 4,287 companies. From the participating companies, a total of 4,255 graduated from BI centers.

As for marketing support, the government introduced a system of performance recognition and insurance of technological products developed by SME in 2005. The government had adopted the Technological Product Purchase Target System to public institutions. The purchased technological products made by SME accounted for 5% in 2006, but it is expected to increase to 10% in 2010. The purchase amount has increased from 400 billion won in 2003 to 1.1 trillion won in 2006.

Overseas private service centers in major economies were designated to help SME advance into foreign markets. They are responsible for conducting market surveys on export and foreign investment, identifying partners, and providing consulting for projects such as establishment of a local legal entity. During 2001 -2005 period, 752 companies received support by overseasservice centers achieving export sales of $12.78 million.

The inflow of high skilled people into SME is critical for SME to become successful and sustainable. Most SME cannot afford to hire high-skilled people nor equip themselves with self-owned training facility, while universities are already equipped with not only facility for training but also skilled trainers and lecturers. So the government the government assists with the establishment of university-industry cooperation offices and research institutes attached to business so as to enable SME to utilize ample workforce and physical R&D resources of universities by providing policy programs of technology development and training. Particularly students from various universities would have chances to work in SME and be familiar with an SME environment before graduating from universities. The earlier experiences would lead them to continue their jobs in SME. In 2005, 164 university-industry cooperation offices were installed and 44 university-industry collaborated research institutes linked to SME were established.

One particular program, the Industrial Technician Selection program, was designed to relieve SME labor shortage problems. Among the people who have obligation to do military service, the program select some of them as industrial technicians to SME for production or manufacturing.

2. Public and private cooperation in promoting SME

The government has driven the public sector towards supporting SME innovation. One of the most representative programs is the Industry-University-Research Institute Consortium Program. In the sense that this program promotes technological development through cooperation between Central government, local governments, local universities, local research institutes and local SMEs, it is well evaluated as ideal structure for the regional industrial and SME developments.

However, it has been argued that the government financial support is too small, less than 10 million won, to make technological development. In addition, it is also argued that the manpower of the participant universities and institutes lacks of field experience. In this aspect, the program should be integrated into the regional innovation programs. Furthermore, large companies need to be involved in the regional innovation programs so that they can further purchase SME developed products.

Some other programs for public and private cooperation may include New Technology Purchasing Assurance program, KOSBIR program, Fund of Funds, and Technological Product Purchase Target system. The New Technology Purchasing Assurance Program involves government agencies,

public institutions and private large businesses for SMEs to be solely engaged in the technology development without the concerns of marketing. The KOSBIR program recommends 16 government agencies to allocate some portion of their annual R&D budget to the SME technology development.

The Fund of Funds using public funds complements private venture capital markets by stabilizing the venture investment environment. The Technological Product Purchase Target system institutionalized the obligatory purchase of SMEs' technological products by public institutions for promoting technology development in SMEs. These public and private cooperation activities indicate that the government has a strong commitment to promote innovative SMEs by resolving inherent deficiencies of SMEs like technology development, marketing development and financing. Well-designed cooperation programs will not inhibit the free competition paradigm but foster the policy paradigm of concentration on innovative SMEs.

3. Small and Medium Business Administration (SMBA)

More than half of the expenses directed to SMEs are targeted to Small and Medium Business Administration (SMBA). Technology training and information provision in non-pecuniary policies are also mostly provided by SMBA. “Techno-Net Operation” and “Project to promote exchange among different industries” are some of its examples. In addition, SMBA makes efforts to develop and foster “Inno-Biz” by providing them consulting service, regular check-up for business operations, and showing successful examples of Inno-Biz.

