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Industrial-Innovative Development Plan of Kazakhstan

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MINISTRY OF STRATEGY AND FINANCE

KDI Korea Development Institute

Industrial-Innovative Development Plan of Kazakhstan

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Program Directors	Wonhyuk Lim, Director, Policy Research Division, Center for International Development(CID), KDI Tai Hee Lee, Director, Policy Consultation Division, CID, KDI
Project Coordinator	Sae Won Lee, Specialist, Policy Consultation Division, CID, KDI
Project Manager	Wonhyuk Lim, Director, Policy Research Division, Center for International Development(CID), KDI
Authors	Chapter 1: Wonhyuk Lim, Fellow, KDI Joon-kyung Park, Former Vice President, KDI Chapter 2: Jongil Kim, Professor, Dongguk University Chapter 3: Byoung Jun Song, President, Korea Institute for Industrial Economics and Trade (KIET) Chapter 4: Hawon Jang, Professor, Korea University Joon-kyung Park, Former Vice President, KDI Sejun Mo, Senior Researcher, Hana Institute of Finance Chapter 5: Hoseop Yoon, Professor, Yonsei University Annex I : Sae Won Lee, Specialist, Policy Consultation Division, CID, KDI Annex II: Hyung Koo Lee, Former Minister, Ministry of Labor
English Editor	Sae Won Lee, Specialist, Policy Consultation Division, CID, KDI

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Preface

In May 2009, President Myung-bak Lee of the Republic of Korea met with President Nursultan Nazarbayev of the Republic of Kazakhstan during an official visit to Kazakhstan, and both vowed to strengthen the economic cooperation between the two countries. As a follow-up to the state visit, a delegation from Kazakhstan came to Korea from June 8-11, 2009, and participated in a short-term policy training program on formulating macroeconomic policies.

Subsequently, the Ministry of Industry and Trade of the Republic of Kazakhstan officially requested the Korea Development Institute (KDI) on June 15, 2009, to assist in formulating a "Long-term Industrial-Innovative Development Plan of Kazakhstan", under the auspices of the Knowledge Sharing Program (KSP). The KSP is a comprehensive policy consultation program - supported by the Ministry of Strategy and Finance (MOSF) and executed by KDI since 2004 - that aims to contribute to the socio-economic development of partner countries by sharing Korea's economic development experience and knowledge.

In July 2009, MOSF and KDI organized a first delegation to visit Kazakhstan. As President of KDI, I headed the delegation of 5 to meet with policy-makers and practitioners from the relevant ministries in charge of the 7 major industries mentioned under the "Industrial-Innovative Development Plan of Kazakhstan" in order to explore their needs and identify research priorities for the project. The 7 major industries stated in the Master Plan refer to: 1) agriculture and food processing; 2) construction and construction materials; 3) building infrastructure for oil refining and petroleum gas; 4) metallurgy; 5) chemistry, pharmaceuticals and defense industry; 6) energy and; 7)

transportation, communication and infrastructure development. During this visit, the Korean delegation also held meetings with resident executives and managers of major Korean companies in Almaty as well as the country representative of UNDP in Kazakhstan, where they received useful information on the past and current development situation of Kazakhstan.

As a direct result of the visit, a Memorandum of Understanding was signed between MOSF-KDI of the Republic of Korea and the Ministry of Industry and Trade of the Republic of Kazakhstan, according to which KDI was to provide advice on the planning of the Industrial-Innovative Development for Kazakhstan, with a special focus on the prioritization and harmonization of sectoral plans and individual projects. Minister of Industry and Trade, Mr. Aset Isekeshev, furthermore requested KDI's support in the analysis of 1~2 industrial sectors listed in the Master Plan as well as a Korean Resident Advisor to conduct consultations on the preparation of the Master Plan.

The Corporation for Export Development and Promotion, KAZNEX, was selected as the counterpart for KDI with Vice Minister of Industry and Trade, Mr. Nurbek Rayev, and Dr. Wonhyuk Lim from KDI taking the role of Project Managers for this project. Mr. Yerlan Arinov, President of KAZNEX, and Mr. Meiram Kazhyken, Vice President of KAZNEX, were also recommended from the Kazakh side to work closely with the Korean expert group in promoting this project. The Korean expert group was then brought together with the Former Minister of Labor, Dr. Hyung Koo Lee, being selected as the Resident Advisor for Kazakhstan. After a thorough examination of relevant documents as well as a series of meetings among the Korean expert group, the main consultation topics were decided as follows:

Preface

- The Overview of Kazakhstan's Economy and Development Strategies (PM: Wonhyuk Lim, KDI)
- Comparative Growth Experience: Kazakhstan vs. Other Resource-Rich Countries (Jongil Kim, Dongguk University)
- Development Strategies of Construction Materials and Agricultural Machinery in Kazakhstan (Byoung Jun Song, Korea Institute for Industrial Economics and Trade)
- Automobile Industry Promotion Project in Kazakhstan: Finding Potential and Cultivating Capacity of Commercial Vehicles (Hawon Jang, Korea University; Joon-kyung Park, KDI; SeJun Mo, Hana Institute of Finance)
- Agricultural Development in Kazakhstan (Hoseop Yoon, Yonsei University)

In September 2009, the above group returned to Kazakhstan to conduct further research and obtain important data. The highlight of this visit was the launch of a seminar, where Minister Lee and Ms. Zhamila Bopieva of the Ministry of Economy and Budget Planning (MEBP) introduced 5-year Development Plans of their respective countries. The Korean expert group reviewed and provided useful comments on the "Industrial-Innovative Development Plan of Kazakhstan 2010-2014" covering areas such as the methodology used in planning and raising funds. Following the visit, Minister Lee remained in Kazakhstan as the advisor for Kazakhstan for the month of September 2009. Based on the Korean experience, he continued to give intensive consultations pertaining to planning methodology, so that the Master Plan for Kazakhstan would be consistent with the numerous plans covering the whole economy, industrial sectors and individual projects.

In November 2009, after extensive research, the Korean expert group visited Kazakhstan once again, in order to present their consultation outcomes during the Final Reporting Workshop. The presentations were held before the staff of the relevant ministries: Overall economic planning and strategies at the Ministry of Economy and Budget Planning, Agricultural development at the Ministry of Agriculture, analyses on construction materials, agricultural machinery and commercial vehicles at the Ministry of Industry and Trade.

In the Senior Policy dialogue, Minister Lee and Dr. Lim presented the final policy consultation results to Minister Isekeshev. The prioritization and harmonization of the various sectoral plans as well as the implementation of a monitoring mechanism were emphasized. This would ensure that past failures would not be repeated. It was further stressed that an over-dependence on certain resources should be avoided by encouraging industrial diversification and human resources development. The income from natural resources should be wisely allocated by improving the political and economic system. It was recommended that the state oil fund should increase its domestic investments as opposed to foreign investments. The build-up of infrastructure through active and systematic government investments, rather than through Public-Private-Partnerships (PPP), was cited as another critical recommendation for Kazakhstan at its current development stage.

Minister Isekeshev showed great interest in the above recommendations and engaged in further discussions, focused on pending issues regarding the overall industrial-innovative development for Kazakhstan. He also asked for further cooperation, especially regarding the development of a Special Economic Zone (SEZ) and its establishment and management. Overall, this project started later

than other KSP projects, but progressed rapidly in order to meet the needs of the Kazakh government as well as to incorporate the consultation results in the "Industrial-Innovative Development Plan of Kazakhstan."

All research depends on financing, and this project was no exception. The MOSF provided the budget for the KSP with the understanding that learning from Korea's development experience and obtaining economic policy advice tailored to the needs of developing and transition countries may be the greatest gift that Korea can offer to the world. The Development Cooperation Division at the MOSF, in particular, has closely worked with the Office for Development Cooperation (Currently, Policy Consultation Division of the Center for International Development) at KDI to enhance the effectiveness of KSP.

KAZNEX also contributed in providing the budget for the Residential Advisory Program as well as the Senior Policy Dialogue and Final Reporting Workshop. The Korean delegation was fully funded for during its last stay in Kazakhstan and this could not have been arranged without the full support of Vice Minister Rayev, Mr. Arinov, Mr. Kazhyken and the logistical support of the KAZNEX staff.

The Korean Embassies located in Astana and Almaty as well as the Embassy of Kazakhstan in Seoul provided valuable logistical support and useful information on bilateral relations between the two countries. Special thanks are due to Ambassador Byung-hwa Lee and Mr. Jooil Lee from the Korean Embassy in Astana, Minister-counselor and Consul-General Yang Goo Lee and Mr. Bok-won Kang from the Korean Embassy in Almaty. I would also like to thank Ms. Tae-Youn Kim for her excellent Korean-Russian interpretation at the

most urgent time of need as well as her assistance in both communication and coordination for the project.

On behalf of the Korea Development Institute, I would like to take this opportunity to express my heartfelt gratitude to Dr. Wonhyuk Lim, Prof. Jongil Kim, Dr. Byoung Jun Song, Dr. Hawon Jang, Dr. Joon-kyung Park, Mr. Sejun Mo and Dr. Hoseop Yoon, for successfully completing this project. My sincere appreciation also goes to Minister Hyung Koo Lee for staying back alone for a month in Astana and providing the project with excellent knowledge and experience on the Development Plan of Korea. I am also grateful to Minister Aset Isekeshev, Vice Minister Nurbek Rayev, Ms. Zhamila Bopieva, Mr. Ismet Utebayev, Mr. Yerlan Arinov and Mr. Meiram Kazhyken for all their hard work, cooperation and support for this project. Finally, I would like to thank Ms. Lyazzat Karataykysy, Ms. Oksana Kim and Ms. Sae Won Lee as well as the staff at the Center for International Development for their dedication and contribution to the project.

Oh-Seok Hyun
President
Korea Development Institute (KDI)

Contents

Chapter 03

Development Strategies of Construction Materials and Agricultural Machinery in Kazakhstan

Contents

Chapter 05
Agricultural Development in Kazakhstan

Annex 01
Heavy-Chemical Industrialization Promotion Policy

Annex 02
Advisory Work on the "5-Year Industrial Innovative Development Plan" of the Republic of Kazakhstan

Contents | LIST OF Tables

Annex

Chapter 01

Innovative-Industrial Planning

Chapter 01

Innovative-Industrial Planning

Wonhyuk Lim (KDI)
Joon-kyung Park (KDI)

The state program of the forced innovative and industrial development in Kazakhstan for 2010-2014 ("Innovative-Industrial Development Plan"), announced by President Nursultan Nazarbayev at a convention of the ruling Nur Otan Party on May 15, 2009, represents the country's latest attempt to achieve the familiar objectives, designed to modernize its economy and reduce its dependence on mineral resources: 1) resilience to external shocks and expansion into (integrated) domestic and regional markets; 2) industrial diversification and upgrading; 3) development of innovative capability; and 4) rational spatial organization of economic activities (clusters). This chapter places the Innovative-Industrial Development Plan in perspective[1], and is organized as follows.

Section 1 provides a brief overview of Kazakhstan's economy and development strategies. Section 2 discusses the fundamentals of planning, focusing on the appropriate division of labor between the state and market, the extent of incentive and information problems, and the effective planning architecture to facilitate prioritization and coordination. Section 3 looks at growth, structural change, and innovation in catch-up economies, drawing implications for the drafting of the Innovative-Industrial Development Plan. Section 4 highlights the role of the national and regional innovation system in promoting growth.

Within the broad context of this report, Chapter 1 serves as the introduction. Chapter 2 analyzes economic challenges faced by Kazakhstan from a comparative perspective, benchmarking large, resource-rich, sparsely-populated countries such as Australia and Canada. It looks at how these countries integrated their national market and promoted industrial and trade development as well as innovation. Chapters 3, 4, and 5 looks at Kazakhstan's policy

1) The "State Program of Forced Industrial-Innovative Development of the Republic of Kazakhstan for 2010-2014" has since been published. This publication can be found at http://www.mit.kz/en/page/395

challenges in promoting specific industries as mentioned in its Innovative-Industrial Development Plan: construction materials and agricultural machinery, motor vehicles, and agriculture. Annex I provides a case study on Korea's Heavy and Chemical Industry drive in the 1970s, while Annex II presents the advisory work and recommendations made on the "5-Year Industrial Innovative Development Plan" of the Republic of Kazakhstan.

1.1. Overview of Kazakhstan's Development Strategies

Kazakhstan suffered a 40-percent decline in real GDP from 1991 to 1995 in the aftermath of the break-up of the Soviet Union, due to the emigration of ethnic Russians and Germans, disruptions and adjustments in production networks, and breakout of hyperinflation, which exceeded 1000 percent per year from 1992 to 1994. Kazakhstan responded to the post-independence shock by attracting foreign direct investment (FDI), privatizing many state-owned enterprises, and taking stabilization measures.

The economy had stabilized by 1996-97, but Kazakhstan fell victim to the Russian currency crisis of 1998. Kazakhstan appropriately devalued its national currency, the tenge, and restored macroeconomic stability.

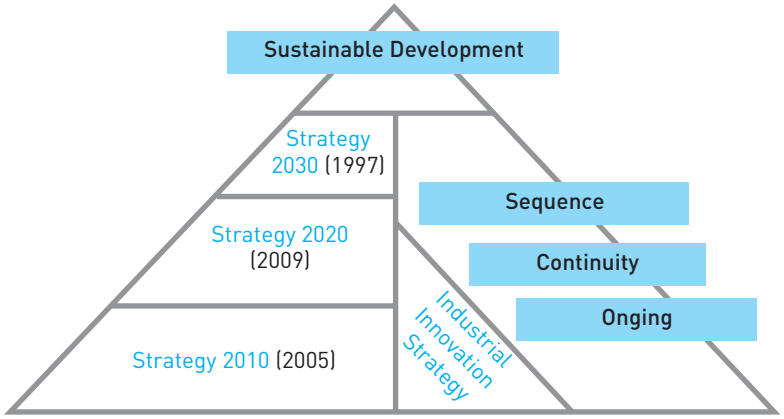
Rising oil production and prices fueled rapid economic growth from 2000 to 2007. Oil Production increased from 25.6 million tons in 1998, 47.3 million tons in 2002, to 67.5 million tons in 2007. At the same time, the crude oil price per barrel soared from $13.1 in 1998, $24.9 in 2002, to $72.7 in 2007.

A speculative construction boom, supported by massive capital inflows, did little to strengthen the industrial base and instead created massive non-performing loans, triggering the financial crisis of 2007-08 even before the onset of the global financial crisis. The government adopted effective anti-crisis measures and is now focused on the industrial-innovative development of Kazakhstan, trying to reduce its dependence on extractive sectors and develop a sustainable industrial base.

Kazakhstan has drafted a number of significant development strategies and plans over the past decade, and but before taking stock of their accomplishments and shortcomings, Kazakhstan has tended to draft even more strategies and plans. Moreover, these development strategies and plans do not seem to take into account the appropriate role of the state and private sector, the extent of incentive and information problems, and the effective planning architecture to facilitate prioritization and coordination.

Substantively, Kazakhstan has yet to formulate an effective mechanism to use its massive resource revenues for the development of a sustainable industrial base. For instance, most of the

Figure 1-1 | Diversification Policy of Kazakhstan



National Fund resources are invested abroad, and Kazakhstan seems to rely on a patchwork of piecemeal PPP projects to promote economic development. However, when many end-users cannot afford to pay fees or tolls at a level high enough to guarantee commercial viability for PPP investors, this kind of dependence on PPP is counterproductive. It would be better for the state to channel oil revenues into the infrastructure and manufacturing sectors and facilitate the integration of the national market and accelerate economic development. This would also have the effect of counterbalancing capital inflows. Korea had to rely on foreign loans to build its infrastructure in the 1960s and 1970s. Kazakhstan today is in a much better position to use its own resources for development. Kazakhstan should set up a transparent and accountable system of resource distribution and use oil revenues as a source of patient capital.

1.2. Fundamentals of Planning

1.2.1. Basic Premises

In Kazakhstan, there is an ongoing debate between those who advocate a business-initiated approach and those who champion a state-initiated approach. At this stage of development, the state should play the role of a *facilitator* in large-scale projects with high investment risks. If a good corporate governance and performance evaluation system can be established and enforced, state-owned enterprises may be justified, especially in infrastructure sectors. However, the state should place a far greater emphasis on creating an environment where individuals and companies can discover business opportunities through their own search and experimentation. The state should focus on sharing investment risks with the private sector and attracting

entrepreneurial talent from home and abroad, instead of getting directly involved in production itself. For instance, Korea established state-owned enterprises such as the Pohang Iron and Steel Company and Korea Electric Power Corporation to implement its economic development plans. For the most part, however, Korea relied on private-sector business groups such as Hyundai (shipbuilding, machinery, and motor vehicles), Samsung (electronics), LG (electronics and chemicals), and Daewoo (shipbuilding and machinery), to promote heavy and chemical industries.

For risk sharing between the state and the private sector to be optimal, the state and the private sector should share the costs and benefits of investment projects from a social welfare prospective. The state should ask why a private-sector company needs state support if the investment project is so fantastic as claimed and why it could not be financed on a commercial basis. If the positive spillover from the project weighed against the investment risk justifies state support, the state should structure the support so that the reward is based on performance and the truthful revelation of information. The state should not allow the private sector to privatize gains and socialize losses (moral hazard). At the same time, the state should allow the private sector to earn a fair rate of return on investment. In some sectors such as transportation infrastructure, the state may have to bear almost all risks if it would like to enable other sectors to develop rapidly. For infrastructure development, the state should be willing to make massive coordinated investment with patient capital instead of relying on a patchwork of piecemeal PPP projects. The state should channel and reallocate oil revenues for the development of non-extractive sectors.

The degree of coerciveness in planning is related to the degree of state control over production, financing, and technology licensing. Even when the state had strong control over the economy as in the old Soviet Union days, it still faced serious incentive and information problems when it tried to impose binding production targets on enterprises, because individuals had little reason to report truthfully to the state when they knew that a better performance would not lead to a higher reward. When the state has weak control over the economy but tries to impose binding targets, it would face even greater problems.

A better approach would be to engage in “indicative planning” to help people to understand where the government wants to take the nation, have some binding targets in the few sectors directly controlled by the state (e.g., infrastructure and human resource development), and establish an incentive regime based on the general principle of performance-based reward. The state should coordinate infrastructure and human resource development with industrial development, taking advantage of agglomeration economies (clusters), but, for the most part, it should leave micro-level inter-sectoral coordination to business groups and markets.

A failure to understand the role of the state and to appreciate the formidable information and incentive problems in planning may lead to preoccupation with technicalities. There are two

separate issues here: (1) preoccupation with project evaluation, at the risk of missing the bigger picture at the economy-wide or sectoral level; (2) preoccupation with precision and rigor in economic planning, when it is clear that the state does not and cannot have all the necessary information to solve the mathematical model involved (i.e., inter-sectoral balance model). Although Korea used such measures as the incremental capital-output ratio (ICOR) to calculate the investment requirement for each sector and made the whole story fit by checking with the input-output coefficients, this was supplementary to the establishment of policy priorities and drafting of the overall macro plan.

1.2.2. Planning Architecture: Economy, Sector, and Project Level

Kazakhstan's Innovative-Industrial Development Plan has three dimensions/levels:

(1) Economic Development Plan, which establishes policy priorities (e.g., macroeconomic stabilization, promotion of particular sectors, etc.) and coordinates various plan elements (e.g., industrial, infrastructure, spatial, and human resource development) for the economy as a whole under a budget constraint;

(2) Sectoral Master Plan, which provides a strategic blueprint and outlines key projects and policy challenges for each of the selected sectors

(3) Project Evaluation, which assesses the feasibility of submitted project proposals and incorporates selected projects into higher-level plans.

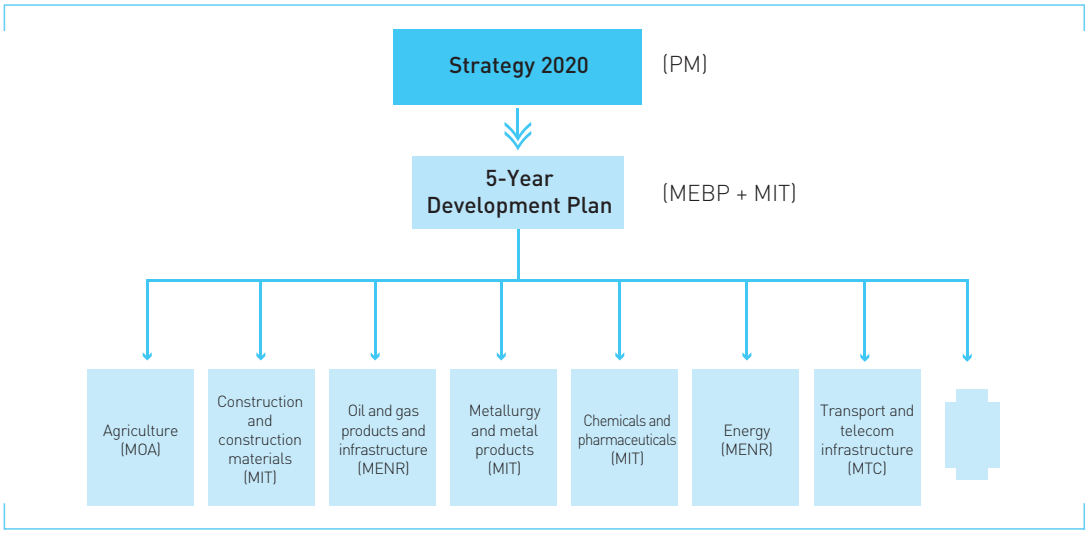
The way the planning process is currently set up runs the risk of overlooking the challenges involved in establishing higher-level priorities (either at the economy-wide or sectoral level) and concentrating too much on submitted individual projects.

(1) Establishment of Economic Priorities

The overall economic development plan should establish policy priorities based on the analysis of Kazakhstan's economic challenges and strategic considerations. The proposed priorities in the preliminary presentation on the Innovational Industrialization Plan make a great of sense for Kazakhstan. To rephrase, these are: (1) resilience to external shocks and expansion into (integrated) domestic and regional markets; (2) industrial diversification and upgrading; (3) development of innovative capability; and (4) rational spatial organization of economic activities (clusters).

Kazakhstan needs a combination of sound macroeconomic policy and innovational-industrial development to address major problems it has faced in recent years. Note that the lack

Figure 1-2 | New Economic Policy of Kazakhstan



of innovative-industrial development was not the primary cause of Kazakhstan's economic difficulties in 2007-08. The prior deregulation of the financial sector and explosive construction boom had a lot more to do with the crisis. One can say that Kazakhstan should have focused on innovative-industrial development instead of fueling the financial and construction boom, but without appropriate macroeconomic measures (e.g., accumulation of foreign exchange reserves, adjustment of the exchange rate, regulation of the financial sector), innovative-industrial development would have only a limited effect on containing macro shocks.

External shocks may come from financial (changes in capital flows) or real (changes in demand-supply conditions) sources. The development of priority sectors may have only a limited effect on cushioning the external shocks. For instance, Japan's advanced industrial structure did not shield the country from the external shocks in 2008-09. In fact, Japan's heavy reliance on exports of durable goods (e.g., automobiles, machinery) amplified the domestic impact of the global crisis.

Macroeconomic policy has a far larger effect on making the economy resilient to external shocks, especially those of financial nature. The maintenance of sufficient foreign reserves (given the level of short-term foreign debt and volatility in the current account), the regulation of capital account transactions, and the adjustment of the exchange rate are three prime examples.

Industrial diversification can help against real external shocks of sectoral nature (e.g., collapse of the price of a commodity), but have only a limited effect when real external shocks are of global nature (e.g., synchronized recession in major markets).

The overall economic development plan should also establish the overall budget constraint and sectoral allocation rules to prioritize sectors. In selecting priority areas, the government should consider (1) the demand side (sizable and growing domestic demand plus potential export demand), (2) the supply side (domestic capability good enough and scale large enough to produce products at competitive prices), and (3) externalities (spillovers, linkages, and public interest).

As the example of the cement industry shows, business interests seeking state support may make an overly optimistic demand forecast. The government should put in place a mechanism to share risks and extract truthful information from the private sector, but it also needs to have its own idea of future demand based on hard data. It would be useful to have data on domestic demand as well as exports and imports for each product.

The government should conduct an expert survey to complement such quantitative measures as revealed comparative advantage (RCA). Revealed comparative advantage or its variant such as the Lafay Index is a lagging indicator. It would be useful to trace the trend of RCA over the past few years to identify products that are becoming internationally competitive. It would be also necessary to conduct expert surveys to identify promising products that have yet to show up on the RCA data and to assess Kazakhstan's domestic capabilities. The government should make strategic decisions and coordinate infrastructure and human resource development with industrial development. Korea's Industrial Development Vision 2020, especially the selection of 14 promising sectors for Korea, may be pertinent to the drafting of the Innovational Industrialization Plan for Kazakhstan.

Among various sectors, it appears that transportation, agriculture, and resource-related industries should be accorded priority.

Building extensive road and railway networks (with logistical support systems and improved local manufacturing capabilities in transport-related sectors) will help integrate the national market and allow Kazakhstan to take advantage of its location as a bridge between Europe and China. Instead of having a number of isolated sub-national markets (cf. Salop's unit circle model), Kazakhstan will be able to exploit scale economies and greatly enhance its export capability.

In Kazakhstan, what is regarded as an industrial problem is often a transportation infrastructure problem. Isolated sub-national markets allow incumbent companies to prosper without technological upgrading and managerial improvement. Industrial development aimed at integrated domestic and regional markets is a reasonable policy objective, but it requires the prior development of transportation and logistical infrastructure, trade liberalization, and institutional harmonization. Kazakhstan should look beyond domestic and regional markets (Customs Union) and explore extra-regional markets as well.

Promoting high-quality wheat and other agricultural products for the regional and global market looks like a much more commercially viable strategy than targeting sophisticated industries or labor-intensive manufactures in the early stages of industrialization.

With intensive learning and strategic participation in the value chain, Kazakhstan may be able to compress the time required for innovative development. However, leapfrogging is unrealistic, and human resource development should be an integral part of promoting technologically sophisticated industries.

With its relatively small population benefiting from high oil revenues, Kazakhstan does not seem to have a comparative advantage in labor-intensive manufactures, especially against neighboring countries like China and Uzbekistan. Within the manufacturing sector, it would be wise to focus initially on those industries with a sufficient level of import-substituting demand to justify the construction of optimal-scale plants such as some chemicals and construction materials.

(2) Development of Sectoral Master Plans

A sectoral master plan would require much more than the sum of submitted investment projects. It must have infrastructure and human resource development in conjunction with sectoral development. Developing a sectoral master plan (based on synthesis) is very different from evaluating projects. A sectoral master plan requires a significant amount of time (1-2 years). This suggests that for the Innovative-Industrial Development Plan, the likely output at the end of this year would be a conceptual plan. Presumably, this conceptual plan will be developed into a full-fledged master plan in 2010.

A sectoral master plan may be organized as follows:

1) Current Situation Analysis

- brief history of the sector: how the sector developed under the Soviet Union, what has been done since independence, and how this legacy affects the current situation
- domestic and international market trends
- trade indicators: how the sector performs in terms of exports and imports (revealed comparative advantage, etc.) and how this trade performance has evolved in recent years
- level of technological development: how advanced is the sector's technological development relative to the world-class level, how much and how fast domestic absorption and assimilation of technology have taken place
- international production network: what place does the sector occupy in the international production network (value chain)
- comparative perspective: how the sector compares to its counterparts in other countries and what kinds of examples may be used as benchmarks

2) Policy Measures

- institutional reform: legislative and administrative measures
- human resource development
- infrastructure development
- spatial development (cluster formation, etc.)

3) Priority Projects

- selection rules (demand, supply, and other considerations): which project would provide a critical mass for the development of the targeted sector
- financing plan: how the project is going to be financed, what role the state should play to share risks
- investment partnership / joint venture: who would be a good investment partner for the project

(3) Evaluation of Project Proposals

The state should establish a project evaluation and support mechanism that will reduce the risk of a full-blown lobbying game and instead lead to performance-based reward.

1.3. Growth and Structural Change in Catch-Up Economies

1.3.1. Income Growth, Productivity Gap and Convergence

US per capita GDP grew at an annual average rate of 1.8% between 1870 and 1998. The major acceleration above the long-run trend was in the post-war golden age, 1950-73. Starting from the same level of productivity and per capita income as the US in the mid-19th century, Western Europe fell behind steadily to a level of barely half in 1950, and then began a rapid catch-up. Western Europe, Japan and the US were approaching equality of income by the later 1980s.

Since the early 1970s, growth has been slower: average growth rates of GDP per capita for much of the OECD countries were only half of the preceding period. This triggered widespread concern over the possibility of continued slow growth or even retardation in coming decades. There was a growing sense of insecurity and instability, alongside rising indicators of malaise such as unemployment.

Since the 1980s, there has been a new wave of interest in economic growth, catch-up and convergence. In the 1990s, a few OECD countries had seen acceleration in income growth, while other major economies have triggered. This divergence has caused renewed interests in

the main factors driving economic growth and policies that might influence it.

Table 1-1 | GDP per Capita, Benchmark Years (US = 100)

	1820	1870	1913	1950	1973	1990	1998
United States	100.0	100.0	100.0	100.0	100.0	100.0	100.0
12 West European Countries	101.0	85.3	69.6	52.4	72.9	72.6	68.6
Japan	53.2	30.1	26.2	20.1	68.5	80.9	74.7
Korea			16.8	8.1	17.0	37.5	44.5
8 Latin American Countries	56.7	30.2	30.2	28.2	29.2	23.5	23.1

The suspicion that persistent differences in economic growth across countries may have something to do with technology had been around for a long time. In spite of the massive and systematic exploitation of scientific discoveries and technological innovations, economists were unable to understand - or possibly just uninterested in - the sources of innovation. Since the mid-1980s, economists have, to some extent, addressed this gap.

Table 1-2 | Growth Rates of GDP per Capita (%)

	1820-1870	1870-1913	1913-1950	1950-1973	1973-1998
United States	1.34	1.82	1.61	2.45	1.99
12 West European Countries	1.00	1.33	0.83	3.93	1.75
Japan	0.19	1.48	0.89	8.05	2.34
Korea			-0.40	5.84	5.99
8 Latin American Countries	0.10	1.79	1.42	2.60	1.05

Source: Angus Maddison (2001), The World Economy: A Millennial Perspective, Development Center of the OECD: Paris.

In the 1980s, it became obvious that the neoclassical growth theory had little to offer in terms of policy advice. Even the new growth model has, due to its high level of abstraction, shortcomings for managers and policymakers confronting concrete problems: its assumption suppresses with rich complexity of real-world technological innovations.

The technology-gap theory recognize technological differences as the prime cause for differences in GDP per capita across countries, and argued that technology is embedded in organizational structures (firms, networks, institutions, etc.), and is difficult and costly to transfer from one setting to another. Technical change is analyzed as the outcome of innovation and learning activities in organizations, and interaction between these and their environment. The path-dependency of this process is often emphasized: country-specific factors influence the process of technological change, and thus give the technologies of different countries a distinct national flavor. Thus the concept of national innovation systems - each with its own specific dynamics - is used as an analytical device.

Empirical studies on technology-gap suggest that catch-up is very difficult and only countries with appropriate economic and institutional characteristics will succeed. Countries characterized by a large technological gap and a low social capability run the risk of being caught in a low-growth trap. As a country moves closer towards the technological frontier, indigenous technological capabilities become more and more important.

The catch-up literature is mostly descriptive with emphases on historical analysis. However, it has not been very successful in explaining why some societies are technologically more creative than others. The diversity of technological history is such that picking up regularities in this massive amount of qualitative and often uncertain and incomplete information is hazardous. Yet without it, the role of technology in history of economies will remain incomprehensible.

Economic growth can occur as the result of four distinct processes: increases in the capital-labor ratio, increases in trade, increases in the stock of human capital, and scale and size effects. These four forms of economic growth reinforce each other in many complex ways. Studies on technological change inevitably must move between an aggregate and the individual level of analysis. The economic historian is directed to the macro foundations of technological creativity, that is what kind of social environment makes individuals innovative; what kind of institutions create an economy that encourages technological creativity.

For a society to be technologically creative, many diverse conditions have to be satisfied simultaneously. There must be a cadre of ingenuous and resourceful innovators. Socioeconomic institutions have to encourage potential innovators. Innovation requires diversity and tolerance: in every society there are stabilizing forces that protect the status quo. Some of these forces protect entrenched vested interests that might incur losses if innovations were introduced.

The technology stalemate perspective accord with the long-wave hypothesis - the exhaustion of technological styles in the later phases of long-waves: the diffusion of ICT remained limited across sectors of the economy; their full impact will come when they became pervasive in their adoption across a wide range of user industries. It seems likely that there will be high R&D costs and only limited economic payoffs in such an area for a considerable time to come, though the long-term payoffs are prospectively massive.

1.3.2. Growth and Export Specialization

There was a general tendency for OECD countries to de-specialize in terms of export specialization over the period from 1965 to 1992. There was no particular industrial structure conductive to growth. Certainly high-tech sectors were high growth sectors. However, many low- and medium-tech sectors were also among the high growth sectors.

The OECD catching up countries (Japan, Italy, Spain, Finland, Ireland, Portugal, Greece,

Turkey, etc.) on average experienced the highest degree of structural change in their specialization patterns.

Low- and medium-tech sectors are among the highest in terms of employment and output and thus contribute strongly to overall growth. Low-tech sectors are often highly innovative, and this is because they are knowledge-intensive from a systemic perspective.

The knowledge bases of apparently low - and medium-tech industries such as textiles, food-processing, chemicals, oil and gas, and so on, are in fact complex, science-based and above all systemic (in the sense of involving complex and sustained institutional interactions).

The policy point of this is that policy-makers ought to be aware of the industrial structures - and the associated technological bases - on which growth actually rests, which requires a deeper understanding of the specificity of innovation systems.

As for the determinants of the direction of trade specialization, the importance of advanced users in home markets as an inducement to technological innovation is well recognized. In this context, support for upstream-downstream interaction could be more effective in influencing trade specialization towards a higher technology level than support for corporate R&D. (The determinants of trade specialization are sector-specific, but certain regularities can be identified in terms of sectors being governed by certain technological regimes, which transcend traditional sector boundaries.)

Either cumulative character of technological change or inter-sector linkages (home market effects) explain the trade specialization. Inter-sector linkages were important for specialized-suppliers as well as scale-intensive sectors, while, in science-based industries, the most important determinant was own sector technological efforts and linkages tend to be horizontal rather than vertical.

Structural change (change in specialization patterns) is an integral part of economic development processes. The growth of market shares at the country level is related to the ability of countries to transform their specialization patterns towards fast-growing sectors, which are in general high-tech sectors. The reaction speed of specialization patterns, however, might be too low to allow for an active policy.

Policy makers must be prepared to aim at a high degree of interaction between their various instruments, as well as be willing to risk unsuccessful attempts, and admit these in an early enough stage. Enhancing growth by steering specialization patterns seems a quite risky art rather than a well-established science.

It might be too late to catch up in a fast growing sector, if no technological competence is

present at all. From the perspective of a policy-maker, it is probably wise to support research on small scale in new areas, in order to monitor the new areas, but also in order to support/secure a minimum of technological competence.

Countries must change their level of human capital as well as their production structure as they catch up, in order to catch technology spillovers from the leading countries.

The reason why low-tech sectors play a prominent role in the distribution of growth among sectors is not because innovation is unimportant to growth, but rather because these sectors are on the contrary highly innovative. Innovation involves learning and the creation of knowledge; it involves the creation of novelty in the various aspects of competence related to product and process development and implementation. Basic results flow into these sectors in indirect ways, through capital equipment, the services of other firms, or services provided by the science and technology infrastructure.

Industrial knowledge bases are institutionally distributed. Industries apparently low-tech can in fact be intensive users of high-grade scientific knowledge. Flows of knowledge between industries or institutions take two forms, disembodied and embodied spillovers. The latter involve knowledge built in machinery and equipment. The former involve the use of knowledge, transmitted through scientific and technical literature, education systems, consultancy, movement of personnel, and so on.

Most research-intensive industries develop products that are used in other industries as materials, components, machines or equipments. Improved performance in one firm or industry thus shows up as productivity or quality improvements in another.

Competition leads directly to the inter-industry diffusion of technology. The receiving industries must develop the skills and competence to use advanced knowledge-based technologies. The disembodied flows and spillovers are also significant. Underlying such technologies is advanced research-based knowledge. A wide range of back-ground knowledge, often developed in universities, flows into industries.

1.3.3. Innovation in Technology Followers

The technological frontier is defined by technology leaders; technology followers are primarily concerned with the development of new products to move up the value-chain of global markets. R&D in technology-followers rarely involves research aimed at generating new technological or scientific knowledge. However, the tacit dimension and dynamic nature of technology require considerable innovation on the part of the technology followers to keep up with the technology frontier.

Technology-leader countries collectively define the technology frontier at any point in time, and move it forward. Successful innovations in technology-leader countries define the new technology frontier that is commercially correct. Technology-follower countries may be far, near, or even at the technology frontier for particular industries, but are generally not involved in pushing it forward.

Firms in technology-follower countries usually approach the frontier through transfer from technology-leader countries, but this requires indigenous technology learning capability. As the technology frontier is constantly moving, if a follower fails to progress technologically at more than the speed of the leader, it will not catch up.

Entry into global markets that allows for sustained income growth requires an understanding of dynamic factors in the whole value chain. Participation in global markets reflects the strategic decision of leader-firms in the value chains. Value chain analysis helps in understanding the need and scope for systemic competitiveness.

Efficiency in production is only a necessary condition for successfully penetrating global markets. The analysis and identification of core competence will lead the firm outsource those functions where it has no distinctive competence. With the growing division of labor and the global dispersion of components manufacturing, systemic competitiveness has become increasingly important. Value chain analysis considers not just the efficiency of production link in the chain, but also factors that determine the participation of particular groups of producers in final markets. It treats the whole cycle of production, including governance of connectedness to final markets. That is, it helps in understanding the advantages and disadvantages of firms and countries specializing in production rather than services, and why the way in which producers are connected to final markets may influence their ability to gain from participating in global markets.

Value chain analysis helps to explain the distribution of benefits to those participating in the global economy. The key policy issue is not whether to participate in global markets, but to do so in a way that provides for sustainable income growth. If firms, sectors and countries continue to specialize in highly competitive markets, they will be increasingly subject to the erosion of their returns due to falling terms of trade, which is increasingly to be found in the export of manufactures. The decline in the terms of trade for less developed country (LDC) exports has been significant, particularly since China's entry into global markets in the mid-1980s. In many LDCs, there has been increasing economic activity (more output and more employment) but at the same time falling economic returns.

Participating in global markets that allows for sustained income growth requires the capacity to learn and upgrade. The value chains is an important construct for understanding the distribution of returns arising from design, production, marketing, coordination and recycling.

Essentially, the primary returns accrue to those parties who are able to protect themselves from competition. This ability to insulate activities can be encapsulated by the concept of rent, which arises from the possession of scarce attributes and involves barriers to entry. The primary rents in the chain of production are increasingly to be found in areas outside of production, such as design, branding and marketing. Yet, even within production some activities involve greater barriers to entry. The pervasive trend is towards control over disembodied activities in the value chain.

Economic rents take various forms in a firm, including technology rents (command over scarce technologies), organizational rents (superior forms of internal organ-ization), human resource rents (access to better skills than competitors) and marketing rents (better marketing capabilities, valuable brand names). This cluster of attributes is often discussed in relation to dynamic capabilities and core competence in the literature. Economic rents may arise from purposeful activities taking place between groups of firms - these are referred to as relational rents.

Economic rents have become increasingly important since the growth of differentiated products after the 1970s. Economic rent is dynamic in nature, eroded by the forces of competition after which it is then transferred into consumer surplus in the form of lower prices and/or higher quality. The competitive process - the search for new combinations to create scarcity and the subsequent bidding away of this economic rent by competitors - fuels the innovation process, which derives capitalism forward.

Value chains imply repetitiveness of linkage interactions. Governance insures that inter-actions between firms along a value chain exhibit some reflection of organization. Power asymmetry is central to value chain governance - there are key actors in the chain who take responsibility for the inter-firm division of labor, and for the capacities of particular participants to upgrade their activities.

1.3.4. Globalization and Developing Countries

Technological change and deregulation have given rise to global markets. Transnational Corporations (TNCs) have penetrated global markets and integrated their world-wide operations, which are both broadening and deepening the economic interdependence of nations. Trade and technology transaction takes place more and more within TNCs rather than in the market (more through the sales of their affiliates than through direct exports). TNCs are locationally responsive to differences in national conditions, and relocations are becoming more strategically motivated, focusing on particular functions.

Governments compete with each other to attract and retain higher value-added activities of TNCs. An increasing number of developing countries are actively participating in globalization.

However, not all countries are benefiting equally. Sustainable development requires the ability to conform to high standards for domestic policies and institutional practices and the ability to upgrade from labor-based FDI to skill-and-technology-based FDI through the building of technological capabilities.

Activities of a TNC are potentially mobile or contestable by other affiliates in different local settings. These activities include technology-intensive activities, such as research, development, and design. Competitive processes can be led by the parent company or initiated by affiliates. Intra-TNC competition may lead to incremental development at individual affiliate operations. The gaining of regional product mandates is not simply a result of parent company decisions but can involve considerable affiliate initiative.

Such affiliate initiative has been classified into attempts to defend, retain, and build local domains within global parent company organizations. Of particular interest is the entrepreneurial (or subversive) behavior of affiliate managers as they seek to contest their affiliates' position and status within established parent company hierarchies.

Recently, there has been a shift from the push of parent-led competition among affiliates towards the pull of host country affiliate initiative, coupled with increased efforts by national institutions to embed TNC affiliates. National policy stances toward inward investment provide the context for more specific localized efforts at aftercare and the embedding of TNCs.

Local initiatives include policies aimed at the development of specific local labor skills, local suppliers, and technology transfer opportunities between universities and industry. Support for the entrepreneurial or subversive activities of local affiliate management through fact-finding and lobbying at the parent appears to be an increasingly important aspect of the aftercare of overseas companies in host economy settings.

An important aspect of different affiliate roles is their variable indirect developmental effect through external linkages with host economies. The main benefits to local economies are related to different types of intra-TNC competition. It is the tangible and intangible, direct and indirect benefits associated with winning new mandates or capabilities that may produce long-term economic development, and these are the most sought after by the institutions of host economies. Mandates are relatively immobile since the development of capabilities entails considerable sunk costs associated with accumulated labor skills, management practices, and the like.

Parent-led open competition is most closely associated with the branch plant, where internal economy of TNCs precludes viable local external linkages. Intermediate products and services are the most mobile and contestable by a wide range of affiliates, since they can often be uncoupled from vertically related production processes, and since the location decision is one

that often centers on cost reduction. Although the winning of component responsibilities can lead to jobs and even the prospect of increased skill content of work at affiliates, these benefits may be short-lived. Activities won solely on the basis of relative labor and other costs can be the subject of intense competition among affiliates, benchmarking, and deliberate strategies of location switching by parent companies

At the other extreme, affiliates may seek out important local external linkages to contribute to competitive processes they themselves have initiated. The desire of parent companies to exploit competitive advantages drawn from diverse local settings means that new and repeated investments by TNCs now involve bargaining not just over direct financial incentives but also incentives in kind.

A key role for R&D in technology-followers is to build independent design capability for the firm. Moving up the value chain to more attractive markets depends on the capability to develop proprietary product-designs, which requires formal R&D effort. Some technology-follower firms from NICs made a transition from original equipment manufacturers (OEM) to original design manufacturers (ODM), to original brand manufacturers (OBM). Such move involved substantive learning and competence building.

In technology-followers, in-house R&D team play a crucial role as the firm's formal learning unit of knowledge produced elsewhere; it can have intangible spin-off benefits for the rest of the organization. R&D unit can perform the role of gatekeeper to plug into external reservoir of knowledge. The knowledge is usually highly specialized, requiring advanced training to understand it. Any R&D function grouping usually contains a high concentration of more qualified people, making them suited to carry out a role of gatekeeper.