Direct labor supply programs such as “Scout for foreign expertise and training program” and “Training program for foreigners” are provided by SMBA. Other assistance for manpower development and training program are also being executed. SMBA was born in 1996 to exclusively take care of SME policies with a vision to foster strong innovative SMEs that can lead the era of $20,000 per- capita GDP. The major SME policies that SMBA runs and implements are as follow:

a) Revitalizing start-up and enhancing entrepreneurship

To foster the would-be entrepreneurs and create the entrepreneurial business climate, the SMBA runs various programs such as the start-up course, start-up clubs, Biz-cool program for young people, and graduate school for business start-up. The SMBA also tries hard to make a favorable business environment for starting up by removing or streamlining regulations and procedures that used to hinder start-up activities and by providing the start-up agency services through a business plan approval system. The SMBA offers the necessary location for start-ups by supporting the operation of business incubators (BIs) at universities and institutes across the nation, and providing funds for business founders through venture & start-up funds.

b) Providing effective financial service

One of the most serious difficulties that those intending to start up an enterprise, or expand/restructure an existing business face is financing problems. This is mainly because most of the banks require collateral prior to agreeing to extend a loan, since their technology and corporate value cannot be correctly assessed when evaluating creditworthiness. Therefore, the SMBA provides direct and indirect financing support for SMEs.

As for indirect financing services, the SMBA provides a security assurance service for SMEs ineligible for bank loans due to a lack of collateral and technology so that SMEs can borrow needed funds from Korea Credit Guarantee Fund (KCGF), Korea Technology Credit Guarantee Fund (KOTEC), and local KCGF offices. In addition, it provides policy funds to small business owners, enterprises in the start-up phase, technology-oriented SMEs and SMEs awaiting reorganization through Small Business Corporation (SBC).

SMBA plans to utilize venture capital and the KOSDAQ market as a source of direct financing for SMEs. Promising SMEs with technological capability but are not elegible for credit or lack of collaterals are provided with venture investment funds from venture investment companies and venture investment partnerships. The KOSDAQ market and the Free Board are operating to enable public offering from the stock market or to provide large funds for small and medium venture companies

c) Strengthening capacity building of human resources

The key to corporate competitiveness in the 21st century is acquiring competent human resources capable of flexibly and promptly responds to the changing environment. Currently Korea is suffering from high unemployment rate of youth reaching up to 400,000, and SMEs are demanding 100,000 workers in the workforce. However, as this lack of workforce is attributable to the combined factors of the SMEs' poor working conditions and relatively few welfare benefits as well as young people's preference for larger enterprises, it requires much effort and time to fundamentally resolve the problem.

The SMBA well recognizes that 'Developing & Securing Competent Human Resources' is the core solution for enhancing competitiveness of SMEs. Therefore, while SMBA is making policy efforts to raise the capabilities of both SME employees and managers, it additionally tries to create a social and business environment whereby SMEs can employ competent human resources. To attract an increasing number of the workforce into SMEs, the SMBA implements the 'On-site Work Conditions Improvement Program' and provides tax benefits and preferential treatment to workers with lengthy employment. In order to change the perception the youth had toward SMEs, and maintain friendly ties between the jobless and SMEs, the SMBA initiated a 'SMEs Experiencing Program for College Students' and a 'Youth Employment Package Program'. The 'SME Training Center' implements various programs to educate the SME managers and employees in respect of a new management methods, and on-site work skills. The foreign workforce's industrial training system and the industrial technician certified system have been executed to ensure stable availability of manpower at production sites and intermediate-level technicians, respectively.

d) Strengthening marketing capability of SME

In order to respond accordingly to diversified and ever-changing consumers' demands, marketing capabilities have become more important than ever in the global market as well as domestic market. The companies which are capable of finding Blue Ocean or niche market earlier than others can survive. Nevertheless, export-based SMEs represent only 30% of the total SME manufacturers. Also, the export destinations and products are limited to China and the US, and to some items such as IT, respectively.

Hence, the SMBA is assisting SMEs to reinforce their export capability and receive customized export services of specialized export institutions in the private sector. Efforts are being made to solidify the domestic demand base of SME products, for example, by having public institutions purchase SME products, and supporting domestic exhibitions by industry. Exhibitions are held in foreign countries to increase the contact between SMEs and foreign buyers, and overseas trade professionals are trained to widen the access into foreign markets.