1.3.5. Technology Policy in Catch-up economies

In the catching-up process, R&D can play dual roles for firms: innovation and learning. The combination of technology acquisition and learning and the sequence that runs from imitation to creativity are two sides of the same process. Efforts to imitate depend on internal capabilities: initial stage of development and the catching-up process depend on absorptive capability. To monitor knowledge developed elsewhere, firms invest in basic research (an entry ticket for a network of technological and scientific information). Internal capabilities are prerequisite to imitate and absorb knowledge from advanced countries.

During the initial phases of development, scientific institutions are necessary mainly for the learning side of innovative process. The necessity of scientific institutions to support learning processes and diffusion of technologies is greater now, since the technological paradigms are more science-based than those in the past, and current technology depends more heavily on science. Over time, as a country develops, the mix between the learning and innovation faces of

the R&D process changes. Beyond their key role as supporting the absorptive capability, the scientific institutions have other important contributions for development.

Indigenous process of technical advance has not always been seen as the key policy problem by those most directly concerned with technology policy to support industrialization. The central technology policy issue has often been seen in terms of questions like: how to create a structure of local R&D institutions and how to ensure that those institutions are actually used after they have been created. These questions are far from being the same as the question of how to achieve and sustain indigenously driven processes of rapid technical change. The problem at the heart of the key issue is not simply about investment in R&D to create new knowledge. Instead it is about investment in creating the whole spectrum of human and institutional resources for generating and managing technical change. Over time, the focus of policy attention shifts from supply side to user-side, and the issues of how to link the two.

The issue of human capital development is coming to receive increased attention. However, the specific aspect of that issue which is emphasized here (the development of change-generating human capital in industry) requires two fundamental changes in conventional perspectives on human resource development. 1) The issue should not be seen simply in terms of strengthening education and training institutions like universities, technical colleges, training institutions etc. 2) The significance of explicit investment in these human capital assets need to be given much greater prominence.

The role of education and training institutions is important, but just as important is the role of industrial firms. The issue is not just about human resource development for industry. It is about human resource development by industry. It is striking, for instance that, just as industrial firms in the developed countries are intensifying their investment in creating new knowledge by R&D, they also appear to be intensifying their training and learning efforts to accumulate existing knowledge and expertise embodied in their managers, engineers and operatives.

Relatively costless forms of learning-by-doing obviously remain important; but, as the underlying knowledge-intensity of industrial production rises, more deliberate and costly forms of investment in change-generating skills and experience also become more important. Policy research therefore needs to generate new understandings about how investment in these kinds of industrial human capital can be massively increased and undertaken more effectively.

We are concerned with understanding complex evolutionary process in which the dynamic technological behavior of firms interacts with change in their economic environment. At the same time, we are concerned with the ways in which other kinds of institutions such as R&D organizations change their roles and structures over time in response to changing pressures and incentives.

1.4. Economic Growth and Innovation System

1.4.1. The Notion of Innovation System

Innovation systems encompass the economic, social, political, organizational, and institutional elements that influence the development and diffusion of innovations. Innovation is no longer seen primarily as a linear process but rather as a non-linear process of interactive learning, which occurs in specific institutional contexts. The focus on interactive learning evokes the important role of economic structures and institutional setting in determining the rate and direction of innovative activities. An innovation system undergoes transformation through the co-evolution of its elements.

From the perspective of evolutionary theory, the economic growth experienced over the past two centuries needs to be understood as the result of the progressive introduction of new technologies that were associated with increasingly higher levels of worker productivity and the ability to produce new or improved goods and services.

The huge divergence in long-term growth rates over the past two centuries must be attributed largely to the presence or absence of social capability for institutional change, and especially for those types of institutional change that facilitate and stimulate a high rate of technical change.

Different eras were driven by the particular clusters of technologies, and the institutional structures needed to exploit and support these clusters varied significantly. The advance of technologies played the leading role, and institutions enabled the implementation of technologies.

The recent literature on national systems of innovation can be described as an attempt to come to terms more systematically with these problems of social capability for technical change.

1.4.2. Innovation Research and Policy learning

The development of the notion of innovation system has largely been the work of the non-orthodox economists active in the development of evolutionary growth theory, who have been motivated by the perception that neoclassical growth theory is totally inadequate in its treatment of technological advance.

The analysis of economic development must take into account the process of innovation. Neo-classical perspective is less adequate for the analysis of the innovation process. The

intention behind the concept of innovation system is to change the analytical perspective from allocation to innovation and from decision-making to learning.

It would not be reasonable to understand the process of innovation and learning without bringing fundamental uncertainty into the analysis. Focusing on the problems of optimal allocation, neoclassical economics assume that the agents already knew everything that can be learnt in advance, and that innovators know all possible outcomes of the process of innovation.

Certain aspects of the innovation process have been approached from a neoclassical perspective of rational choice (selection of R&D projects, allocation of R&D resources as a process of rational choice). Transcending the limits of the neoclassical paradigm, however, requires that the analytical perspective should combine innovation and learning.

The innovation system approach is critical to derived dogmas about the general superiority of pure markets, reflecting the assumption that innovation is rooted in processes of interactive learning and that interactive learning does not thrive in pure markets. The focus on interactive learning evokes the important role of economic structures and institutions in determining the rate and direction of innovative activities.

The innovation system approach gained ground as empirical findings through the 1970s and 1980s revealed that innovations reflect a process where feedback from the market and knowledge inputs from users interact with knowledge creation and entrepreneurial initiatives. Such relationships and interactions among the agents involved non-market relationships, and were presented as organized markets with elements of power, trust and loyalty. Different national contexts offered disparate possibilities for establishing such organized markets.

In innovation system approaches, the main reason for differences in performance between national systems may be that the degree of mismatch between economic structure and institutions differ among countries. The interdependence between economic structure and institution is one reason why it is meaningful to apply the system perspective. Institutions may be rooted far back in social history and they might be slow to adapt to the change in economic structure. Therefore, a complete matching does not appear and this affects the performance of innovation systems.

The links between innovation theory and innovation policy have been part of an evolutionary learning process, beginning with crises associated with stagflation and the oil shocks of the 1970s. This created a niche that permitted the development of a set of diverse and non-orthodox ideas. These pertain not only to the nature and determinants of innovation itself, but wider problems of institutional mismatches locking up the economic potential for radical technical change.

Theory and policy learning can be seen as an integrated, co-evolving and interactive process. There is a close connection between the development of innovation theory, since the late 1970s, and the evolution of innovation policy ideas, primarily in the 1990s. The economic crisis of the 1970s created an opening for rival analyses of events. The theory-policy link has been central to the intellectual development that would have been impossible within the constraints of existing disciplinary structures. The analytical achievements have permitted a wide expansion in the conceptualization of policy targets and in the design of instruments available to policy-makers.

During the 1980s, the development of evolutionary theories and of empirically based theories of the innovation process created a framework in which policy agencies could consider heterodox ideas concerning objectives and instruments of public policy. By the early 1990s policy-makers, particularly in Europe, came to see research and technology development (RTD) and innovation policies not just as important arenas of action in themselves, but as instruments towards more wide ranging policy objectives.

The policy agencies involved were characterized by relatively open structures permitting a degree of intellectual diversity: the OECD and the European Commission (EC) played a central role, whereas the World Bank did not. Growing policy interest stimulated a second phase of research in the 1990s, sponsored both nationally and by various EU programs, in which expanding the innovation-oriented knowledge base became a significant objective for policy-makers.

There has been a significant change within innovation-related policy arenas during the last 20 years. In terms of objectives, innovation policy has become a central instrument for achieving outcomes that lie well beyond the field of RTD or innovation. The concepts and instruments of policy have also shifted, with non-linear models of innovation and the innovation system concept playing a central role in policy discourse, and with a wide range of new policy instruments directed at networking, clustering, and personnel mobility. This complex process of change can best be understood as policy learning.

The innovation system approach helps understand economic dynamics and socio-economic development. Economic performance may reflect more or less dynamic capabilities. Three levels of dynamism have an impact on wealth creation: neoclassical dynamics (the capacity utilization, allocation and reallocation of given resources are important for wealth creation); Schumpeterian dynamics (the introduction and diffusion of innovations and the introduction and growth of new industries on the basis of a given set of competencies); and learning economy dynamics (major outcomes of investment in knowledge production or of learning processes is the creation of new competencies, which may determine performance in the very long run).

In more stable sectors and technologies such as construction, transport and retailing, neo-classical dynamics may be most relevant, while in the most dynamic sectors such as software

and knowledge intensive business services the creation of new competencies are crucial for performance. National systems may be more or less prone to support these different kinds of dynamics.

The Japanese model (cross-ownership, long-term employment, and supplier contracts) promoted Schumpeterian and learning economy dynamics in a more stable context. The present US success in high-tech seems to reflect the combination of institutions that are more successful in a context of accelerating rates of change (high mobility in labor markets and venture capital).

Firms are confronted with an increasing transformation pressure reflecting the combined impact of accelerating technological changes and the entrance of new competitors at the global level. This transformation pressure gives a premium to organizations capable of renewing their competencies.

For firms in the exposed sectors, the alternatives are either to move to a lower cost region and close down or to enhance its competence building capacity. The latter can be done by building competence in house, by hiring competent personnel in the labor market, or by entering into closer and more intense and close network relationships. This indicates that system approaches to the performance of national economies need to focus not only on network relationships but also on education and training, the dynamics in the labor market, and the diffusion of new forms of learning organization.

From a cognitive perspective, the firm is conceptualized as an organism (a cognitive system) that is able to acquire, develop and accumulate knowledge, which is absorbed by the firm and embedded in technologies, individual capabilities, and organizational routines, and then valorized in terms of firm competencies.

Organizational learning is interpreted as a process of development and acquisition of new knowledge necessary for solving organizational, manufacturing and marketing problems and creating platforms for the development of new ideas.

Innovation in innovation policy is not easily accomplished: it usually requires significant investment of economic, social, and political capital; it will frequently encounter barriers and opposition from vested interests; and it is a risky process that does not always lead to desired outcomes. Despite these difficulties, efforts to modernize innovation institutions and policies continue. Such efforts are accelerating, even though success remains elusive.

There are substantial downside costs not to stimulating change, not only limited to the expenses of maintaining outmoded institutions but also in broader terms of opportunities foregone. If innovation in innovation policy is to be fruitful, it needs to be accompanied not only by a tolerance for risk and flexibility, but also by considered assessment, reflection and

learning through discursive process of evaluation, comparison and contrast.

1.4.3. Rationale for S&T Policy, Research Funding and Policy Evaluation

Technology foresight is defined as systematic attempts to look into the long-term future of science, technology, economy and society with a view to identifying emerging generic technologies likely to yield the greatest economic and/or social benefits.

The primary rationale is the widespread recognition that emerging generic technologies are likely to have a revolutionary impact on industry, economy, society and the environment over coming decades. If identifying at an early stage, governments and others can target resources on the strategic research areas needed to ensure rapid and effective development.

With research costs rising and scientific opportunities expanding, research priorities have to be selected. Technology foresight has a different philosophical starting-point from that of traditional forecasting (in unsystematic extrapolative manner), and attempts to devise a more systematic procedure for research priority setting.

Technology foresight exercises need to be carried out at several levels, ranging from bodies responsible for the coordination of overall national S&T policy down to individual firms or research organizations. Some foresight exercises need to be holistic in scope, others more micro-level. The foresight activities at different levels should be fully integrated.

Successful foresight involves counter-balancing intrinsic tensions: a balance between technology push and demand-pull; a balance between top-down and bottom-up approaches; allocation of responsibility for foresight among interested parties and a neutral third party (in funding, performing research, and exploiting the results).

Successful foresight depends on involving a wide variety of people. This aspect can be summarized as “the 5 Cs”- Communication, Concentration, Coordination, Consensus and Commitment.

Public/private partnerships reduce the risk of government failures that result from “picking winners” through traditional R&D subsidization schemes. Public/private partnerships entail the competitive selection of participants and greater influence from the private sector in project selection and management, helping ensure that the best participants and projects are targeted.

Collaboration between public research and industry has been characteristics of the German research system since the 19th century. In post-war Japan, participants have been an integral part of large government-sponsored industrial technology programs. By the early 1980s, the

success of Japanese collaborative R&D and growing competition in global technology markets led to a paradigm shift in the United States, with public/private partnerships becoming a key component of federal technology policy and a tool for improving national competitiveness.

A high rate of complementary public and private investment in R&D is a pre-requisite for sustained innovation performance, and ensuring such complementarity requires governments to be responsive to the rapid transformation of innovation processes and related business needs and strategies.

A well-functioning of science-industry interface is necessary to reap broader economic and social benefits from investment in public research, but also contributes to the validity and quality of the science system itself.

There are various types of innovation partnerships between private and public actors, including general research support, informal collaborations, contract research, training schemes, cluster formation, human resource development, etc. In particular, US Manufacturing Extension Partnership (MEP) programs provide SMEs with broad-based partnerships with tailored support to different types.

*** Best-practice Evaluation Principle**

Basic Rational, Objectives and Criteria for Evaluation:
Establish a realistic hierarchy of objectives, so as to allow quantitative ex-post assessment of their attainment whenever possible;
Clearly establish the economic rationale for the intervention and use it in the evaluation; carefully balance market and systemic failures against potential government failures;
Identify and attempt to measure the additionality implied by the policy intervention;
Coverage of Evaluations and Use of Different Tools and Methods:
Evaluate as broadly as possible all existing innovation and technology policies;
Attempt “portfolio” evaluations;
Develop the use of quantitative techniques where appropriate;
Combine results of quantitative and qualitative techniques when interpreting results;
Conduct of Evaluations and Institutional Setting:
Design the evaluation together with the program to be evaluated;
Ensure that evaluations are user-driven;
Formulate guidelines and a “code of conduct” for evaluations, ensuring their independence;
Ensure feedback and learning by establishing a requirement for responding to evaluations.

1.4.4. The Public Science System

During the second half of the 20th century, advanced countries made unparalleled public

investment in exploring what Bush termed the endless frontier. However, the consensus supporting public investment in science began to fray since the early 1980s. The decline of belief in three fundamental principles has been central to the unraveling of the consensus.

There remain only a few fundamental rationales for public science: 1) supporting social needs such as health care and safeguarding of the environment, 2) supporting domestic industrial competitiveness by supporting the generation of knowledge for eventual commercialization, and 3) supporting advanced scientific training.

The governance models used in other contexts have been extended to science, which are likely to have mischievous and unintended effects.

The progress of science and the advance of technology become complementary. Technological knowledge is not likely to be a public good. The asymmetry in access between scientific and technological knowledge provides a motive for linking scientific and technological research efforts and institutions, which suggests an alternative model for science system based on a network of distributed scientific knowledge.

Some parts of the network may function effectively by employing traditional social norms of open science. Other parts of the network may require the negotiation of exchange. The negotiated access part is further subject to scientific network failure, missing of nodes or transfer agents that might bridge those parts that do not regularly interact.

The network of distributed scientific knowledge is a new mode for the operation of the public science system and it is in the process of displacing the traditional system in which universities and public research institutes held a favored position.

Corporations are seeking wider and more effective access to a broader range of scientific and technological knowledge. Achieving this access may require active participation in scientific networks to acquire better absorptive capacity for new knowledge.

The role of the public science system in supporting the growth of new industries with radically innovative technologies has varied between countries. Two characteristics of public science system - different levels of reputational competition and intellectual pluralism and flexibility - account for continuing differences in the rate at which public science system produce highly novel intellectual innovation and deal with a variety of problems. They help to explain 1) Significant differences in the degree to which research is coordinated across universities and similar organizations to solve common problems, and 2) The ease with which new intellectual goals and approaches are developed and incorporated into research programs to deal with new kinds of problems.

These characteristics are in turn affected by four major features of the institutional frameworks governing the production of public formal knowledge in different countries: 1) the extent of state delegation of employment and resources control to scientific elite; 2) concentration of intellectual and administrative control within research organizations; 3) the stability and strength of the hierarchy of research organization; and 4) organizational segmentation of research goals and labor markets.

1.4.5. Sub-National Systems of Innovation

The notion of sectoral innovation system (SIS) provides the multi-dimensional, integrated and dynamic view of sectors, which relates to the industry life-cycle literature and broader analyses of long-term evolution of industries as well as the innovation system approach and the evolutionary theory. It provides decision-makers with a taxonomy that may help them to avoid the trap of generalizing policies without taking sector specificities into account.

Sectors differ in terms of knowledge base and learning process. Knowledge does not diffuse automatically and freely among firms, and it has to be absorbed by firms through their differential abilities accumulated over time.

Accessibility, technological opportunity and cumulativeness are key dimensions of knowledge that related to the notion of technological and learning regime, which provides a description of the knowledge environment in which firms operate, and which is composed by opportunity and appropriability conditions. (Greater accessibility implies low appropriability. High cumulativeness implies a mechanism leading to high appropriability of innovations.)

Technological regimes characterized by high opportunity conditions are expected to show patterns of innovation characterized by remarkable turbulence in terms of technological entry and exit and a high instability in the hierarchies of firms. High degrees of appropriability are likely to result in a relatively higher level of industrial concentration.

Technological regimes and patterns of innovation change over time. Early in the history of an industry, uncertainty is very high, barriers to entry are very low, new firms are the major innovators and are the key elements in industrial dynamics. When the industry develops and eventually matures and technological changes follow well-defined trajectories, economies of scale, learning curves, barriers to entry and financial resources become important in the competitive process: and thus large firms with monopolistic power come to the forefront of the innovation process.

Empirical evidence suggests the existence of differences across sectors in the patterns of innovative activities and of similarities across countries in the patterns of innovative activities for each sector. This result provides support for the relevance of technological regimes in

determining invariance in sectoral innovation patterns across countries.

The specificities of technological regimes and the knowledge base provide a powerful restrictions on the patterns of firms' learning, competencies, behavior and organization of innovative and production activities in a sectoral system. Case studies in the managerial and economic history literature shed light on this aspect.

The innovation system approach has been diversified by studies that recognized the evolution of autonomous systems of innovation at the local, the regional, the continental, and the global level. The dominance of national institutions is called into question, as institutions at territorial levels below and beyond the nation-states become increasingly important for innovative processes. Functions of the NIS became part of a multi-level governance system. A multi-level approach directs on the dynamic reconfiguration of NIS towards the sub-national as well as international level.

Tensions for NIS arise from globalization and regionalization, resulting first of all from increasing cross-border technological alliances of MNCs: nationally based innovation systems turn into open systems. The internationalization of corporate R&D rests on 2 main factors: the search for specialized regional centers of excellence in key technological areas, and their presence on lead markets.

In recent years, much more attention has been paid to the concept of regional innovation system (RIS). The concept of RIS is based on the assumption that the regional level can play a balancing role in the age of growing globalization. The NIS cannot function well without RIS in respect of the enterprise and innovation support infrastructure, specialized human capital, leading edge basic and applied research, and the varieties of network relationships that function most effectively in the relatively close proximity of regional clusters.

Specific regional or local characteristics and structural patterns exist, which have a deep impact on the competitiveness of regions: RIS on the level of sub-national units, such as German Länder or the US federal states.

Some sectors or clusters interact with the regional governance and innovation support infrastructures as well as the national and global levels. The RIS approach tries to explain how and what extent the institutional and cultural environment of a region support or obstructs innovation.

The formal NSI allocates R&D funding to and interacts regularly with a handful of large corporations. Italian innovation occurs, with sub-national variation, in sub-national and often local clusters of highly interactive small and medium-sized enterprises (SMEs), which are not effectively touched by the NIS. Systemic innovation is appropriately sought at the regional (and

even sub-regional) level as well as at the national and global levels.

Small countries are incapable of investing public research budgets over a wide range of technological areas and possessing relatively few large corporations, therefore having to be selective about areas of innovative strength and well organized to monitor and absorb valuable innovations from elsewhere.

1.4.6. Cluster-based Innovation Policies

In practice, the cluster approach has proven to be a useful framework for developing and applying new forms of governance, moving away from direct intervention towards forms of indirect inducement.

Clusters reflect the systemic character of modern innovation; innovation increasingly depends on interaction among independent firms as well as other knowledge institutes, based on trade linkages, innovation linkages, knowledge flows or the sharing of common knowledge base. The cluster perspective offers useful insights into how these linkages and interdependencies are shaped, how they evolve over time and how they affect innovation, and defines the scope for policy actions.

The cluster approach provides a robust organizing framework for addressing or removing systemic imperfections in the functioning of innovation systems.

It focuses on facilitating networks and creating the institutional setting that provides incentives for market-induced cluster formation and for the revitalization of existing clusters. Policy makers can use the cluster approach as a tool for identifying those actions that are most needed to overcome barriers to innovation and to customize these actions to a specific cluster.

Cluster policy fits neatly with the idea of a learning economy, creating territorial institutions and/or mechanisms to facilitate business-led interactive learning. Cluster policy seeks only to augment firms' strategies by encouraging them to collectively solve problems. The process of clustering is driven by market, leaving only limited scope for government involvement.

In applying academic conceptions of clustering to the design and implementation of policies, there is a degree of uncertainty with respect to the development of the policy at each stage of cluster policy cycle. In the process of cluster policy development, a hypothetical solution to a perceived problem is realized and evaluated. Cluster policies evolve over time, and lessons learned are carried forward into successive innovation policy generations.

The first stage of cluster policy process is the decision to use a cluster policy and the debate on the state role (e.g. direct intervention, research funding, collaboration facilitating), which

directs the set of policy tools.

The second stage is the selection and designation of clusters. The cluster policy enters a more technocratic phase from strategy formulation to program delivery. Willing participants in the cluster are identified; aims and targets for the cluster determined; and then actions are planned and delivered.

The designation of clusters is a highly politicized process, often heavily dependent on the prior existence of interest groups that press government to support particular sector. It is in the interests of effective public administration that the selection procedure is transparent. However, because the benefits of clusters are not wholly measurable, they are not always amenable to quantitative analyses. It is likely that there will be a mix of minimum qualifying standards (such as size and strategic importance) alongside more opportunistic and political factors. In tandem with the identification of clusters, it is necessary for governments to take a number of political decisions about what support will be given to those clusters.

Cluster policy is often implemented with the intention of joining up existing policies, and the choice of tools is limited by established governmental practices. Policy innovation is a prerequisite for the introduction of successful cluster policies

Finally there is an evaluation and reporting-back stage, where lessons are learned, and the possibilities of subsequent policy phases are evaluated. The policy finally re-emerges into the political sphere, where its appropriateness and efficiency as a policy measure can be democratically debated, and decisions taken over the future of cluster policies.

In Korea, except for the internal relations within the business group and the relations between the parent companies and their suppliers, firms were not used to the idea of cooperation. Mainly due to the high dependence on imported technology, Korean industry had been organized into separate firms dealing with each other at arm’s length.

Large corporations, which have been and will be the technological leader in network collaboration, have a reputation of behaving in a predatory manner towards smaller firms. Compared with advanced countries, innovative SMEs are relatively small in number, and their innovative capacities are significantly weaker. For the majority of SMEs, R&D activities are much less planned and formalized, and technological innovation is of lesser importance in their competitive and market strategies than qualities such as short delivery times and flexibility in adapting to special requests from customers.

Korean institutional frameworks are also less supportive than in advanced countries. There is clearly a significant difference between Korea and industrialized countries in the amount of support for both innovation in general and collaboration in particular. Only recently, Korean

Table 1-3 | Cluster-based Innovation Policies

Systemic and market failures	Policy responses
Inefficient functioning of markets	Competition policy and regulatory reform
Information failures	Technology foresight Strategic market information and strategic cluster studies
Limited interaction between Actors in innovation systems	Broker and networking agencies and schemes. Providing platforms for constructive dialogue. Facilitating co-operation in networks
Institutional mismatches between Knowledge infrastructure and Market needs	Joint industry-research centers of excellence Facilitating joint industry-research co-operation Human capital investment Technology transfer programs
Missing demanding customers	Public procurement policy Attracting FDI
Government failures	Privatization / Reducing government interference Bottom-up policy making and implementation

Source: OECD, Boosting Innovation: The Cluster Approach, 1999.

firms become aware that, in order to acquire and develop the next generation of generic technologies, the development of strategic alliances and partner-ships among themselves as well as with foreign firms becomes a key strategic issue.

More recently, large firms are aware of the opportunities presented by SMEs with technical competence, and technology-based SMEs also recognize the advantage that comes from interacting with the research division of large corporations in order to gain user expertise on site. The relationship between large companies and their suppliers is also undergoing a fundamental transformation. Large companies recognize that the competitiveness of final products cannot maintained without the engineering and innovation capability of parts and components suppliers.

In recent years, the number of innovative SMEs increases rapidly, and their technical competencies are also improved considerably. The growth and performance of SMEs depend largely on whether they are traditional businesses or new technology-based firms with higher R&D capabilities. However, dynamic changes have been identified which occur even within the traditional businesses.

Korean manufacturing SMEs, however, have not yet turned to more or less formally organized networks in order to obtain the scientific and technological information. The lack of innovation capability in SMEs is probably the major reason for this phenomenon.

In almost all branches of the manufacturing industry, only a few Korean SMEs opt for a strategy of systematic change or adaptation to new technologies. Sheltered from domestic competition with large firms as well as international competition, the majority of SMEs were

not interested in network collaboration. Only a few SMEs that really have a competition strategy might want to use the network other than very occasionally. That is, the number of SMEs having innovation capability has been too small to build up more or less formally organized networks.

The effectiveness of network patently depends on the numbers, quality and diversity of its participants, on the relations they establish in order to foster synergy, and on the links with other networks which can supply additional or more specialized information when required. Even if such networks were to be established, its effectiveness could not be expected to be comparable with those found in industrialized countries.

The effectiveness of network depends on the participation and the quality of the persons who produce and have access to the most uptodate and useful information, on the time devoted by the owner/director, and on the density of the interactions among participants and the range of their specialization. For each SME, network complexity, and thus its effectiveness, depends on the effort put into building up the network and, above all, fitting into it. SMEs conducting their own R&D attach great importance to the availability of different organized information sources; they fit more easily into dynamic complex networks; and make more use of those networks to speed its own growth.

Table 1-4 | Innovation Strategy and Support System

Industry	Strategic areas	Policies
Electronics/ Automobiles (Korean MNCs)	Generic technology research Advanced engineering Overseas R&D & Strategic alliances Acquisition of NTBFs	National R&D Programs Promotion of research university & industry-university collaboration
Machinery/ Fine chemicals (Large companies)	Applied research Design and advanced engineering Overseas R&D & Strategic alliances	National R&D Programs Promotion of research university & industry-university collaboration Attracting regional research centers of TNCs
Biotechnology Scientific instruments	Basic research New-technology Based Firms	National R&D Programs Research-industry interface
Machinery/ Fine chemicals (Specialized suppliers)	Design and advanced engineering Regional innovation system	National R&D Programs Attracting FDI Cluster-based policies
Textiles & apparels/ Leather goods/Foods (Traditional SMEs)	Regional innovation system	Cluster-based policies

Table 1-5 | Typology of Technology Diffusion Programs

	Goal	Program types	Objectives
Level 1	Improve the adoption and adaptation of specific technologies	Technology-specific	Diffuse a specific technology to a wide number of firms and sectors
		Institution-specific	Technology transfer from specific institutions
		Sector-specific	Diffuse technology to particular Industrial sector
		Demonstration	Demonstrate the practical implementation of technologies
Level 2	Improve the general technology receptor capacity	Technical assistance	Assist firms in diagnosing technology needs and in problem solving
		Information networks	Access to information on technology sources
		Assistance for small-scale R&D projects	Build capacity for autonomous technology development
Level 3	Build the innovation capacity of firms	Sector-wide Technology roadmap	Systematic planning for future strategic technology investments
		Diagnostic tools	Assist firms to develop innovation oriented management
		Benchmarking	Transmit best practice from elsewhere
		University/industry Collaboration	Upgrade the knowledge base of the firm

Source: OECD, Implementing the OECD Jobs Study: Lessons from Member Countries' Experience, 1997.

Chapter 02

Comparative Growth Experience: Kazakhstan vs. Other Resource-Rich Countries

Chapter 02

Comparative Growth Experience: Kazakhstan vs. Other Resource-Rich Countries

Jongil Kim (Dongguk University)

2.1. Introduction

Kazakhstan is a middle-income country with per capita GDP of US$ 6,713 and population of 15.1 millions in 2007. Compared with other Central Asian countries, Kazakhstan has shown best economic performance since the collapse of Soviet Union. It has abundant natural resources such as oil and gas, uranium, iron, copper, etc. Along with the abundant natural resources, Kazakhstan has vast areas of arable land as 9th largest country in the world and also inherited significant amounts of infrastructure from the Soviet times with relatively well-educated population.

Although natural resource abundance and vast land size provide enormous opportunities for Kazakhstan, these factors could turn into significant risk factors for the future growth. In the short term, as experienced last two years, Kazakhstan still faces the risk of macroeconomic instability. In the long run, Kazakhstan would reach the time of depletion of oil, the main export commodity and its growth would stagnate if it cannot find the renewable and reproducible sources of growth. In addition, the easy growth based on natural resources could retard the due efforts needed for the promising future. The vast land size could rather become an obstacle for the national consolidation of domestic market if Kazakhstan does not construct the infrastructures of transportation and agriculture since it is one of the most sparsely populated in the world.

In this chapter, we will exercise a comparative economic analysis to find out the prerequisites for growth strategy of Kazakhstan. To do this, first, we look into the international stance of Kazakhstan in terms of development indicators to see the potentials and constraints of future growth of Kazakhstan. Second, we compare the industrial structure of Kazakhstan with

other relevant developed countries to find the direction of structural transformation for Kazakhstan restructuring. We also investigate the trade structure of Kazakhstan in comparison with other industrialized countries. Finally, we review Australia's long-term growth experience and draw its implications for Kazakhstan's future growth. The conclusion will be followed by presenting the prerequisites for Kazakhstan's growth strategy.

Before going into comparative growth analysis, in this introductory section, we go over the long-term economic trend of Kazakhstan. The two tables in Table 2-1 and Table 2-2 show the major macroeconomic indicators and balance of payments of Kazakhstan. Since Kazakhstan declared independence in 1991, it experienced a steep fall in output due to the collapse of previous centrally planned system of the Soviet Union. The break-up of the old Soviet Union system meant the loss of industrial linkage of Kazakhstan to Russia and massive outflow of well-educated and professional labor with emigration of ethnic Russians and Germans. Population of Kazakhstan actually declined until 2001 and began to increase afterwards at the rate of 0.7% but is still lower than the population in 1991.

After post-independence severe recession in the early 1990s, Kazakhstan economy stabilized in the late 1990s and showed the rapid growth in the 2000s. As result, per capita GDP increased from US$ 1,218 in 2000 to US$ 6,713 in 2007. Per capita GDP in 2008 is estimated to be as much as US$ 8,494. The rapid growth in the 2000s may be characterized as an investment-led oil boom. It is originated from the development of oil sector and rising oil price. As of 2007, resource sector accounts for more than 40% of GDP and about 85% of total merchandise export. With booming oil industry, the investment ratio has increased from 20% to 30%. Particularly, the rising investment in oil industry and accompanied construction boom led the upward investment ratio.

Rising global commodity prices, particularly of oil and metals, the main export commodities, and inflows of foreign investments resulted in steady appreciation of Tenge up to 2007 before global economic crisis broke out. It also incentivized the foreign financing of Kazakhstan's banks which induced the borrowing boom with most credit flowing into construction sector. Thus, the external debt is now estimated to be 100% of GDP. With booming oil exports and construction business, the inflation rate steadily rose since 2002 with the CPI rising as high as 10.8% in 2007.

However, the economic boom throughout the current decade faced the slowdown since the final quarter of 2007 and further sharp recession with global credit squeeze and steep deterioration of oil price. It brought about the financial insecurity and pushed the current account into huge deficit recently. In 2009, Tenge depreciated against the dollar by around 20% which deteriorated further the situation of commercial banks. Although the global economy shows the sign of stabilization, the macroeconomic instability of Kazakhstan is expected for the time being with rising inflation rate, large external debt, and wide rally in commodity prices,

and expected fall in FDI inflow. However, unlike other developing countries, the fiscal deficit of Kazakhstan government has been kept close to balance and its external debt is about 2 % of country's total, which give the relief that Kazakhstan would not face the full-blown currency crisis to resort to an IMF bail-out.

Kazakhstan is a resource-based economy by definition.[2] The natural resource export accounts for more than 80% of total export and 40% of GDP. The wipe-out of industries linked to Russia after independence and development of mineral extraction with FDI inflow made Kazakhstan more resource-dependent. After post-independence industrial shrinkage, Kazakhstan turned around to the high growth mainly due to rising world oil prices and growth in oil export. The long oil boom led to rising real wages and appreciation of Tenge which exacerbated the competitiveness of non-oil sectors.

Thus, in spite of high growth throughout this decade, the economic indicators show typical problems surrounding resource-based economies. First, high dependence on a small number of primary goods makes the economy subject to economic instability due to volatile commodity prices. Second, the indicators in the 2000s show the risk of 'Dutch Disease' with exchange rate appreciation and rising inflation. Third, although the high unemployment rate, as high as 13.5% in 1999, declined steadily throughout the decade, it still stays high around 8%. Employment is a laggard behind the GDP growth since most investments and following economic activities concentrated in the extraction of mineral resources that is not so labor-intensive. The bulk of foreign investment which contributed to the economic boom in the 2000s rarely goes into other sectors which suffer from underinvestment. The share of mining industry in industrial production is as much as 57% in 2007 but those in value added and employment are meagerly 15% and 2.5%, respectively. Fourth, the external balance is quite vulnerable to price fluctuation of oil. In addition, current account stayed in deficit despite huge trade surplus due to the large remittance of profit earning from FDI. Imports also increased rapidly. Domestic manufacturers could not meet the local demand for capital or consumer goods since they cannot compete with imports on either price or quality. Growing investments and explorations in the oil sector contributed a lot to capital goods imports and recent construction boom also induced large imports of construction materials.

2] The operational definition of resource-based economy is an economy in which natural resources account for more than 40% of exports and 10% of GDP.

Table 2-1-A | Long-run Economic Trend of Kazakhstan

Period	GDP billions of current US$	Per capita GDP current US$	Population millions	Total employment thousands	Unemp-loyment rate %	Gross savings ratio %	Gross investment ratio %	Gross fixed investment ratio %
1990			16.5	7563				
1991			16.5	7494				
1992			16.4	7578			31.5	30.4
1993	4.5	275	16.3	6963		13.3	20.0	27.9
1994	12.7	791	16.1	6582	7.5	19.0	28.7	26.1
1995	17.2	1080	15.9	6552	11	18.2	23.3	23.1
1996	20.1	1280	15.7	6519	13	14.8	16.1	17.2
1997	21.3	1374	15.5	6472	13	12.0	15.6	16.3
1998	21.1	1383	15.3	6128	13.1	10.5	15.8	15.7
1999	17.6	1164	15.1	6105	13.5	17.9	17.8	16.2
2000	18.2	1218	15.0	6201	12.8	20.8	18.1	17.3
2001	21.5	1443	14.9	6699	10.4	21.7	26.9	23.7
2002	23.0	1542	14.9	6709	9.3	23.1	27.3	24.0
2003	29.9	1990	15.0	6985	8.8	24.9	25.7	23.0
2004	43.2	2861	15.1	7166	8.4	27.3	26.3	25.1
2005	57.6	3794	15.2	7244	8.1	29.7	31.0	28.0
2006	81.4	5321	15.3	7340	7.8	30.5	32.8	29.1
2007	103.4	6713	15.4	7631				
2008			15.5	7855				

Source: Statistical Yearbook, Kazakhstan in 2007 (2003-2007), International Financial Statistics (1990-2002)

Table 2-1-B | Long-run Economic Trend of Kazakhstan

Period	GDP growth rate %	Population growth rate %	Employment growth rate %	Inflation rate (CPI) %	Exchange rate Tenge/$	FDI inflow millions of current US$	Resource export/ total export %	Resource export/ GDP %
1990								
1991	-5.4	-0.1	-0.9					
1992	-9.6	-0.5	1.1			100		
1993	-13.5	-0.9	-8.5	1658.4		1271		
1994	-8.6	-1.0	-5.6	1877.4	35.5	660		

Period	GDP growth rate %	Population growth rate %	Employment growth rate %	Inflation rate (CPI) %	Exchange rate Tenge/$	FDI inflow millions of current US$	Resource export/ total export %	Resource export/ GDP %
1995	0.5	-1.2	-0.5	176.2	61.0	964	49.1	12.6
1996	1.7	-1.4	-0.5	39.3	67.3	1137	52.6	14.8
1997	-1.9	-1.5	-0.7	17.4	75.4	1321	57.7	16.9
1998	2.7	-1.4	-5.5	7.1	78.3	1151	64.8	15.6
1999	9.4	-1.2	-0.4	8.3	119.5	1587	66.6	23.2
2000	12.7	-0.8	1.6	13.2	142.1	1283	73.0	35.2
2001	9.3	-0.3	7.7	8.4	146.7	2835	74.3	29.0
2002	8.9	0.1	0.2	5.9	153.3	2590	76.5	30.0
2003	9.2	0.5	4.0	6.4	149.6	2092	74.7	31.3
2004	9.3	0.6	2.6	6.9	136.0	4157	79.4	37.0
2005	9.7	0.7	1.1	7.6	132.9	1975	83.5	40.7
2006	10.7	0.7	1.3	8.6	126.1	6143	84.1	42.0
2007	8.9	0.7	3.9	10.8	122.6	7099		
2008		0.7						

Source: GDP growth rate is the annual growth rate of GDP in constant Tenge obtained from *World Development Indicators(WDI)*. Resource exports which are ores and fuels are obtained from *WDI*. Others are from *Statistical Yearbook, Kazakhstan in 2007 (2003-2007), International Financial Statistics(1990-2002).*

Table 2-2 | Balance of Payments of Kazakhstan

millions of US$	1995	1997	1999	2001	2003	2004	2005	2006	2007
Current Account	-213	-799	-171	-1390	-273	335	-1056	-1915	-7184
Trade Balance	114	-276	344	983	3679	6785	10322	14642	15141
Exports	5440	6899	5989	8928	13233	20603	28301	38762	48349
Imports	-5326	-7176	-5645	-7944	-9554	-13818	-17979	-24120	-33208
Balance of Services	-241	-283	-172	-1374	-2040	-3099	-5267	-5912	-7971
Balance of Income	-146	-315	-500	-1237	-1747	-2863	-5697	-9437	-12144
Current Transfers	59	75	157	238	-165	-488	-414	-1207	-2210
Capital & Financial Account	782	2462	1065	2429	2738	4877	912	16093	7384
Net Errors and Omissions	-270	-1114	-642	-654	-932	-1016	-1800	-3104	-3252
Overall Balance	299	548	253	385	1534	3999	-1943	11075	-3051

Source: Statistical Yearbook, Kazakhstan in 2007 (2003-2007), International Financial Statistics(1995-2001)

2.2. Resource Curse or Blessing?

Kazakhstan achieved high growth by taking advantage of natural resource abundance so far but the recent sharp contraction following the global economic crisis implies the existence of problem of resource-based growth. For Kazakhstan to maintain considerable long-term growth, it should develop an economic system that could overcome the down risk of resource dependence. Before going into comparative economic analysis, in this section, we will go over the existing studies on the role of resource in economic development.

2.2.1. Resource Blessing

Although a term, 'resource curse', became more famous in the field of development economics by its paradoxical explanation of the widening north-south gap, the traditional view on the role of natural resource in economic development has been rather positive.

First of all, natural resource could be a source of export earnings. The obstructs the developing countries face in the initial stage of growth, formulated by the two-gap model, are the shortage of domestic savings and foreign exchanges. The natural resources are kinds of underutilized hidden saving of a country and exporting them generates foreign exchanges needed for capital goods import. Second, the activity of discovering and utilizing natural resources itself is value-adding activity and increases the domestic income. Third, it spills over to local economic activity if the income is spent on locally provided services and manufactures. Extracting and exporting natural resources generate demands for intermediate goods and services through backward linkage. Furthermore, they need new and improved capital equipments, infrastructure for transportation and utilities, and financial institutions. Forward linkages also arise if the natural resources need processing to meet the final demand locally or abroad. Fourth, the income from local economic activity could lead to final demand linkages if that is spent on domestically-produced goods and services.

We can summarize the transmission mechanism of natural resources to long-term economic growth as follows. Utilizing natural resource itself provides income to initiate domestic economic activity and funds to import capital goods for investments. The rise of sectors dependent on natural resources has both backward and forward linkages. These spillover effects give rise to the industries such as transportation, electricity, banking, business services linked to resource industry. The income effect from these sectors is multiplied by increasing the final demand of domestic goods and services. In the initial stage of development, the direct income from natural resource extraction would take the largest portion of income growth. However, as this initiation of growth spreads into other sectors, the linkage and spillover effects become more important through multiplier effect and economies of scale. As industries other than resource-exploiting grow, the economy becomes less dependent on resources. At this stage, the

economy could sustain long-term economic growth following a pattern similar to other countries which are not so resource-based.

This process of economic growth is the story of virtuous cycle from the resource-dependent and low-income to the high-income country in which growth could be attributable not to resource but to economies of scale and industrial linkages. This is, in a true sense, the economic development which achieves both structural transformation and income equality through creation of various jobs. For this, the natural resource abundance is a blessing.

2.2.2. Resource Curse

However, the resource-blessing story has been limited to a small number of now-developed countries. In many resource-rich countries in Asia and Africa, exports of natural resources could not generate the true development but rather had negative impacts. The potentially negative effect of resource exploitation is known as a 'resource curse', meaning that ironically the more resource-rich countries experienced the slower growth. Sachs and Warner(2001) examined a sample of 95 developing countries between 1970-90 and found that resource-poor economies such as Korea and Taiwan often much outperform resource-rich economies such as Mexico and Nigeria in economic growth. On average, they report, countries which started the period with a high value of resource-based exports to GDP tended to experience slower growth during the following twenty years. Also Gylfason(2001) reviewed the relationship between natural resources and traditional sources of economic growth such as physical, human, social capital and foreign capital since 1960s and found that natural capital tends to crowd out other capitals. He reports that nations with abundant natural assets tend to have less trade and foreign investment, bigger government, more corruption, less education, and less domestic investment.

As the story of resource-blessing is old, the story of resource-curse has also a long history. The story of resource-curse could be summarized by suggesting the channels of transmission from natural resource abundance to slow economic growth. The first channel could be found in the study of structural problem of resource-exporting countries in international trade. From the experience of Latin American underdevelopment during the interwar period, Prebisch (1950) and Singer(1950) argued that the developing countries based on primary goods based on natural resource advantage are destined to economic stagnation because of worsening terms of trade which disadvantage primary goods exporters in the South relative to manufactured goods exporters in the North. Their logic lies in the fact that the primary goods are not differentiated and have many suppliers who cannot control the amount at their will in competitive market, while manufactured goods market are oligopolistic and the supply is controlled. As an additional factor, the lower income elasticity of primary goods relative to manufactured goods could disadvantage the producers of primary goods in the world market as income grows. Although it is not always true of all primary and manufactured goods as asserted by Prebisch and Singer, it indicates what kinds of commodity a country exports matters for its economic growth.

Second, resource-based growth could not last long since it may shrink industrial base, so called 'the Dutch Disease'. From the characteristics of production and supply, the prices of primary goods tend to be more volatile and sensitive to market condition. Thus, a resource-based boom which takes an abrupt downturn with sharp drop in prices may have bad side-effect. Boom times with high export prices of natural goods accompanies the real wage hike and appreciation of national currencies which adversely affect the competitiveness of other sectors by increasing cost and making more expensive in foreign markets. The prolonged period of resource-based boom, in severity, hollows out the economy as the industrial bases of the economy become squeezed by increased cost of domestically-produced inputs and no longer competitive relative to imports. This boom and bust characteristics of resource-rich countries retard economic growth in the end.

Third, it becomes worse if the resources are non-renewable. Unlike agricultural products, most minerals are not reproducible. In this case, present growth brood the economic situation worse than the pre-boom since the ability to earn income is eroded. To ensure long-lasting prosperity, the economy should find out alternative activities that will produce a continuing income stream.

Fourth, even without terms of trade problem and 'Dutch Disease' effect, the long-term growth of resource-dependent countries would be lower than that of industrialized countries if we follow the logic of new growth theory that the long-term growth is ultimately determined by efficiency-enhancing technical progress and human knowledge accumulation. Modern economic growth after industrial revolution has been based on growth accompanying industrialization which provides a huge room for innovations and spillovers. In particular, manufacturing sector has been a major engine of learning-by-doing and thickening industrial linkages through fine specialization. Therefore, a country which has not experience manufacturing growth could be said to be limited in accumulating human capital and organizational capacity.

Fifth, the secular decline and boom and bust in resource-rich developing countries could lead to a wrong policy subscription which may worsen the situation. It is well known that Prebisch and Singer's logic was bought by Dependency theories who contended that, to lessen the bad effects from structural problem in international trade, the South should cut off the trade with the North. It was subscribed to build self-sufficient domestic industrialization by raising trade restrictions. Although pursuing import substitution itself is not wrong, the policy tools of restricting trade against market forces resulted in rent-seeking behavior and distortions in resource allocation.

Sixth, the natural resource itself bears huge rents, especially in conjuction with ill-defined property rights in many developing countries. It may lead to rampant rent-seeking behavior. In the initial stage of exploitation, the government usually earns and distributes most of the rents.

The existence of huge rents in the hands of government incentivizes the formation of special-interest groups which corrupts the decision-makers and distorts the distribution to their interest against society. Due to head-to-head competition on zero-sum game of rent-taking, social conflicts increase and in the extreme civil wars break out. On the other hand, a strong government could spend the rent to meet political ends in bureaucratic and discretionary ways. Tornell and Lane(1999) coined a term, 'Voracity Effect', that a windfall coming from natural resource can perversely generate the a more-than-proportionate increase in fiscal redistribution by powerful political groups and end up inefficiently exhausting the public good.

Finally, it is pointed out that the easy money from natural resources and well structured political governance of rents make an economy resistant to structural reform until too late.

2.2.3. Reconsidering Resource Curse

However, we should be reminded that the resource curse is just one side story of the effect of natural resources on economic growth. There are many evidences of resource-blessing or non-existence of resource-curse. First of all, the United States, one of most resource-rich countries, has a history of unprecedented successful economic growth. To name more, Canada, Australia, and Scandinavian countries such as Norway belong to the same group as the U.S. in terms of resource-richness. There are also successful experiences of several resource-rich developing countries such as Chile and Malaysia.

Therefore, what is detrimental to growth is not the dependence on natural resources per se, but the wrong management of interrelated side effects of the dependence. The problems of resource dependence, first of all, come from high export concentration on products subject to large price swings, which leads to recurrent boom and bust. The continuous resource dependence will in the end hollow out the economy and result in weak domestic industrial linkages. Without domestic industrial base except for mineral extraction, there will be high unemployment and thus unequal income distribution, which leads to low skill and low education. It is a vicious cycle which turns in the reverse direction of virtuous cycle of resource-blessing story.

Thus, the essence of turning resource curse into blessing lies with structural adjustment to lessen resource dependence by strengthening and diversifying industrial base other than natural resource. It ultimately depends on the adequate management of revenue to direct rent-seeking behaviors into productive and innovative activities. In the following section, we investigate the economic structure of Kazakhstan through international comparison to see the direction of structural reorientation.

2.3. Comparative Economic Performance

2.3.1. International Comparison of Major Indicators of Development

We explore the international stance of Kazakhstan by comparing the several indicators of economic environment and the progress of development. The data are obtained from the World Development Indicators (WDI) collected by the World Bank. WDI allows a comprehensive overview of development by providing hundreds of indicators on more than 200 member economies of the World Bank. We select several relevant indicators such as GDP size, per capita GDP, resource dependence, industrial structure, population density, and infrastructure in the year 2005.

Here, we report the rankings of countries in the sample to show the relative stance. The sample sizes are different among indicators by the data availability. We select the countries to be reported in the following tables as follows. First, to see the relative performance of Kazakhstan with respect to countries with similar historical and economic background, we include CIS countries such as Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan, and Georgia(former CIS). Second, we include China, and the U.S., the two popularly selected countries for international comparison. Third, we include several resource-rich countries which achieved successful economic development such as Australia, Canada, Norway, Chile, and Malaysia.

Australia and Canada are two resource-rich developed countries with small population and vast land size. In terms of geographical conditions and natural endowments, Australia seems to be most similar to Kazakhstan with its sparsely populated huge land size, abundant mineral resources, and its isolation from major world markets. We will go over Australian development later.

Norway is another developed country which made resources a blessing. Since it discovered rich oil field in the late 1960s, it became a major exporter of oil staying within the fifth largest oil exporters. However, Norway shows no clear symptoms of Dutch disease. It has attracted a relatively limited inflow of FDI, relatively stable exchange rate, and no signs of overt rent-seeking.

Chile and Malaysia are two resource-based developing countries which realized strong economic growth by nurturing non-traditional industries. According to Andersson et al. (2005), Chile has successfully managed to exploit its natural resource endowment to achieve vertical and horizontal diversification. Besides copper, the agro-food sector has played an important role in this transformation. The Chilean agro-food industry now accounts for around 11 per cent of

GDP and 43 per cent of total exports. It led to spread the benefits of growth by creating employment opportunities through backward linkages toward pesticide and machinery industries and forward linkages to food-processing, distribution, and the service industry, including hotels.

Malaysia is one of two cases of resource-rich developing countries along with Mauritius which, according to Sachs and Warner(2001), avoided a resource curse. Malaysia were in the top quartile in the ratio of primary-product exports to GDP in 1970 but had sustained per capita growth of greater than 2.0 percent per annum for the period 1970-89 among 23 developing countries of primary-product exporters. Malaysia paid much attention to labor-intensive manufacturing exports by establishing zero-tariff Export Processing Zones and had its growth sustained by the very rapid development of such exports.

Table 2-3-A | Size of Economy and GDP per Capita

Ranking in 185 countries	Country	GDP (current US$ in billions)	Ranking in 182 countries	Country	GDP per capita, PPP (constant 2005 international $)
1	United States	12397.9	3	Norway	47538
4	China	2243.9	6	United States	41813
8	Canada	1131.7	13	Canada	34972
12	Korea	791.4	15	Australia	34106
14	Russia	764.5	35	Korea	21273
15	Australia	737.9	54	Chile	12248
24	Norway	301.6	56	Russia	11858
37	Malaysia	136.7	57	Malaysia	11678
42	Chile	118.9	**71**	**Kazakhstan**	**8699**
52	Ukraine	86.1	74	Belarus	8541
57	**Kazakhstan**	**57.1**	93	Ukraine	5583
69	Belarus	30.2	102	Azerbaijan	4575
92	Uzbekistan	14.6	107	Armenia	4162
94	Azerbaijan	13.2	108	China	4088
111	Turkmenistan	8.1	117	Georgia	3520
118	Georgia	6.4	131	Moldova	2190
130	Armenia	4.9	135	Uzbekistan	2008
140	Moldova	3	140	Kyrgyzstan	1728
145	Kyrgyzstan	2.5	147	Tajikistan	1478
146	Tajikistan	2.3			

Source: 2005 World Development Indicators

Table 2-3-A compares the size of economy by GDP in current US$ and the income level by per capita GDP at PPP. Kazakhstan is a middle-size economy by ranking 57 among 185

countries and relatively large compared with other CIS countries except for Russia and Ukraine. Kazakhstan is a middle-income country by ranking 71 among 182 countries with its income higher than other CIS except for Russia. Income per head of Kazakhstan is more than 4 times of adjacent Uzbekistan, which makes the large number of workers illegally immigrate into Kazakhstan to find the jobs in construction and agriculture industries in recent years.

Table 2-3-B shows the indicators on resource and trade dependence. If we measure the resource dependence as the share of primary goods such as ores, metals and fuels in total merchandise exports, Kazakhstan stands as 11th among 125 countries. The amount of oil along with other minerals takes 84% of total export, higher than Azerbaijan, another oil-exporting CIS county and much higher than 56% of Russia. The trade to GDP ratio of Kazakhstan is 98%, indicating high trade dependence as Korea and Chile. The high trade dependence with most of exports concentrated in oil and minerals indicates Kazakhstan macroeconomic condition would be quite sensitive to the price fluctuation of oil, which makes Kazakhstan subject to the Dutch disease.

Table 2-3-B | Resource Abundance and Trade Dependence

Ranking in 125 countries	Country	Ores, metals and fuels exports (% of merchandise exports)	Ranking in 170 countries	Country	Trade (% of GDP)
11	**Kazakhstan**	**83.5**	5	Malaysia	217.6
12	Azerbaijan	78.2	22	Moldova	142.8
13	Norway	73.9	39	Belarus	118.9
22	Chile	58.0	44	Azerbaijan	115.8
24	Russia	55.8	46	Turkmenistan	112.8
27	Australia	47.2	59	Ukraine	102.1
30	Belarus	35.2	**68**	**Kazakhstan**	**98.3**
38	Canada	25.9	72	Kyrgyzstan	95.1
42	Georgia	22.7	86	Georgia	85.3
50	Ukraine	16	91	Korea	82.2
55	Malaysia	14.5	93	Tajikistan	78.8
57	Armenia	14.2	102	Chile	73.6
64	Kyrgyzstan	11.5	103	Norway	72.7
79	Korea	7.2	105	Canada	72
103	China	4.2	113	China	69
107	Moldova	3.2	119	Armenia	67.8
			121	Uzbekistan	66.5
			141	Russia	56.7
			159	Australia	42.1
			169	United States	26.8

Source: 2005 World Development Indicators

Table 2-3-C shows the shares of manufacturing and service sector in GDP. The share of manufacturing sector in Kazakhstan is 13%, as low as Australia and Norway, indicating its economic base is other than manufacturing sector unlike rapidly growing East Asia Economies. The relatively low share of service in Kazakhstan, lower in ranking than manufacturing share, indicates agricultural sector still takes considerable share of GDP. Thus, considering the general pattern of structural transformation along economic development presented by Chenery et al. (1989), Kazakhstan has relatively underdeveloped industrial structure with large share of economic activity held in agriculture.

Table 2-3-C | Industrial Structure in Terms of GDP Share

Ranking in 154 countries	Country	Manufacturing valued added (% of GDP)	Ranking in 161 countries	Country	Services valued added (% of GDP)
3	Belarus	33.7	12	United States	76
4	China	33.5	31	Australia	69
5	Malaysia	29.8	47	Moldova	64.2
6	Korea	28.4	77	Ukraine	57.3
12	Tajikistan	23.7	79	Georgia	56.5
24	Armenia	20.9	81	Korea	56.3
32	Ukraine	19.6	85	Norway	55.4
35	Russia	19.3	89	Russia	54.8
60	Moldova	15.9	98	Chile	53.3
61	Chile	15.7	**99**	**Kazakhstan**	**53.1**
69	United States	14.4	105	Uzbekistan	48.9
70	Kyrgyzstan	14.4	107	Belarus	48.5
78	Georgia	13.7	117	Kyrgyzstan	45.7
85	**Kazakhstan**	**12.8**	121	Tajikistan	44.8
97	Australia	11	127	Malaysia	41.9
101	Norway	9.6	133	China	39.9
105	Uzbekistan	9.1	144	Armenia	36.7
125	Azerbaijan	7	154	Azerbaijan	26.5

Source: 2005 World Development Indicators

Table 2-3-D confirms clearly the retarded structural transformation of Kazakhstan. It still holds relatively large employment in agriculture with large rural population. The agricultural employment in Kazakhstan accounts for about 32% of total employment, much higher than other resource-rich developed countries. Also, the proportion of rural population in Kazakhstan is about 43% implying large population scattered on the large territory.

Table 2-3-D | Employment in Agriculture and Rural Population

Ranking in 77 countries	Country	Employment in agriculture (% of total employment)	Ranking in 206 countries	Country	Rural population (% of total population)
8	United States	1.6	27	Tajikistan	75.3
15	Canada	2.7	52	Kyrgyzstan	64.2
18	Norway	3.3	54	Uzbekistan	63.3
20	Australia	3.6	63	China	59.6
39	Korea	7.9	74	Turkmenistan	53.8
44	Russia	10.2	77	Moldova	53.3
48	Chile	13.2	87	Azerbaijan	48.5
57	Ukraine	19.4	90	Georgia	47.8
64	**Kazakhstan**	**32.4**	102	Kazakhstan	42.7
67	Azerbaijan	39.3	123	Armenia	35.9
69	Moldova	40.6	134	Malaysia	32.7
74	Kyrgyzstan	48	138	Ukraine	32.2
75	Georgia	54.3	148	Belarus	27.8
			152	Russia	27
			163	Norway	22.6
			164	Canada	19.9
			166	Korea	19.2
			167	United States	19.2
			180	Chile	12.4
			181	Australia	11.8

Source: 2005 World Development Indicators

Table 2-3-E shows the population density and the railway connectivity. Kazakhstan is one of most sparsely populated countries in the world along with Canada and Australia. Its population density at 5.6 people per square kilo meter is lower than Russia due to its small population size. In Kazakhstan, small population relative to the vast landlocked land is sparsely located with large share of population living in the rural area. However, Kazakhstan stays behind with poor infrastructure for transportation. The inland transportation is critical for a landlocked country but the length of railway per square kilo meter of land is just 5.3 meters. The railway connectivity is not so good in Australia, either. However, Australia is not landlocked and most population is located in urban area unlike Kazakhstan.

Table 2-3-E | Population Density and Railway Connectivity

Ranking in 207 countries	Country	Population density (people per sq. km)	Ranking in 107 countries	Country	railway(m) per land(sq. km)
15	Korea	489.2	24	Ukraine	38
66	China	139.9	26	Korea	34.4
76	Moldova	117.9	28	Moldova	32.7
84	Armenia	107	35	Belarus	26.5
87	Azerbaijan	101.5	36	Azerbaijan	25.7
99	Ukraine	81.3	37	Armenia	25.2
103	Malaysia	78.1	41	Georgia	21.8
120	Georgia	64.4	49	United States	16.8
122	Uzbekistan	61.5	53	Norway	13.4
134	Belarus	47.1	59	Uzbekistan	9.4
135	Tajikistan	46.8	63	Canada	7.4
154	United States	32.4	64	China	6.7
159	Kyrgyzstan	26.8	66	Turkmenistan	5.4
165	Chile	21.8	**67**	**Kazakhstan**	**5.3**
175	Norway	15.2	69	Russia	5.2
188	Turkmenistan	10.3	73	Malaysia	5.1
190	Russia	8.7	77	Tajikistan	4.4
195	**Kazakhstan**	**5.6**	92	Kyrgyzstan	2.2
198	Canada	3.6	101	Australia	1.2
204	Australia	2.7			

Source: 2005 World Development Indicators

Finally, Table 2-3-F compares growth rates of per capita GDP and population between 1995 and 2005. Kazakhstan achieved very high growth of per capita GDP at 5.5% per annum over 1995-2005 even with recession following Russian economic crisis in 1998. As indicated by the high growth rates of other CIS countries, the high growth was on the one hand due to the abnormal slump in the early 1990s and on the other hand due to favorable movement of global oil industry. Population growth was negative and the size has not recovered to the level of pre-independent era.

Table 2-3-F | Growth Rate of GDP per Capita and Population, 1995-2005

Ranking in 173 countries	Country	Growth rate(%) of GDP per capita, PPP (constant 2005 international $)	Ranking in 196 countries	Country	Growth rate (%) of population, total
3	Armenia	8.94	55	Malaysia	2.2
4	Azerbaijan	8.84	100	Turkmenistan	1.42
6	China	7.91	105	Uzbekistan	1.38
8	Georgia	7.55	112	Tajikistan	1.26
10	Belarus	7.1	114	Chile	1.24
12	**Kazakhstan**	**6.59**	116	Australia	1.21
31	Russia	4.12	119	Kyrgyzstan	1.14
37	Korea	3.68	122	United States	1.08
39	Ukraine	3.59	131	Canada	0.96
42	Moldova	3.45	135	Azerbaijan	0.88
43	Kyrgyzstan	3.45	140	China	0.79
53	Tajikistan	3.22	142	Korea	0.69
56	Uzbekistan	3.14	146	Norway	0.59
61	Chile	2.86	183	Russia	-0.34
82	Canada	2.33	185	Belarus	-0.42
83	Australia	2.32	**186**	**Kazakhstan**	**-0.43**
84	Norway	2.31	191	Armenia	-0.67
86	Malaysia	2.28	194	Ukraine	-0.89
91	United States	2.14	195	Georgia	-1.18
			196	Moldova	-1.22

Source: 1995 and 2005 World Development Indicators

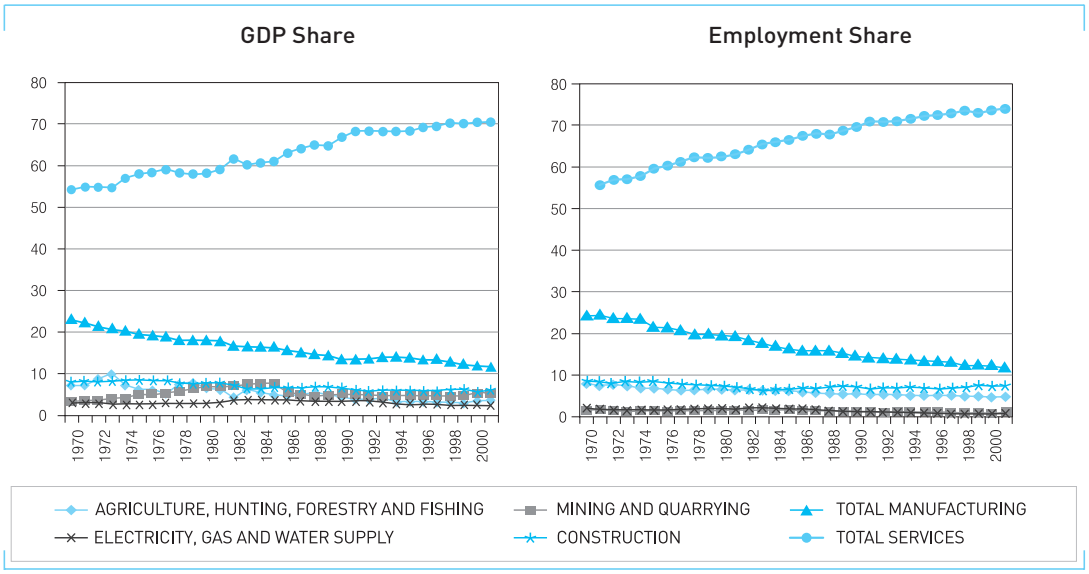
2.3.2. International Comparison of Industrial Structure

Next, we evaluate industrial structure of Kazakhstan in comparison to selected OECD countries such as Australia, Canada, Norway, and Korea based on OECD Structural Analysis Database (STAN DB) and Statistical Yearbook of Kazakhstan. As already told, the three developed countries are resource-rich countries which maintained high income since the late 19th century. To compare the industrial structure, we calculate the share of industries such as agriculture, mining, manufacturing, utilities, construction, and services over the three decades since 1970.

Figure 2-1-A shows the trend of structural transition of Australia in terms of GDP and employment composition. The service sector has been the major sector accounting for the highest share in GDP and employment. The GDP share of service sector has increased from around mid 50% in 1970 to around 70% in the 2000s and the share in total employment shows

the similar trend. In contrast, the share of manufacturing sector has declined from over 20% in 1970 to around 10% in the 2000s both for GDP and employment. Other industries such as agriculture, mining, construction and utilities do not show any distinguished direction of change. The GDP share of mining sector shows the ups and downs with global price movement of natural resources.

Figure 2-1-A | Industrial Structure of Australia

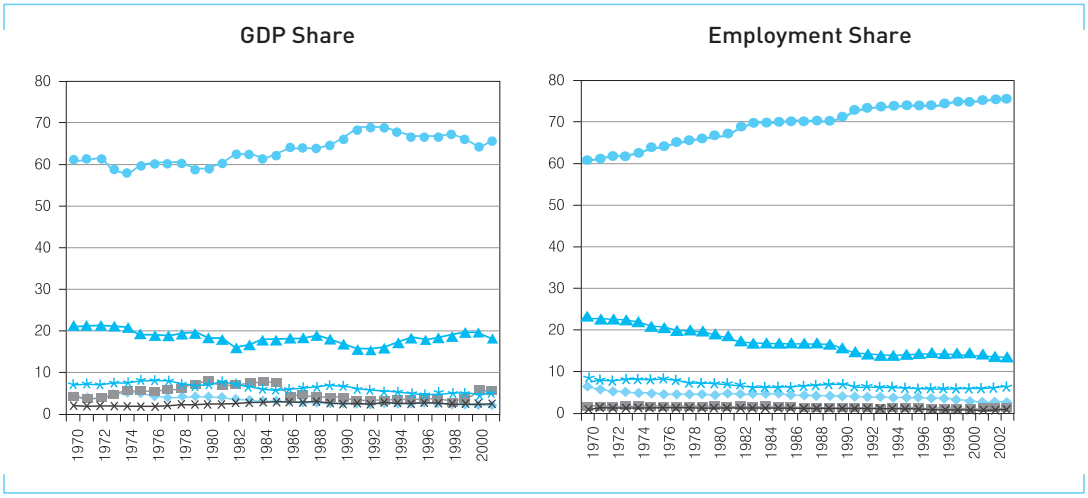


Source: *OECD Structural Analysis Database*
Note: The GDP share is the share of each industry's value-added in percentage in nominal GDP. The employment share is the share of each industry in total employment.

Figure 2-1-B shows the trend of structural transition of Canada, as in Australia, the service sector is the most important sector producing around mid 60% of GDP and generating mid 70% of employment. Next to the services, manufacturing sector accounts for around 20% of GDP and mid 10% of total employment. However unlike Australia, the GDP share of manufacturing has stayed around 20% since 1970s, although the employment share of manufacturing declined from over 20% in 1970 to mid 10% in the 2000s. It implies that Canada has transformed the manufacturing sector to be more productive by increasing the labor productivity.

Figure 2-1-C shows the trend of structural transition of Norway. Unlike Australia and Canada, the compositional trend of GDP in Norway shows the effect of oil-exporting which has grown since the mid 1970s. Due to the increasing GDP share of mining, the share of services stayed around 60%. The GDP share of manufacturing shows a declining trend like other developed countries. However, the employment structural change is similar to Australia and Canada with increasing share of services and declining share of manufacturing. Since mining is not labor-intensive, the share of mining sector in employment stayed low in spite of its increasing share in GDP.

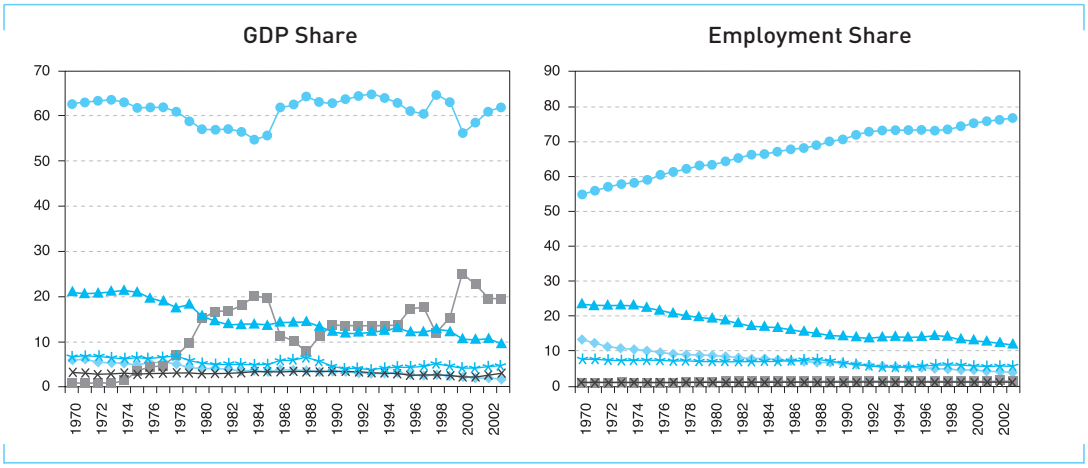
Figure 2-1-B | Industrial Structure of Canada



Source: *OECD Structural Analysis Database*

Note: The GDP share is the share of each industry's value-added in nominal GDP in percentage. The employment share is the share of each industry in total employment. The legend is the same as Figure 2-1-A.

Figure 2-1-C | Industrial Structure of Norway



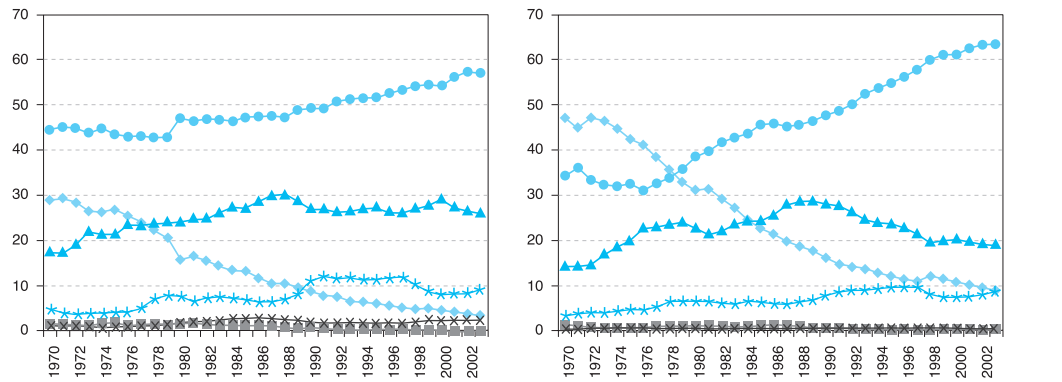
Source: *OECD Structural Analysis Database*

Note: The GDP share is the share of each industry's value-added in nominal GDP in percentage. The employment share is the share of each industry in total employment. The legend is the same as Figure 2-1-A.

Figure 2-1-D shows the trend of structural transition of Korea. Unlike other developed countries, Korea, a developing country which achieved the rapid growth around 8% per annum, experienced the significant structural transformation. First, Korea in 1970 has a typical pattern of industrial structure found in low-income countries with large agricultural sector. With rapid industrialization, the GDP share of agriculture declined from 30% in 1970 to less than 5% in recent years. The employment share of agriculture shows more dramatic change falling about

40% point. Due to the rapid building of infrastructure and urbanization, the share of construction shows an increasing trend and takes the share around 10%, higher than other developed countries. An interesting observation is that Korea shows the declining share of manufacturing employment as experienced by other developed countries since 1970s.

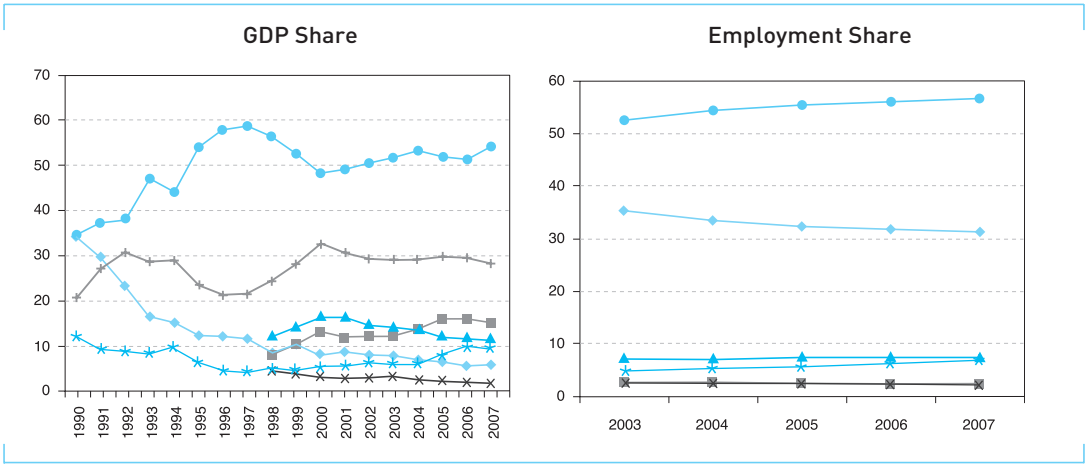
Figure 2-1-D | Industrial Structure of Korea



Source: *OECD Structural Analysis Database*
Note: The GDP share is the share of each industry's value-added in nominal GDP in percentage. The employment share is the share of each industry in total employment. The legend is the same as Figure 2-1-A.

In sum, even though GDP compositions show different patterns among countries, the employment compositions in the resource-rich developed countries are quite comparable. In terms of employment share, the service sector is largest followed by manufacturing sector. Other industries such as mining, construction, and utilities are providing less than 10% of employment. Since 1970s, the developed countries experienced the de-industrialization. That is, the share of manufacturing sector has been declined with rising employment in services. Although the GDP share of mining has been rising in Norway after its oil production started in the early 1970s, the GDP compositions in most developed countries are not so different. The GDP share of services and manufacturing are generally around 70% and 20%, respectively. Manufacturing shares of Australia and Norway have declined since the 1970s while Canada maintained 20%. Korea's industrial transformation shows a typical transition of structure through industrialized development. Korea experienced rapidly growing manufacturing share until the late 1980s and maintained relatively high manufacturing share around 30%.

Figure 2-1-E | Industrial Structure of Kazakhstan



Source: *Structure of GDP, Statistical Yearbook "Kazakhstan in 2007".*

Note: The GDP share is the share of each industry's value-added in nominal GDP. The employment share is the share of each industry in total employment. The legend is the same as Figure 2-1-A. Due to the method of estimation, the GDP share between 1990- 1997 and 1998-2007 are not comparable.

Comparatively, Kazakhstan shows a similar trend as Korea in terms of rising services share and declining agricultural share in GDP. With booming oil industry, the share of mining has been increasing in the 2000s and it is now about 15% of GDP. However, the share of manufacturing is around 10% which is much lower than high-performing developing countries. The share of construction sector at 30 % of GDP seems exceptionally high. In term of employment composition, although GDP share of agriculture declined rapidly to less than 10%, Kazakhstan agriculture employs around 30% of labor force. It means that Kazakhstan agriculture retains many unproductive farmers. The manufacturing employment share is less than 10% percent, lower than most developed countries, even much lower than Korea. In comparison with other countries, structural change is needed for Kazakhstan to become a high-income country. To increase per capita income, large unproductive labor force in rural area should be reallocated to higher productive sector, which could be manufacturing or service sector.

2.3.3. International Comparison of Manufacturing Structure

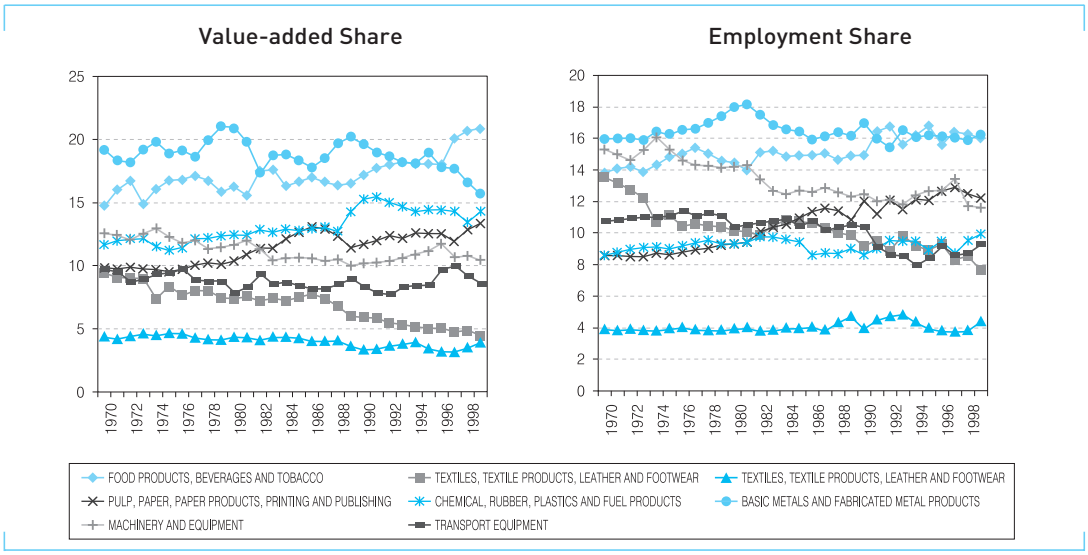
Now, we will go over the manufacturing structure in terms of value-added and employment share of each industry in manufacturing sector.

Figure 2-2-A shows the compositions of value-added and employment of manufacturing industries of Australia. The share of basic metals and fabricated metal products which are forward linked to the mining is relatively large both in value-added and employment along with food products, the other major export goods. Both in value-added and employment, the share of textiles shows a declining trend. In terms of employment share, machinery and equipment show

downward a trend while pulp and paper products show an upward trend. Overall structure of manufacturing sector did not change much with the share of each industry staying within narrow range over time.

Figure 2-2-B shows the trend of value-added and employment share of each industry in total manufacturing of Canada. The industry of pulp and paper products is one of major industries in Canada. Similar to the case of Australia, the share of textile industry shows a clear declining trend both in value-added and employment. In contrast, the share of transport equipment has risen over time and become a major industry taking advantage of relatively low wage and geographical proximity to the large automobile market in the U.S.

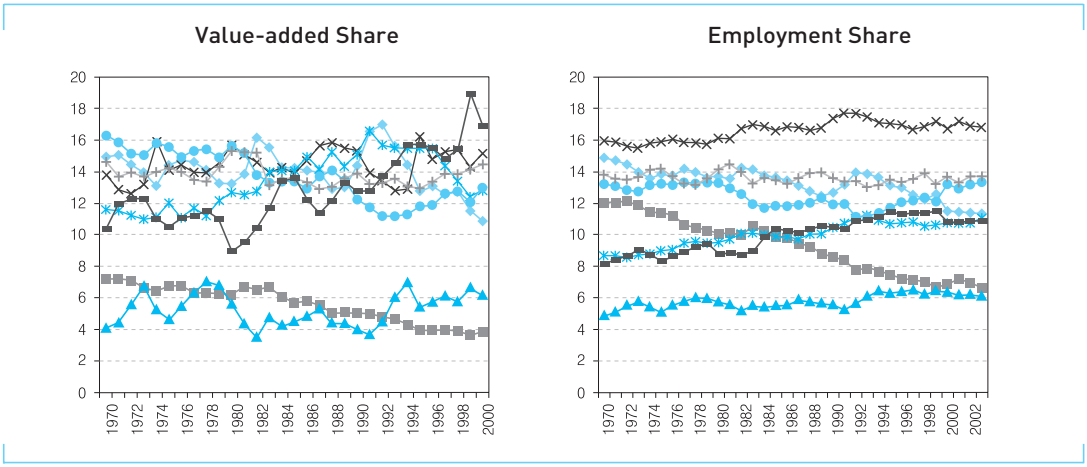
Figure 2-2-A | Manufacturing Structure of Australia



Source: *OECD Structural Analysis Database*

Note: The value-added share is the share of each industry's nominal value-added of total manufacturing in percentage. The employment share is the share of each industry in total employment of manufacturing.

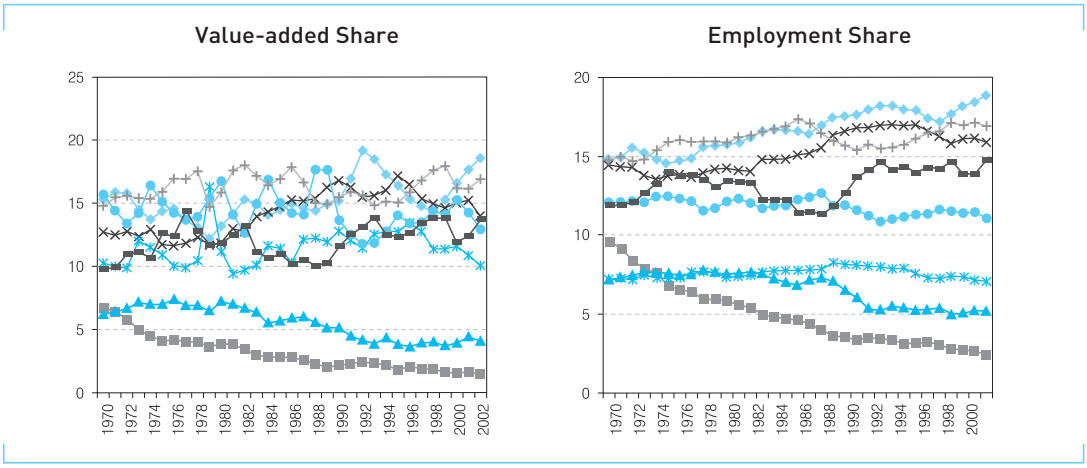
Figure 2-2-B | Manufacturing Structure of Canada



Source: *OECD Structural Analysis Database*

Note: The value-added share is the share of each industry's nominal value-added in total manufacturing in percentage. The legend is the same as Figure 2-2-A.

Figure 2-2-C | Manufacturing Structure of Norway



Source: *OECD Structural Analysis Database*

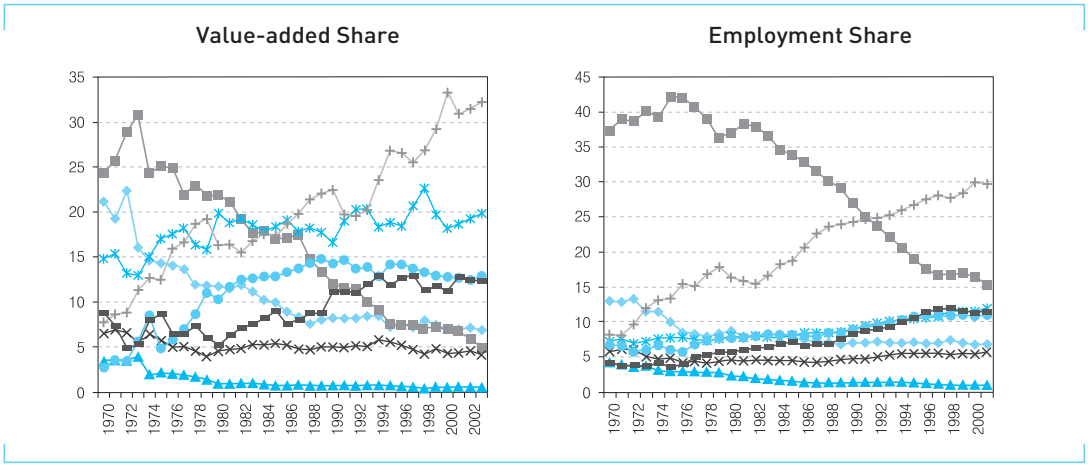
Note: The value-added share is the share of each industry's nominal value-added in total manufacturing in percentage. The legend is the same as Figure 2-2-A.

Figure 2-2-C shows the manufacturing structure of Norway. As Australia and Canada, Norway also shows the share of textile industry declining both in value-added and employment. The industry of wood products also shows a steady decline both in GDP and employment share. In contrast, the industries of food and beverage and pulp and paper products industry are slowly increasing their share over time.

Figure 2-2-D shows the trend of value-added and employment share of each manufacturing

industry of Korea. Unlike other developed countries which show slow structural changes with the shares of industries staying in narrow ranges, the manufacturing structure of Korea experienced a radical transformation. In the 1970, the textile industry is most important both in value-added and employment. However its share in value-added declined from around 30% in the early 1970s to about 5% recently. Its share of employment also declined from around 40% to about 15%. Instead, the share of machinery and equipment mostly in electronics increased dramatically from less than 10% in the early 1970s to more than 30% recently. Overall structural change of Korea could be characterized as the rapid transformation from labor-intensive light industries toward capital and technology-intensive heavy and chemical industries.

Figure 2-2-D | Manufacturing Structure of Korea



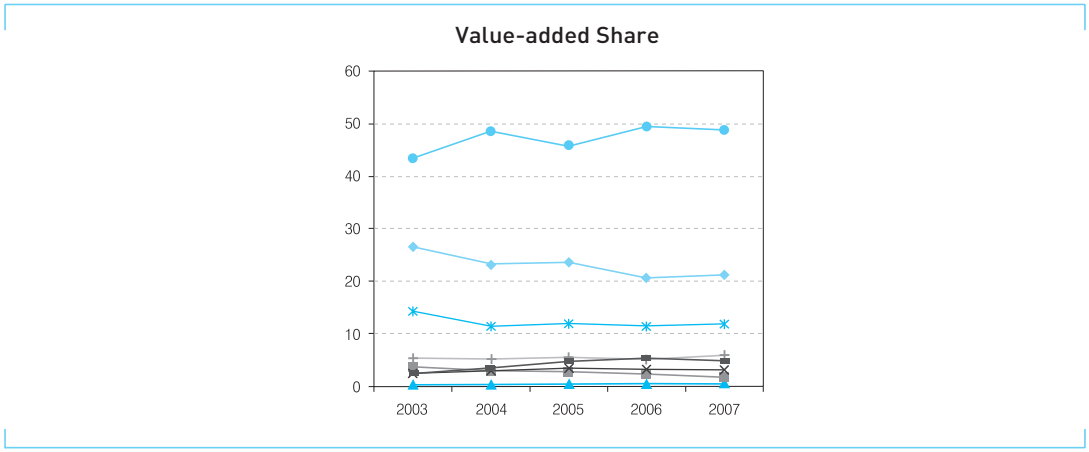
Source: *OECD Structural Analysis Database*
Note: The value-added share is the share of each industry's nominal value-added in total manufacturing in percentage. The legend is the same as Figure 2-2-A.

In sum, the value-added composition of manufacturing sector shows that each developed county has a distinct and persistent pattern of manufacturing structure and shows the diversified way of specialization following the comparative advantage. Similarly for all countries, the shares of food and metal products are high, indicating the demand for these industries are generally dependent on local supply. Textile sector is losing share in most developed countries since the 1970s, reflecting growing textile imports from developing countries. Compared with developed countries, Korea underwent a rapid structural change. In the early 1970s textile sector was most important but lost its share due to leaping sectors of electronics, transport equipment, ship building, and chemical products, the spurt of which started with Heavy and Chemical Industrialization drive in the 1970s.

Employment composition of manufacturing sector also shows a similar pattern. Shrinking employment in textile sector was a decisive factor for de-industrialization in most developed

countries. Manufacturing sectors in developed countries became more capital and technology-intensive by giving away labor-intensive production to developing countries. Korea's employment composition shows a structural change from labor-intensive toward capital and technology-intensive sectors. Until mid 1970s, the labor-intensive textile sector gained the share. However, since then, the share of machinery and equipment such as electronics and electrical appliance rose rapidly.

Figure 2-2-E | Manufacturing Structure of Kazakhstan



Source: *Statistical Yearbook "Kazakhstan in 2007".*
Note: The value-added share is the share of each industry's nominal value-added in total manufacturing in percentage. The employment share is not available. The legend is the same as Figure 2-2-A.

Figure 2-2-E shows the value-added composition of Kazakhstan. The metallurgy industry is most important in Kazakhstan and accounts for about 50% of valued added. Next follow food and chemical sectors. These industries are forward-linking sectors from resource exploitation. However, textiles and electronics, the driving forces of manufacturing growth in most developing countries are small in share. In addition to relative unimportance of manufacturing sector, the manufacturing sector itself is concentrated in just a small number of industries in metallurgy. Therefore, for Kazakhstan to realize the true development accompanying the industrial transformation, more manufacturing industries should be developed and promoted. This point is also clearly displayed in trade structure.