In other efforts to encourage the entrance of SMEs into global markets, the SMBA is helping SMEs to increase their export volume, get information on international procurement market (www.b2g.go.kr), obtain internationally recognized certifications, and advance into foreign retail distribution chains.

e) Building technological innovation capacity of SME

In the knowledge-based economy, the competitiveness of SMEs will be determined by their knowledge and innovative capabilities. The technological innovation of SMEs, and their capabilities of utilizing IT technology and network is a key for success of Korea future. However, their technological capabilities remain at merely 70% of the world's highest, and their R&D portion of the total sales recorded 3.58% in 2004 from 3.53% in 2003, showing a slight growth.

In order to strengthen innovation capabilities of SMEs, the government is pushing for various policies with focus on the following areas: fostering innovative SMEs that will lead technology innovation of SMEs down the road; reinforcing the networking of industry, academia and research institutes; promoting the commercialization of developed technology; and establishing the infrastructure of digitalization.

Promising SMEs equipped with capabilities of technology development and innovation are designated as 'Inno-Biz' and brought up as a core engine of growth under the principle of choice and concentration.

Additionally, government ministries and government-financed institutions are required to allocate over a certain percentage of the R&D budget to support SMEs' technology development under the Korea Small Business Innovation Research (KOSBIR) system, and cover R&D expenses of SMEs capable of separately developing technology. In support of this, end-users in the public sector such as defense and electricity assure that they will purchase SME products developed by new technology in order to encourage their technological development under the technological development project on the condition of product purchase.

To encourage networking for technological innovation among enterprises or among industry, academia and research institutes, for example, the 'Industry-University-Research Consortium Project for Technology Development', 'Cooperation between Industry and Academia' and technical training of SME employees through the utilization of universities and research institutes are implemented.

Through digitalization, the SMBA also helps SMEs enhance their productivity. Digitalization measures include the assessment of the SMEs digitalization level, provision of comprehensive consulting for innovative digitalization and the digitalization of production facilities of SMEs

f) Fostering venture business

As venture businesses are expected to be a strong growth engine of the Korean economy in the future, the government will continue to foster venture businesses by improving quality and competitiveness of SMEs rather than quantitative growth.

The government ensures the flow of funds, human resources, land or other necessary production resources into SMEs. Based on the law of special measures on fostering venture businesses, efforts are under way to establish an infrastructure that will facilitate the start-up and development of innovative SMEs by easing or even removing various regulations relating to business activities. Furthermore, M&As of venture companies are underway to facilitate strategic alliances among enterprises, and venture investment, and the flexible movement of technician services. Additionally, the government is promoting the globalization of venture businesses through the establishment of overseas small business development centers and global star funds.

g) Providing service for Micro-Enterprises (ME)[7] and conventional markets

Substantial assistance to MEs through systematic organization and measures is planned by SMBA. The SMBA established a dedicated micro-business development office in 2005 and Micro-enterprise Promotion Agency in 2006, and strengthened the function of a micro-enterprise assistance center. The SMBA also modernized shopping districts to enable people to enjoy regional culture and tastes by investing $106.8 million in 2005, which increased up to $112.4 million in 2006.

The SMBA is providing assistance to revitalize a joint project called 'promoting sales through an online shopping mall for the conventional market' aimed at improving sales techniques and enhancing the capability of managerial innovation. This measure is expected to cut costs and increase sales. Furthermore, the SMBA is helping MEs to conduct diverse and aggressive marketing activities to attract customers. The SMBA is also providing education and consulting services for the innovation of conventional markets.

By launching 'commercial complex information system,' SMBA assists MEs' start-up activities and their managerial stability, and is operating a five-stage start-up package program aimed at linking education and fund to encourage start-up activities. To improve the effectiveness of government funding for MEs, the SMBA also expanded the size of the guarantee from $3.4 billion in 2005 to $4 billion in 2006, and operates special guarantees amounting to approximately $1 billion.

[7] Micro-enterprises refer to self-employed people engaged in subsistence sectors such as handicraft manufacturing, distribution, catering, and other services. The microenterprises of manufacturing business should have no more than 10 employees, and the service business less than five.

h) Guide for SME, SPi-1357

The SMBA operated the SPi-1357 system to deliver an integrated policy information online and offline in real time. It is expected to improve the understanding of SME businessmen and enhance the achievements of policy innovation by increasing their convenience. This information delivery system consists of an online SPi system, a customized policy information system and an offline, comprehensive counseling system through 1357. The number of employees in the headquarters is 271, and 372 employees are working in 11 regional offices across Korea.

4. Korea Institute of Industrial Technology (KITECH)

In the 1980s, many SMEs in Korea had difficulty in having independent R&D center or developing its own technology. Under this circumstance, Korea Institute of Industrial Technology (KITECH) was established in 1989 with a name of Korea Academy of Industrial Technology (KAITECH) as a research center specialized in production technology that can generate actual output in production. KAITECH was renamed as KITECH in 1997. The institute was under MOCIE, but its affiliation was changed from MOCIE to Korea Research Council for Industrial Science & Technology (KOCI) in 1999. Finally, KITECH was placed under KOCI of Ministry of Science and Technology in 2004. However, its role is closely related to the activities and policies that MOCIE perform.

KITECH's main role is technology innovation and support for SMEs' as well as the commercialization of three major focal R&D areas- manufacturing system, production, parts and materials. Manufacturing system technology includes digital manufacturing system, sustainable technology, and robotics. The projects like "Digital Technology Implied High-tech Manufacturing System" and "Eco-friendly Recycle Manufacturing System" are the examples related to the commercialization process in manufacturing area. Production area includes production technology and production process. Advanced materials and textile &chemical materials are the main area of commercialization related to materials. Projects like "New Technology in Metallic Materials for Fusion" and "High Functional Chemical Textile Material Production Technology" are the examples. Through the commercialization, it helps to reduce or eliminate SMEs' weakness and commonly encountered difficulties, and supports market-oriented technology development and SME-led technology development. In addition, it is designed to reinforce technology support function according to the new industrial demands providing customized technology support promptly on the prototype development and reliability evaluation.

The institute sets the vision to lead manufacturing of technology innovation to enhance technologically innovative SMEs to be equipped with global competition. In detail, it focuses on demand-oriented high-tech manufacturing technology development and R&D human resource training, and also tries to establish close collaborative networking system among domestic and international innovative institutes.

KITECH's total budget in 2005 was $180 million, which increased in 2006 to $200 million. 30% of income is supported by government, but the majority of the revenue is self generated. The institute spends 70% on R&D related activities, and 12% on labor cost, and 11% on various business cost. Total employees working at the institute is 937, 841 people in KITECH is R&D personnel, and administrative personnel is 91 persons (Table 2).

TABLE 32
EMPLOYEES IN KITECH

		Irregular			
Classification	Regular	Full-Time	Part-time	SubTotal	Total
R&D Personnel	318	396	132	528	846
Administrative Personnel	57	32	2	34	91
Total Human Resource	375	428	134	562	937

Source: KITECH website [online] http://www.kitech.re.kr.

VI. Implications

When Korea started its development strategy, the only productive factor at the disposal of the economy was human resources. The economy at that time lacked natural resources, industrial facilities, sufficient land, foreign reserves and business experiences.

However, through heavy and aggressive investments in education, training and borrowing foreign capital, Korea could overcome the barriers, although the development process has not been so smooth. Human resource was the key factor through the Korea's economic development for the entire period. The Korean success also benefited from effective institutions. The Korean bureaucracy consisted of high quality technocrats with strong motivation.