2.3.4. International Comparison of Trade Structure

To investigate the trade structure of Kazakhstan, we first compare the revealed comparative advantage (RCA) with other relevant countries such as Australia, Canada, Malaysia, China, and Russia in Figure 2-3. The Revealed Comparative Advantage index suggested by Balassa (1965) is defined as the share of a given commodity or sector in national exports divided by the share in world exports. Thus, the RCA index contains a comparison of national export structure with

the world export structure. If the RCA index is above 1, the country is said to be specialised in that product or sector and vice versa where RCA is below 1. We classify the trade commodities into five groups following the classification by the stage of process in production provided by Chelem DB from which the data are taken. The five groups are primary, basic manufacturing, intermediate, equipment, Consumer goods, and mixed products. Primary goods include agricultural products, minerals, and fuels. Basic manufacturing goods include cement, glass, iron and steel, and chemicals. Intermediate goods include fabrics, fertilizers, and components. Equipment goods include transport equipment, instruments, and machines. Consumer goods include clothing, consumer electronics, food and beverages. Finally, mixed products include leather, furniture, and plastic articles.

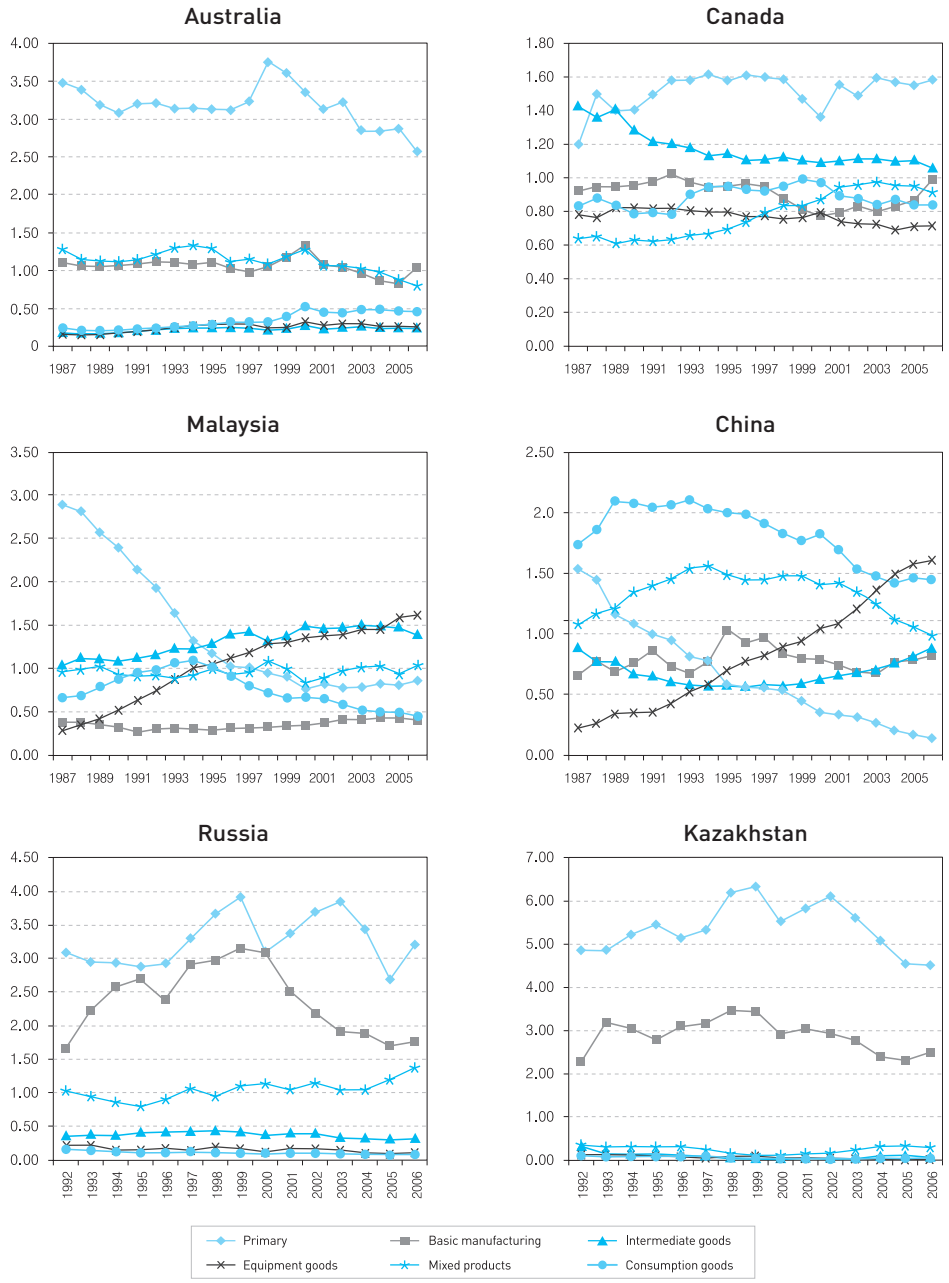
Australia whose main exports are based on natural resources are clearly specialized in primary goods, the RCA of which is around 3. Also, the basic manufacturing goods and mixed products show the RCA around 1, implying the share of these commodity groups is almost equal to the world average. The RCA of intermediate, equipment, and consumer goods are far below 1, showing external dependence of supply. Canada, though regarded as a resource abundant country as Australia, shows a dissimilar pattern such that Canada is more oriented to manufacturing than Australia. By exporting natural resources, Canada also show the RCA of primary goods around 1.6, lower than that of Australia. Instead, the RCA of intermediate goods are above 1, though declining over time. Other goods show the RCA slightly lower than 1. The RCA indices of basic manufacturing and mixed goods are close to 1 and those of consumer and equipment goods are around 0.7~0.8.

Malaysia, a resource-rich developing country in Asia, shows its rapid diversification from primary goods orientation. The RCA of primary goods declined sharply from 3.00 in 1987 to slightly less than 1 in 2006. Instead, the RCAs of intermediate and equipment goods climbed over time showing Malaysia's specialization of new industries. The RCA of consumer goods increased up to 1994 but declined afterwards, affected by the rise of Chinese export prowess. The trend of RCA overall shows that Malaysia which depended on resource exports in the 1980s transformed itself to a manufacturing-oriented exporter. China also shows another successful transformation of trade structure showing declining specialization in primary goods and rising share of manufacturing goods. In addition, China rapidly changes its manufacturing export composition moving from consumer goods and mixed products-oriented toward more technology-intensive equipment exports. Although the RCA of intermediate goods is lower than 1, it is increasing steadily over time since mid 1990s.

Unlike Malaysia and China which achieved steady growth since the 1980s, Russia shows high dependence on primary goods and resource-related manufactured goods. The RCA of the primary goods has stayed around 3. The RCA of mixed products around 1 show a slight upward trend. Other major manufacturing products such as intermediate, equipment, and consumer goods shows their RCA less than 0.5, showing heavy dependence on imports. The trade

structure of Kazakhstan show more severe dependence on natural resource exporting than Russia. The RCA of primary goods, mostly oil, is around 5 and the RCA of basic manufacturing goods has stayed around 3. The RCAs of other manufacturing goods are close to zero implying almost non-existence of major manufacturing exports and Kazakhstan's heavy dependence of domestic demand on imports.

Figure 2-3 | **Revealed Comparative Advantage by Commodity Groups**



Source: CHELEM DB

Next, we compare the degree of diversification of Kazakhstan with other CIS countries, high-performing developing countries such as China, Korea, and Malaysia, Chile, developed countries such as Australia, Canada, Norway, and the USA. First, we count the number of export commodities which take the world market share more than 1% in the year 2000. We classify the commodity at 4 digit level of Standard International Trade Classification(SITC) revision 2. The data are obtained from UN COMTRADE DB.

Table 2-4 shows the number of export commodities for each commodity group. SITC 0 includes food and live animals. SITC 1 includes beverages and tobacco. SITC 2 includes crude materials, inedible, except fuels. SITC 4 includes animal and vegetable oils, fats and waxes. SITC 3 includes mineral fuels, lubricants and related materials. SITC 5 includes chemicals and related products. SITC 6 includes manufactured goods classified chiefly by material. SITC 8 includes miscellaneous manufactured articles such as furniture and footwear . SITC 7 includes machinery and transport equipment.

Although Kazakhstan has more competitive export commodities than other low-income CIS countries, the competitive goods are concentrated in SITC 2 and 4, mostly in crude materials. Compared with other industrialized countries in East Asia, even Russia and Ukraine are less diversified. It is because the manufacturing commodities such as consumer goods and machinery and equipment are more differentiated than primary goods such as crude materials. More differentiation also means the innovation is more active in manufacturing goods sector through inventing new products and improving production process. Korea has 427 competitive export commodities. China also shows diversification over all industries by having 689 competitive commodities. Even Malaysia has 218 competitive commodities and shows diversification into SITC 7 commodity group which is relative more technology-intensive. Another interesting observation is Chile. Even though Chile has few competitive exports in manufacturing, it has 55 competitive exports more than Kazakhstan.

Although Australia, Canada, and Norway are actively exporting natural resources, they have a considerable number of competitive export goods. Australia which shows a bias toward primary exports in SITC 0 & 1 and 2 & 4, has 192 competitive export goods. Norway, a major oil exporter, has 129 competitive export goods. Compared with Australia and Norway, Canada is more diversified by having as many as 535 competitive export goods. Canada has maintained export competitiveness in consumer, machinery, and equipment goods. As expected, the USA, the largest economy in the world, plays as an all-round exporter even though its manufacturing sector has declined in its share in GDP and employment.

Table 2-4 | Export Diversification in Terms of Competitive Commodities

Country	SITC 0, 1 Food and beverages	SITC 2, 4 Crude materials	SITC 3 Mineral fuels	SITC 5 Chemicals	SITC 6,8 Misc. Manu factures	SITC 7 Machinery and equipment	Total Including un-classified SITC 9
Armenia	0	0	0	0	0	0	0
Azerbaijan	2	2	0	0	0	0	4
Belarus	0	5	0	4	10	12	32
Georgia	1	0	0	0	0	0	1
Kazakhstan	5	16	4	4	13	1	44
Kyrgyzstan	1	1	0	0	0	0	2
Moldova	15	3	0	1	6	5	30
Russian Fed	17	42	18	41	85	48	255
Tajikistan	0	2	0	0	1	0	3
Turkmenistan	0	4	1	0	0	0	5
Ukraine	15	33	9	19	68	38	182
Uzbekistan	2	6	0	0	1	0	10
Korea	17	22	9	52	196	129	427
China	72	70	11	89	295	147	689
Malaysia	21	38	5	23	77	52	218
Chile	23	18	0	6	6	1	55
Australia	50	52	9	16	50	11	192
Canada	70	71	16	60	178	134	535
Norway	10	20	10	19	43	27	129
USA	111	101	22	125	314	218	895

Note: The competitive export commodities are those having more than 1% world market share. The number of export commodities with more than 1% world market share in 2000 is calculated from UN COMTRADE DB.

Next, we compare the degree of diversification in terms of export destination in Table 2-5. The more diversified the destination a country has, the more stable flow of exports it can expect without being affected by the economic situation of a certain counterpart. More destinations also mean more opportunity to find new markets for hidden exports.

Most CIS countries which have few trade partners at the time of independence from Soviet Union in the early 1990s have considerably many more trade partners now in 2005. Kazakhstan's export destination has increased from 60 in 1995 to 106 in 2005. However, compared with other industrialized countries, the degree of diversification of Kazakhstan in terms of export destinations is lower. Exports of most industrialized countries reach to more than 200 destinations. Even Chile which is relatively less industrialized and has agricultural products as major exports has partners as many as 155, more than Kazakhstan.

In terms of concentration of exports on top 3 destinations, Kazakhstan is not so much concentrated showing a similar degree of concentration as other countries except for Canada who exports mostly arrive at the USA. However, in terms of concentration of exports on top 3 products, Kazakhstan excels apparently other countries except Azerbaijan, another oil-exporter in the CIS. The share of top 3 export products of Kazakhstan is more than 70 % which is much higher than that of Malaysia which is less than 30%

Table 2-5 | Export Diversification in Terms of Destinations

	Number of export partners		Share of top3 partners	Share of top3 export products
Country\Year	1995	2005	2005	2005
Armenia	10	78	42.8	61.7
Azerbaijan	24	79	57.1	79.3
Belarus	40	134	64.1	18.9
Georgia	16	92	41.5	28.5
Kazakhstan	60	106	46.4	73.7
Kyrgyzstan	12	70	66.7	47.7
Moldova	18	100	54.4	33.8
Russian Fed	54	171	34.3	62.8
Tajikistan	20	n.a	n.a	n.a
Turkmenistan	18	n.a	n.a	n.a
Ukraine	45	170	33.4	20.2
Uzbekistan	29	n.a	n.a	n.a
China	159	211	49.0	12.6
Korea	144	216	44.0	26.4
Malaysia	120	215	42.5	24.9
Chile	94	155	39.2	53.4
Australia	141	211	43.0	31.0
Canada	142	216	87.6	26.4
Norway	107	196	46.8	67.4
USA	165	220	42.7	11.6

Note: Export products are classified at 4 digit level of SITC revision 2. The data are obtained from UN COMTRADE DB.

Finally, Table 2-6 presents the top 10 exports and imports of Kazakhstan in 2005 along with major export and import partners. As expected, the petroleum oils account for about 65% of total export which are mostly delivered to Russia, Romania, and Portugal. Other major export goods are mostly minerals and fuels such as copper, ferromanganese, iron ore, coal, natural gas, aluminum ores, and liquid propane. Major export destinations are Russia, China, and Eastern European countries, the countries geographically close to Kazakhstan. Interestingly, the largest share of import is also petroleum oils imported from Russia. It is due to regional trade within

two countries that, having vast land size, take advantage of geographic proximity of cross-border trade. However, the share of top 1 import goods is just 4.7%. It implies that the imports of Kazakhstan are spread all over manufacturing commodities to meet the domestic final demand. Other major import goods are footwear, motor vehicles, metal containers, construction and mining machinery, aircraft, apparels, medicaments, bulldozers, and furniture. The origins of Kazakhstan imports are also spread all over the world.

Table 2-6 | Kazakhstan Trade Structure, 2005

	top 10 exports	Share (%)	Top 3 destinations	top 10 imports	Share (%)	Top 3 origins
1	3330 Petroleum oils and oils obtained from bituminous minerals, crude	64.6	Russia Romania Portugal	3330 Petroleum oils and oils obtained from bituminous minerals, crude	4.7	Russia
2	6821 Copper, refined and unrefined	5.5	Italy Germany Philippines	8510 Footwear	4.1	Spain Canada Armenia
3	6716 Ferromanganese	3.6	China Ukraine Azerbaijan	7810 Motor vehicles for the transport of persons, n.e.s.	2.6	U.A.E. Finland Singapore
4	2816 Iron ore agglomerates	1.7	Russia China	6783 Metal containers for storage or transport	2.3	Germany Turkey Canada
5	3222 coal other than anthracite	1.6	Hungary Poland Italy	7239 Construction and mining machinery, n.e.s.	2.2	Finland Spain Slovakia
6	3414 Natural gas, in the gaseous state	1.4	Russia Moldova Hungary	7924 Aeroplanes and other aircraft	1.9	France USA Japan
7	2873 Aluminum ores and concentrates	1.3	Russia China Tajikistan	8459 Suits, ensembles, jackets, blazers, trousers, bib and brace overalls, breeches and shorts	1.7	India Italy Hungary
8	6861 Zinc and zinc alloys, unwrought	1.1	China Ukraine Iran	5417 Medicaments containing antibiotics or derivatives thereof	1.7	Croatia Pakistan Cyprus
9	3413 Propane, liquefied	1.0	Turkey Iran Kyrgyzstan	7234 Bulldozers, angledozers, graders and levellers, self-propelled	1.6	Russia Poland USA
10	6749 Flat-rolled products of iron or non-alloy steel	1.0	Brazil Lebanon Viet Nam	8219 Furniture	1.5	Germany Kyrgyzstan Sweden

Note: The figures above the commodity name are the codes of SITC revision 2. The data are from UN COMTRADE DB.

To sum the comparative analysis, the weakness of Kazakhstan trade structure lies in its limited diversification in exports with a small number of competitive export products concentrated in crude materials and oil. It also has a small number of export destinations although the number of destinations increased last 10 years. Oil and minerals, which account for more than 80% of exports, are mostly exported to the adjacent countries due to lack of transport infrastructure. Imports are widely spread over transport, mining & construction equipments and various consumer products. Compared with resource-rich developed countries, Kazakhstan should make more efforts to discover the exportables in agricultural, chemical, and consumer products. Considering the industrial linkages, industries such as petroleum refining and processing and agricultural product processing have potentials to to find the international competitiveness in world export market.

It seems critical for Kazakhstan's long-term growth to diversify export structutre. Most empirical studies so far indicate the positive correlation between export diversification and growth. To name a few, cross-country studies of Al-Marhubi(2000), Agosin(2007), Hesse (2008), de Pineres and Ferrantino(1997), and many others confirm the correlation between export structure and growth. Sachs and Warner (2001) also attributed the successful East Asian economic growth to export-oriented industrialization. According to them, among resource-based economies, only four managed to attain both long-term investment exceeding 25 percent of GDP on average from 1970 to 1998, equal to that of various successful industrial countries lacking raw materials, and per capita GNP growth exceeding 4 percent per year on average over the same period. These four countries are three East Asian countries such as Indonesia, Malaysia, and Thailand in addition to Botswana. Even developed countries could accelerate growth through structural transformation. Blomstrom and Kokko (2003) reported the restructure of Sweden and Finland from raw materials to high-tech industry. Herzer and Nowak-Lehman(2006) reported the Chilean resource-based diversification strategies which spurted growth.

There is no exception to the fact that a country should diversify its economic activity at the early stage to achieve economic development, though it may intensify the specialized activity later. Hummels and Klenow (2005) reported that the extensive margin, the growth of exports in new categories, accounts for 60 percent of the greater exports of developed countries compared to developing countries. Within categories, richer countries export higher quantities at higher prices. Carrere et al. (2007) also confirm this by presenting the observation that low and middle-income countries diversify mostly along the extensive margin. High-income countries diversify along the intensive margin, growth of exports in goods that are already being exported, and ultimately re-concentrate their exports towards fewer products.

The channel through which diversification helps to economic growth is the externalities based on learning-by-doing. The diversification is easy in differentiated manufacturing sectors with fine division of production. Also, economic growth is a self-discovery process and the

discovery is revealed in export structure. The Korean experience also implies that the enhancement of the industrial capability is indispensable to the long-run economic growth. Export growth alone cannot contribute to the long-run growth without foundation of domestic industrial capability. In the long run, not only enlarging the markets for existing major export goods but also finding the new varieties are important. To sustain growth, the industries should continuously adapt themselves to changing environment, which creates new varieties. The ability of adaptation and diversification is the indicator of industrial strength.

However, it is not easy or may not be advisable for Kazakhstan to promote the export-oriented industrialization as East Asian countries such as Korea since the geographical and economic environments are quite dissimilar. In the next section, we will go over Australian growth experience which could be a proper benchmark for Kazakhstan.

2.4. Australia's Growth Experience

First, we compare Kazakhstan and Australia in terms of various indicators of social and economic development in Table 2-7. Australia seems to be similar to Kazakhstan as follows. Both countries are similar in terms of population size with Australia around 20 millions of population and Kazakhstan around 15 millions. In terms of population size, two countries are not so large enough to pursue industrialization based on domestic demand. Thus, both countries are sparsely populated with small population relative to the vast land size. Population density of Australia is just 2.7 people per square kilo meter and that of Kazakhstan is 5.6. Therefore, the domestic markets of both countries are fragmented on their vast territories. Due to geographic distance and accompanying transport cost, sometimes cross-border trade has more cost advantage than domestic trade. Both countries are also located distant from major world markets. Australia is a continent by itself and should cross over ocean to transport goods to other countries. Kazakhstan, a landlocked country, relies heavily on adjacent countries for trade. In particular, the oil export of Kazakhstan is limited by the capacity of pipelines. The vast land size is the source of natural resource abundance for both countries. The share of primary goods such as food, ores, metals, and fuels in total exports is more than 70% in Australia and 80% in Kazakhstan. It implies that both countries has small manufacturing sectors. Manufacturing share in GDP is a little over 10 % and share in total employment is around 20% for both countries, the level of which are relatively small compared with other developed countries.

Although both countries are similar in terms of geographical and size condition of economy and their dependence on natural resources, there are many differences between the two. First of all, Australia is a developed country since the late 19th century with per capita GDP at US$ 36,000 in 2005 much higher than Kazakhstan. Its unemployment rate is 5% lower than 8% of Kazakhstan. Although Australia has relatively small manufacturing activity, it makes up for this weakness by employing more people in high productive service sectors. In contrast, Kazakhstan

holds underutilized workers in rural agricultural sector. The share of agriculture in total employment is as much as 32.4%, the level of which is very low compared with other middle-income countries. The share of Kazakhstan agriculture in GDP is meager 6%, which implies most agricultural workers are low-wage unproductive labor. It also indicates the problem of income inequality between urban and rural economy in Kazakhstan, which could lower the life expectancy. Although both countries are resource-based, Kazakhstan's dependence on mining in terms of GDP and trade are greater than Australia. Although both countries are sparsely populated, Australia's domestic economy is concentrated in several cities with most people living in urban area. In contrast, Kazakhstan's rural population share is more than 40%. With development of marine transportation and communication technology, Australia has narrowed its distance to world markets.

Table 2-7 | Comparison of Australia and Kazakhstan in 2005

	Australia	Kazakhstan
GDP (current billions of US$)	737.9	57.1
GDP per capita (current US$)	36174	3771
Gross fixed capital formation (% of GDP)	26.5	28.0
Unemployment, total (% of total labor force)	5.1	8.1
Population, total (millions)	20.4	15.1
Land area (thousands sq. km)	7682	2700
Population density (people per sq. km)	2.7	5.6
Rural population (% of total population)	11.8	42.7
Agriculture, value added (% of GDP)	3.1	6.8
Manufacturing, value added (% of GDP)	11.0	12.8
Services, etc., value added (% of GDP)	69.0	53.1
Employment in agriculture (% of total employment)	3.6	32.4
Employment in industry (% of total employment)	21.1	18.0
Employment in services (% of total employment)	75.0	49.6
Trade (% of GDP)	42.1	98.3
Food exports (% of merchandise exports)	16.8	2.4
Ores and metals exports (% of merchandise exports)	20.4	12.8
Fuel exports (% of merchandise exports)	26.8	70.6
Manufactures exports (% of merchandise exports)	25.4	13.4
Life expectancy at birth, total (years)	80.8	65.9
Internet users (per 100 people)	69.6	4.0

Source: 2005 World Development Indicators

The aforementioned differences between the two countries could be the indicators dividing the developed Australia and developing Kazakhstan. Even though Australia has unfavorable geographic environment, it could maintain the long-term economic growth since the late 19th

century to stay as a high-income developed country.

Next, we explore the long-term growth of Australia and investigate the major factors which made it possible. Table 2-8 presents the long-term growth performance of Australia since the early 19th century. As a planted offshoot of European society, Australia' growth performance is closely correlated with economic fluctuation and political events of outside world. The European depressions of the early 1840s, 1890s and 1930s are mirrored in the poor growth in those decades. It is due to the natural resource-based and export-oriented expansions of Australia. Various resources drove the expansion through the periods, starting from wool in the 1830s followed by gold in the 1850s, livestock and crop in the 1890s. Australia experienced fast extensive growth through the first half of the 19th century with inflows of European settlers. As the useful natural resource was discovered, the complementary factors of labor and capital were attracted in significant flows. Along with factors came the European institutional framework. The combination of resource abundance and strong foreign demand encouraged specialization in production and trade, which ensured high levels of productivity and increased the size of the economy.

Table 2-8 | Long Term Growth of Australia

	GDP	Population	GDP per capita
1828-1840	13.2	10.4	2.8
1840-1850	8.7	7.8	0.9
1850-1860	12.8	10.9	1.9
1861-1889	4.8	3.5	1.3
1889-1905	0.8	1.7	-0.9
1905-1914	5.2	2.3	2.9
1914-1920	-1.6	1.3	-2.9
1920-1930	3.2	1.9	1.3
1930-1939	1.6	0.8	0.8
1939-1946	3.4	1.0	2.4
1946-1974	4.8	2.2	2.6
1974-2000	3.2	1.3	1.9

Source: McLean(2004)

However, in the early 20th century, Australia experienced a severe depression and even negative per capita GDP growth. It synchronizes with the long-term deterioration in the terms of trade for primary goods exporters. It contrasts with the U.S. growth experience. The growth of the U.S., another settler economy, started based on vast arable land and abundant natural resources and was closely related with European economy. However, the U.S. outgrew the small economy of isolated and scattered domestic markets with small population. The reason Australia could not be like the U.S. could be the constrained capacity of Australian continent

with limited water supplies and vast desert inlands. McLean and Taylor(2003) also pointed out the importance of economies of scale as a factor which divided different growth paths of Australia and California. California has a similar initial condition but has outgrown Australia by taking advantage of integration to the U.S. market. This lesson is well reflected in recent periods when Australia abandoned "White Australia" policy and turn their interests to their economic linkage to Asia.

The lack of economies of scale might have caused the nonexistence of structural transformation in comparison with the U.S. The U.S. underwent a fundamental shift around the end of the 19th from extensive growth toward intensive growth of technology and capital-intensive industrialization. Afterwards, as Abramovitz (1993) reported, the productivity improvement rather than factor accumulation became the principal source of the U.S. growth. It is well revealed in Table 2-9. Australia was born rich with the highest per capita GDP in the late 1800s. Throughout the 19th century, Australia's per capita GDP was much higher than the U.S. but the gap narrowed down fast, thus making Australia fall behind the U.S. in the 20th century. The long term decline of Australia's relative stance is contrasted also with that of Canada. Canada started as a relatively poor settlement but steadily climbed to surpass Australia's per capita GDP recently. As shown in previous sections, Canada achieved a mature industrial base taking advantage of its proximity to the large U.S. market.

Table 2-9 | GDP per Capita Relative to the U.S.

	Australia	UK	Canada	New Zealand	Argentina
1820	119	136	69	n.a	n.a
1850	169	130	70	n.a	n.a
1870	155	133	66	127	53
1890	141	121	66	111	63
1900	105	113	67	105	67
1913	104	95	79	98	72
1929	74	76	69	77	63
1938	92	98	70	106	66
1950	75	72	74	89	52
1973	75	72	82	76	48
1994	76	73	81	67	37

Source: McLean(2004)
Note: The figures are per capita GDP of each country relative to the U.S. in percentage.

Although Australia fell behind other developed countries, Australia is one of the few economies that have maintained its living standards close to world-best levels over the periods. As a relatively small economy distant from major world markets with high dependence on resource-based exports, Australia overcame dramatic shifts in international economic conditions

and avoided the resource curse that derailed many resource-rich countries.

First of all, as Acemoglu et al. (2001) proposed, the fundamental cause could be found in the pro-growth institutional arrangement, social value, and following political decision. Institutions determine the discovery of the exploitables, the rate of their exploitation, and the distribution of the rents, that lead to an impact on growth. The colonial legacy of English settlers in Australia made a favorable effect on the pro-growth institutional system with sound establishment of property rights and contract enforcement. Australia had terms and conditions of access to pastoral land which allowed more egalitarian distribution of land ownership of family farms and secure property rights. Also the reforms of goldfields regulations and taxation arrangements were made to be growth-promoting. It contrasts with institutional framework of colonial Latin America which evolved into growth-retarding unequal society. In addition, British tradition of free press and democracy was transplanted in Australia which made the corruption less pervasive.

Second, this institutional arrangement with secure private property rights provided the ownership of property with a long-term perspective of paying attention to the net gains materializing over time. It brought about continuous investments in education, research, infrastructure, and health. For example, the provision of agricultural research through the establishment of agricultural colleges and experimental farms has built the base for renewable resources.

Third, the right institutional framework lessened the severity of depressions from unfavorable movement in terms of trade and the stable political environment was sustained. Unlike some which turned away from international markets by pursuing a radical policy for self-sufficient economy, Australia stayed export-oriented since colonial period.

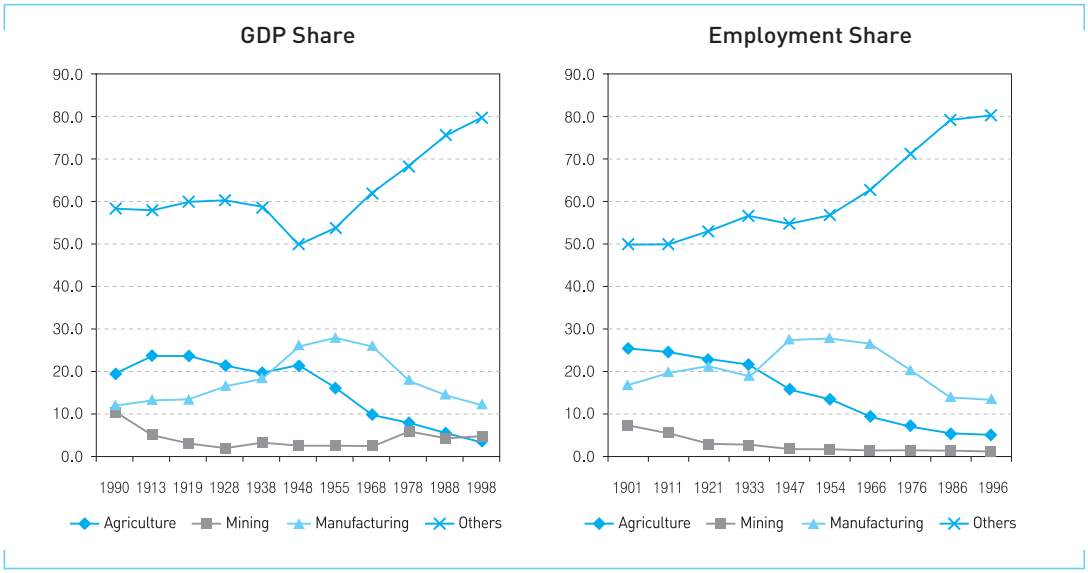
Fourth, Australia made continuous efforts to find exportable products, although the principal exports are mostly resource-based. In the early 19th century, the major exports were wool. Next came a boom in gold extraction followed by livestock and crops. After the World War II, major exports are mineral resources. Although the exporting booms of various resources were triggered by world demand situation, we should not disregard the discovery-efforts of Australia through private initiatives.

Fifth, Australia also endeavored for a structural transformation to find other non-resource factors of growth. It reduced its resource-trade dependence and dampened the macroeconomic impact of fluctuations in primary exports. The Figure 2-4 shows the long-term trend of industrial structure of Australia. Even though Australia is still a resource-based economy, it followed a pattern of industrial transformation similar to the structural change of now developed countries. Throughout the 20th century, the share of agriculture continued to decline to become around 5% both in GDP and employment. Although Australia exports a large amount of

minerals, the share of mining is small less than 10%. Instead, Australia diversified its industrial base to find opportunities in non-resource industries. The share of manufacturing sector increased in the 1920s and stayed high until the early 1970s. Immediately after the World War II, the share of manufacturing in GDP and employment reached close to 30%. The importance of manufacturing has declined since the 1970s showing deindustrialization trend by moving the weight of economy toward services. It synchronizes with deindustrialization of most of developed countries in the same period. As a result, the current industrial structure of Australia is not so much different from that of other industrialized developed countries.

For this structural transformation, we cannot disregard government's interventionist trade policy. Due to the relatively small size of economy, high level of real wages, and high cost of transportation which made price of imported investment goods relatively high, the manufacturing industries were not so competitive in Australia. However, to expand employment other than agriculture which faced the end of expansion through rural settlement and reduce the economic volatility associated with the vagaries of international commodity markets, manufacturing were encouraged by tariff protection since the early 20th century. The inward-oriented growth strategy targeting at the promotion of manufacturing sectors were introduced gradually between 1901 and the 1920s. This policy stance were enforced during interwar periods and continued until the 1960s.

Figure 2-4 | Long Term Structural Change of Australia



Source: Robertson(2008)

How can we evaluate this interventionist and inward-oriented trade policy? In Australia, this interventionist policy seems not have retarded economic growth. Manufacturing tariffs rose between 1901 and the 1920s after the relative stance already deteriorated in the 19th century. As

shown in Table 2-9, the relative stance of Australia with respect to the U.S. did not decline with introduction of interventionist policy and even rose during and after the Second World War. The War time experience reassured the necessity of reducing the resource-based trade dependence to Australian government. Thus, the government pursued the increase in its population by recruiting European migrants in one way and promoting development of the manufacturing sector to generate jobs in the other way. In this respect, the policy of promoting industrial diversification might have reduced macroeconomic instability and created more jobs. Furthermore, this experience of industrialization came with human and organizational capital build-up through learning-by-doing.

However, Australian manufacturing sectors never had a chance of being internationally competitive due to the limited scale economies and the tyranny of distance. In addition, global shift of manufacturing activities to low-wage developing countries in the East Asian countries such as Japan, later Korea and Taiwan accelerated losing comparative advantage in manufacturing. In this period, Australia was not alone and the deindustrialization was a global pattern in developed countries. It accompanied the broadening of outsourcing and growing specialization in manufacturing production. In addition, the advance of information and communication technology generated new businesses in services and increased the demand for services such as finance and transportation. Australia rode together with this global trend of post-industrial era and directed resources from weak manufacturing to service sectors by turning away from protectionist trade policy.

In sum, Australia is a peculiar developed country because of its continued dependence on a narrow range of primary exports to financial industrial imports. However, unlike trade structure, the structure of economic activity is not so different from other developed countries. It is the result of continuous structure transformation from early specialization of agriculture and mining to manufacturing and later services. Thus, it could be less vulnerable in the short to medium runs to external shocks from falling demand and price of major primary exports and could breed educated labor and business capacity in the long run.

2.5. Implications for Kazakhstan Growth Strategy

After severe depression in the early years of transition, Kazakhstan established a legal framework to attract FDI into oil and mineral extraction sectors and made progress in the creation of institution for public resource management. As a result, Kazakhstan has achieved high economic growth to become a leading country in the CIS countries in Central Asia. The high growth in the 2000s was possible because of rising global commodity market, inflows of FDI, and domestic construction boom. However, recent macroeconomic instability with the financial insecurity and huge current account deficit portends a resource curse.

The international comparison so far indicates the structural problem with too much dependence on natural resources. Kazakhstan's dependence on exports of oils and minerals is one of highest in the world with high trade dependence. However, the manufacturing activity is quite weak contributing a little more than 10% of GDP. The long-run economic development of Kazakhstan is worrisome since most developed countries and rapidly growing developing countries underwent the stage of industrialization. Even in Australia, a peculiar developed country which exports natural resources and imports most of manufactured goods, the manufacturing sector once produced 30% of GDP. For developing countries, the manufacturing sector creates a large number of jobs for various workers with different skills and education levels. It critically helps human capital building through learning-by-doing. With the weak activities in non-extractive sectors, Kazakhstan still holds a large share of labor force as underutilized and poor farmers in rural area, which is about 30% of employment. The large underutilized labor is not only an indicator of economic backwardness but also the opportunity for high growth through structural transformation.

To make resource-abundance a blessing rather than a curse and achieve the long-run economic growth, Kazakhstan should diversify the economy into non-extractive industries to generate jobs that could give various workers opportunities for acquiring skills as well as incomes. With high unemployment and a large pool of unproductive workers, Kazakhstan cannot achieve a true development in which growth accompanies distribution. Therefore, the major focus should be given to the reallocation of large underutilized agricultural labor to productive sectors.

The productive sectors could be found in manufacturing and services but manufacturing sector should be given more weight since it could provide productive and stable jobs to unskilled workers. Thus, further industrial diversification should be pursued to create jobs in manufacturing sectors. For this, the extensive growth within manufacturing sector is needed by discovering new sectors demanding domestic activities. The first candidate for new sectors could be backward and forward linked sectors to resource-extracting and exporting sector. The next could be export development and diversification in agricultural and manufacturing products. Export could be further diversified through finding new trade networks along with Central Asian countries and Russia. Finally, current imports could be substituted by domestic products, which would provide another route of manufacturing diversification.

To make it possible, firstly, Kazakhstan needs private investment, both domestic and foreign, into various manufacturing industries. For this, reducing fiscal incentives is not enough. Instead, the country should give a promising business environment in order for investors to make a proper profit from domestic operations. Thus, government should lower investment risks and the cost of doing business, remove the improper regulations and red tape such as unnecessary inspections, and reform legal and administrative institutions such as tax and customs. Secondly, it is critical to provide skillful workers to the business by investing in

education and making education more responsive to the market needs. In particular, it is also necessary to adopt a system to make up for the shortage of professionals from the emigration after independence. Thirdly, more public investment is needed to improve key infrastructure in telecommunication, roads, railways, and electricity facilities.

In addition to manufacturing diversification, agricultural development is also critical. As the growth experience of Australia implies, agriculture could be an internationally competitive industry regarding the large arable land of Kazakhstan. Agricultural development could provide another business opportunity in manufacturing such as food processing. First of all, it is urgent to establish ownership structure in rural society through land reform. Along with this, land restructuring and management should be given more attention. More investments in irrigation facilities and development of water-management policies are needed.

Along with improving infrastructure and business environment, government could play a role in promoting industries, which may allow the economy to leap over a distance by implanting new innovative industries. Korea also drastically expanded industrial diversity through deliberate efforts led by the state in the 1970s. Although there are controversies on the extent the government may intervene to promote industries, the industrial policy can make a positive difference if it is congruent to the technological and social capabilities of the country. Any government intervention in industrial transformation should maintain the balance between the risk of static inefficiency and the benefit of dynamic efficiency. It could be achieved by flexibly adjusting policy stance according to market signal, and orienting policy measures toward stimulating self-discovery process of private sector through competition.

In this respect, although currently the strategy of industrialization through export-promotion is prescribed more often due to East Asian experience, Kazakhstan may pay more attention to the import-substitution rather than export-promotion of manufacturing goods. Population of 15 millions of Kazakhstan could be large enough to provide a minimum scale of demand for many fields of manufacturing industries. In addition, as a landlocked in Central Asia, the transport cost is a natural trade barrier for Kazakhstan. According to Limao and Venables(1999), extra 1,000 kilometer by sea adds $190 whereas a similar increase in land distance adds US$ 1,380. Thus with some temporary import-substitution incentives and relative high transport costs to import complete products, Kazakhstan could diversify industrial structure through extending import-processing activities and finding new manufacturing opportunities for local demands.

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Chapter 03

Development Strategies of Construction Materials and Agricultural Machinery in Kazakhstan

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Development Strategies of Construction Materials and Agricultural Machinery in Kazakhstan

Byoung Jun Song (Korea Institute for Industrial Economics & Trade)

3.1. Introduction

The Republic of Kazakhstan plans to promote the construction material industry as one of the 7 sectors in the Industrial Innovation Development Plan of Kazakhstan for 2010-2014. The rapid economic growth and construction boom, which began in the late 1990s, entailed a sharp increase in construction material imports and their prices. Construction investment in Kazakhstan increased from 3.4 billion dollars in 2000 to 17.3 billion dollars in 2006 representing a 31.1% annual growth rate. The increased prices of construction materials put a large inflationary pressure on the Kazakh economy. As of 2008, the average import ratio for construction materials was 46.7% and total industry imports amounted to 2.9 billion dollars. The Kazakh government, therefore, adopted a strong import substitution policy for construction materials and plans to reduce the import ratio to below 20%.

Based on the Industrial Innovation Development Plan, the government of Kazakhstan also attempts to promote the agricultural machinery industry as a new growth engine in the long run. Kazakhstan has a huge agricultural base, given that its agricultural land covers about 30% of the country and the employment share of the agricultural sector is 31%. This means that potential demand for agricultural machinery is very high. Neighboring countries such as the Republic of Uzbekistan, the Republic of Tajikistan and the Kyrgyz Republic have large agricultural sectors as well. In the long run, these countries can be attractive export markets for Kazakhstan's agricultural machinery industry, if Kazakhstan succeeds in promoting it.

3.2. Rationale and Assessment of Sector Promotion Policy[3]

3.2.1. Necessity and Criteria of Specific Sector Promotion Policy

In the early stages of industrialization, it is a practical strategy for a government to adopt a sector specific promotion policy to achieve rapid economic growth. This is true, especially when countries do not have significant natural resource endowments. That is, the government intervenes in factor markets and supports resources for specific sectors. Even in developed countries new technology and new products are needed to ensure continuous growth and an upgrading of the industry. It is important to promote specific sectors that show the greatest potential for technological progress and spillovers to the rest of the economy. Such a strong industrial policy is justifiable when the free market fails in the early stages of economic development or in the case of high-technology sectors.

The Criteria for selecting a specific sector differs according to the policy targets. If the priority is on finding a new growth engine, a company or a government may select the most promising sectors for the future. For this purpose, the most useful criteria are as follows:

- Potential for growth: expecting high growth rates in the target years
- Profitability: large market size and technological competitiveness in the target years
- Externality (or other public interest): large technological spillover effects or strategically important items

Kazakhstan's sector promotion policy stresses import substitution. The import ratio and amount of import are, therefore, the most important criteria.

3.2.2. Rationale of Sector Promotion Policy

There are pros and cons regarding the long term effects of any industrial policy on a national economy. Promoting specific sectors is a strong industrial policy, in which a government actively intervenes in the market.

An argument in favor of sector promotion policy focuses on the externalities of the specific industries. Some activities create technology in such a way that the investing firm cannot fully capture the benefits as private profit. In this case, the promotion policy aims at expanding the scale of the externality-generating activity and creating social gain. In general, a sector

3) A specific sector promotion policy which would be called "picking winners policy" is a typical industrial policy and a strong targeting policy.

promotion policy is strongly recommendable for new, export-oriented industries which facilitate the diffusion of foreign technology in developing economies, and for new technology- intensive industries in advanced economies

A second argument on sector promotion policy focuses on strategic support for domestic firms in global, oligopolistic markets. In this setting, appropriate government intervention can help domestic firms capture a larger share of the international pool of excess profits. These arguments apply most directly in internationally concentrated markets such as that for aircraft. So, the government subsidizes its firms and helps them to compete with firms of other nations in the race to capture the world market.

Criticisms on sector promotion policy classifies the practice as a misguided attempt to pick winners, while ignoring the broader range of government actions, such as its role in spearheading the expansion of certain manufacturing sectors. “Picking winners” seems to imply culling from a fixed pool of applicants to find those with the highest long-run social returns. East Asian governments have instead performed an entrepreneurial role. Entrepreneurship requires the combination of technological and marketing knowledge, a vision of the future, willingness to take risks, and an ability to raise capital. But in the early stages of development, these ingredients are typically in short supply. The governments in East Asia stepped in to fill the void, but in a way, that promoted, rather than thwarted, the development of private entrepreneurship.

The strongest argument against this policy form is that erroneous government intervention and sector targeting is worse than maintaining neutrality; poor targeting diverts resources from economically beneficial activities to inefficient ones. In some policy environments, sector promotion policy may not even have a fair chance to be successful, because targets are chosen based on political- rather than economic criteria. To a greater or lesser extent, political institutions tilt government policy in favor of powerful, rather than economically meritorious industries.

Even correctly targeted promotion policy is not without costs. The taxes required to finance industrial subsidies, for example, withdraw resources from other activities and distort economic decisions in the taxed sectors of the economy. Alternatively, policies that raise targeted sectors’ revenues through protection tend to distort the consumption decision and reduce welfare. In a worst case scenario, sector specific promotion policy can draw substantial resources into nonproductive activities such as lobbying.

The effective implementation of target policies requires sophisticated institutions for setting policy goals and efficient control mechanisms. Targeting requires a great deal of information and difficult technical judgments have to be made. Thus active promotion policies require a powerful and capable technocratic institution that is, on one hand, sheltered from the political

process, and on the other hand, well connected to industry expertise. However, it appears that economic decision making may be politicized in a country like Korea, and that the business-government relationship can be more strained than desirable.

Furthermore, under the WTO system, many policy instruments have either been restricted and are subject to strict controls or become illegal altogether over time, limiting the available options today. The possibility to protect domestic industries through tariffs has gradually been eroded by the WTO. The direct use of subsidies in export-oriented industries has also been curtailed under the WTO Subsidies Code and in the face of aggressive countervailing actions by the United States and other countries. The Procurement Code has also begun to limit the extent to which governments can give preference to their own producers.