One of the strengths of Korean economy is that according to market system, industries with comparative advantages have been promoted letting the market conditions select specific industries that the government should support. Also the relatively stable political system which enables rapid decision making and policy implementation allowing elite bureaucrats to react appropriately to environments is strengths. In addition, Korea has put high priority on education and is equipped with accumulation of human resources. In the 1960s and 1970s, cheap and educated workers for labor-intensive industries were relatively abundant and in the 1980s and 1990s, skilled workers for heavy and technology-oriented industries were supplied. High savings and capital investment are also the strong foundation of Korean economy since 10% of GDP in 1960s has been increased up to 30% throughout other periods.

On the other hand, Korean economy has some weaknesses to overcome. Concentrated economic power to chaebols constrains the fair competition and causes moral hazard problems. Reforms in the financial sector should be more expedited as well. Rigid and immature industrial relations is also a problem.

Lastly, collusive relations between government and business undermined efficiency, fairness and public respect for the bureaucracy.

In the earlier stage (Phase-I Model), a strong government leadership may be of necessity. In this period, mobilization of resources for rapid economic growth is the essence of the national development strategy. However, in the later stage (Phase-II Model) when the economy becomes more diversified and complicated, the role of the market mechanism and the public-private partnership gain the importance. Although the public-private partnership in Korea has been shown in the process of plan or strategy formulation at the national level to a certain extent, the Korean case shows that the country has not achieved a desirable public-private partnership in this later period for implementation of strategies.

Under the Phase-I Model the relationship and interactions between the public (government) and the private (business) in Korea were characterized by a top-down (hierarchical) system where the government directed and guided major economic agents for the implementation of Five-Year Economic Plans, which were formulated by the government with the joint-work of government bureaucrats and civilian experts. Thus, the horizontal interactions among major economic players were not developed and the authoritative government treated the private sector on the basis of the 'divide and rule' method.

Under the Phase-II Model, the horizontal relationship between the major players is expected. However, the ideal cooperative horizontal relationship has not been fully developed yet. Korea is now in a transition period.

Except for the short-period of the Tripartite Commission among the government, the business and labor, since the Korean financial crisis in the late 1990s, and ad-hoc basis special task teams for some national agendas, there is no such a formal partnership mechanism in Korea. This close relationship between the government and Chaebols in the Phase-I Model period of the 1970s, was not such a partnership in the true sense, but an imposed one by the authoritarian government.

Today the scale of the Koran economy and the diversity of the Korean industries do not make it easy to form such an ideal partnership. In this sense, there is a big difference between Korea and Japan. Japan still maintains its world-famous 'consensus-making' practice between the government and the business sector. The Korean economy, especially the trade sector, is still dominated by Chaebols and large enterprises. Although SMEs are gaining their importance and strengthening competitiveness, they are not the leaders but followers.

In Korea, there is no stable formal public-private partnership mechanism, but only ad-hoc partnership activities. For example, delegates from FKI, KCCI and industrial associations are asked to form or join in a task force such as FTA feasibility study team. For the formulation of a long-term industrial development strategy, some experts or delegates from the private sector organizations participate in as planning committee members. These participants are invited by the government. The government selects and recruits them according to the recommendations of government's officials or by searching. In most cases, these experts or delegates from the private organizations act passively in the task force meeting.

This fact does not necessarily imply that the private sector organizations themselves are passive in policy or strategy formulation. Rather, they voice their opinions and put great efforts to influence the policy formulation process of the government. The point is that these efforts are not necessarily implying the partnership relations with the government or the public sector. Rather, it means there are interest groups that put more weights on their members' interests. Thus, the interactions among organizations and interactions between the public sector and the private sector are more of competition rather than cooperation or partnership.

In order to link technological innovation and trade, a comprehensive and well balanced NIS (national innovation system) is needed. Korea drastically reformed its NIS and science and technology governance in 2004. Although the reform is on the half way, it renders the lesson of the importance of coordination and integration of major institutions and activities (programs).

Economic system cannot be innovated overnight. The reform and innovation process itself requires patience and consensus building that allows intuitional and policy experiments. High quality of bureaucrats and experts from the private sector including think tanks are one of the success factors.

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