3.2.3. Policy Assessment

Those who strongly believe in free market mechanisms tend to downplay the role of the government and sector promotion policies in the process of economic development in Korea and other East Asian economies. In their view, markets drove the efficient allocation of resources during the periods of success, while it was distortive and counterproductive government interventions, represented by sector promotion policy, which were responsible for the 1997-98 economic crises in Asian countries.

This view also maintains that the initial development of an economy can be adequately engineered and maintained solely through the management of macroeconomic fundamentals, such as the money supply, fiscal policy and exchange rates, provided that the economy's trade is liberalized and market institutions work well.

These arguments against active industrial policy such as specific sector promotion policy suggest that Korea, and other East Asian countries, would have grown even faster without the so called "picking winners" policy. Such criticisms, however, is difficult to substantiate and has subsided in the case of Korea, as the country developed into a major player in some key industries such as steel, ship building, semiconductors and LCD which were part of Korea's high-technology strategy.

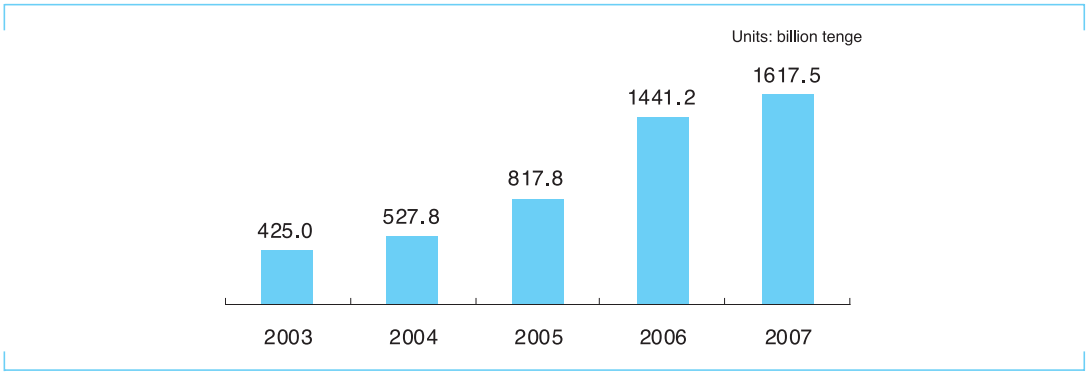
Another school of thought stresses the importance of government intervention in guiding the economy. According to this outlook, a government is able to improve market outcomes and accelerate growth by deliberately distorting prices and incentives. Recent history appears to support the position that sector promotion policy was essential to jump-start the development process and, up to a point, to keep it going. In fact, it seems certain that without the extensive promotion policy during the 1960s and 1970s, Korea would not have been able to become the economic powerhouse that it is now. After all, Korea became a success story only after the major institutional and economic policy framework was put in place.

3.3. Current State and Promotion Strategies for the Construction Material Industry in Kazakhstan

3.3.1. Background and Characteristics of the Construction Material Industry

As the Kazakh economy has rapidly grown since the late 1990s, the construction industry has been booming. Due to the new capital city construction project, construction investment has overheated in 2004-2007. As shown in the table below, the volume of construction works increased from 527.8 billion tenge in 2004 to 1,617.5 billion tenge in 2007 representing an annual growth rate of 45.3%. The number of construction businesses has increased from 4,289 to 7,087 between 2003 and 2007. As a direct consequence, imports of construction materials have dramatically increased during the same period. The import ratio of building glass was almost 100% as of 2007, and that of ceramic tiles was 97%. On average imports supplied covered almost 47% of domestic demand in construction materials. A high import dependency weakens the competitiveness of the domestic construction industry and causes inflation as prices of imports increase. The Kazakh government, has therefore, decided to promote the domestic construction material industry and bring the average import ratio to less than 20%.

Figure 3-1 | Volume of Construction Works



Source: The Agency of Statistics of the Republic of Kazakhstan
Notes: The volume of construction works is a cost of the works for construction of new fixed assets and also extension, reconstruction and modernization of acting fixed assets, capital repair.

The construction material industry can be shown to have the following characteristics:

- Labor intensive and high technology industry
- Multi-product and small-lot-sized production
- Dependence on business fluctuations of forwarding industry, i.e. construction industry
- High entry barriers due to large initial investment and technology requirements
- Production heavily relies on supply of raw materials

Multi-product and small-lot-sized production characteristics make it difficult to localize most multi-products in a short time period. Economies of scale cannot be achieved for every item in a small economy. An efficient distribution network or system is very important to supply such multi-products to a whole country. Small-lot-sized production is suitable for small and medium enterprises. The construction industry is extremely sensitive to the business environment and economic fluctuation. For material industries like cement, iron, steel and glass, huge initial investments are necessary to build production sites, which effectively erect barriers to entry, keeping out new competitors. The competitiveness of these capital intensive industries is mainly determined by facility productivity whether newly built or not. Some fine chemical products like paint or special glue are high technology products and there are technological entry barriers in one form or another. Logistic costs of raw materials, such as limestone, are very high, so that low-end material industries, such as cement factories, should be located close to raw material suppliers. For high-end products, factories should be close to consumption markets in big metropolitan areas. Production of low end ceramic products is dependent on supply of raw material like clay. Fine ceramic products are high technology products.

3.3.2. Current State and Problems of the Construction Material Industry in Kazakhstan

As of 2008, the total production of construction materials in Kazakhstan amounts to 3.3 billion dollars, equivalent to 4% of total industrial production. Total imports for this industry are worth 2.9 billion dollars and the average import ratio stands at 46.7%. The total number of firms in the Kazakh Construction Material Industry is 1,237 companies.

(1) Cement

Cement production in Kazakhstan has increased by 24% annually between 1997 and 2007 with yearly production standing at 5.2 million tons as of 2008. During the same time period, domestic demand has increased by 25.4% per year while imports have increased by 31.3% annually from 1999 to 2007. The import ratio peaked at 38.4% in 2007. Cement prices increased from 47.6 dollars/ton in 2002 to 124.6 dollars/ton in 2008, representing an annual growth rate of 17.4%.

Table 3-1 | Demand and Supply of Cement in Kazakhstan

Units: Thousand tons, %

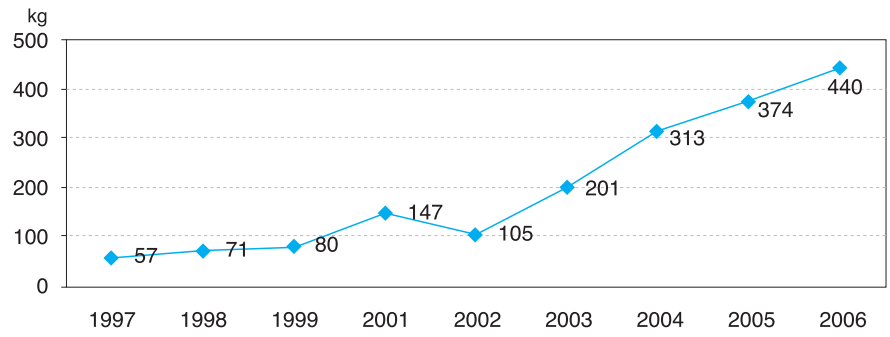
	1997	1999	2001	2003	2005	2007	2008	AnnualGrowth Rates ('97-'07)
Production	661	838 (40)	1,957 (67)	2,520 (25)	3,975 (9)	5,671 (16)	5,200 (-8)	24.0
Import		400 (-15)	225 (-25)	483 (61)	1,894 (83)	3,534 (41)	1,980 (-44)	31.3
Export				15 (25)	4 (33)	0.15 (-85)	131 (87,819)	-68.4
Consumption	961	1,200 (13)	2,182 (71)	2,989 (30)	5,672 (21)	9,205 (24)	7,049 (-22)	25.4
ImportRatio		33.3	10.3	16.2	33.4	38.4	28.1	

Sources: Republic of Kazakhstan, CEMBUREAU (EU)
Notes: 1) Statistics in parentheses are growth rates comparing to the previous years.
2) Import Ratio = Import/Consumption

The number of countries from which cement is imported has recently increased. In 2005, Russia alone was the source of 82%[4] of total cement imports to Kazakhstan, while China supplied another 12.9%. In 2007, Russia accounted for only 21.1% of cement imports to Kazakhstan, while China had become the number one source of cement with a market share of 23.6%. The import market share of Iran and Turkey jumped dramatically from 2.7% in 2005 to 23.2% in 2007 and from less than 1% to 22.2% in 2007 respectively.

As shown in the following graph, average Cement consumption per person sharply increased from 57 kilograms in 2002 to 440 kilograms in 2006. Cement consumption increased 43% per year between 2002 and 2006 due to the unprecedented boom in the construction industry.

Figure 3-2 | An Average Cement Consumption per Person in Kazakhstan



Source: CEMBUREAU(EU).

4) The shares are based on volume not in terms of value. The raw data are from Jee Young Hwang et al.(2008)

(2) Ceramic Tiles

Ceramic Tiles production in Kazakhstan increased by 3.3% annually between 2002 and 2007. The import of Ceramic Tiles, however, increased by 26.2% per year over the same period, while consumption of Ceramic Tiles increased by 24.8% annually. The import ratio in 2007 recorded 96.6% in 2007 and has been at least 91% in each of the past 6 years, except in 2008 when the construction industry fell into recession due to the world economic crisis. The Kazakh government was very much concerned about this great dependency on imported Ceramic Tiles and other construction materials. The price of imported Ceramic Tiles jumped from 3.9 dollars per square meter in 2002 to 6.2 dollars per square meter in 2008. Major suppliers are Russia (46.4% of total ceramic tiles import), China (34.5%) and the EU (10.3%).

Table 3-2 | Demand and Supply of Ceramic Tiles in Kazakhstan

	2002	2003	2004	2005	2006	2007	2008	AnnualGrowth Rates ('02-'07)
Production	562 (25)	694 (24)	770 (11)	490 (-36)	707 (44)	660 (-7)	473 (-28)	3.3
Import	5,842 (94)	8,560 (47)	9,986 (17)	9,017 (-10)	14,690 (63)	18,728 (27)	19,065 (2)	26.2
Export	2.4 (-7)	4.9 (106)	0.3 (-94)	0.3 (-3)	0.1 (-75)	0.1 (-6)	0.1 (10)	-47
Consumption	6,402 (85)	9,249 (44)	10,756 (16)	9,507 (-12)	15,507 (62)	19,388 (26)	19,538 (1)	24.8
Import Ratio	91.3	92.6	92.8	94.8	95.4	96.6	46.4	

Sources: Republic of Kazakhstan, CEMBUREAU(EU)
Notes: 1) Statistics in parentheses are growth rates compared to the previous years.
2) Import Ratio = Import/Consumption

(3) Sanitary Wares

The production of Sanitary Wares in Kazakhstan moderately increased from 96 thousand tons in 2002 to 122 thousand tons in 2008. Domestic consumption increased from 204 thousand tons in 2002 to 267 thousand tons in 2008, imports, however increased by 11.2% annually between 2002 and 2007. As a result, the average import price of Sanitary Wares has increased by 9.3% annually between 2002 and 2008. As of 2008, the average import price is 1,293 dollars/ton. The import ratio peaked at 64.2% in 2005 and has since fallen to 53.9% (2008).

Table 3-3 | Demand and Supply of Sanitary Wares in Kazakhstan

Units: Thousand tons, %

	2002	2003	2004	2005	2006	2007	2008	AnnualGrowth Rates ('02-'07)
Production	96 (-4)	100 (4)	107 (7)	111 (4)	103 (-7)	111 (8)	122 (10)	2.9
Import	108 (21)	123 (14)	156 (27)	199 (28)	175 (-12)	184 (5)	144 (-22)	11.2
Export	0.4	1.0 (164)						
Consumption	204 (8)	222 (9)	263 (18)	310 (18)	278 (-10)	295 (6)	267 (-10)	7.7
Import Ratio	52.9	55.4	59.3	64.2	62.9	62.4	53.9	

Source: Republic of Kazakhstan

(4) Ceramic Bricks and Other Construction Materials

The domestic production of Ceramic Bricks has increased by 22.8% annually between 2002 and 2007, while domestic demand has increased by 26.9% annually during the same period. Between 2002 and 2007, imports increased by a dramatic 57.6%. As a consequence, the average import price of Ceramic Bricks increased from 91 dollars/cubic meter in 2002 to 202 dollars/cubic meter in 2008. Importers active in the construction material industry took advantage of this price hike and realized additional profits.

Table 3-4 | Demand and Supply of Ceramic Bricks in Kazakhstan

Units: Thousand m^3, %

	2002	2003	2004	2005	2006	2007	2008	AnnualGrowth Rates ('02-'07)
Production	376 (92)	379 (1)	465 (23)	681 (46)	812 (19)	1,050 (29)	744 (-29)	22.8
Import	29 (24)	79 (173)	136 (71)	208 (53)	256 (23)	282 (10)	92 (-67)	57.6
Export	0.1 (-34)		0.2	0.1 (-34)	0.3 (77)	0.5 (96)	8.3 (1,529)	
Consumption	405 (85)	458 (13)	601 (31)	889 (48)	1,067 (20)	1,331 (25)	828 (-38)	26.9
Import Ratio	7.2	17.2	22.6	23.4	24.0	21.2	11.1	

Source: Republic of Kazakhstan

Kazakhstan also imports most of its plate glass from Iran, Poland, China and Russia. Even though Kazakhstan exports a lot of iron and steel products, rebar and pipe are imported from Russia, China, Ukraine and Turkey. The total value of rebar and pipe imports is estimated to have amounted to 2.4 billion dollars in 2007. Total exports of iron products including Ferro-

alloys, hot coil, and cold rolled sheet amounted to more than 3 billion dollars in 2007. Major export countries are Russia, Iran, Korea and the Ukraine. The import of wood products such as furniture, plywood and pulp amounts to approximately 1 billion dollars with an import ratio of about 50%. Kazakhstan's paint imports amounted to 23 million dollars in 2007. Major import countries are Russia (33%), Turkey (12%), Sweden (7.7%) and the UAE (7.5%)[5].

(5) Problems of Construction Material Industry in Kazakhstan

There are many opportunities to promote the construction material industry in Kazakhstan. First of all, original raw materials such as limestone, clays, silica, etc are abundant. In addition, a large demand for construction materials exists in Kazakhstan and the prospects of the domestic construction industry are good. The government forecasts an annual growth rate of 7.9% for the construction- and construction material industry for 2009 through to 2014[6]. The construction of apartments and houses will restart as the world economy recovers in 2010, because the demand for new apartments and the development of residential areas will increase as income levels increases. The government will also expand investment in infrastructure such as highways, bridges, harbors and power plants. Furthermore, the government is eager to promote the construction material industry and cluster projects.

On the other hand, the construction material industry in Kazakhstan confronts a variety of problems as listed below:

- High logistic cost and monopolistic market
- Low level of production technology and outdated "dry" production methods
- Energy inefficiency in operating cement plants
- Lack of financing for a new plant construction
- High import ratio in most construction materials
- Planed construction of new plants located away from consumption markets
- Imbalanced regional development: no cement plants in the Northern and Western regions of the country
- Big price differences of construction materials across regions
- Inadequate range of domestic products to fully cover the needs of the construction industry

The lack of an efficient logistic infrastructure, for example railways and highways heightened logistic costs by approximately 150 percent on average from 2000 to 2006. The increased logistic costs led to the import of construction materials from neighboring countries and caused big price disparities. A few large companies dominate the logistic market. Almost half of the domestic market is supplied by imported goods. Poor quality of domestic products in

5) For more details, see Jee Young Hwang et al.(2008)

6) Demand for Cement in 2014 will be 16.8 million tons, forecasted by the Kazakhstan government.

construction materials comes from low level of production technology and outdated "dry" production methods. The existing plants are too old to save energy and technical innovation is necessary to accelerate localization and increase the supply of domestic products.

Some of the new plant construction plans are not feasible and may fail to induce foreign direct investment. From a foreign investor's point of view, some of the planned projects may not be profitable because neighboring Russia and China are planning to construct new plants and competition in this market will be high. Even if consumers want to purchase domestic products, domestic suppliers cannot provide a variety of construction materials but only a limited range of products.

In addition, the construction industry has overshot, so far as dominating over the manufacturing industry. So, in Kazakhstan, the constructional material industry which is a manufacturing industry has no strong base yet. As shown in the table below, the number of registered entities in the manufacturing sector is 19, 613 but that in the construction sector is 33,346. The share of small and medium sized firm is bigger in construction than in manufacturing.

Table 3-5 | Number of Registered Legal Entities by Size

(Units: companies, %)

	All industries	Manufacturing	Construction
Small	253,689 (94.5)	18,398 (93.8)	32,367 (97.1)
Medium	12,595 (4.7)	866 (4.4)	764 (2.3)
Large	2,280 (0.8)	349 (1.8)	215 (0.6)
Total	268,564 (100.00)	19,613 (100.00)	33,346 (100.00)

Source: The Agency of Statistics of the Republic of Kazakhstan
Notes: 1) statistics in parenthesis are shares in total.
2) Small: up to 50 persons
Medium: from 51 up to 250 persons
Large: more than 250 persons
3) As of January 01, 2008

3.3.3. Development of the Construction Material Industry in Korea and its Implications

(1) Development of the Construction Industry in Korea

Development of the construction material industry in Korea began with the establishment of cement plants in the 1960s. The cement industry is representative of the construction materials industry in terms of market size and policy-making in Korea. The various development stages

and the policies adopted for the cement industry are as follows:

- 1963-67 : active promotion policy for building cement plants
- 1969 : sufficient supply for domestic demand
- Early 1970s : strong export driving policy to solve oversupply problem
- 1978 : exports are prohibited due to excess domestic demand
- Early 1980s : severe slump due to recession in the construction industry after the second oil shock
- Late 1980s : recovery from recession thanks to the Asian Games and Olympic Games

As of 1961, South Korea only had two cement companies with a total production capacity of 0.5 million tons. Until the mid-1960s, Korea was a cement import country. Thanks to government promotion policy in the 1960s, cement production capacity expand to 6.9 million tons in 1971 and 8 companies were competing in the domestic market. Exports increased to more than 1 million tons per year in 1971. From 1962 onwards, the Korean government set 5 year economic plans, which provided a blueprint for the governmental long term policy and helped the people to understand it. One of the major targets in the 1960s and 1970s was export promotion. To implement these long term policies the government held monthly- and ad hoc meetings between the public- and private sector. Thanks to these positive measures, Korea achieved its export targets in advance. The well known motto during this development stage was “export of all industry products”. In the 1960s, the top 10 export items included iron ore, tungsten ore, raw silk, anthracite, cuttlefish, live fish, natural graphite, plywood, rice, and bristles[7]. In the 1970s, it included textiles, plywood, wigs, iron ore, electronics, fruits & vegetables, footwear, tobacco, iron & steel products, metal products. In the 1980s, the top 10 exports were textiles, electronics, iron & steel products, footwear, ships, synthetic fibers, metal products, plywood, fish, electrical goods.

In the 1980, Korea’s cement industry had developed so far that it could compete with advanced countries, which had old facilities and lower productivity. The Korean cement companies developed new products making use of their advanced technology. In the early 1990s, cement industry grew rapidly to meet the growing demand for apartment construction. The currency crisis in 1997-98 hit the construction and cement industries heavily. Halla Cement went bankrupt and foreign investors took over Halla Cement.

(2) Current State of the Korean Cement Industry

The table below shows that there are 11 cement companies in Korea and that their annual production volume is 47 million tons. The Korean cement industry employs 6,639 people and consists of 13 kiln plants with a total of 51 kilns, .27 grinding plants and 117 terminals with 174

7) Cited from Doo-Gyu Park(2009).

silos that have a capacity of 1.2 million tons.

Table 3-6 | Scale of Cement Industry in Korea (2005)

No. of Companies	11
No. of Kiln Plants	13
No. of Grinding Plants	27
No. of Kilns	51
Capital (Million Won)	919,617
Cement Production(1,000t)	47,195
Domestic Consumption(1,000t)	46,283
No. of Employees	6,639
No. of Distribution Terminals(Silos)	117(174)
Terminal Capacity(1,000t)	1,154

Source: Korea Cement Industrial Association
Notes: 1) White cement not included.
2) Exported clinker not included.

Ssangyong is the largest cement company in Korea and Tong Yang is the second largest. Most of the larger companies were established in the 1960s although Dong Yang and Asia were founded in the 1950s. Production figures and the number of employees at companies producing 'white cement' are not included in the above table. Most cement companies are affiliated with big construction companies. Halla, which was established in 1978, but went bankrupt during the 1997-98 economic crisis was taken over by Lafarge. The new company is called Lafarge Halla Cement Corporation. Lafarge Halla has the third largest production volume followed by Sungshin.

Table 3-7 | Status of Companies (2005)

Company	Established	Production(1,000 t)	No. of Employees
Tong Yang	1957.6	7,227	967
Ssangyong	1962.5	11,884	1,283
Hanil	1961.12	4,374	700
Hyundai	1963.9	4,794	1,019
Asia	1957.4	2,859	480
Sungshin	1967.3	6,081	913
Korea	1962.12	1,424	167
Lafarge Halla	1978.1	6,222	671
Hankook	1976.2	1,610	126
Daehan	1995.4	720	90
Total		47,195	6,416

Source: Korea Cement Industrial Association
Notes: 1) White cement not included.
2) Exported clinker not included.

In Korea, the production share of Blended cement has increased to 17% in 2005. The share was 2.5% in 1980, 3.7% in 1985 but jumped to 6.1% in 1990 and 9.9% in 2000. In the Portland Cement category, the ordinary type of production is overwhelming with the share of this type of production being 94.4% in 2005.

Table 3-8 | Cement Production by Type

		80	85	90	95	00	01	02	03	04	05
Portland Cement	Ordinary	15,043	19,056	31,268	51,135	44,256	44,923	47,077	49,465	43,772	36,950
	Moderate Heat		425	108	5	1,739	1,378	2,279	1,745	1,710	1,991
	High Early Strength		8	19	40	7	18	26	59	39	47
	Sulphate Resisting	132	229	126	339	156	108	71	24	6	6
	Other		26	3	2	23	51	82	54	67	155
	Total	15,175	19,744	31,524	51,521	46,181	46,478	49,535	51,347	45,594	39,149
Blended Cement	Blast Furnace Slag	398	754	2,051	3,609	5,074	5,568	5,979	7,847	8,736	8,046
Total		15,573	20,498	33,575	55,130	51,255	52,046	55,514	59,194	54,330	47,195

Source: Korea Cement Industrial Association

The import of cement has been increasing recently. In 2001, imports stood at 1.1 million tons and increased to 1.9 million tons in 2003 and 3.4 million tons in 2004. All imports are sourced from China (56%) and Japan (44%). Imports from China increased due to its low price.

Cement exports in 2005 were 6 million tons. The largest export market for Korean cement is America. In 2005, 2.5 million tons of cement were exported to the United States. The U.S. account for 41.5% of Korean cement exports with Japan being the second largest export country with a share of 14.6%. Other major destinations for Korean cement are Nigeria, the Dominican Republic, South Africa, Ghana, Qatar and Guatemala, etc.

Table 3-9 | Export and Import (2005)

(Unit: 1,000 tons)

Export		Import	
U.S.A	2,475	China	1,905
Japan	871	Japan	1,498
Nigeria	755		
Dominica Republic	346		
South Africa	295		
Ghana	222		
Qatar	185		
Guatemala	164		
Ivory Coast	142		
U.A.E	142		
Others	373		
Total	5,970	Total	3,403

Source: Korea Cement Industrial Association
Notes: Clinker included.

As of 2004, Korea was ranked 5th in the world for both cement production and consumption with a market share of 2.6%. Korea's export market share was 2.8% and ranked 12th. The share of Korea's import reached 2.3% and ranked 9th. The consumption per person is 1,097 kilogram a year and ranked 12th in the world.

Table 3-10 | Status of Korea's Cement Industry ('04)

	Shares in World Market(%)	Rank
Production	2.6	5
Consumption	2.6	5
Consumption per person	-	12
Export	2.8	12
Import	2.3	9

Source: Korea Cement Industrial Association
Notes: 1) White cement not included.
2) Exported clinker not included.

(3) Lessons from Korea's Experience to Promote Construction Materials

Many lessons can be learnt from Korea's development experience. First of all, Korea adopted a top down development policy, combining of a demanding vision with multi-year plans. To develop the economy and industry, the government adopted a kind of evolutionary approach based on pragmatism and feedback. In the beginning, the Korean government adopted a strong conventional industrial policy and successfully implemented it. As the Korean economy and industry were developing more and more, government policy increasingly tilted towards indicative planning. Another big lesson from Korea is the importance of export orientation. It is imperative to exploit economies of scale and overcome the limit of the domestic market.

Since the beginning of industrialization, the Korean government has never given up on its import substitution policy, even when it was not explicitly stressed in a specific industry. The government has been heavily investing into further localization. In the early stage of development, localization focuses on low and medium technology products. Now, R&D investment is concentrated on high technologies and fundamental research. In a small open economy, however, it is not necessary to enhance the local content ratio or achieve localization for every industry or item, not only because of technological problems, but also profitability issues. The following table shows local content ratios in Korea. The localization rate of all manufacturing industries is 76.5%. The localization rates for some fine chemical products such as ink, paint and coating are much lower than those for petrochemicals, rubber & plastics and motor vehicles. This implies that a country should not be overly ambitious to achieve

localization even though Korean's localization ratio may not be considered the optimal level in manufacturing industries of other countries.

Table 3-11 | Local Content Ratios in Korea (2005)

(Unit: %)

Manufacturing	76.5
Petrochemical	74.4
Fine chemical	69.7
Ink, Paint, Coating	44.8
Rubber & Plastics	89.5
Non-metallic mineral products	87.0
Plate Glass	28.3
Ceramic product	51.1
Basic precious and non - ferrous metals	56.0
Electrical equipment	76.0
General machinery	63.7
Moto vehicles and trailers	93.2

Source: Bank of Korea, Input/Output Tables

Another lesson comes from from Korea's logistics system during the development of the construction materials industry. Before the first Korean highway was opened in 1970, transportation of heavy materials and bulky products had totally relied on railway transportation. The share of trucks in the transportation of cement considerably increased in the 1980s and 1990s as shown in the table below. Using trucks is more convenient and cost effective for short distance distribution. The share of railway transport, therefore, kept decreasing from 44% in 1980 to 29.8% in 2005. The share of nautical transportation was high, as export volumes are included in this form of transportation. To assume the supply of heavy construction materials, a functioning transportation infrastructure should be assured. In Korea, the railway extension is 34.4 meter/square kilometer but in Kazakhstan it is only 5.3 meter/square kilometer. For a big land country like Kazakhstan the establishment of a railway hub might be economical. Short distance transportation from the hub could be covered by trucks.

Table 3-12 | Transportation of Cement in Korea

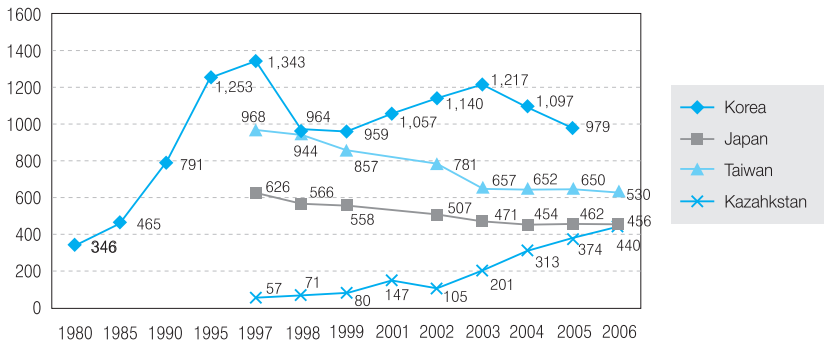
Units: Million tons, %

	Train		Truck		Vessel		Total	
1980	7.8	(44.0)	3.1	(17.5)	6.9	(38.5)	17.8	(100.0)
1990	12.4	(35.6)	12.0	(34.6)	10.4	(29.8)	34.8	(100.0)
2000	16.5	(30.7)	17.1	(31.7)	20.2	(37.6)	53.8	(100.0)
2005	14.7	(29.8)	15.9	(32.1)	18.8	(38.1)	49.5	(100.0)

Source: Korea Cement Industrial Association(KCIA)
Notes: Exports included

Based on the graph below, we may predict that Kazakhstan's demand for cement will increase at least twice as much from its current level by 2020s. In Korea, demand for cement reached its peak in 1995-1997 when apartment and office construction were booming. Cement consumption in Korea declined to less than 1,000 kilogram per person in 2005 yet this level is more than twice that of Kazakhstan. For Taiwan and Japan where population density is very high, the average cement consumption per person has continuously declined.

Figure 3-3 | Comparison of an Average Cement Consumption by Country



Source: CEMBUREAU (EU).
Note: kilogram/person for a year

3.3.4. Promotion Strategies

From the analysis of the current situation and the known difficulties Kazakhstan is facing in developing its construction material industry, the review of Korea's experiences, may yield the following suggestions.

First, the quick launch of a new project is most important. In Kazakhstan, new projects related to construction materials, such as the building of new cement plants are in process. In reality, most of them are not under construction because of financing problems. To attract foreign direct investment for these projects, strong incentives and/or deregulation for foreign investment should be provided. The rearrangement or rescheduling of these projects may be necessary to improve the chances of success for these projects. The development of a well-designed master plan is required to evaluate planned projects critically and prioritize them.

Second, the establishment of a technological institute for construction materials is necessary to localize and upgrade technology know-how. The institute's role is to conduct researches, to solve technological problems related with this industry or localize import materials. The private sector may not have strong incentives to run a technical institute at an early stage of industrial development because of spillover effect of R&D activities. It is, therefore inevitable for a

government to sponsor such an institute. In Korea, there is the Korea Institute of Ceramic Engineering & Technology (KICET) in addition to a number of government technology institutes. In Korea, there are 35 think tanks[8] which provide valuable information and technology to the government as well as the private sector. Most public think tanks were established by the government. In addition, many private institutes were founded by big conglomerates in the 1990s. Both public and private institutes regularly provide technical and professional consulting services to their customers.

Third, it is a practical strategy to forge entities which assemble and represent the collective voices of manufacturers. For example, the manufacturer's associations of construction materials plays a major role for promoting industry wide policy making and standardization, R&D strategy setting, promotion system establishment, etc. Otherwise, individual policies or systems brought forward by firms to promote the industry may not be consistent and there is no accumulation of development know-how. For this reason, a government should ensure and provide an environment and system in which these entities may sprout out. Deregulation and/or regulation may be necessary to make those organizations work efficiently and effectively. In Korea, There are the Korea Fine Ceramics Association (KFCA) and the Korea Cement Industrial Association (KCIA) besides many manufacturers associations, such as the Federation of Korean Industries (FKI), the Korea Chamber of Commerce and Industries (KORCHAM), and the Korea Employers Federation (KEF), etc.

Fourth, to promote exports in particularly, it is imperative to establish a public organization like KOTRA in Korea and boost the private sector by acting like a general trading company. Korea Trade Investment Promotion Agency (KOTRA) was established in 1962 to promote exports and to provide information relevant for marketing and investment purposes of Korean products overseas. KOTRA currently has 98 Korea Trade Centers in 71 countries. The General Trading Company (GTC) has invaluably contributed to export promotion. GTC is a kind of trading company, that carry's various products of third companies and tries to place them overseas using their market network and strategy. GTC has been booming since the 1970s and parts of the GTC were initially developed by big conglomerates such as Daewoo. Both KOTRA and GTC were very helpful for exports of small and medium sized companies whose overseas marketing strategy were not good due to lack of information and manpower.

Fifth, in the long run, construction engineering technology should be developed to enhance the local content ratio. In general, procurement requirements for most construction materials are fixed during the design process. Foreign engineers may prefer imported products to domestic products because some of these may be of inferior quality. In this situation, domestic products cannot be supplied to construction projects.

8] The Chosun daily newspaper on January 29, 2010, reported that there are 1,815 think tanks in the United States, 428 think tanks in China, 285 ones in U.K. and 108 ones in Japan.

Sixth, the Kazakh government should expand the infrastructure for logistics. Additional highways and railways should be constructed for the distribution of construction materials. This kind of public good[9] is essential for industrial development. The expansion of transportation infrastructure would also be necessary for a more balanced development across regions. Big price disparities among regions provide an opportunity for suppliers to take advantage of consumers and to make an extra profit. To stabilize the local market and extend distribution systems including those for export, it is urgent to establish a network of cement clinker terminals.

3.4. Current State and Promotion Strategies for the Agricultural Machinery Industry in Kazakhstan

3.4.1. Background and Characteristics of the Agricultural Machinery Industry

As mentioned in the introduction, Kazakhstan has a lot of potential for agricultural machinery industry development. The employment share of the agriculture sector is 31% and arable land makes up 30% of the whole country. Export of agricultural products is increasing at a rate of 26.6% annually for each of the past 5 years. In 2008, exports of agricultural products amounted to 3.2 billion dollars and account for 4.8% of Kazakhstan's total exports. However, the share of the agricultural sector in total GDP was merely 5.6% in 2007. This implies that the agricultural sector is underdeveloped and that productivity is probably low in this sector compared to other industry sectors in Kazakhstan. To improve the productivity in the agricultural sector, mechanization is needed.

Based on potentially large demand, the government has planned to promote the agricultural machinery industry and to utilize this industry as an engine for future growth, even though the infrastructure for developing the general machinery industries has not yet been set up.

The agricultural machinery industry has the following characteristics as compared to the general machinery industry:

- Heavy seasonal fluctuation in demand and production
- Multi-product, small-lot-sized production
- Different standards and different types of machinery by country
- Technology intensive assembling industry
- Heavily influenced by government policy on agriculture sector

9) Infrastructure for transportation is a typical type of public good.

As agricultural produce changes from season to season, demand and production of agricultural machinery fluctuate according to the season. Therefore, the capacity utilization rate differs by season and agricultural machinery makers face huge inventory cost. As of 2005, the unadjusted average capacity utilization rate of the five largest Korean makers was 53.6%[10] which is far below the average of the total manufacturing sector. As a consequence, human resource requirements can be expected to be different from the ordinary machinery industry with respect to the seasonal fluctuations. During the peak season, manufacturers hire more workers to meet higher operating schedules, and in the off season less workers, while companies hold many core workers regardless of seasonal fluctuation.

Many different types of agricultural machinery are required to produce a variety of agricultural products. As a result, the industry is characterized by a multi-product and small-lot-sized production system. It is not easy to localize and achieve economies of scale. As agricultural products per se and the cultivating environment are different by country, there are various types of agricultural machinery. In other words, technological standard and model variety differ from country to country, making global standardization of technology difficult and effectively erecting a technological entry barrier to this industry. Therefore, export promotion is hard in the short term.

The agricultural machinery industry is a technology intensive assembling industry and shares many characteristics of the general machinery industry, which is a kind of representative industry for manufacturing competitiveness of a country. To promote the machinery industry effectively, the so called "supporting industries"[11] should be competitive, since the quality of the assembled machinery relies on the quality of the parts and components it is comprised of.

The demand for and the supply of agricultural machinery are directly related to a government's policy on the agriculture sector. Government subsidies or financial incentives encourage farmers to purchase certain machinery. Government policy, therefore, influences a maker's R&D investment and marketing strategy. In the 1980s, the Korean government's price ceiling on agricultural machinery resulted in low profitability and discouraged manufacturers to invest in R&D and quality control. In the mid-1990s, the "half-price" policy for agricultural machinery led to a sharp increase in the demand for these products.

10) After comprehensive adaptation including seasonal adjustment, the adjusted capacity utilization rate is 74.9%.

11) This expression is commonly used by Japanese industrial experts to evaluate competitiveness of a country's manufacturing. The supporting industry includes die-casting, forging, molding and iron & steel industry.

3.4.2. Current State and Problems of the Agricultural Machinery Industry in Kazakhstan

(1) Current State of the Agricultural Machinery Industry

The current state of the Kazakh agricultural machinery industry can be said to be less developed and small, given its low production volumes. Total production was 358 units in 2007 and it has decreased by 13.6% a year between 2003 and 2007. Kazakhstan has stopped the production of mowers and cutter bars since 2006 and now imports them. Major products are reaping machines, trailers, semi-trailers and containers.

Table 3-13 | Production of Agricultural Machinery in Kazakhstan

(Based on units)

	2003	2004	2005	2006	2007	Annual growth rate('02-'07)
Mowers, cutter bars for tractor mounting	117	31	4			
Reaping machines	310	365	338	222	259	-4.4
Trailers and semi trailers containers	215	284	213	136	99	-17.6
Total	642	680	555	358	358	-13.6

Source: Agency on Statistics of Kazakhstan, Statistical Yearbook(2008)

(2) Problems of the Agricultural Machinery Industry in Kazakhstan

Kazakhstan has a lot of opportunities to develop a strong agricultural machinery industry. First of all, 30% of the country is agricultural land. The Kazakh government emphasizes agricultural development and implements many development projects under the Industrial Innovation Development of Kazakhstan 2010-2014 Plan. Rapid economic growth led to wage hikes and a labor shortage for undesirable jobs. Many foreign workers are moving to Kazakhstan. This will result in capital gradually substituting for labor in the agriculture sector and demand for agricultural machinery increasing before long. Neighboring countries, including the Republic of Uzbekistan, the Republic of Tajikistan, Kyrgyz Republic are mostly based on agriculture and would potentially be large export markets for Kazakh agricultural machinery. The Kazakh government's strong intention to develop this industry is also considered to be as an important asset.

The Kazakh agricultural machinery industry, however, also has a lot of obstacles in its way to rapid development, primarily due to a poor infrastructure. Furthermore, the technology level in the machinery industry is poor and workers are not well trained yet. A lack of semi-skilled and skilled workers will be another hurdle to overcome. The so called "supporting industries", which include die-casting, forging, molding and components are not competitive when compared to those in developed countries. Even though per capita income has increased

considerably since 1999, farmer's purchasing power is not yet high enough to promote the agricultural machinery industry. It can be seen from the table below, that the average monthly earnings in agriculture, hunting & forestry is 19,924 tenge, which is equivalent to 162.5 dollars per month in 2007. For the past 5 years, the monthly earnings in agriculture, hunting & forestry are less than a half of that of other industries. Imbalanced regional development may be one of the reasons for this earnings gap. The average monthly earnings in the construction sector are much higher than those in manufacturing. Institutional foundation and system to develop this industry are not settled yet. Supporting system for agricultural sector is not well established and is not working effectively.

Table 3-14 | Trend of Average Monthly Earnings of Employees by Industry

(Units: tenge, %)

	2003	2004	2005	2006	2007	average annual growth rate ('03-'07)
All Industries(A)	17,583	21,102	28,536	34,045	43,841	25.7
Agriculture, hunting & forestry(B)	8,030	10,124,	13,239	15,390	19,924	25.5
Manufacturing	14,477	17,742	22,460	25,796	34,820	24.5
Construction	20,519	24,181	34,090	37,653	46,526	22.7
B/A	45.7	48.0	46.4	45.2	45.4	

Source: The Agency of Statistics of the Republic of Kazakhstan

3.4.3. Current State and Development of the Agricultural Machinery Industry in Korea and its Implication

(1) Development Stages of Agricultural Machinery in Korea

Korea's development of the agricultural machinery industry can be divided into five stages. Policies and events for each development stage are as follows:

■ Period of Import Substitution Policy (1967-76)

- Korea Agricultural Machinery Industry Cooperative (KAMICO) established in 1962.
- Decreasing population and increasing wages in agricultural sector: population in rural region moved into urban and industrialized region.
- Increased joint venture production and demand for power tiller
- 'Basic Plan of Agricultural Mechanization' adopted in 1974: based on this plan, power tillers were widely supplied to agricultural households.
- Korea Institute of Machinery & Materials (KIMM) established in 1976: KIMM played a major role in R&D for machinery and materials including agricultural machinery.
- Increased subsidies and financial incentive for farmers to purchase agricultural machinery: the following table shows decreasing share of self-financing and subsidies

transformed into favored financing with low interests

Table 3-15 | Financial Incentives for Consumer of Agricultural Machinery

Units: 1,000 Korean Won, %

	Prices	Subsidies	Government Financing	Self-financing
1970	338	75(22.3)	101(30.0)	161(47.7)
1971	360	25(6.9)	155(43.1)	180(50)
1972	325		228(70)	98(30)
1973	382		229(60)	153(40)
…				
1977	633		380(60)	253(40)
1978	716		501(20)	215(30)
1979	818		573(70)	246(30)
…				
1982	1,306		914(70)	392(30)

Note: Statistics in parentheses are growth rates comparing to the previous years.

■ Take-off Period (1977-81)

- "Agricultural Mechanization Acceleration Act" announced in 1978
- Localization plan for agricultural mechanization launched in 1979
- Korea Institute of Agricultural Mechanization founded in 1979
- The Second Five Year Plan for Agricultural Machinery Supply
- Farm Tractors, Combines, and Rice Transplanters were widely supplied.

■ Slump Period (1982-87)

- Price ceiling policy of 1982 on agricultural machinery, leads to lower manufacturers' profitability
- Weakened motivation for R&D and quality improvement
- Deepened over-capacity problem due to sluggish demand
- Various roles of National Agricultural Cooperative Federation (NACF):
  - ▶ Providing farm loans, credit service and cooperative insurance for farmers
  - ▶ Expediting farm mechanization
  - ▶ Running farm machinery service centre
- Since 1987, strengthening import substitution policy for machinery that has a large spillover effect on other machinery.

■ Recovery Period (1988-93)

- As labor shortage became more serious in the agricultural sector, the government

increased the supply of agricultural machineries.
- To cope with the Uruguay Round (UR), the government strongly drove its agricultural mechanization plan.
- Lifting price ceiling policy for agricultural machinery
- More financial support for farmers: lowered interest rate from 8% to 5% on loans for purchasing agricultural machinery
- Increased government investment in agricultural mechanization project
- "Half priced" policy for agricultural machinery adopted (1993-97): because of this policy in the mid-1990s, government's subsidy was temporarily increased.

Table 3-16 | Government Financial Aid for Agricultural Machinery

(Unit: Billion Won)

Year	1990	1995	2000	2005	2006
Loan	374.4	368.9	780.1	412.4	416.9
Subsidy	46.1	310.9	-	-	-
Total	420.5	679.8	780.1	412.4	416.9

Source: Agricultural Machinery Yearbook, 2008

■ Exporting and Restructuring Period (1994-present)

- As the agricultural machinery industry was developed on the basis of a government policy towards the agricultural sector and farmers, it was a domestic market oriented industry until 1980s.
- In 2000 - 2006, export increased by 17.3% annually while import increased by 16.7%.
- Major export products: tractor, cultivator, rice transplanter
- Major export countries: U.S., China, Japan, Australia, U.K., Spain, Thailand
- Major import products: tractor, rice transplanter, combine
- Major import countries: Japan, U.S., Germany, Italy, China, U.K.

Table 3-17 | Import & Export of Agricultural Machinery in Korea

(Unit: Million Dollars)

Year	2000	2001	2002	2003	2004	2005	2006
Export	134.8	146.4	147.5	225.2	279.2	341	350.9
Import	131.8	134.2	118.1	153.2	221.4	282.3	332.2

Source: KAMIC, Agricultural Machinery Yearbook, 2008

- Restructuring in the late 1990s due to the economic crisis in 1998 and over-capacity problems because due to lower domestic demand was contracted by as a result of the severe credit crunch.
- Under the matured world market, Korean manufacturers are eager for outward FDI, M&A, strategic alliances with companies of developed countries, etc.

- Total supply of agricultural machinery is continuously decreasing: domestic demand is almost saturated.
- Korean makers' target item is the mid- and large sized tractor and engine.

Table 3-18 | Annual Supply of Agricultural Machinery in Korea

(Unit: Thousand)

Year	1990	1995	2000	2005	2006
Total Supply	152.9	245.9	121.2	54.8	55.5

Source: KAMIC, Agricultural Machinery Yearbook, 2008

(2) Current State of Korea's Agricultural Machinery

In Korea, power tiller, farm tractor, rice transplanter, combine and cultivators are the major products manufactured by the agricultural machinery industry. Production of power tillers and rice transplanters were high in 1980s-1990s, but have been decreasing since the late 1990s. The reasons for this decrease were the substantial reduction in the number of farm households, farm population, and cultivated areas in the 1990s. However, the production of farm tractors has been increasing recently due to a substantial growth in exports. Major exporting countries are the U.S., Australia, Japan, and U.K. The production of rice transplanters and combine has decreased recently as the agricultural sector shrunk and imports increased.

Table 3-19 | Domestic Production of Major Agricultural Machinery in Korea

(Each Unit)

Year	Power Tiller	Farm Tractor	Rice Transplanter	Combine	Cultivator
1985	68,773	3,438	16,162	3,813	-
1990	52,707	16,441	41,603	15,392	25,479
1995	89,350	16,192	29,345	6,754	51,091
2000	7,005	23,315	20,854	11,714	9,890
2004	4,197	26,590	7,367	4,058	15,447
2005	4,793	31,594	5,640	4,163	17,837

Source : Korea Agricultural Machinery Industry Cooperative (KAMIC), Agricultural Machinery Yearbook, 2008

3.4.4. Promotion Strategies for the Kazakh Agricultural Machinery Industry

Based on the analysis of industrial characteristics and Korea's development experience, we may propose the following strategies to promote the Kazakh agricultural machinery.

First, establishing an institutional foundation is the basis for developing the industry. To improve the technology level in the machinery industry, foundation of a technological institution is important. In the beginning, it may not be necessary to establish an institute which

concentrates on or specializes in agricultural machineries. Instead, an R&D institute for basic technologies would be practical to improve the technology level of a country. Due to the industrialization process, more advanced and specialized technologies will be needed to promote a specific industry.

Second, to set up a practical development measure, a collective voice for policy establishment and enforcement is needed, and for this purpose, a manufacturers' association for the industry will be crucial. Manufacturer's association of an industry plays a major role for promoting the industry in policy making, R&D strategy setting, promotion system establishment, and so on. Otherwise, policies or systems in promoting the industry may not be consistent, resulting in no accumulation of the development know-how. An entity that takes full responsibility is important to develop a specific sector.

Third, the government should take various measures to induce foreign direct investment and joint venture production. A country can hardly be self-financed and needs the support of foreign technologies in developing an industry. At the early stages of industrialization as can be seen in the agricultural machinery industry in Kazakhstan, KD or CKD[12] production is commonly adopted. As economy grows, governments encourage localization. Major agricultural machinery companies were founded in the 1960s and 1970s as joint venture companies, mostly with Japanese firms. In the beginning, KD production was dominating the market, but thanks to the localization process in the 1970s and 1980s, Korean companies were able to increase exports to Japan from the 1990s. To overcome the limits of the domestic market, which seem to be almost saturated, the Korean agricultural machinery companies are currently eager to invest in foreign countries, such as China and India. In Tsingtao China, LS Mtron, a Korean maker, is constructing a factory which is capable of producing 30 thousand tractors a year, and these are targeted for the Chinese market. Another Korean agricultural machinery maker, Daedong Co., has been operating a factory for rice transplanters and combine in Nanjing and plans to build a new factory for producing tractors in China. Tong Yang Moolsan Co. is exporting rice transplanters to India and expanding the export volume. In this sense, Korean agricultural machinery makers could be strong candidates for the joint venture investment in Kazakhstan.

Fourth, the government should provide more financial incentives to consumers in order to enhance purchasing power and easily substitute labor for machines. Although subsidy is generally prohibited under the WTO system, some exceptions occur for developing countries or those regions that are seriously lagging behind. Many WTO member countries still provide huge incentives for farmers. Government's incentive scheme should also include those aids to compensate extra inventory cost of manufacturers.

12] KD implies 'knock-down' production and CKD does 'complete knock-down' production. In other words, knock-down production means import components and assemble them.

Fifth, promoting the supporting industries and part industries is required. The competitiveness of supporting industries, such as die-casting, forging, molding, significantly influences the parts and assembling industry of machinery. In the beginning, Korea adopted a policy to develop the assembling companies as a joint venture with foreign companies to take advantage of the abundant manpower. This strategy enabled Korea to increase export faster than any other countries. As the export of assembled products increased, the import of parts and components from developed countries, such as Japan, increased as well. A large share of value-added from export was given to those countries that exported major parts and components. Although the Korean government adopted the import substitution policy, particularly for parts and components, we are still dependent on import in many items and materials.

Sixth, manpower planning and vocational training are essential for rapid economic development. Human resource development is the most effective strategy. Strengthening the vocational training system provides many skilled and semi-skilled workers for the machinery industry. In 1981, Korea founded a comprehensive vocational training system in collaboration with Germany[13]. A number of young people were trained under this system and they worked in production factories. In order to upgrade the agricultural machinery in the near future, it is important to open more machinery or agricultural machinery departments in engineering schools.

13) In 1981, Korea Vocational Training Management Corporation was established. It is currently renamed as Human Resource Development Service of Korea.

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Chapter 04

Automobile Industry Promotion Project in Kazakhstan: Finding Potential and Cultivating Capacity for Commercial Vehicles

Chapter 04

Automobile Industry Promotion Project in Kazakhstan: Finding Potential and Cultivating Capacity for Commercial Vehicles

Hawon Jang (Korea University)
Joon-kyung Park (KDI)
Sejun Mo (Hana Institute of Finance)

4.1. Kazakh Automobile Industry Today

4.1.1. The Current Status of the Automobile Industry

(1) Automobile Market and Forecast

The automobile market in Kazakhstan is the third largest among the CIS economies. It has recorded a tremendous growth rate by an average of 70% per annum since 2002, though starting from a small base. The number of registered cars as of 2007 is 2,180,000 for passenger cars and 440,000 for commercial vehicles. The number of car possession per 1,000 people is approximately 170, which is the third largest among the CIS countries after Russia and Belarus.[1)] Compared to the Western advanced economies and some Eastern European countries, however, the automobile saturation rate is still low, which, in turn, implies that there is high potential for growth in the automobile market.

The rapid growth rate of auto market in Kazakhstan is due to those factors such as rapid rise in income, imports of diversified sales models, expansion of consumer credit from banks, lax government regulation in comparison to the neighboring countries, and wider network of international dealers. One thing to bear in mind is the fact that the proportion of secondhand cars is quite high, reaching up to 70%, and most of them are imported. This aging structure and the high proportion of auto imports could drag the auto market development in Kazakhstan. The high market saturation rate by imported secondhand cars may hinder domestic production in spite of the high potential for growth in the automobile industry.

1) Car Saturation Rate per 1,000 people (2007): Hungary(343), Poland(451), Bulgaria(417), Japan(591), USA(813), Germany(533), Korea(339)

Since the automobile production in Kazakhstan is minimal, the automobile market can be divided into three domains: 1) imported new cars; 2) imported secondhand cars; 3) illegally imported cars. In 2007, among the total of 375,000 car sales, domestic production was merely 6,290, while the number of imported cars recorded up to 369,000. However, the number of new registered cars was 547,000, which exceeds, by far, the car sales figure. This means that, apart from official imports, there is a considerably larger number of illegally or unofficially imported cars. The magnitude of illegal automobile trading is assumed to have reached up to 172,000, mostly being secondhand cars.

The Kazakh government has applied the uniform import tariff rate of 10% on automobile products, which is the lowest among the CIS countries. Thes tariff rate is applied equally to all sorts of automobiles regardless of age (old and new), while other CIS countries apply different rates according to age and type. This situation allows massive influx of foreign cars, especially secondhand ones. The number of secondhand car import via official routes amounts for 342,000, and if unofficially imported cars are taken into account, the total import figure of secondhand cars could exceed 500,000, which is 94% of the market share.

Since consumer demand is skewed on cheap ones, 70% of imported cars are, on average, 6~8 year old secondhand cars, causing serious pollution problems. In order to tackle this environmental hazard, the government has strengthened the emission control regulation by adopting the 'Euro-2' standard. This will help the aging structure improve by limiting import of old cars that fail to satisfy the standard. Also, the government has announced the plan to raise the tariff rate to 30% in order to promote domestic automobile industry. If the tariff rate is to be raised without the development of the domestic production base, however, that might hinder the growth of the auto market and, in turn, the growth of the economy as a whole.

Table 4-1 | Automobile Statistics of the CIS Countries

Country	Population (1,000 people)	GDP per capita($)	No. of vehicles (1,000)			Auto Retention (# of car/ 1,000 people)
			Passenger Car	Commercial Vehicle	Total	
Russia	142,300	9,050	26,790	5,247	32,037	225
Ukraine	46,400	3,055	6,542	1,258	7,800	168
Kazakhstan	15,422	6,753	2,183	443	2,626	170
Belarus	9,700	4,621	1,930	116	2,046	211
Uzbekistan	27,372	704	1,306	284	1,590	58
Azerbaijan	8,467	3,691	800	103	903	107
Kyrgyzstan	5,317	704	217	286	503	95
Armenia	3,173	3,057	255	120	375	118
Tajikistan	6,736	555	185	72	257	38
Moldova	3,940	1,158	232	6	238	60
Turkmenistan	4,965	1,461	85	11	96	19
All	273,792	6,005	40,653	7,891	48,544	177

Note: As of 2007, Ernst&Young, Kazakhstan National Statistical Office

Another problem is the uneven development within the automobile industry between passenger cars and commercial vehicles. The proportion of passenger cars has increased by 5% point in 5 years from 78.1% in 2003 to 83.1% in 2008. As a result, the commercial vehicle proportion has decreased from 22.0% to 16.9% during the same period. With the income level rapidly increasing, thanks to huge revenues from export of natural resources, the demand for passenger cars has increased faster than commercial vehicles. This phenomenon is somewhat unusual during the period of rapid industrialization as, generally, the demand for commercial vehicles tends to increase faster than that of passenger cars. When Korea's economy was at the comparable level of today's Kazakh economy, the proportion of passenger cars was merely 30.5%, which is far lower than that of Kazakhstan. This implies that as the Kazakh economy develops, especially in construction and natural resources sectors, there shall be an exponential rise of demand for commercial vehicles such as trucks and buses.

In 2007, the market size of new and secondhand cars was estimated to be US$ 2.6 billion, and the market size of auto parts US$ 200 million. Since complete automobile production is negligible, most auto parts are not destined for production, but to as replacements in A/S. Parts imports are mostly sourced in Russia. Since importing parts from Russia has cost competitiveness, if not quality, due to logistics advantage and geographical vicinity, their market share exceeds 60%. Recently, however, import of automobiles as well as auto parts from China have been increasing rapidly. Chinese makers have the same advantages in logistics and cost as the Russians, but with better quality. In the future, it can be expected that Chinese manufacturer will have eroded the Russian manufacturers competitiveness, and will, therefore, become the main source of import parts in Kazakhstan.

Though the 5% tariff rate for auto parts is lower than that of other neighboring countries, the market development is rather sluggish due to the disadvantage in logistics and the weak base for a domestic complete car production. Most auto part traders have small shops, compete in a small market, while they have to deal with a large variety of different parts. However, due to oligopoly, the prices are rather high given the low quality of part supplies. If domestic production of complete cars increases and logistics conditions improve, then the auto parts market could develop in line with the complete car industry in both size and system. Also, imports from other countries other than Russia and China are expected to expand gradually.

Kazakhstan has signed a Tariff Union Treaty with Russia and Belarus since 2010. According to the treaty, more than 90% of the tariff rates are to be synchronized, and as a result, the tariff rates for automobile products are expected to rise since the Kazakh rates are low as can be seen today. Henceforth, imports from other countries other than Russia and Belarus are expected to decrease. In 2009, due to the global financial crisis, the sales rate of passenger cars and commercial vehicles decreased by 43.9% and 38% respectively than the previous year. In the future, though sales will likely recover, it may be quite difficult to reach the size of sales in the past. In particular, the sales of passenger cars may be subdued for a considerable period,

amounting for only 90,000~100,000 by 2014. This forecast has, however, only taken into account the official import statistics, and if the number includes unofficial import cars, the market size will remain as high as 300,000 a year.

Figure 4-1 | Rate of Sales by Vehicle Type

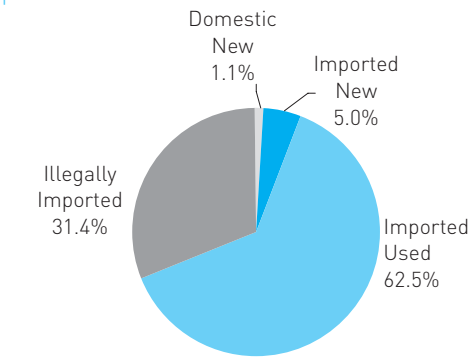
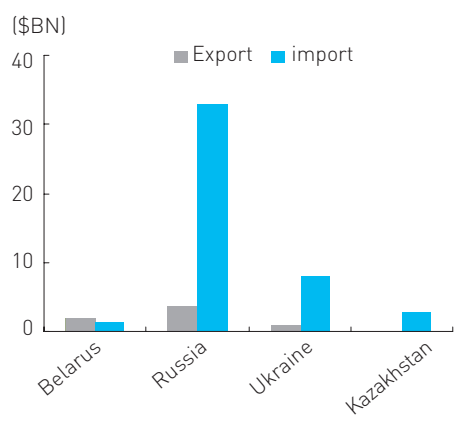


Figure 4-2 | Rate of Sales by Country



Note: as of 2007
Source: Ernst&Young, KOTRA

With the government's industrial innovative development plan being prepared and ready to be put into action, the increasing need for infrastructure will be met as the construction and logistics industries take a big leap. This, in turn, will increase the demand for commercial vehicles such as trucks of 7% a year by 2014. Truck sales is expected to reach 20,000 a year, a proportion of 17.1%, an increase of 3.5% from 2009. The total number of vehicle registration is expected to show a 2.9% increase per year, reaching a total of 2.7 million.

Figure 4-3 | Possession Rate by Vehicle Type

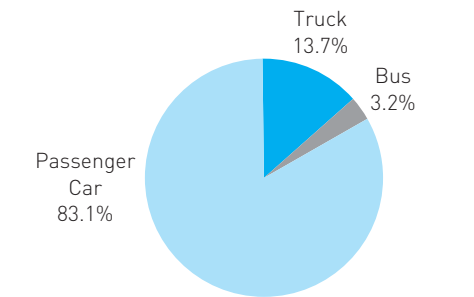
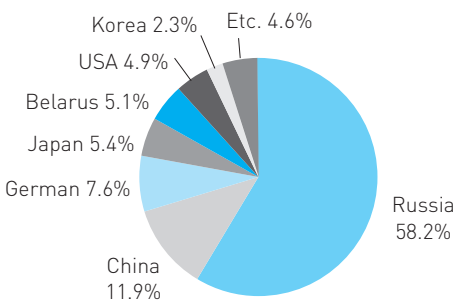


Figure 4-4 | Parts Import by Country Origin



Source: Kazakhstan Statistical Office, WTA(World Trade Arlas)

(2) Automobile Makers in Kazakhstan

'Azia Avto' is the only passenger car maker in Kazakhstan. 'Azia Avto' is the joint venture with Bipek Avto, which is the dealer of Russian AvtoVaz and GM-AvtoVaz. The production capacity is 45,000, and the models are AvtoVaz(with GM) and VW(with Skoda, a VW's Czech subsidiary). In 2008, hit by the global crisis and domestic economic recession, it produced only 3,271 cars. Recently, AvtoVaz acquired 25% shares of Azia Avto and they announced the plan to expand production capacity to 120,000 by 2010. The plan includes a blueprint of building press, chassis, and paint facilities to upgrade Azia Avto as a comprehensive automaker class. Also, in order to fulfill this ambition, they announced the plan to build auto part complex to increase local supply. It was rumored that Renault-Nissan, GM and VW, all of which that have pursued aggressive market expansion strategies into emerging markets, had considered setting up a joint venture in the region in order to enter the Central Asian market. However, given the present situation, this remains skeptical.

Figure 4-5 | Car Sales Forecast

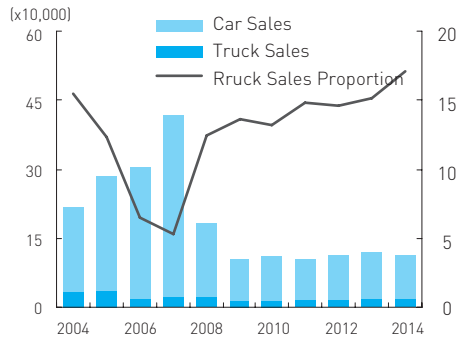
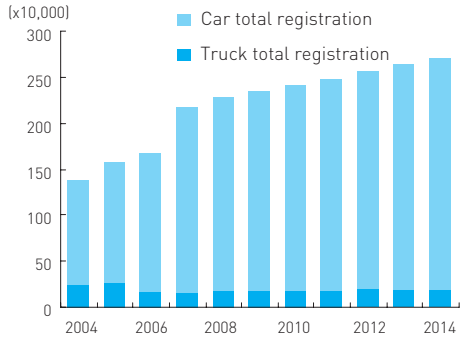


Figure 4-6 | Car Registration Forecast



Over 90% of the commercial vehicle market is dominated by the Russian brands of which the market share of 'Kamaz' is 60% and that of 'Gaz' is 30%. In 2005, Kamaz, the biggest Russian commercial vehicle marker, and Kazakhstan Engineering set up a joint venture called 'Kamaz-Engineering', which has the production capacity of 2,350 commercial vehicles (200 buses, 1,500 trucks and 650 tractor). Kamaz has 76% of the shares and Kazakhstan Engineering has 24%. However, Kamaz-Engineering has no capacity in producing essential components but an assembly line. Its products are Kamaz truck and NefAZ bus. A Korean maker, Daewoo, and a local importer, Virazh, set up the bus assembly factory in 2007 with the share being 50:50.

4.1.2. Government Industrial Policy

Among CIS countries, Kazakhstan has attracted the second largest foreign investments after Russia. During the last four years, foreign investments into Kazakhstan have increased by an average of 24.2% a year. In 2008 alone, the amount was US$ 19.81 billion. Investments by foreign enterprises mainly concentrated on natural resources and real estate development. The foreign investment proportion by sector was 39.4% for real estate construction and 15.4% for mining, while being 8.7% for the manufacturing sector. Though foreign investments in manufacturing are still high by international standards, they are mostly concentrated on machinery industries and transportation equipment investments are as low as 0.22%. Even though foreign investments focus on natural resources development, FDI into Kazakhstan have increased continuously and manufacturing investments are gradually mounting as well.

Table 4-2 | Passenger Car and Commercial Vehicle Production

Type	Company	Brand	No. of New Car			Model	Others
			2006	2007	2008		
Passenger Car	Azia Avto	AvtoVaz (Lada)	2,350	3,252	2,358	Niva, Samara	
		GM (Chevrolet)	1,481	593	344	GM-Daewoo	Cadillac will be produced
		VW (Skoda)	1,196	1,557	320		
Total			3,546	6,290	3,271		
Commercial Vehicle	Kamaz-Eng	Gaz (Kamaz-Isker)	247	149	-	Under 15 ton	Discontinued
		Kamaz (Kamaz)	852	2,150	1,898	Above 15 ton	
Total			1,099	2,299	1,898		

Note: Except bus and special purpose vehicle
Source: Global Insight (2009.9)

Many analysts see Kazakhstan as one of the most favored countries by foreign investors among CIS nations. However, due the incentives provided by the government, FDIs into Kazakhstan are smaller than what they should have been, only concentrating on specific sectors and regions. Moreover, investments in plants and fixed asset are not sufficient, which will eventually result in aging stocks. The Kazakh government amended the foreign investment law in May 2005 in order to fix the imbalance problem among sectors and regions, and to induce more investments in production facilities. According to the amended law, the taxation incentive scheme is extended from 5 to 10 years and focuses on the selected priority sectors mainly in manufacturing. Automobile industry is selected as one of the priority sectors and is granted with tax exemption on corporate, property, and land for up to 5 years. Also, the government is to provide tangible assets, such as real estate including land and facilities, to those selected industries. Moreover, it is to exempt tariffs on imports of production equipments, raw materials and intermediate goods. Based on these incentives, foreign investments in manufacturing production facilities will accelerate, allowing foreign investors to be interested in investing in

the automobile industry to exploit such opportunities and benefits.

4.2. The Framework of the Automobile Industry Promotion Policy

4.2.1. Economic Condition and Trade Environment

Traditionally during the Soviet era, Kazakhstan exported agricultural products, minerals, and metal products, while importing intermediate and finished goods. However, after the collapse of Soviet blocks, Kazakhstan had suffered a severe shortage of supplies. Since 2000, the country has achieved rapid growth and industrialization thanks to the rise in oil exports and oil prices. Since 2005, most investments have been concentrated on real estate and financial sectors, which brought about massive bad debts during the global crisis in 2008.

Table 4-3 | **FDI and Investment Rate by Industry**

(Units: million dollars, %)

Industry	FDI	Investment %
Agriculture, Hunting, Forestry and Fishing	32.5	0.2
Mining and Quarrying	3,104.4	15.4
Manufacturing	1,756.5	8.7
(Transport Equipment)	(45.0)	(0.2)
Electricity, Gas and Water supply	134.5	0.7
Construction	448.2	2.2
Wholesale and Retail trade, Repair of motor vehicles, motorcycles and personal and household goods	824.1	4.1
Hotels and Restaurants	34.3	0.2
Transport, Storage and Communication	626.1	3.1
Financial Intermediation	2,245.3	11.1
Real estate, Renting and Business activities	7,941.1	39.4
Education, Health and Social work	65.6	0.3
Activities of professional organizations, Association and unions	2,960.7	14.7
Total	19,809.1	

Source: The Central Bank of Kazakhstan (2008)

The government recently overhauled the past development framework, re-setting the investment focus on diversification of industrial capacity and upgrading the industrial infrastructure. Kazakhstan has large reserves in oil, uranium, and chromium, while also owning a considerable amount of various precious minerals. Kazakhstan is the world leader in agricultural production, especially grains, due to its vast land. It is known to have great potential in grain production, such as wheat and corn, as well as being the biggest exporter in the world. Nevertheless, the lack of processing facilities and bottleneck of logistics make such

possibilities difficult to be realized. In particular, competitive disadvantage from logistics bottleneck is a crucial hurdle to overcome.

In an effort to diversify the industrial infrastructure, the government selected seven priority sectors in the 5-year Industrial-Innovative Development Plan (2010~2014). Those sectors include agriculture and food processing, construction and construction materials, oil refining and oil & gas infra facility, metal and metal products, chemical and medicine, energy, and transportation and communication infrastructure. In particular, transportation infrastructure is a prerequisite to overcome the logistics hurdle and to exploit the geopolitical advantage of Kazakhstan connecting Asia and Europe. In order to lower expensive logistics cost, together with transportation infrastructure building, it is vital to upgrade the domestic production capacity of transportation equipments.

Table 4-4 | The Status of Transportation

Sector	Extended Length (1,000km)	Passenger		Freight	
		Loaded Q' ty (1 million)	Ratio (%)	Loaded Q' ty (1 million)	Ratio (%)
Highway	93.1	11,139.1	99.8	1,667.4	85.3
Railroad	15.1	18.1	0.2	260.6	13.3
Flight	-	2.7	0.02	25.7	1.3

Source: The Central Bank of Kazakhstan, EIU (2008)

With no access to sea, Kazakhstan's transportation system is mainly dependent upon road, railways and aviation. However, air cargo can be ignored due to the lack in aircrafts and airports. The railway system, which had mostly been built during the Soviet era, is aging and not sufficient to cover the nationwide network. Moreover, high rail freight rates due to expensive import cargo from Russia do not help alleviate the logistics problem. Also, the road system is insufficient to cover the nationwide transportation network of the vast land. In spite of the scarce road system, transportation of freight and people via road are 85.3% and 99.8% respectively. During the last four years, while road construction grew only by 1.1%, the freight transportation by road increased by 5.8%. It implies that the demand for road transportation will grow faster than building roads.

In regards to the trade structure of Kazakhstan, it exports crude oil, natural gas, and minerals, while importing machineries related to resource mining, metal, and transportation equipments. Accordingly, the trade balance depends critically on the international price of natural resources. The major trade partners are the neighboring countries like Russia and China. The proportion of imports from the two countries was 35.5% and 10.7% respectively in 2007. On the other hand, in order to diversify the industrial base, it is necessary to expand the manufacturing capacity since machinery import is accounted for 37.3%. In particular, transportation equipments account for 17.4%, which is the highest proportion among import

items. In the future, the demand for transportation equipment will be greater as the economy and logistics industry grow faster. It is the appropriate time to build the domestic capacity for automobile production.

High logistics cost is also the main obstacle to economic stability. High inflation is caused by high logistics cost and scarce distribution system. Hence, the priority is to build and expand the production capacity of commercial vehicles together with road infrastructure. The merit of building a commercial vehicle industry is that, compared to railway and aviation equipment, it is much easier to overcome technological barriers and much cheaper to build the industrial base. Even if railway systems and aviation freight infrastructure is sufficient, the last resort in the distribution system to the end user depends on commercial vehicles. Therefore, building a commercial vehicle industry is the investment priority among the transportation infrastructures.

Figure 4-7 | Export Structure

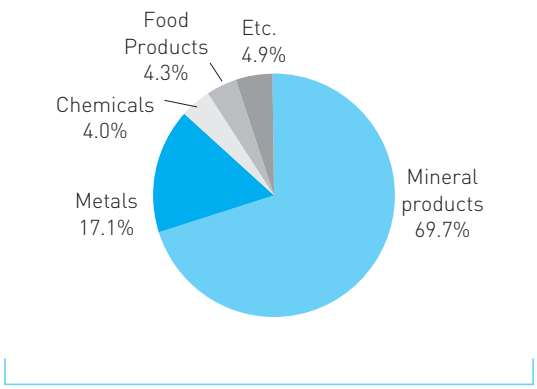
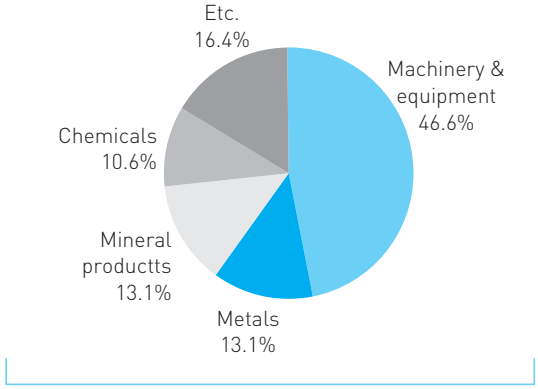


Figure 4-8 | Import Structure



Source: Kazakhstan Statistical Office, EIU (as of 2007)

4.2.2. Characteristics of the Commercial Vehicle Industry

The commercial vehicle industry is closely linked to the dfferent stages of economic development. The commercial vehicle industry is the main means of transportation of freight and people, which, in turn, grow parallel to GDP growth. Recently, the demand for commercial vehicle has grown rapidly in developing economies. China and Eastern European and CIS countries emerge as a one of the biggest markets of medium and large commercial vehicles. In 2006, the market share of these regions accounted for 21.3% and 15.5% respectively. Though European, Japanese and American makers are dominant in the commercial vehicle global market, as they are in the passenger car market also, Chinese, Russian and Indian makers' market share in the local markets have been growing fast as well. Dueto the close relationship between the commercial vehicle industry and the defense industry, the latter producers have

competitive advantage in their own backyard. As for China, the production share of the Chinese commercial vehicle makers is, surprisingly, the second in the world with 19.9%. Moreover, they are not large corporations but mostly small-scale local makers. This implies that it is not necessarily true that it be a large corporation in order to promote the commercial vehicle industry. This more or less goes for Russia as well. The Russian global share in the commercial vehicle market accounts for 10.9%. While Gaz is the major commercial vehicle producer in Russia, a considerable proportion of commercial vehicles is produced by small-scale makers. India's global market share is 8.4% which exceeds the Japanese share.

It is true that those late developers will take time to catch up with the quality of the world-class competitors. However, China and Russia who had developed commercial vehicle technologies for military purposes are rapidly upgrading their quality and marketing through aggressive strategic alliances with world-class makers since market liberalization. India developed the commercial vehicle industry prior to the passenger car industry due to poor transportation infrastructure and logistics of agricultural products. Commercial vehicle production is only 3% (2.5 million) of the total automobile production in the world market due to limited demand. Daimler-Benz, which is the biggest commercial vehicle maker in the world, produces 450,000 a year, and Nissan Diesel, which is the smallest, produces 40,000 a year. In some cases, even global class makers produce less than 10,000 cars a year in a factory unit. This means that the production unit of commercial vehicles need not necessarily be big as it requires a large sunk cost.

The commercial vehicle industry usually consists of a wide range of automobile types and varieties of purpose built vehicles other than passenger cars and SUVs. In general, trucks, buses and special purpose vehicles make up the majority of commercial vehicles. Since most special purposed cars are the modified version of trucks, they can easily be built according to their use once one has the capacity to build trucks. Trucks are classified into small, medium and heavy trucks according to the loading capacity of cargo boxes. Furthermore, we distinguish between straight and articulated trucks. Straight trucks are usually called, 'cargo trucks' of which cargo boxes are installed on vehicle frames. Articulated trucks are the tractor type vehicles towing various trailers. In developing economies, there is more demand for small trucks by individuals and small vendors, which have 4x4 gear mode that are versatile on rough roads. Most truck makers produce buses as well because they are built on the same power train and use many common parts.

Figure 4-9 | Sale Ratio by Regions

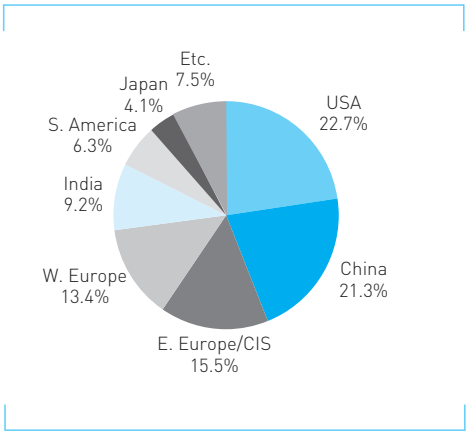


Table 4-5 | Global Market Share

Country	Brand	Market Share (%)
Germany	Daimler/MAN/VW	23.1
China	Dongfeng /Diyi /Others	19.9
America	Paccar/Navistar/Ford/GM	14.0
Russia	GAZ/UAZ/others	10.9
Sweden	Volvo/Scania	9.8
India	Tata/Ashok Leyland	8.4
Japan	Hino/Isuzu/Nissan diesel	6.6
Italy	Iveco	6.0
Korea	Hyundai-Kia/Daewoo bus/ Tata daewoo	0.7

Note : Based on large-sized Models in 2006, Fourin

4.2.3. Linkage Effects of Commercial Vehicles

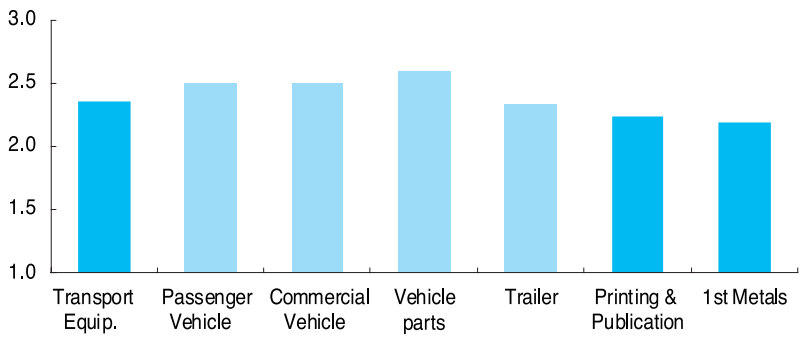
The automobile industry is representative of the comprehensive machinery industry. Its production process synthesizes machinery, steel, electric, electronic, petrochemical, textile, rubber industry and many more. Its sales process includes finance and insurance, and moreover, it needs maintenance, repair, A/S parts and fuel station network. Automobile industry requires a large-scale production base with a wide range of relating industries. It also needs a large sunk cost to build factories and a considerable amount of investments to develop new models. However, once developed, trade balance improves significantly by this single item. In the case of Korea, transportation equipment, including automobiles, is the third largest industry accounted for US$ 48.7 billion in 2000 after the construction and chemical industry. Among them, the production of automobiles and related items accounts for 79.3% of the total amount of transportation equipments. Commercial vehicle production is far lower at US$ 3.5 billion than passenger cars at US$ 24.7 billion, but if including parts, the amount equals to US$ 8.4 billion. Transportation equipment industry, including automobile production, has the highest production inducement ratio among all industries at 2.36%, while the average ratio of the whole industry is 1.66%.

Table 4-6 | Types of Commercial Vehicles

Car	Type	Definition
Bus	Small	25-seater
	Medium	35-seater
	Large	45-seater
Truck	Light	Maximum Payload: under 1t, Gross Wight: under 3t
	Medium	Maximum Payload: 1t up to 5t, Gross Wight: 3t up to 10t
	Heavy	Maximum Payload: over 5t, Gross Wight: over 10t
Special Purpose Vehicle	Dump Truck	Equipped with a hydraulically operated open-box bed hinged at the rear
	Mixer Truck	Concrete Mixer
	Van Fleet of Powder	Carry light fuel oil, cereal grain, feedstuff
	Freezer, Insulated Truck	Carry Chilled/Frozen Food
	Van Fleet of liquid	Equipped with tank lorry

If we look at the linkage effect of the automobile industry to other related industries in terms of the intermediate input ratio, auto part industry's ratio is the highest at 38.2%. That of the chemical industry including tire and interior products is 8.2%, electric and electronic industry is 6.5%, general machinery industry is 5.7%, and business service including real estate is 3.6%. In particular, since the auto part industry requires a high content of metal and plastic products, its linkage effect on chemical, steel, and metal product industry is greater than other industries. The linkage effect between commercial vehicles and passenger cars is virtually the same. However, because commercial vehicles are mainly built for freight carrier purposes so that they have higher contents of tire and steel plates, they have higher linkage effects on chemical and metal product industries. If the trailer industry is taken into account, then it is bound to be higher.

Figure 4-10 | Production Induction Ratio by Industry



Source: The Bank of Korea, Input-Output Table (2000)

Table 4-7 | Linkage Effect of the Automobile Industry

(Unit: %)

Industry	Passenger Car	Commerciale Vehicle	Auto Parts	Trailer & Container
Transport Equip.	38.8	38.2	29.4	2.2
Electronic machine	6.3	6.5	3.5	0.3
Chemical Product	5.5	8.2	11.5	5.5
General Machinery	4.5	5.7	3.2	16.5
Basic Metals	3.1	2.1	13.3	38.7
Wholesale and Retail	3.0	3.5	2.4	5.1
Financial/Insurance	1.8	1.8	1.9	1.6
Metal product	1.0	2.0	3.2	2.3

Note: Intermediate input coefficient (2000), Sort top related industries, Gross Input 100%
Source: Input-Output Table, The Bank of Korea (2003)

4.3. Lessons from Other Countries' Experiences

4.3.1. The Korean Case

(1) Development Stage of the Automobile Industry

The development process of the Korean automobile industry is divided into 6 stages: 1) KD(Knock-Down) Assembly; 2) Localization of Parts Industry; 3) The development of Indigenous Model; 4) The establishment of Mass Production and Export Infrastructure; 5) Expansion of the Domestic Market; and 6) Globalization. Through this development process, Korea has now become the fifth highest producer in the world. The automobile industry promotion policy started in 1962 when the first Five-Year Development Plan was launched. It began from the KD system of a simple assembly line production where all parts were imported from foreign suppliers. At that time, since no automobile producers had existed beforehand, the newly established companies that were supported by the government were able to enjoy monopoly for a while. However, those companies that enjoyed the monopolistic status in sustaining profitability did not make concerted efforts to localize parts. Thus, the government decided to invite foreign investments in settingup other companies. Being under competitive pressure, the incumbent companies started investing in the localization of parts. Also, the KD system was upgraded from the SKD(Semi Knock Down)[2] to CKD(Complete Knock Down)[3]. From this stage, Korea built a foundation to manufacture engines and chassis.

In the 1970s, the government policy focused on the acceleration of part localization. As engines and chassis began being manufactured in Korea, the demand for local parts began to

2) Simple assembly production method by all imported parts as completed ones
3) Assembly production method by imported parts except locally produced engine and body parts

increase as well. Domestic automobile makers set up joint venture for engine production with foreign makers and they carried out ambitious plans toward building comprehensive auto manufacturing factories. From this moment, the domestic auto part industry began to grow in earnest. The success of the Heavy and Chemical Industrialization Plan of the mid 1970s provided the different stakeholders with the confidence to turn the automobile industry into an export industry. Part makers formed strategic alliances with the machinery industry in order to develop indigenous models. Volume production of vehicles and parts were made possible for Korean auto makers to promote export in a large scale.

In the 1980s, as the income level improved, the automobile penetration rate rose as well. Based on the higher domestic demand, mass production systems were aopted and quickly brought to operate at full scale. The quality improvement of parts through strategic technology alliance upgraded the export competitiveness of indigenous models. It was then that some Korean automobile makers emerged as major global players based on large export volumes of Korean models.

However, in the late 1990s, struck by the Asian Currency Crisis in 1997, the Korean automobile industry faced another critical threshold of restructuring. In retrospect, however, the automobile restructuring during the crisis turned out to be a 'blessing in disguise'. Some big ailing automakers were consolidated through M&A into a giant and it became a world top ranking company, namely, 'Hyundai-Kia'. Some minor makers like Samsung Motors, Daewoo Motors, and SSangyong Motors were sold to global makers like Renault-Nissan and GM. The latter makers were transformed into parent companies' global strategic production bases.

From the year 2000, Hyundai, who has expanded a global production network in China, India, USA, and Eastern European countries, consolidated its status as one of the top five global makers. Quality upgrade through rigorous investments in R&D greatly enhanced competitiveness and, in turn, the global market share. In particular, Hyundai's promotion strategy focusing on emerging economies bore fruits. Unlike its competitors, it targeted small passenger cars in those markets where it had competitive edge in terms of price and quality.

(2) Industrial Policy

The essence of the Korean automobile industrial policy can be summarized as localization, affiliation of supply chain, export promotion, industrial restructuring and rationalization, technology development, and market liberalization. The policy of localization and affiliation of the supply chain for parts mainly aims to promote the domestic capacity of parts production in the early stages of development. Parts production is separated from finished car assembly production line to make affiliated company. This policy accelerates the domestic production of parts by setting up specialized separate companies, solely responsible for the development of parts, that are still affiliated to parent companies in order to have an organic relationship in the

technology development. This policy also contributed to the increase in volume of the auto part production. On top of this policy, the government introduced another important policy measure for localization. It banned imports of locally produced parts, and also, prohibited imports of foreign models in order to induce the development of indigenous models. With various incentive schemes for export promotion, the sales rate of small Korean cars began to rise in the global market, which, in turn, accelerated further expansion of the production scale.

Rapid expansion of production resulted in overcapacity in the late 1970s. Hit by the Second Oil Shock in 1979, the government launched industrial rationalization and reorganization programs, including the automobile industry from the early 1980s. The essence of the automobile industry rationalization program was specializing the types of vehicles by makers. In the 1990s, the framework of the automobile industrial policy focused on technological development in order to upgrade the value of Korean models in the global luxurious car market. The government provided various incentives and supports for R&D investments focusing on establishing the industry-university-research clusters. During this time, the domestic auto demand expanded enough to guarantee the economies of scale of domestic manufacturers, and the consumer demand drove the diversification of models. As the market penetration rate reached a certain point enough to preserve domestic producers' competitiveness, the government only introduced the market liberalization policy to avoid trade conflicts. It lifted the import restriction on automobile items and lowered tariff rates. This open market policy, in a sense, accelerated globalization of Korean manufacturers.

4.3.2. The Chinese Case

(1) Development of the Automobile Industry in China

The History of the Chinese automobile industry dates back earlier than Korea. However, since they were largely driven by military purposes, industrial development lagged far behind until the open policy was launched in the 1980s. In the early 20th century, there were attempts to promote automobile manufacturing through strategic alliances with foreign makers like Ford and Daimler-Benz, but it did not succeed. In the 1950s, car factories were built by Soviet aids but it had certain limits in contributing to the development of the automobile industry in its scale and technology.

Table 4-8 | Development Stages of the Automobile Industry in Korea

Period	Development Stage	Summary
1960s	Formation of the industry and assembling of KD	- Establishment of assembly line (setting up 5~6 assembly companies) - Simple assembly line of imported KD parts - Technological transfer from foreign partners - Domestic production of parts, affiliation
1970s	Establishment of production base and domestic production of parts	- Establishment of large scale multi production plants - Development of domestic models, beginning of export - Establishment of R&D system
1980s	Establishment of large scale production systems and export, Market opening and popularization of cars	- Large scale production - Export of locally produced cars - Introduction of competition policy - Popularization of car ownership
1990s	Technological development and gaining global competitiveness	- Development of domestic technology and production of essential components - Development of vehicle with minimum emission and better mileage - Gaining globally competitive production capability - Export expansion of line-ups
2000s	Establishment of global production bases, globalization, and emergence of large companies	- Gaining the economies of scale through export - Establishment of global manufacturing network - Emergence of giant companies through M&A process - M&A of small makers by global companies

Source : KIET, KAMA

In the 1960s, the local government was mainly responsible for the development of the automobile industry rather than the central government and it promoted small-scale auto manufacturing by region. During this time, Shanghai, Beijing, Nanjing, and Jinan Auto companies were established. These companies specialized in manufacturing specific types of vehicles according to the government plan, while Changchun Auto Research Institute focused on R&D. In the late 1960s, during the Cultural Revolution era, the centralized automobile manufacturing system began dismantling. As many other local governments established automobile factories, the number of auto companies rose from 22 in 1967 to 53 in 1976. This was the time that China tried to develop indigenous automobile technologies depending on the Soviet Union, setting up Dongfeng Auto Company. Nonetheless, it was still the Cold War period at the time and China was restraint from having any contact with the Western countries, thus, it was difficult to get assistance from the outside world in developing technologies. Accordingly, until China adopted the open policy in the 1980s, there had not been any substantial development in the automobile industry.

Table 4-9 | Framework of the 5 Year Economic Development Plan

Step	Main Framework	Main Policy
1st Plan ('62~'66)	Building Infrastructure	- Fostering auto manufacturing industry (commissioning auto manufacturing license) - Lifting import restriction on auto manufacturing equipments and components, tariff reduction - Plans for part localization, Establishing part manufacturing subsidiaries - Import restriction of completed vehicle
2nd Plan ('67~'71)	Building Infrastructure	- Partnership with foreign investors, Building foreign joint venture plants - Upgrading part localization and Lineup of component manufacturing subsidiaries
3rd Plan ('72~'76)	Heavy & chemical industrialization	- Selecting auto manufacturing as a main export industry - Long-term promotion plan for auto industry
4th Plan ('77~'81)	Deepening of industrial structure	- Rationalization of automobile industry
5th Plan ('82~'86)	Introduction of competition	- Tax reduction for popularizing cars
6th Plan ('87~'91)	Establishment of global competitiveness	- Deregulation of auto manufacturing - Deregulation of auto import - Stricter regulation on pollution emission and noise level
7th Plan ('92~'97)	Stability and Efficiency	- Specialization of part manufacturers - Development strategy for the economies of scale of part manufacturers - Expansion of completed car production capacity - Investment for R&D
8th Plan ('98~)	Liberalization and technological development	- Policy for developing essential part manufacturing technology - Training & education of human resources - Policy support of R&D institution

Source : KAMA

The Chinese Reform Policy that was launched from 1979 stimulated economic growth and demand for automobiles. Free enterprise policy was adopted and government control was restricted. Thanks to this market orientation policy, automobile companies gained management autonomies from the government. In addition, the government changed its policy towards foreign investments by inviting active investments from outside. Though some joint ventures with foreign investors emerged in the automobile manufacturing industry, the domestic market was mostly seized by Chinese makers for some time. By 1988, the number of Chinese automobile companies reached 115. In the late 1980s, the government chose the automobile sector as one of the strategic promotion industries. According to the domestic automobile industry promotion plan, the government selected a limited number of auto companies that were to be provided with assistance and incentives. Despite the government's strategy of selection and concentration, the number of auto companies did not dwindle and it reached 120 in 1992.

Until the early 1990s, most of the auto companies benefitted from the government promotion policy.

When the government changed the industrial policy from market protection to competition promotion in 1994, foreign investors saw this transition as an opportunity to compete in the Chinese market. This was the time when foreign investors established automobile joint ventures in earnest in China. Nevertheless, due to regulations, such as restriction on investment proportion, localization ratio and import restriction, market competition did not work in full motion and the policy was insufficient to bring about immediate results. Full-scale foreign investment came after 2001 when China joined the WTO. After joining the WTO, China opened a new era of mass production of automobiles and technological innovation. In the 2000, China was finally able to develop Chinese indigenous models based on the significant development of part localization. On the other hand, the remaining non-joint venture auto companies were supported by the local governments. Nowadays there are three big auto companies who produce all types of vehicles. They have developed their own prototype models to export to the emerging markets and they are even tapping on the Western markets. In 2010, many analysts expect that auto demand in China will be over 15 million. China has now become the biggest auto market in the world where all the global makers compete.

Table 4-10 | Development Stages of the Chinese Automobile Industry

Period	Main Issue	Remarks
Early ('49~'57)	Beginning of Chinese auto manufacturing	- FAW Establishment based on Soviet plant models
Foundation Building ('58~'77)	Production Specialization by components	- The first domestic car by FAW - Too many auto makers
Foundation Expansion ('78~'86)	Global makers entering to China and production modernization	- Germany's VW and U.S.'s AMC, France's Peugeot set up joint ventures in China
Expansion Stage ('87~'93)	Localization Promotion, Development of passenger car industry	- Industry development led by government selected companies - Emphasis on development of indigenous models
Market Deregulation ('94~present)	Increase in civilian demand Strategic development for export	- Rapid growth after joining WTO - Rapid export growth to the emerging markets

Source : B.H. Choi 'The Future of Chinese Auto industry' (2008)

(2) The Evolution of Industrial Policy in China

In the 1950s, China was a major beneficiary of Soviet aid under the China-Soviet Amity Treaty. During that time, China received technological assistance from Soviet Union to set up FAW(First Automobile Works). This company was the first kind of comprehensive automobile

manufacturer producing 30,000 cars a year. Accumulating automotive production experience for a decade, the central government established 'China Automobile Corporation' in 1964 by merging small automobile related companies in various regions. From the early 1980s, with the adoption of Open and Reform Policy, the government began to ease regulations on the automobile industry and liberalize restrictions on foreign investments. Rapid economic growth significantly increased the income level, which, in turn, brought about rapid increase of demand for vehicles. Some local governments joined the race in establishing small-scale auto companies to compete with one another.

In the 1980s, as China opened the market to outsiders, major global makers began to invest in the Chinese auto sector. Based on the rapidly widening domestic auto market, Chinese joint ventures were able to modernize technology and to expand the production capacity. Then, China gradually curbed the industrial policy from foreign investment invitation to localization promotion. The government selected the automobile industry as a target industry in the seventh 5 Year Plan (1986-1990), in which the key issue was the localization of passenger cars. In 1989, the government chose the so-called 3 big, 3 medium and 2 small companies[4] to be fostered as strategic producers by focusing government incentives and support on these companies. Selected companies were nurtured as strategic forerunners to achieve specialization in vehicle types and establish the basis for localization of essential components. When these companies expanded production capacities, the government changed its policy to the protection of the domestic market by announcing the "New Automobile Industry Policy" in 1994. Its main purpose was the introduction of new regulations on further entry of foreign investments by limiting the foreign share proportion to below 50%. The policy aimed to prevent the Chinese automobile industry from merely becoming the production base of foreign markers and to expand the market share of Chinese makers.

In the 2000s, the Chinese automobile industry became interested in the global market. The policy focus was on developing indigenous models to promote export of Chinese cars. In 2004, the government launched the Automobile Industry Development Plan for the independent development of technologies and Chinese models. Under this plan, the government concentrated subsidies and incentives on the auto companies without foreign shares. Recently, these makers have begun to dominate the auto market.

In the future, the framework of the government plan is on the restructuring of the automobile industry in order to upgrade competitiveness through the economies of scale. It is to accelerate M&A of small producers by big makers, and also, to restrict exports by small size makers. By doing so, China aims to improve the image of Chinese products in the global market by upgrading the quality. Also, the government provides financial and diplomatic support for

4) 3 Big; FAW(First Automobile Works), DFM(Dongfeng Motor Co.) SAIC(Shanghai Automotive Industry Co.), 3 Medium; BAIC(Beijing Automotive Industry Holding Co.), GAIC(Guizou Aircraft Industry Group), Tianjin, 2 Small; Guizou Motors, Chana(Chang'an Motors)

Chinese makers to undertake foreign auto companies. In the near future, it is expected that Chinese automobile makers will emerge as the major producers in the global market.

4.4. The Promotion Strategy of the Commercial Vehicle Industry in Kazakhstan

4.4.1. Promotion Method by Types of Vehicles

(1) The Selection of Vehicle Types and the Market Condition

As for commercial vehicles, Kazakhstan established Kamaz-Engineering, a joint venture with a Russian auto company, Kamaz, in 2005. It specializes in the production of heavy duty trucks, medium/larger cargo trucks, large size buses, and trailers. Its production capacity is 1,500 a year. However, there is an immediate need to promote the commercial vehicle industry as the production capacity of this company is far short of the domestic demand for commercial vehicles in Kazakhstan which is expected to be over 20,000 a year. Moreover, heavy and medium duty commercial vehicles that Kamaz-Engineering specializes in are too expensive for individual and small enterprise automobile users to purchase, who are the main source of demand for commercial vehicles during the rapid economic growth period. Considering the present economic situation in Kazakhstan, it is evident that the demand for commercial vehicles will increase rapidly, and most demand will come from small enterprises and self-employed shops that prefer light commercial vehicles. Therefore, the promotion of light commercial vehicles should be the policy priority. Recently, the import of Korean made light trucks of less than 1 ton is rapidly increasing. The reason is that Chinese trucks have low quality, Japanese trucks are restricted due to being left-handed, and the Russians have uneconomic gasoline engines. Kamaz does not produce light commercial vehicles, and thus, Kazakhstan needs a new partner for light commercial vehicle production.

In the future, when the market size ensures the economies of scale, the production of containers and tractors will be the next stage of development. Kamaz is equipped with such technologies and capacities, thus, it merely has to extend the production line for those products. Large sized buses are produced by Kamaz, while medium buses are being produced by Daewoo's assembly line in Kazakhstan. However, the production of small sized buses is not an immediate necessity as its demand is just 5% of the medium and large sized buses.

By 2014, the market size of commercial trucks is expected to reach 20,000, and that of buses 4,700. Usually, the market size of buses is expected to be 25% for trucks. As of now, the domestic supply of commercial vehicles is only at 3~5% of the total demand and more than 95% is being imported. If the government makes concerted efforts in promoting the commercial vehicle industry, it is a realistic assumption that the Kazakh made commercial vehicles would

be able to supply 30% of the total market demand within 5 years. Taking into account the Kazakh economic growth trend of the next 5 years, the production of heavy and medium duty commercial vehicles should reach 2,300, and that of light commercial vehicles should be 3,500 a year. On the other hand, the production capacity of trucks should be 5,900 and that of buses should be 1,400 a year. These forecasts are based not only on the market demand trend but also on the minimum level of the economies of scale.

A successful strategy will need to target two fronts. First, it is to extend the existing production capacity of heavy and medium duty vehicle manufacturers, that is, Kamaz-Engineering. Currently, the operation ratio of the Kamaz site is far less than the production capacity, thus, it is necessary to increase the production capacity in order to meet the domestic demand. Needless to say, it needs to upgrade the quality and technology of Kamaz products to compete against imported vehicles, which have superior specs. To do that, strategic alliances with global makers, rather than Russian Kamaz, may be an option. It does not necessarily mean that Kamaz models should be ceased. With the existing Kamaz models, new components and technical details can be added. Second, as for the vehicle types that Kamaz does not produce, it is necessary to build a new production line with assistance from the global makers.

(2) The Promotion Strategy of Heavy and Medium Duty Commercial Vehicles

Most heavy and medium duty commercial vehicles are built on the same platform, frame and power train. Therefore, trucks and buses employing many common modules can be produced in one production site. Kamaz-Engineering which produces heavy duty commercial vehicles can extend its production to heavy and medium duty trucks and buses. Kamaz is equipped with such production capacity and Kamaz models can be modified to various types of vehicles in the same category. At present, Kazakhstan does not produce tractors and trailers. Also, Kamaz models can be extended to the tractor and trailer production lines. However, the key issue in further developing Kamaz-Engineering is the stance of Russian Kamaz. For the parent company, Kamaz, it is not clear whether it has any intentions on developing Kazakhstan Kamaz beyond the assembly line. Also, the fact that Russian Kamaz retains management control with 75% of Kamaza-Engineering is a crucial limitation in making the development of the Kazakhstan commercial vehicle industry a long-term success, given the Kamaz-Engineering existing capacity and its resulting interests. Unless Russian Kamaz agrees on the development plan, it might be difficult to take any actions.

In other countries' case, the promotion policy of the commercial vehicle industry aims the domestic market in the early stages so that one company may enjoy monopolyi for a considerable amount of time until competitiveness is gained. Moreover, even for the monopolistic company, it is a formidable task to reach the economies of scale since the domestic market is not large enough. This is the reason why there are only few countries that

have developed the commercial vehicle industry. Therefore, in a long-term perspective, it is necessary that the government play an active and pivotal role in the development of the commercial vehicle industry. In the Kazakh case as well, the domestic market is not large enough to guarantee the economies of scale. Hence, it is better for Kazakhstan to adopt a policy fully utilizing its geographical merit. The first step is to invite a global commercial vehicle maker to set up its strategic production base in Kazakhstan. Then the strategy is to expand the production capacity to an extent to guarantee the economies of scale by exporting products to the neighboring countries. For the time being until it is able to export, it is necessary to safeguard the minimum level of production such as by a government procurement program.

Table 4-11 | The Chinese Industrial Policy for the Automobile Industry

Year	Policy	Main Issues
1949	Alliance between China and U.S.S.R.	- Establishment of truck production by Soviet system
1964	Establishment of 'China Automobile Corporation'	- Government merged 75 automotive related companies
Late 70s	Modernization and market opening	- Upsurge of automobile demand due to rapid economic growth
Mid 80s	7th 5 year plan	- Selecting auto industry as one of the key promotion industries. Policies geared towards domestic production. - Upgrade of technology and production capacity through foreign joint ventures
Late 80s	3 Big, 3 Medium, 2 Small System	- Selecting 8 makers as the principal receiver of governmental support - Selecting 3 Big in 1987, 3 Medium in 1988, 2 Small in 1992
1994	New policy of auto industry	- Restricting foreign companies' equity share of domestic companies up to 50% - Focus on the existing 8 companies growth - Policy support of 3 Big to capture 70% market share
1996	9th 5 year plan	- Production capacity expansion, promotion of finished car and auto part manufacturers and upgrading localization
2001	10th 5 year plan	- Prepare for market opening after WTO - 3 Big's 70% market share & 20% exports
2004	New industrial plans for car manufacturing industry	- Selecting auto industry as one of the key export industries, to achieve global export competitiveness - Auto export target: US$ 100bn
2005	11th 5 year plan	- To promoting domestic brands, to increase export of finished cars - Fostering local makers with model development capability and global competitiveness
2007	Regulation of exports	- To introduce the minimum quality standard of export vehicle to gain consumers' trust on Chinese cars

Source : B.H. Choi 'The Future of Chinese Auto industry' (2008)

Table 4-12 | Ten Lessons from Korea & China

1. Exploiting & Maximizing Merits of FDI (Tapping & Testing Various Foreign Partners)
2. Heavy Protection of the Domestic Market
3. Cultivating only a Limited Number of Makers
4. Rapid Localization through Specialization of Parts & Models
5. Development of Indigenous Models for Export Market
6. Bold Rationalization of Ailing Makers & Upgrading Scale Economies through M&A
7. Gradual Liberalization & De-regulation to Stimulate Competition
8. Maintaining the Proper Level of Discipline & Competitive Pressure
9. Massive Investments for R&D & HRD (Training & Education)
10. Demand Creation: Government Procurements & Tax Redemption for Consumer

Unlike the passenger car industry, there are only a few commercial vehicle markers in the world due to the shortage of global demand. Most of them have their global base in Russia and China where the market size is large and the growth potential is high. However, these markets have already been occupied by them currently, and others delay the investment decision in the region as Russia and China have ceased to offer incentives while the competition is high. Therefore, if Kazakhstan intends to invite foreign investors for joint venture, it has to target the global makers that have not entered Russia and China. In order to prevent from simply becoming their assembly production base, the government or domestic companies has to occupy the majority share of a joint venture to maintain management control.

The joint venture should have the capacity to produce all types of heavy and medium duty commercial vehicles ranging from trucks to buses. Chinese and Russian makers have large production capacities, but they produce only limited types and models with low quality. It might be better to choose European, Japanese or American makers as joint venture partners with quality, technology and global sales network. For example, Daimler-Benz(Germany), Iveco(Fiat Group) and MAN(VW Group) have no strategic production base in CIS countries yet. American makers have not entered the emerging markets at all. In the case of Japan, Hino(Toyota Group) has no base in CIS and Eastern Europe.

The development process of the joint venture can be divided into three stages. The first stage is to lay out the production line of heavy and medium duty trucks. The second stage is to extend the line to large and medium sized buses. By doing so, the third stage is to promote localization of common parts and modules in order to ensure the economies of scale. Since the Kazakh market is almost all occupied by imported vehicles, it would not be difficult for a newly established joint venture company to expand its domestic market share up to 30% in a relatively short period of time. On top of that, taking into account the export volume, the minimum level of production is viable. By 2014, the market demand for trucks is expected to reach up to 2,400 a year, and the Kamaz-Engineering's production capacity of trucks is currently at 1,500. Then

the joint venture can produce 1,000 a year to fill the shortage of domestic supply and to export the remaining products. As to large and medium sized buses, the present production capacity is 700 a year and the domestic demand for 2014 is forecasted as 1,300. Hence, 700 more buses would be the minimum volume of production to satisfy the domestic demand and export. With the addition of these demands by 2014, 1,700 vehicles a year (1,000 trucks and 700 buses) would be the minimum level of the projected production capacity of the new joint venture. Starting from this base, it can gradually expand the capacity to meet additional demands generated by economic growth and export promotion in the future.

Table 4-13 | The Status of Commercial Vehicles in Kazakhstan

Type	Model	Company	Reference
Large-sized dump truck	 KamAZ-55102/55111/65115	Kamaz-Engineering	- 55111 : Payload 13t, Ventilation 10.9ℓ - 65115 : Payload 15t, Ventilation 10.9ℓ
Large/Middle-sized Cargo truck	 KamAZ-43114/4326/43261	Kamaz-Engineering	- 43114 : Payload 6t, Ventilation 10.9ℓ - 4326 : Payload 3t, Ventilation 10.9ℓ
Large-sized bus	 NefAZ-5299	Kamaz-Engineering	- Seat Capacity 45, Ventilation 6.6ℓ
Large/Middle-sizedbus	 BS090/106	Daewoo Bus	- BS090 : Seat Capacity 34, Ventilation 7.6ℓ - BS106 : Seat Capacity 48, Ventilation 7.6ℓ
Trailer		Kamaz-Engineering	

Source: Each company

Table 4-14 | Summary of Small-sized Trucks

Type	Small-sized Truck
Outline	 ⟨Single Cap⟩  ⟨Double Cap⟩
Power Train	Diesel 2.5~3.0ℓ
Reference	Various transformed model: Single Cap, Double Cap, 4X4, Long/Short shaft

Source: Hyundai Automobile

Table 4-15 | Commercial Vehicle Supplies in Kazakhstan

Type		Supply Line	Production Capacity	Supply Goal	Demand
Truck	Large Truck	Kamaz-Engineering assembly production	1,500	2,293	7,644
	Heavy-duty tractor	None	-	59	196
	Small Truck	None	-	3,528	11,760
Bus	Large bus	Kamaz-Engineering assembly production	200	212	705
	Medium bus	Daewoo Bus assembly production	500	1,128	3,760
	Small Bus	None	-	71	235

Note: Demand is estimate of 2014 and supply goal is based on independency ratio, 30%
Source: Each company, Hana Institute of Finance

(3) Light Commercial Vehicle Promotion Strategy

Light commercial vehicles are the most demanded type of automobiles during the period of rapid economic growth as individual users and self-employed shops prefer them for versatile purposes, and as they are affordable. In general, passenger car manufacturers produce small trucks because they use the same power train and platform as SUVs. Hence, it would be an option for Azia Avto, which produces passenger cars and SUVs, to take part in light commercial vehicle production by extending its existing production line. The type and operation system of small trucks are different according to the production region of America, Europe and Asia. Among them, the Asian models are known to have versatile cargo capacity and efficient carriage space. Considering the geographical characteristics, location, and the economic condition of Kazakhstan, it might be better to choose the Asian models. Demand for small sized buses is less than the large and medium sized buses, and they have limitations in traveling long distances. The demand for small buses will rise only after the Kazakh economy passes a certain point in the future and urbanization accelerates. Hence, rather than initiating the production of small sized buses now, it might be better to import until the economy reaches that certain stage. In a long-term perspective, small sized trucks can be modified to small buses.

Table 4-16 | Heavy and Medium Duty Commercial Vehicle Development Strategy

Stage	Solution	Advantage
Short- term	Establish joint venture with global leading firms	- Acquirement of advanced technology - Diminution of degree of dependency upon Russia - Economies of scale through secure export volume as a strategic base of leading enterprises - Development of government dominant model & long-term development strategy
Long- term	Export Strategy, Raising relevant industry	- Strategic exports of commercial vehicle - Support for parts supplier and localization

The power train of light commercial trucks usually use 2.5ℓ ~3.5ℓ diesel engines. These engines are commonly used for passenger cars as well. Since they can be employed in many types and models, the priority is to build the diesel engine production capacity to the extent of securing the economies of scale. Currently, Azia Avto produces a high proportion of passenger cars with gasoline engines, and SUVs also use gasoline engines. Kazakh auto consumers prefer SUVs due to the geographical and road conditions. In the future, when small trucks are to be produced, the development of diesel engine SUVs will follow as well. Co-development of small trucks and SUVs is essential to secure the economies of scale. As a strategy, it is viable to develop Azia Avto for such purposes as it has the capacity to produce diesel engines and chassis frames. The market size of small trucks is estimated to be 12,000 a year. Therefore, in order to accomplish the 30% localization target, it should be able to supply 3,500 a year. In addition, taking into account the demand for SUVs and exports, it needs to build the production line to at least 7,000, and the same scale applies to the engine production capacity. It is told that Azia Avto has plans to expand the production capacity up to 120,000 a year. If true, the plan should include the production of small trucks and diesel engine SUVs.

Table 4-17 | Global Commercial Vehicle Companies' Operation

Company		Neighbors' Business Trend		Subsidiaries
		China	Middle East	
Europe	Daimler-Benz	Operating manufacturing plant	Turkey: Operating manufacturing plant	- Mitsubishi Fuso(Japan) - Freightliner(America)
	Volvo	Operating manufacturing plant	Russia, Poland, Turkey: Operating manufacturing plant	- Nissan Diesel (Japan) / Renault truck (France) - Volvo truck/bus(Switzerland) - Mack truck (America)
	Iveco	Operating manufacturing plant	Russia: Producing of small-sized commercial vehicle	- Iris bus(Italy)
	MAN	Operating manufacturing plant	Poland, Turkey: Operating manufacturing plant	- Neoman bus(Germany) - ERF(England)
	Scania	Import sales	Russia: Bus production	
America	Paccar	-	Import sales	- DAF truck(Netherlands) - Leyland truck(England)
	Navistar	Granting engine license	-	
Japan	Isuzu	Small/Medium size bus production	Uzbekistan, Turkey: Operating manufacturing plant	
	Hino	Operating manufacturing plant	-	

Source: A&D Consultant

(4) Auto Part Industry Promotion Strategy

For the development of auto part manufacturing, the role of upstream industry is prerequisite. It is necessary for the complete built unit companies to play pivotal roles in creating the supply chain by constructing automobile clusters. The complete built unit factories are located along the border of Russia and China. Except Kamaz-Engineering, most bus/passenger car/tractor companies are in the northeastern region of Kazakhstan. These regions have geographical advantages in terms of logistics due to the vicinity to Russia and China. They are the candidate locations for new joint ventures. Though there is no auto part industry in Kazakhstan at the moment, the auto part cluster should be built in these regions together with the complete built unit factories for the merit of import of KD(knockdown) components and export of vehicles.

Table 4-18 | Commercial Vehicle Production of Global Makers

(Unit: 1,000)

Company	North Americal	South America	West Europe	CIS/Middle Eastern Europe	Asia Pacific	Africa	Middle East	All
Daimler	178	50	151	22	18	8	10	436
Isuzu	24	0.02	13	10	153	10	17	227
Volvo	70	10	88	17	7	2	7	199
Iveco	-	12	130	18	20	2	2	183
Paccar	105	0.1	47	6	3	0.5	0.03	162
Mitsubishi Fuso	7	3	9	8	119	3	-	148
Navistar	138	0.4	-	-	0.2	1	0.5	140
Hino	8	3	0.8	0.05	80	2	2	95
MAN	0.3	0.2	57	9	0.8	3	3	74
Scania	0.3	8	36	8	17	1	2	57
Nissan Diesel	3	0.2	0.06	-	28	5	2	38

Note: Sales of large-sized commercial vehicle in 2006
Source: A&D Consultant

Table 4-19 | Heavy and Medium Duty Commercial Vehicle Promotion Strategy

Joint Venture Partnership	- Global Commercial vehicle company for exporting to CIS region including Russia - A company with ability and model of large-sized truck & bus
Production Capacity	- Yearly 1,700 cars (truck: 1,000, Middle-sized bus: 700) - Occupy facility site for expansion of export and input of large-sized bus
Sale	- Domestic demand: 1,400 cars (truck 800, bus 600), Export 300 cars (truck 200, bus 100) - Export to neighbor countries by global selling power of joint venture

The most important condition for heavy and medium duty trucks and buses is the cost of ownership, meaning that durability and fuel efficiency are crucial. For this reason, many foreign joint venture partners are reluctant in transferring technologies of the essential components related to fuel efficiency and quality, such as chassis frames and power trains. These parts are usually the ones that are localized at the last stage, or even, not at all. Hence, at the early stage of development, it would be better to try the localization of parts first, which does not seriously affect the basic quality of vehicles, such as the interior and body parts. The most commonly used components with least restriction of use by the type of vehicle models are bolt, nut, bracket, and so on. These can be used to other machinery industry as well. Interior and body parts need no great technology and can be easily developed locally. Moreover, due to their bulky sizes, local supply is much economical. Those components include plastic items like bumpers and interior trims, and tires and batteries. In order to develop the auto part industry

beyond the simple assembly production, i.e., knockdown production, the strategy should be to start from the local development of body part modules.

Figure 4-11 | Iveco Line-up

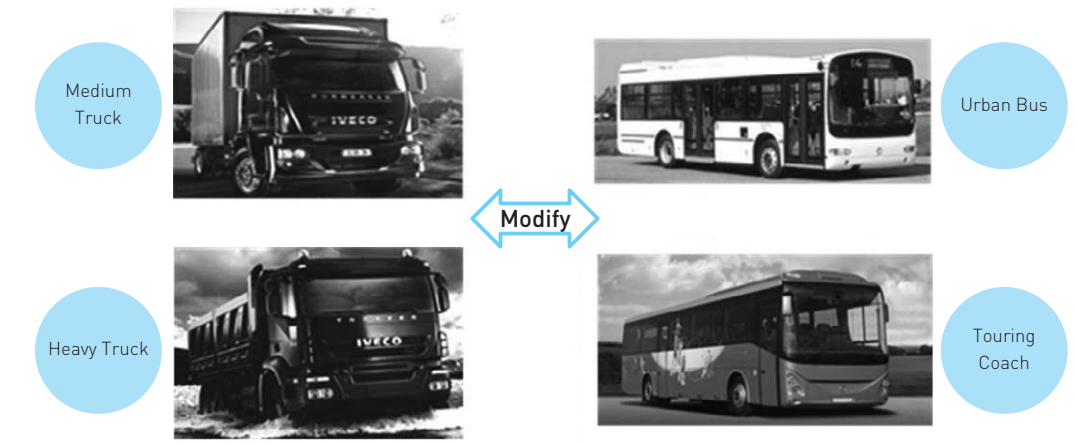


Figure 4-12 | Model Versatility of Light Commercial Vehicles

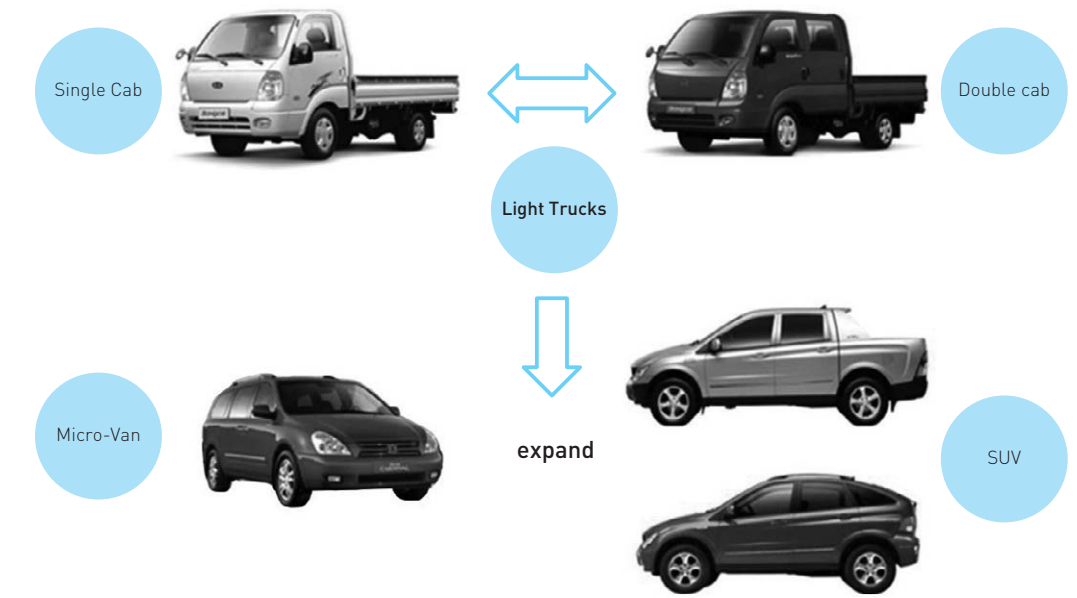
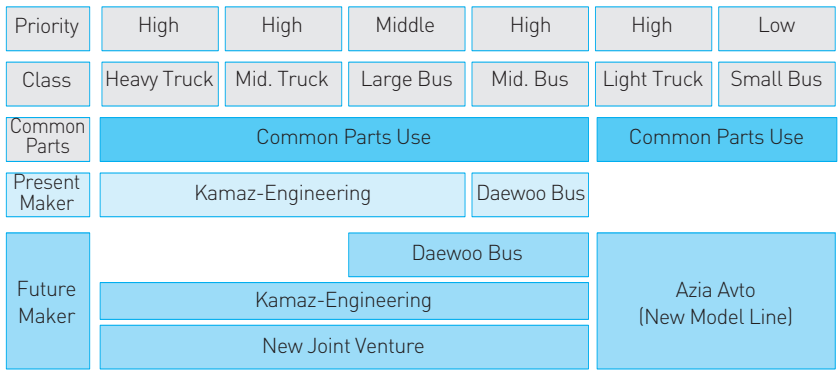


Table 4-20 | Light Commercial Vehicle Promotion Strategy

Development	- Launched small-sized truck model from the existing automobile producer, *Azia Avto* - Strengthen Diesel SUV lineup (Diesel engine) - Secure supply ability and technology power by construction of Diesel engine
Production Capacity	- Establish yearly 7,000 cars production line of small-sized truck(over 3,500 yearly) and Diesel SUV(under 3,500 yearly) - Construct Diesel engine factory with production capability of 7,000 cars yearly
Sale	- Supply 3,500 cars to domestic market primarily, but export under changed production ratio of each model

Figure 4-13 | Suggestions for Industrial Organization



The functional components include transmission, axle, brake system and, most of all, engine. It is quite difficult to develop these parts locally in a short period of time. They need considerable amount of time and investments for R&D and human resources. Hence, it would be better to get technical and technological assistance from the foreign partners at each stage. This would allow for parts of such part production, if not the whole part, to be transferred gradually. One way to achieve such goal is to make a contract for the condition of technological transfer when Kazakhstan invites a joint venture partner with attractive incentive schemes. The ultimate goal of inviting foreign investments is not just setting up the production line, but, more importantly, technological development through partner's transfer.

Figure 4-14 | Manufacturing Bases of Kazakhstan

Table 4-21 | Components and Possibilities of Localization

Classification		Main materials/Processing operation	Possibility of localization
Design	Accessories parts	Rubber, plastic	High
Body	Body parts	Press, welding, forging	High
Design	Interior parts	Rubber, plastic	High
Electron	Electric parts	Plastic, electronic parts	Mid
Chassis	Brake System parts	Forging, cutting, sintering process	Mid
Chassis	Drive parts	Forging, cutting work	Mid
Chassis	Steering parts	Forging, cutting work	Low
Chassis	Suspension parts	Forging, cutting work	Low
PT	TM parts	Casting, cutting, forging, aluminum	Low
PT	Engine parts	Casting, cutting, forging, aluminum	Low

4.4.2. Marketing Strategy

In order to increase the operating ratio of the new vehicle production line, the priority should be the expansion of domestic sales of the new vehicles. At present, the imported second hand vehicles occupy virtually all the commercial vehicle markets while the market share of domestic vehicles is minimal at 8.4% for trucks and 4.8% for buses. In order to meet the localization ratio target up to 30% in the next 5 years, the sales of the new domestic trucks should be 5,800 in the

domestic market and 200 in the export market by 2014. If these sales targets are satisfied, then the operating ratio of the new production line will be maintained at 90%. As for buses, the domestic sales should be 1,400 and the export sales should be 100 by 2014. The 30% localization in 5 years is an ambitious target. Therefore, in order to maintain a stable operating ratio, the strategy is to shift the balance between domestic and export sales. To widen the domestic sales at the early development stage, the new vehicles should have competitive prices. On the other hand, the role of the government is crucial in order to sustain the sales target of the new vehicles. The government can mobilize a procurement program of the public office, army, and public enterprises. Also, it should make a concerted effort to persuade private enterprises to purchase the new Kazakhstan vehicles, sometimes by offering incentives.

Kazakhstan is located in the center of the CIS region and it has made Tariff Union Treaties with neighboring countries including Russia. In the near future, the Union Treaty countries have to unify their tariff rates on trading goods and scrap the tariff within the Union. In that case, global makers do not have to necessarily establish the production base in Russia in order to enter the Russian market. They simply have to choose one of the Union countries who provide the best condition and environment for investment. Moreover, like China, Russia recently has raised the entry barrier to deter foreign joint ventures and to protect the domestic market and industries. Therefore, there is an increasing opportunity for other CIS countries to invite foreign investors who want to set up the strategic export base in the CIS region by exploiting the gap left by the Union Treaty. If Kazakhstan succeeds in inviting the global joint venture partners who already own the global sales networks, the export promotion of the joint venture company would be much easier, cheaper, and shorter with little cost for export marketing.

Considering the fact that export logistics of Kazakhstan is limited to land transportation, the potential export markets are CIS countries, China, and the Eastern European countries. However, since the gas emission regulation is different according to each country, the main export markets are likely to be CIS countries, which have lax regulations on exhaust emission compared to China and Eastern European countries that apply stricter regulations. In order to promote export to the countries with stricter emission control, more investments on R&D and advanced technology are needed, but at the assembly stage, it would not be an easy option. Therefore, CIS countries are the prime target of the export market as they follow the Russian standard of the emission regulation and they urgently need to expand the infrastructure and the means of public transportation.

4.4.3. The Government Industrial Policy and the Incentive Scheme

Since the machinery industry base of Kazakhstan is currently weak, the industrial policy for automobile manufacturing should focus on inviting foreign investments of global makes that intend to build modern production lines and are willing to transfer technologies to Kazakhstan.

In order to induce foreign investments, the government should provide a favorable environment to potential investors in building strategic bases that are targeting the CIS markets. In particular, the priority would be to conclude and enlarge the Tariff Union with CIS countries at the earliest possible date. In addition, the government needs to build the automobile industry cluster in the eastern Kazakh region to accumulate complete unit makers and part manufacturers together. As to the cluster policy, it is necessary to provide incentives such as tax reduction or exemption for some time, while free leasing factory sites. Also, road construction is a prerequisite to reduce logistics cost.

Figure 4-15 | Marketing Strategy

Cluster policy needs a rather different approach from the conventional industrial policy, of which the government mainly provides incentives and administrative support to firms. Providing incentives, especially financial support, directly to firms can act as a strong means to promote production in a relatively short period of time. However, it has a side effect that may result in a moral hazard. Also, there is little room to discipline under-performers. On the other hand, cluster policy is to provide the grounds for innovation and cooperation to many players such as firms in the same field, universities, research institutions and central and local governments. Therefore, it requires coordination capability of the government to invite various parties. Above all, designing a cluster policy is a formidable task for governments who have no such experience. However, once cluster begins to work, it brings about a long lasting effect.

In order to vitalize the auto sales market, the priority is to reduce the market share of secondhand vehicles by restricting the import of old cars. Prior to that, the government offices should purchase new vehicles. It also needs to differentiate tariff rates between new and old cars

to curtail the consumers' demand for old cars. Kazakhstan is one of the countries that is seriously affected by the current global crisis. The auto market also has been hit hard by the crisis and the sales figure has decreased by 40% in 2009. Automobiles are expensive durable goods, thus, when the finance sector is in trouble, then the auto market is contracted as well. In particular, since the price of heavy and medium duty commercial vehicles is formidable to anyone, firms cannot easily afford them unless financial supportis provided by financial institutions. In other words, the government can play an important role in activating the auto market by providing financial assistance to firms.

At the early development stage, the auto manufacturers generally start the assembly production with imported parts and components. Hence, it is necessary to lower the tariffs and duties in order to reduce the production cost, enabling them to compete against imported complete vehicles. Together with the tariff and duty on auto parts, the government also needs to consider lowering the tariff and duty on imported machines of part manufacturers and financing them with preferred interest rates.

Kazakhstan is a resource rich country with abundant oil and natural gas. The auto manufacturers can exploit such merit by manufacturing specialized vehicles. In the case of buses, they can specialize in manufacturing the eco-friendly CNG (compressed natural gas) buses. It is economic in urban transportation and good for the environment. CNG buses are a little bit more expensive to produce, but for Kazakhstan with abundant natural gas, it is economic in the long term as it can reduce other social costs incurred from pollution. Commercial vehicles consume more tires than passenger cars. Hence, by utilizing favorable conditions to promote the petro-chemical industry, it can build the tire industry as well. Most auto manufacturers cannot afford independent R&D and human resource development due to financial limitations. The government can set up public research institutes, which take responsibility for training and education of auto specialists, and provide technical assistance in design and production to medium and small firms. Kazakhstan could also learn lessons from the other late developers who invited foreign specialists for training and education at the early stage of development. On the other hand, many global makers operate their own program of technical assistance and education to the foreign partners. When Kazakhstan invites foreign joint venture partners, such program can be applied.

4.5. Conclusion: the Framework of Development Stages

4.5.1. Mid-to-Long Term Development Road Map for the Automobile Industry

Kazakhstan currently has a weak manufacturing base, and in order to promote the overall industry, those with the largest upstream and downstream impact need to be developed first.

The automobile industry is a key downstream industry for a wide variety of manufacturing sectors, including machine working, materials, electric and electronic industries. As a result, the government should decrease used car imports and stimulate new car purchases by rationalizing the automobile market, and expand production by replacing imports. This would gradually localize the industry and promote the development of related sectors. Most developing nations have followed a similar path in developing their automobile industries, and the global automobile industry has recently been shifting in focus towards the emerging markets. If the government takes advantage of this environment to aggressively promote and support industry in the long term, the Kazakhautomobile industry can build a strong foundation for development. In addition, if the domestic and global business environment and barriers to entry are considered and the consumer car sector is made as a strategic priority, development could be accelerated.

4.5.2. Foundation Establishment Period (2010~2014)

Currently, most automobile production facilities are run by Russian firms seeking to expand into the Central Asian market and reduce logistics costs, and are mainly simple assembly operations. Other nations have started with the assembly stage in building a foundation for their industries, but the problem Kazakhstan is the lack of companies that can serve as a foundation for the government-led development of the industry. The government needs to shift the industry away from serving as a production base for Russian firms, and enable it to compete and acquire advanced technologies. In addition, the government needs to enlarge the domestic market through policies that stimulate demand for new cars, and then attract investments from foreign partners that wish to use Kazakhstan as a base for exporting to the Central Asian market. In the mid-to-large car sector, a stake of over 50% is needed to establish a new government-led joint venture. In addition, maintaining a stake in a joint venture formed by a consortium of major dealers and domestic financial institutions may also be useful.

Designating the eastern Kazakhstan region as an industrial cluster and providing incentives to firms in the region would spur automobile-related firms, such as auto parts makers, to enter the industry. As a result, this region should be designated as a cluster, and policies such as free leases on land plots, should be implemented in order to attract advanced joint venture firms. In addition, the logistics systems around this region should be improved by upgrading the transportation infrastructure in order to reduce raw material costs in the initial production stages.

The auto parts industry begins with body parts and interior parts. Body parts include bolts, nuts, clips and clamps, and different standards are used depending on which section of the automobile is the target. Manufacturing these parts requires cold forging technology, and this sector needs to be developed. In addition, production of basic materials for interior trim parts, including rubber and plastic, can be localized. Interior trim parts include console boxes, door handles, overhead lights, glove boxes, lamps, and seat covers. Technologies needed to produce

these parts include polymer materials and injection molding, and the petrochemical industry must be developed to support these activities.

In the simple assembly stage where parts are imported, securing human resources with the necessary technical know-how is the top priority. Production know-how, including management capabilities for modern technologies and improvements in manufacturing processes to increase efficiency, as well as the skills needed to maintain production facilities need to be acquired. As a result, the government should send workers to be trained by joint venture partners that have experiences with overseas expansion. Also, since there is a lack of managers with experience in running automobile firms, the government should support a program to cultivate management and marketing skills. In addition, joint venture firms should adjust their organizations to employ outside workers if necessary and shift away from a socialist management style.

Table 4-22 | Mid/Long-Term Road Map (Foundation Establishment Period)

Goal	- Encourage establishment of joint ventures with global companies in order to procure manufacturing capability and build foundation for an exportation industry - Increase assembly production - Secure manpower with manufacturing skills - Establish basis for developing component manufacturing industry
Policy	- Boost domestic demand for new vehicles - Establish industrial cluster with East Kazakhstan - Enhance policies designed to invite foreign investment
Industry	- Secure modernized manufacturing facilities - Adopt models and technology exportable to CIS countries - Introduce competition to and expand the size of component manufacturing industry
Domestic production	- Basic fastener components(bolt/nut, clip/clamp, etc) - Interior trim components(rubber/plastic type)
Training	- Exchange programs to technologically advanced manufacturers - Executive education programs and recruitment from outside in order to enhance management and marketing ability

4.5.3. Foundation Expansion Period (2015~2019)

Exports must be expanded after a competitive structure is in place, scale is achieved in assembly, and production lines for the consumer car sector and sedans have been set up. If competitive products are assembled with the introduction of foreign models and technologies, and joint venture partners are using Kazakhstan as a base for exports to Central Asia, expanding exports will not be very difficult. In addition, facilities will need to be established to move gradually beyond simple assembly as production volumes increase. Firms that perform simple assembly may have only one facility, and will need to build new pressing, body, and painting factories. Also, production of parts for engine factories that were built in the foundation

establishment stage should be localized. To do so, facilities to handle casting, forging, and heating are needed. These are owned by automobile companies, and can produce key engine parts. In addition, the parts can be sourced locally with the establishment of parts firms, and engine production can be increasingly localized.

In order to secure export competitiveness, the necessary human resources must be secured as well. This includes staff to control quality in the production process and marketing staff that can develop overseas markets. Joint venture firms can utilize the training programs run by their partners to cultivate the necessary human resources, and the government can provide support for these costs to stimulate these programs. In this stage, the parts that can be localized include body and plastic parts, as well as tires, and batteries. In order to produce these parts, molding and parts installation skills, as well as material development for petrochemical parts are needed. Government-run research institutes should be set up to help develop these skills. These institutes can work with small-to-mid sized parts makers through technical consulting or through joint projects. This will help develop key human resources and technologies. Also, in order to accelerate the localization of parts production, domestic parts firms will need to acquire technology from advanced firms, and the government needs to support this process through the establishment of joint venture parts firms.

Table 4-23 | **Mid/Long-Term Road Map (Foundation Expansion Period)**

Goal	- Foster into a key exportation industry - Move from being a simple assembler of parts and begin to establish systems for manufacturing finished cars - Enhance global competitiveness and secure manpower - Establish JVs with foreign manufacturers in order to acquire domestic core component manufacturing capability
Policy	- Establishment of trading systems in order to allow exportation to CIS region - Fostering of industries in the lower part of the value chain (petro-chemical, machinery, metal/steel industries) - Import regulation on components being manufactured domestically. Tax incentive for companies with high proportion of components manufactured domestically (basis is 30%)
Industry	- Establish press/main- frame/Paint plants. Increase the proportion of domestically produced parts in car engines - Quality control in order to achieve global competitiveness and increased emphasis on overseas marketing - Improve domestic production of core components
Domestic production	- Exterior components(bumper, panel, frames, injection molding parts) - Tire, batteries
Training	- Foster quality control and marketing manpower - Government-run-labs designed to support component manufacturers' product development are created in order to create demand for professional - Coordinated efforts between universities, labs, and companies in order to develop engineers

4.5.4. Development Period (2020 afterward)

After the expansion stage, the joint venture firms will have built the entire production process and upgraded technology and skills. The development period is the stage that will accomplish the comprehensive production system and evolve towards the autonomous design capability. To have the design capability on its own requires the independent R&D center and the related human resources to develop own models. At this stage, it is necessary for the government to initiate a policy that induces the auto companies and part producers with the economies of scale to set up R&D centers. R&D centers should recruit specialists to develop own models and manpower for testing and evaluation. The joint ventures can get help from their strategic partners through various knowledge sharing programs. Some global makers provide technical assistance and training and education programs to their local partners.

Among other parts, the priority is to achieve the local production capacity of chassis, power train, and their related components. Developing these parts require a considerable amount of time and investments, thus, it would be better and effective to endorse this task to a government funded research institute.

In order to expand the export market beyond Central Asia toward Eastern Europe, China, and the Middle East, the automakers must have the dual design capacity to meet diverse regulations by countries. Also, the government needs to overhaul the trading system with these countries to avoid, if any, possible trade conflict and to lower tariffs. When entering these markets, the Kazakh auto makers will have reached the economies of scale and the autonomous capability to develop their own models. The Kazakh maker with the localization of the entire production system, the autonomous design capacity, and the global marketing network will emerge as one of the global makers competing in the world market. One of the ways to shorten the time to reach that point is that the Kazakh auto firms could expedite M&A of foreign automakers. The government may assist in M&A activity of Kazakh automotive firms, by providing necessary funding. Kazakh auto firms should prepare for such endeavors by cultivating management of the global standard. Through these development stages, Kazakhstan may have the possibility to emerge as a globally competitive production center, competing with China, India and Russia in the future.

Table 4-24 | **Mid/Long-Term Road Map (Development Period)**

Goal	- Original models, establish brands - Establishment of total vehicle manufacturing system - Develop core component manufacturing capabilities and environment related technologies
Policy	- Establish trading mechanisms in order to increase exportation to Eastern Europe, Middle East, and China - Encourage M&A with foreign manufacturers in order to develop core components. Provided financial support - Increase the proportion of domestically manufactured components needed in order to receive tax benefits to 60%
Industry	- Vertical integration of precision machinery manufacturers in order to enhance domestic production of core components
Domestic production	- Engine, transmission components (gasket, engine belt, etc.) - Driveline components (drive shaft, differential gear box, etc.) - Steering, suspension chassis components (axle, brake, shock-absorber, etc.)
Training	- Establishment of R&D centers by manufacturers in order to develop engineering, testing, and evaluating manpower - Encourage establishment of local R&D centers by JVs in order to develop R&D capabilities - Develop executives' global management skills by M&A activities with foreign companies

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Chapter 05

Agricultural Development in Kazakhstan

Chapter 05

Agricultural Development in Kazakhstan

Hoseop Yoon (Yonsei University)

5.1. Current Situation

As the traditional nerve center of the Kazakh society, the economic weight of agriculture still remains high. Though the agricultural sector has played an important role in the nation's economic and social development, agricultural production has continued to contract in the past twenty years. The present paper, therefore, aims to review the current status of the agricultural sector in Kazakhstan and to derive lessons that will help to define its future direction, based on the Korean experience of agricultural development.

Kazakhstan is the ninth largest country in the world, with its territory of 2,724,900Km^2, about twelve times larger than that of the Korean Peninsula and about twenty seven times larger than that of the Republic of Korea (hereafter, Korea). In particular Karagandinskaya, the largest oblast, covers 428 thousand Km^2, making it roughly twice as large as the Korean Peninsula and about four times larger than Korea. In terms of land size, most oblasts are bigger than Korea. Kazakhstan has more than 48,000 lakes, including the Caspian Sea, sharing the border with neighboring countries as well as bordering the Aral Sea. Kazakhstan also has about 8,500 rivers. The climate is extremely continental and very dry, with annual rainfall amounting to 250mm in the Southern part of the country and 350mm in the Northern part.

Kazakhstan harbors enormous amounts of agricultural land. Agricultural land has ranged from 786 thousand Km^2 to 834 thousand Km^2 during the period of 2003 to 2007. That is, it decreased from 786 thousand Km^2 in 2003 to 779 thousand Km^2 in 2004, and continuously increased from then on to 834 thousand Km^2 in 2007. The share of the agricultural land ranged from 28.6 percent to 30.6 percent of the nation's total territory during the same period. The agricultural land itself is about eight times larger than the size of Korea, and about four times

larger than that of the Korean peninsula. Plough land ranges from 26.5 percent to 28.3 percent of the total agricultural land. The size of plough land increased from 213 thousand Km^2 in 2003 to 221 thousand Km^2 in 2005, and has been stable at that level since 2005. This, in terms of size, is comparable to that of the Korean Peninsula and about twice larger than that of Korea. Other than plough land, the rest of the agricultural land is classified as hayfield. Hayfield has ranged from 560 thousand Km^2 to 613 thousand Km^2, or about 71.7 percent to 73.5 percent of the agricultural land. That is, Kazakhstan has enormous quantities of hayfield as well. Its size compares to six times that of Korea. As indicated by the sheer size of agricultural land, plough land and hayfield, Kazakhstan can certainly be defined as an agricultural country.

Table 5-1 | Agricultural Land

(Unit: Km^2)

	2003	2004	2005	2006	2007
Agricultural Land (A)	786,011	779,724	783,830	812,618	834,068
Plough Land (B)	213,519	219,681	221,520	221,061	221,176
A/National Land (%)	28.8	28.6	28.8	29.8	30.6
B/A (%)	27.2	28.2	28.3	27.2	26.5

Source: Statistical Yearbook "Kazakhstan in 2007", Agency on Statistics of the Republic of Kazakhstan, 2008

During the period from 2003 to 2007, the total population of Kazakhstan increased from 14.9 million to 15.6 million, or about 620 thousand persons. The annual growth rate of the population was about 1 percent. It is interesting to note that during this period, the urban population decreased from 8.5 million persons to 8.3 million, while the rural population increased from 6.4 million persons to 7.3 million. That is, the rural population increased by 873 thousand persons and its annual growth rate was about 3.2 percent, exceeding the growth rate of total population. This stands in stark contrast to the observations made in most other countries experiencing economic development, that is the rural population generally decreases as opposed to increasing as has been seen in Kazakhstan. As a result, the share of rural population over total population increased from 43 percent in 2003 to 46.9 percent in 2007. The relatively high share of rural population and its upward trend, support the view that Kazakhstan is an agricultural country.

In comparison, the rural population, as a percentage of total population, in Korea continuously decreased during the period of economic development, from 50.8 percent in 1975 to 42.0 percent in 1980, 25.9 percent in 1990, 20.0 percent in 2000, and 18.2 percent in 2005. It becomes apparent, that the current share of Kazakhstan's rural population is comparable to that of Korea in 1980s, when Korea transformed itself from an agriculture-based society into a more industrialized economy. Compared to the Korean experience, the rural population remains still high in Kazakhstan.

Table 5-2 | Population and Employment

(Unit: 1,000 people)

	2003	2004	2005	2006	2007
Population(A)	14,951.2	15,074.8	15,219.3	15,396.9	15,571.5
Urban(B)	8,518.2	8,614.7	8,696.5	8,833.3	8,265.9
Rural(C)	6,433.0	6,460.1	6,522.8	6,563.6	7,305.6
C/A (%)	43.0	42.9	42.9	42.6	46.9
Employment(D)	6,985.2	7,181.8	7,261.0	7,403.5	7,631.1
Agriculture(E)	2,446.8	2,387.9	2,335.7	2,318.3	2,366.0
E/D (%)	35.0	33.2	32.2	31.3	31.0

Source: Statistical Yearbook "Kazakhstan in 2007", Agency on Statistics of the Republic of Kazakhstan, 2008

From an employment viewpoint as well, Kazakhstan may be defined as an agricultural country. Total employment increased by 646 thousand persons from 7 million in 2003 to 7.6 million in 2007. The average annual growth rate of employment was 2.2 percent. During this period, however, employment in the agricultural sector decreased slightly from 2.45 million to 2.37 million, representing a 0.8 percent annual decrease. The share of agriculture in total employment fell from 35 percent to 31 percent. Nevertheless, the fact that this ratio still exceeds the 30 percent benchmark highlights the importance of agriculture in Kazakhstan. In Korea, the same ratio, i.e. agricultural employment out of total employment, fell from 50.4 percent in 1970 to 34 percent in 1980, 17.9 percent in 1990, 10.6 percent in 2000, and 7.4 percent in 2007. Comparing the ratios of Korea and Kazakhstan, indicates that Kazakhstan stands at a point similar to that of Korea in the early 1980s when Korea first entered the early stages of industrialization, away from an agriculture-based economy.

The economy of Kazakhstan has grown rapidly on the back of abundant natural resources, including oil, natural gas, minerals, etc. The gross domestic product (GDP) increased 2.8 fold during the period of 2004 to 2007, from 4.6 trillion tenge to 12.8 trillion tenge. The agricultural GDP doubled from 358 billion tenge to 717 billion tenge during the same period. However, as the growth rate of the agricultural sector remained below the growth rate of total GDP, the agricultural sector, as a share of total GDP fell from 7.8 percent in 2003 to 5.6 percent in 2007. Despite this, the ratio of the agricultural sector still above 5 percent of total GDP and the remarkable growth in the agricultural industry, it is believed that agriculture provides food supplies, creates environmental benefits, and preserves the cultures and traditions of Kazakhstan. In this sense, Kazakhstan is still an agricultural country.

Table 5-3 | Agriculture GDP

(Unit: billion tenge)

	2003	2004	2005	2006	2007
GDP (A)	4,612	5,870.1	7,590.6	10,213.7	12,849.8
Agriculture (B)	358.0	412.3	477.4	554.1	717.0
B/A(%)	7.8	7.0	6.3	5.4	5.6

Source: Statistical Yearbook "Kazakhstan in 2007", Agency on Statistics of the Republic of Kazakhstan, 2008

The total exports of Kazakhstan increased sharply from US$ 20.0 billion in 2004 to US$ 47.8 billion in 2007 with the annual growth rate of 33 percent. Meanwhile, the agricultural exports highly fluctuated between 2003 and 2007, showing an increase from US$ 976 thousand million in 2003 to US$ 1.2 billion in 2004, a decrease to US$ 858 thousand in 2005, and another increase to US$ 1.3 billion in 2006 and US$ 2.3 billion in 2007. Accordingly, the annual growth rate also moved unevenly. As a result, the share of agricultural exports in total exports decreased from 6.1 percent to 4.8 percent during this period. Nonetheless, Kazakhstan is one of the major exporters of wheat in the world market. According to the food balance sheet published by the Food and Agriculture Organization of the United Nations (FAO), Kazakhstan produced 11.5 million tons of wheat in 2003 while exporting 5.9 million tons, accounting to more than half of the production. In 2005, Kazakhstan produced 11.2 million tons of wheat and exported 3.2 million tons, representing 28.5 percent of production. Considering that wheat production recorded more than 18.0 million tons in the early 1990s, there seems to be a high potential that wheat production and its exports will increase further in the future. Moreover, Kazakhstan is also a barley exporter. In this regard, Kazakhstan is an agricultural country.

Table 5-4 | Export

(Unit: US $ million)

	2003	2004	2005	2006	2007
Total Export(A)		20,096.2	27,849.0	38,250.3	47,755.3
Agriculture(B)	976.3	1,234.4	858.4	1,292.3	2,307.0
B/A(%)		6.1	3.1	3.4	4.8

Sources: Statistical Yearbook "Kazakhstan in 2007", Agency on Statistics of the Republic of Kazakhstan, 2008
Ministry of Agriculture (Kazakhstan)

Despite the fact that Kazakhstan is an agriculture-based economy, it also imports all kinds of agricultural and food products except cereals. In order to check the demand and supply of agricultural products, food balance sheets from the Ministry of Agriculture of the Republic of Kazakhstan and the FAO will be reviewed. The food balance sheets from 2005 and 2008 were available from the Ministry of Agriculture of the Republic of Kazakhstan, while the same data up to 2005 were also available on the FAO website as of December 2009. It is noteworthy that there are discrepancies in numerical values between the two data sets. The review here is based on the data from the Ministry of Agriculture of Kazakhstan, while the FAO data from 2003 to 2005 is referenced whenever necessary. The reason is that the data available from the Ministry of Agriculture has figures only for cereals as a whole, while the FAO data shows it by commodity such as wheat, barley, etc.

Cereal production increased from 13.8 million tons in 2005 to 20.1 million tons in 2007, but plunged to 15.6 million tons in 2008. During this period, cereal production was in an increasing trend, in particular, exceeding the 20 million tons benchmark in 2007. Average annual production was equivalent to 16.5 million tons in this period, but with relatively high variation by year. However, it should be noted that cereal production in 1992 was 29.5 million tons. This

means that the production in 2005 was less than half of the production in 1992, and the production in 2007 was only two-thirds of the production in 1992. In one word, cereal production showed a decreasing trend after 1992, and the recovery of cereal production up to the level of early 1990s would be a good target.

In regard to the demand side of cereal, processing for food purposes was the largest over the same period, equal to 4.3 million tons per year. Feed demand was the next largest, showing about 3.5 million tons a year. The combination of processing for food purposes and feed demand was about 7.8 million tons, exceeding half of the amount produced. Personal consumption (consumption by human beings directly) was relatively small, about at 290 thousand tons per year. Remarkably, seed demand was an impressive 2.7 million tons, or more than 16 percent of total production. Considering the fact that seed demand is usually less than 5 percent of the production (in other countries), the seed demand remained very high in Kazakhstan, possibly due to poor yield per unit acreage. Cereal exports surged sharply from about 2 million tons in 2005 to 6.8 million tons in 2007, but fell to 5.7 million tons in 2008. According to the FAO data, wheat exports equaled 3.2 million tons in 2005.

Meanwhile, in 2006 per capita consumption of cereal was about 19 kilograms (kg), significantly lower than of the 134.4 kg in Korea. It is noteworthy that the demand for processing for food purposes is high in Kazakhstan, while it is relatively low in Korea.

Table 5-5 | Demand and Supply of Cereals, 2005~2008

(Unit:1,000 ton)

	2005	2006	2007	2008
Total	24657.5	26753.4	31454.9	28852.9
Supply				
Carry-in stock	10840.5	10178.4	11246.5	13154.8
Production	13781.4	16511.5	20137.8	15578.2
Import	35.6	63.5	70.6	119.9
Demand				
Personal Consumption	282.4	291.3	289.6	296.1
Feed	3277.0	3396.0	3530.3	3647.7
Seed	2553.9	2541.3	2643.5	2890.7
Processed product	4292.3	4441.5	4091.8	4466.1
Other Industrial Use	425.1	489.9	496.8	448.4
Waste	599.0	635.5	409.2	784,4
Export	2021.8	3711.4	6838.9	5654.7
Statistic Error	1027.6			
Carry-over stock	10178.4	11246.5	13154.8	10664.8
Per Capita Consumption	18.6	19.0	18.7	18.9

Source: The Ministry of Agriculture (Kazakhstan)

Table 5-6 | Food Balance Sheet, 2003

(Unit: 1,000 ton)

	Supply				Total	Demand			
	Production	Import	Change in Stock	Export		Food	Feed	Seed	Others
Cereal	14,676	131	1,450	6,503	9,754	2,779	3,777	1,929	1,269
Wheat	11,519	69	1,400	5,864	7,124	2,469	2,000	1,700	955
Rice	133	12	0	7	138	122	1	8	7
Barley	2,200	29	250	583	1,896	105	1,370	170	251
Corn	438	2	-145	29	266	11	200	22	34
Other	386	19	-55	20	330	72	206	29	23
Beet	424	35	-70	0	388	0	14	0	374
Sugar	44	540	-33	119	433	414	19	0	0
Oil Crop	626	79	32	62	675	10	57	20	588
Vegetable Oil	109	81	0	12	178	145	0	0	33
Vegetable	2,545	52	0	128	2,469	2,021	258	19	171
Fruit	190	112	15	29	288	243	0	0	44
Meet	693	80	0	1	772	733	5	0	35
Bovine	320	7	0	0	328	291	5	0	32
Pig Meat	185	14	0	1	199	199	0	0	0
Poultry	36	58	0	0	94	91	0	0	3
Other	152	0	0	0	152	152	0	0	0
Milk	4,317	235	0	68	4,484	3,571	857	0	56
Egg	128	5	0	0	132	113	3	2	14

Source: faostat.fao.org

During the period from 2005 to 2008, personal consumption of vegetables including melons and gourds increased from 2.67 million tons to 3.11 million tons, Industrial demand for vegetables, including feed demand and those for seeding purposes was about 90 thousand tons over the period. Export demand was about 209 thousand tons, and annual loss was about 264 thousand tons. Therefore, total demand for vegetables was about 3.3 million tons, ranging from 2.9 million tons to 3.8 million tons. Total demand, excluding export, stood at 3.1 million tons. Yet, vegetable production increased from 2.85 million tons to 3.15 million tons in this period, and its average was about 2.9 million tons. This implies that demand exceeded production. During this period, vegetable imports surged from 10 thousand tons to 126 thousand tons, while exports increased from 151 thousand tons to 282 thousand tons. That is, the growth rate of imports outpaced the growth rate of exports, although the increase in the total amount exported was slightly higher than that for imports. Per capita consumption of vegetables increased by about 13 percent from 176.3kg to 198.7kg, leading to an increase in vegetable consumption and greater imports, while at the same time exports grew as well.

Table 5-7 | Food Balance Sheet, 2005

(Unit: 1,000 ton)

	Supply				Total	Demand			
	Production	Import	Export	Stock in Change		Food	Feed	Seed	Others
Cereal	13,625	171	3,333	26	10,489	2,799	3,558	2,305	1,826
Wheat	11,198	115	3,190	0	8,124	2,432	2,074	2,075	1,544
Rice	207	4	34	6	183	160	1	9	13
Barley	1,445	29	100	0	1,374	119	900	160	195
Corn	494	8	4	0	498	15	405	23	55
Other	488	18	39	26	493	232	180	47	33
Beet	311	2	0	80	392	0	15	0	377
Sugar	43	633	158	0	519	516	3	0	0
Oil Crop	846	54	42	10	868	12	69	19	768
Vegetable Oil	179	100	13	-24	243	175	0	0	67
Vegetable	2,900	64	232	1	2,734	2,454	85	53	141
Fruit	300	222	48	0	474	425	0	0	49
Meet	762	146	2	0	905	852	6	0	48
Bovine	345	10	0	0	354	304	6	0	45
Pig Meat	200	24	2	0	222	222	0	0	0
Poultry	43	111	0	0	154	151	0	0	3
Other	175	0	0	0	175	175	0	0	0
Egg	141	7	0	0	148	132	0	2	14
Milk	4,749	426	143	0	5,032	3,742	1,113	0	176

Sour ostat.fao.org

Nonetheless, greenhouse production of vegetables barely exists as the associated risks are high due to cold weather in the long winter season and unstable energy supply. In addition, despite the fact that Kazakhstan is an energy-exporting country, including oil and gas, the supply of energy remains unstable, especially for electricity. Therefore, it is generally said, in agricultural community, that greenhouse production during the winter season contains high risks.

During the period from 2005 to 2008, personal consumption of fruits including berries and grapes surged from 211 thousand tons to 280 thousand tons, and demand for processing for food purposes remained at 38 thousand tons annually. The amount of loss ranged from 15 thousand tons to 20 thousand tons, with an average of 18 thousand tons. Therefore, the annual demand for fruits stood at about 293 thousand tons, ranging from 271 thousand tons to 340 thousand tons. On the other hand, fruit production plunged from 296 thousand tons to 176 thousand tons during the same period. The combination of an increase in demand for fruits and a decrease in production, led to fruit imports rapidly growing from 51 thousand ton to 204 thousand tons, while fruit exports decreased from 117 thousand tons to 12 thousand tons. Therefore, Kazakhstan is highly dependent upon fruit imports. Except the carry-in stock from the previous

year, imports were about 54 percent of total supply in 2008, increased sharply from 15 percent in 2005. During this period, per capita consumption of fruits increased by 27 percent from 14.0kg to 17.8kg. This makes an increase in fruit production necessary in order to meet the growing demand trend. Meanwhile, there was a significant discrepancy on fruit import data; the Ministry of Agriculture reported 51 thousand tons in 2005, while the FAO data stated 222 thousand tons in the same year.

Meat consumption increased from 881 thousand tons in 2005 to 1,016 thousand tons in 2008, while production rose from 762 thousand tons to 874 thousand tons. As production fell below the consumption level, meat imports increased from 138 thousand tons to 214 thousand tons during this period. Excluding carry-in stock from the previous year, the share of meat imports as a percentage of total meat supply was equal to about 20 percent in 2008, a significant increase from about 7 percent in 2005. Import dependence of meat showed a continued increase. Per capita consumption of meat increased from 58.1 kilograms in 2005 to 64.8 kilograms in 2008, averaging about 62.8 kilograms. As a reference, per capita consumption of meat in Korea stood at 35.4 kilograms in 2007.

According to the FAO's food balance sheet, poultry accounted for most of the meats imported, increasing from 72.5 percent in 2003 to 76 percent in 2005. Given poultry imports doubled, from 58 thousand tons in 2003 to 111 thousand tons in 2005, the share of imports as a percentage of total poultry supply rose from 61.7 percent in 2003 to 72.0 percent in 2005. A draft "Master Plan: Development of Poultry Industry" by the Ministry of Agriculture shows that imports of poultry meat increased from 80.7 thousand tons in 2004 to 152.4 thousand tons in 2006 and decreased to 132.6 thousand tons in 2008, and that most of imports came from the United States of America. That is, more than 90 percent of poultry meat imports came from the United States of America during the period of 2004 to 2008, and the remaining came from Brazil, Ukraine, and other countries. It is said that domestic poultry production faces strong competition from cheap imports.

During the period from 2005 to 2008, milk and daily products consumption increased from 4.6 million tons to 4.9 million tons, while feed demand rose from 588 thousand tons to 644 thousand. Total demand for food and feed increased from 5.2 million tons to 5.5 million tons, while production grew from 4.7 million tons to 5.2 million tons. Since production stayed below demand, import of milk and dairy products surged from 432 thousand tons to 860 thousand tons, growing about twofold. In the meantime exports fell from 62 thousand tons to 23 thousand tons. Per capita consumption of milk and dairy products stood at about 303.6 kilograms during the period of 2005 to 2008, ranging from 300.2 kilograms in 2007 to 306.7 kilograms in 2008.

Although Kazakhstan has abundant agricultural land and is a sugar beet-producing country, it imports a substantial amount of sugar. According to the Ministry of Agriculture, sugar beet production continued to decline from 311 thousand tons in 2005 to 130 thousand tons in 2008.

It should be noted that beet production was about 1.16 million tons in 1992, implying that its production potential exceeds 1 million tons. This means that the beet production decreased dramatically over the last two decades. A draft on "Master Plan: Development of Production of White Sugar and Sugar Beet" by the Ministry of Agriculture indicates that the minimum level of sugar beet production required to exploit the capacities of processing factories is 180 thousand tons of raw materials. That is, the resources of sugar processing industry could be idle in 2008, because the beet production in 2008 was only 130 thousand tons. According to the FAO data, 528 thousand tons of raw sugar were imported in 2003, about 100 thousand tons more than sugar beet production of 424 thousand tons. In 2005, 610 thousand tons raw sugar equivalent were imported, about twice the sugar beet production of 310 thousand tons. Yet, Kazakhstan does not have any restriction on import of raw materials, while it imposes 30 percent tariff on sugar imports and introduced an import quota of sugar of 55 thousand tons. It is interpreted that this policy is aimed at protecting sugar beet processing industry and sugar processors over sugar beet production and its growers.

In sum, although Kazakhstan is an agricultural country, retaining abundant agricultural land and human resources, it imports a large portion of agricultural and food products. Excluding cereals and vegetables, import dependence of fruits, meats, and daily products is facing an upward trend. Import of sugar and vegetable oil is also on the rise. Despite the nation's high agricultural production potential, domestic production has fallen, while imports from foreign countries have grown. This implies that domestic agricultural resources have become idle, while import demand has been on the rise. This is a significant problem and needs to be addressed by Kazakhstan.

5.2. Problems of the Agricultural Sector

Despite the fact that Kazakhstan is an agricultural country, agricultural production has decreased in the past twenty years and its productivity remains very low. Though cereal production reached 29.5 million tons in 1992, it fell to about 16.5 million tons on average during the period of 2005 to 2008. At the same time, sugar beet production plunged from 1.2 million tons to 0.3 million tons, while most other corps decreased in production as well. It is widely acknowledged that agricultural production has fallen, mostly as a result of the withdrawal of subsidies. In addition to this, there are other problems such as low agricultural productivity, excess population and relative poverty in rural areas, underdeveloped agricultural marketing systems, lack of social overhead capital in rural areas, etc. This section will briefly review the problems faced by the agricultural sector in Kazakhstan. A special focus is put on agricultural production and marketing.

Even though Kazakhstan is a big country in land size and has abundant human resources in the rural area, it imports substantial amounts of agricultural products and foods as domestic

agricultural production falls below consumer demand. For example, while Kazakhstan exports cereals, including wheat, it imports fruits, meats, and processed foods such as sugar and vegetable oil, etc. That is, Kazakhstan is dependent upon agricultural imports, and its dependency on imports is increasing and deepening. Of course, the increasing dependencies lies in the fact that agricultural production has been on a declining trend, and its productivity is low.

Tables 5-8 to 5-10, compare agricultural productivity of Kazakhstan, which is represented as yield per hectare, to other major agricultural countries in the world; Table 8, Table 9, and Table 10 display comparisons of yield per hectare in production of cereal, oil crops and sugar crops, respectively.

Cereal production yield per hectare in Kazakhstan, on average, was 0.7 ton during the period from 1994 to 1996, increased to 1.2 ton during the period from 1999 to 2001 and then fell to 1.0 ton during the period from 2004 to 2006. The yield averaged about 1.0 ton per hectare during this period, and it is noteworthy that the yield was declining in early 2000s. During the same period, the world average of yield of cereal production was 3.1 tons; specifically, 7.0 tons in France, 5.8 tons in the U.S., 5.0 tons in China, 3.3 tons in Argentina, 2.9 tons in Canada, 2.8 tons in Brazil and 1.8 tons in Australia. That is, yield for cereal production in Kazakhstan was significantly lower than that in those major agricultural countries in the world, accounting about one third of the world average. In one word, agricultural productivity in cereal production remains low in Kazakhstan.

Table 5-8 | Yield of Cereal Production per Hectare

(Unit: Ton)

	ARG	AUS	BRZ	CAN	CHN	FRA	KZH	USA	World Average
1994-1996	2.8	1.8	2.5	2.7	4.7	6.7	0.7	5.1	2.8
1999-2001	3.3	2.1	2.8	2.8	4.8	7.1	1.2	5.8	3.1
2004-2006	3.9	1.6	3.1	3.1	5.2	7.1	1.0	6.6	3.3

Note: AGR (Argentina), AUS (Australia), BRZ (Brazil), CAN (Canada), CHN (China), FRA (France), KZH (Kazakhstan), USA (United States of America).
Source: faostat.fao.org

Oil crop production yield per hectare in Kazakhstan increased from an average of 0.1 ton during 1994-1996 to 0.2 ton during 1999-2001, and eventually, to 0.3 ton during 2004-2006. The average was approximately 0.2 ton throughout this period. The increase in oil crop yield during this period was remarkable. However, the world average of oil crop production yield was about 0.5 ton at this time, with the average yield surpassing 1.0 ton in France, 0.5 ton in Canada, maintaining around 0.5 ton in Argentina and China, exceeding 0.4 ton in Brazil and the U.S., while remaining at approximately 0.4 ton in Australia. This shows that, in Kazakhstan, the per hectare oil crop production yield fell below those of other major agricultural countries, accounting for about 40 percent of the world average. In one word, agricultural productivity in oil crop production also remains low in Kazakhstan.

Table 5-9 | Yield of Oil Crops Production per Hectare

(Unit: Ton)

	ARG	AUS	BRZ	CAN	CHN	FRA	KZH	USA	World Average
1994-1996	0.5	0.4	0.4	0.5	0.5	1.0	0.1	0.4	0.4
1999-2001	0.5	0.4	0.5	0.5	0.5	1.0	0.2	0.4	0.5
2004-2006	0.5	0.4	0.4	0.6	0.5	1.1	0.3	0.5	0.6

Note: AGR (Argentina), AUS (Australia), BRZ (Brazil), CAN (Canada), CHN (China), FRA (France), KZH (Kazakhstan), USA (United States of America).
Source: faostat.fao.org

Sugar crop production yield per hectare in Kazakhstan stayed at an average of 9.3 tons during the period from 1994 to 1996, decreased to 6.9 tons during the period from 1999 to 2001, and rose remarkably again to 21.7 tons during 2004-2006. The average was about 12.6 tons during this period. The world average of sugar crop production yield per hectare was about 57.5 ton at this time, with 93.4 tons in Australia, 67.1 tons in Argentina, 71.5 tons in Brazil and France, 60.4 tons in the U.S., 52.3 tons in China, and 41.3 tons in Canada. This shows that the sugar crop production yield per hectare in Kazakhstan remained well below those of the other major agricultural countries, accounting for only about 22 percent of the world average. The agricultural productivity in sugar crop production stayed at a low level in Kazakhstan.

Table 5-10 | Yield of Sugar Crops Production per Hectare

(Unit: Ton)

	ARG	AUS	BRZ	CAN	CHN	FRA	KZH	USA	World Average
1994-1996	60.8	95.5	66.9	42.9	44.9	67.0	9.3	57.5	53.8
1999-2001	64.8	97.6	73.8	28.7	45.2	67.1	6.9	63.8	56.9
2004-2006	75.6	87.1	73.7	52.2	66.9	80.4	21.7	59.8	61.9

Note: AGR (Argentina), AUS (Australia), BRZ (Brazil), CAN (Canada), CHN (China), FRA (France), KZH (Kazakhstan), USA (United States of America).
Source: faostat.fao.org

The low level of agricultural productivity can also be understood from the fact that the demand for seed is too high, as shown in the utilization of cereals in the food balance sheet. According to the FAO's food balance sheets in table 5-6 and table 5-7, the demand for seed in wheat utilization was about 1.7 million tons in 2003 when production accounted for approximately 11.5 million tons and demand for about 2 million tons in 2005 when production amounted to about 11.2 million tons. That is, the demand for seed in wheat was about 14.8 percent of production in 2003 and 18.5 percent in 2005, respectively, implying that the demand for seed is excessively much. In general, the demand for seed is less than 5 percent of production. In this sense, the demand for seed is too high in the case of wheat in Kazakhstan. This is also the case for barley. However, demand seems to be at an appropriate level in the case of maize, accounting for about 5 percent of production. On the other hand, it can be interpreted that the seed in use now in Kazakhstan may be a traditional variety with a lower yield, i.e., not a high-yield variety.

In Korea, the share of demand for seed out of total production was usually less than 1 percent for rice and corn, and 5 percent for barley, showing much less demand than in Kazakhstan. The comparison for wheat is not meaningful, given that wheat cultivation is very small in Korea.

Whenever productivity is low, total production is usually low as well, but Kazakhstan exports wheat and barley as production exceeds domestic consumption. However, Kazakhstan imports sugar crops or sugar due to the lack of domestic production. The import policy on sugar and raw materials of sugar should be noteworthy. That is, 30 percent duty on sugar import was introduced in 2008 and a quota on import of sugar was also introduced at 55 thousand tons in 2009. However, there are no restrictions on import of raw materials such as sugar beet or sugar cane. This import policy seems to aim to support the sugar processing industry and sugar processors by restricting sugar import into the country and preventing having any difficulties of lacking raw materials. It is also noteworthy that the market of white sugar producers is 90 percent monopolized, according to expert estimations. This sugar import policy would help to foster the monopolized sugar processing industry, but will ultimately deter the increase of domestic production of sugar crops. Production of sugar cane, however, remained at above 300 thousand tons for the period from 2005 to 2007, but decreased to 130 thousand tons in 2008. If the objective of agricultural policy aims to increase a domestic production of agricultural products and expand income sources for farmers, the import policy on sugar and raw materials of sugar needs to be reviewed and amended, focusing on more production of sugar crops and economic well-being of growers of sugar crops.

A similar example can be found in the case of oilseed crops. Kazakhstan imports vegetable oil even though it has a potential of producing more oilseed crops such as soybeans, sunflower seeds, and so on. The import of sunflower oil has been increasing recently with the share of imports reaching up to 45 percent in 2008. On the other hand, the volume of domestically produced sunflowers has been decreasing. As shown in Table.9, the oilseed crop production yield is lower in Kazakhstan. The draft of the “Master Plan : The Development of the Production and Processing of the Oilseeds” by the Ministry of Agriculture reveals that the lower yields come from low quality of seeds, poor reproductive abilities, deterioration of agricultural equipment, and so on. Financial support introduced in the Master Plan focuses on two parts: subsidization of oilseed production; and the establishment of processing plants and storages.

Considering that producing sugar from sugar crops or extracting vegetable oil from oilseed crops does not require state-of-the-art, the agricultural policy should aim to increase agricultural production, including sugar crops and oilseed crops. Despite the abundant agricultural land and having the potential to increase agricultural production, including sugar crops and oilseed crops, Kazakhstan has been undergoing contraction of agricultural production in the past twenty years, effectively importing either processed food such as sugar and vegetable oil or their raw materials. It may seem contradictory that Kazakhstan imports sugar and vegetable oils while its

resources, such as agricultural land, are left idle. In this sense, the agricultural policy should focus on the increase in agricultural production and the improvement of rural income for the development of agriculture and rural areas. In particular, a high production of oilseed crops is important not only for the high production of vegetable oils but also for the development of livestock sector as the oilseeds obtained from extracting vegetable oils are important animal feeds. It should be noted that feed price has increased rapidly compared to meat price recently, causing difficulties in livestock production. Nonetheless, the Innovative Program for the agricultural sector 2010-2014 is currently putting emphasis on oilseed production and processing, with most of the finances of the Master Plan being planned to go into the establishment of processing plants and storages.

Since the production of meat is below consumption, meat is also imported, with poultry accounting for most of meat imports. One of the major problems in the poultry industry is that the production cost of domestic poultry is higher than the import price, due mainly to a high feed cost. The draft of the "Master Plan : Development of Poultry Industry" shows that the cost of 1 kilogram of domestic poultry in 2008 was 290 tenge, while the cost of an imported poultry at the border, including tax and custom duties, from January to May in 2009 was only 199 tenge per 1 kilogram. The higher production cost is a result of higher feed cost which is accounted for about 65 percent of production cost. In one word, poultry industry is faced with severe competition from cheap imports of poultry meat, implying a higher possibility of increase in imports. In addition, poultry growers suffer from shortage of working capital, outdated equipments and low level of technology, etc.

Agricultural marketing should also be modernized in Kazakhstan. One of the typical problems for agricultural marketing is the instability of demand and supply of agricultural products. In particular, the demand and supply of fresh fruits and vegetables is instable, and supply is not sufficient to cover demand during the winter season especially, which causes a high price fluctuation between the harvest season and winter season. For example, prices for tomatoes and cucumbers fluctuate seasonally and move in a cycle, as shown in Figure 5-1 and 5-2, respectively. That is, wholesale prices of tomatoes both in the Shymkent area and the Petropavlovsk area were about 300 tenge per kilogram (kg) in the first quarter (winter season) in the past three years, but fell sharply to prices below 100 tenge in the third quarter (harvest season). Prices for cucumbers, in both areas, over the past three years showed a similar pattern as that for tomatoes. Their wholesale prices were lower in the third quarter (harvest season) and higher in the first quarter.

A draft "Master Plan : The Development of the Production and Processing of Fruit and Vegetables" by the Ministry of Agriculture indicates that wholesalers face considerable financial risks, and that their risk is diminished by a significant increase in prices, which comprise more than 40 percent of the difference in prices for tomatoes in Astana and the bordering regions. The main challenge for the agricultural industry is the lack of supply, as well

as poor development of distribution channels.

This kind of seasonal (and regional) price fluctuation raises immediate concerns about the instability of demand and supply, implying that supply should be increased in the winter season. As a consequence, it is necessary to adjust supply to demand in order to stabilize agricultural prices. It should come hand in hand with an expansion of storage facilities and a development of the food processing industries. This suggests that more attention and investment are necessary for price stabilization of agricultural products and agricultural marketing modernization.

Figure 5-1 | Wholesale Price of Tomato (tenge/kg)

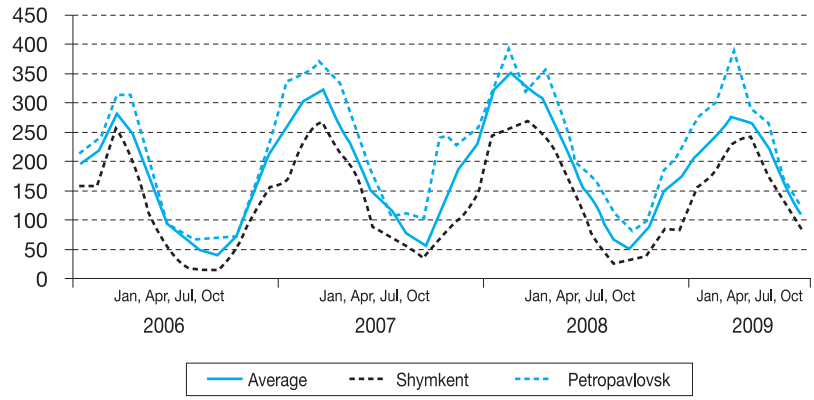
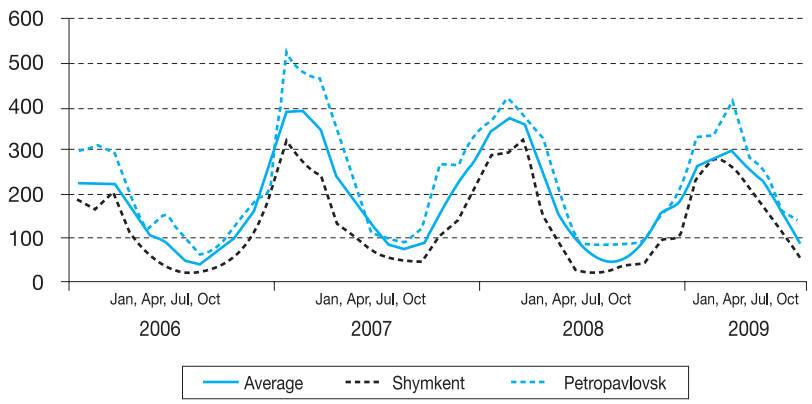


Figure 5-2 | Wholesale Price of Cucumber (tenge/kg)



It is said, that market participants have difficulties with the collection and distribution systems of marketing information, and that a direct result is market information not being circulated well. Even worse, organizations and/or offices in charge of agricultural marketing including the Ministry of Agriculture are believed not to facilitate the exchange of agricultural marketing information between/among them, implying that the cooperation between/among organizations is not in a good state. Therefore, even though the government collects and analyzes marketing information data, it is probable that the use of it by market participants is limited.

Currently, Kazakhstan is lacking social overhead capital (SOC) including transportation and road systems, communication systems, etc. This deficit increases agricultural marketing costs and decreases competitiveness. According to the U.S. Department of Agriculture, Kazakhstan is an exporter with high transportation costs. This suggests that transportation systems may be the main obstacle in promoting agricultural exports. That is, even though agricultural production costs are lower in Kazakhstan, its exports may not be competitive due to elevated domestic transportation costs. Of course, agricultural marketing costs are increased as a result of high transportation costs. Therefore, the social overhead capital and infrastructure should be expanded and increased for efficient agricultural marketing in Kazakhstan.

For a more efficient and effective flow of agricultural marketing information, communication systems should also be enhanced. Even though mobile phone subscription rates are very high in Kazakhstan, those for fixed lines and internet access are low. For example, in 2007, out of 100 people, 81.3 were mobile phone subscribers, while only 20.9 people had access to fixed lines and 2.5 people were connected to the internet. Fixed lines and the internet, which are basic communication systems for an effective flow of agricultural marketing information, are not yet popular in Kazakhstan. Therefore, it is probable that market information is not distributed well.

Considering the difficulty of collecting and distributing agricultural marketing information due to a relatively weak social infrastructure such as transportation and communication systems, it comes as little surprise that agricultural marketing costs remain high in Kazakhstan. As mentioned above, wholesalers try to increase their prices in order to reduce their financial risk, causing higher marketing cost. These are all factors that deter a smoother flow of agricultural products between rural and urban areas, and will continue to aggravate agricultural price fluctuations. Therefore, the modernization of agricultural marketing should be promoted in order to stabilize price fluctuations, and increase marketing efficiency.

During the period from 2003 to 2007, the rural population accounted for about 42.6 to 46.9 percent of the total Kazakh population, and agricultural employment exceeded 30 percent of total employment. The fact that agriculture as a share of total GDP fell to 5.6 percent while the rural population accounted for 46.9 percent of total population in 2007 highlights the excess of

rural population. It is, therefore, inevitable that rural income was low in relative terms, as there are too many people for a relatively small income. Considering limited employment opportunities outside the farm sector in rural areas, rural areas have faced unavoidable poverty.

In general, economic development is measured in terms of industrialization and urbanization. Although the agricultural sector will grow as well, the pace of growth in the agricultural sector is lower than that of the non-agricultural sector, triggering labor movement from the former to the latter. During the economic development process of Korea, a large migration from rural areas to urban areas took place. That is, the farm population decreased from 15 million people in 1962 to 3.3 million people in 2007, and the share of rural population out of total population fell from 56.9 percent in 1962 to 28.4 percent in 1980, 8.6 percent in 2000, and 6.8 percent in 2007. The sharp decline in the rural population was possible due to the rapid development of the non-agricultural sector, which offered more employment and earning possibilities. In this regard, it is necessary for Kazakhstan to absorb the excess population in rural area through the development of the non-agricultural sector. If this does not happen with speed, rural income will continue to remain low.

The rural area in Kazakhstan remains relatively poor. During the period from 2003 to 2007, the monthly average earning in the agricultural sector was rapidly increasing from 9,567 tenge to 24,676 tenge, about 2.6 times increase. The annual growth rate was equivalent to about 27 percent. However, agricultural income was only about 40.8 percent to 47.0 percent of the national average. More strikingly, the share of agricultural income fell to 38.5~45.3 percent compared to that of the manufacturing sector, and plunged to 17.3~20.3 percent when compared to that of the financial sector. Overall, it is commendable that agricultural incomes increased during this period. Compared to other sectors, however, earnings in agricultural sectors increase further to mitigate the relative poverty of the rural population, and the rapid development of the non-agricultural sector should absorb excess population in rural areas.

Table 5-11 | Monthly Average Earnings by Economic Activities

(Unit: Tenge)

	2003	2004	2005	2006	2007
National Average (A)	23,218	29,329	34,060	40,790	52,479
Agriculture (B)	9,567	11,978	14,981	18,811	24,676
Manufacture (C)	24,823	30,234	35,412	43,617	54,415
Finance (D)	55,207	64,532	79,520	97,505	121,568
B/A (%)	41.4	40.8	44.0	46.1	47.0
B/C (%)	38.5	39.6	42.3	43.1	45.3
B/D (%)	17.3	18.6	18.8	19.3	20.3

Source: Statistical Yearbook "Kazakhstan in 2007", Agency on Statistics of the Republic of Kazakhstan, 2008

Besides the aforementioned issues, various policy problems in the agricultural and rural areas exist. For example, trade policy is important, since Kazakhstan is an exporter of cereal and importer of fruits and meats. Both, export and import policy can have a significant effect on farmers and agricultural/rural development. Education services for farmers can be another example. Since agricultural productivity is low and rural people suffer from relative poverty, extension services should be promoted in order to transfer new farming techniques to farmers and improve socio-economic status of farmers. In addition, farmers should have knowledge(s) about changes in the environment of agricultural marketing and market information in order to improve their sales and production systems position. Extension services should be promoted to improve farmers' positions in production and marketing.

Agricultural cooperatives are another policy area. In Korea, agricultural cooperatives have been involved in many economic activities such as supply of production materials and consumer goods, agricultural marketing, agricultural processing, banking and credit business, insurance, training and education, etc, and their performances have been remarkable. Since Kazakhstan is an agricultural country, cooperative movement can be helpful for improvement of farmers' socio-economic position, and agricultural and rural development.

In rural areas, non-farm job opportunities are insufficient. There are less opportunities to earn a non-farm income, given the lack of industrialization in rural areas. Taken together then, the rural community is in a slump and farmers live in a relative poverty. To effectively deal with difficulties in the rural community, it is necessary to deliver an integrated rural development plan.

5.3. Policy Directions of Agricultural Development

In spite of the potential of agricultural development in Kazakhstan, agricultural production has declined since early 1990s. In addition, agricultural productivity is low, rural incomes are relatively low, the rural community is depressed and less developed. Since Kazakhstan is an agricultural country, agricultural development is all the more important and a de facto pre-requisite for economic development. Fortunately, an agricultural development plan is being prepared for the end of 2009 as part of the Innovative Program of Development for the period 2010 to 2014. It is, therefore, expected that a successful implementation of the Innovative Program for agriculture will bring progress to the agricultural sector and rural society. It is noteworthy that the agricultural plan consists of eight sub-sectors: grain, fruit and vegetables, oil seed and vegetable oil, sugar beet and sugar, meat, milk and milk products, poultry farming, and wool. Agricultural processing is to be emphasized in most of the sub-sectors. The plan, further, employs a commodity-based approach, not a function-based approach.

It is quite timely to introduce the Korean experiences on agricultural development to

Kazakhstan as the country is currently drawing up its development plan on agriculture. It is even more meaningful to share the Korean experiences with Kazakhstan since Korea implemented various policies to achieve specified goals in different periods of time.

Korea has implemented various kinds of agricultural policies in order to attain self-sufficiency in rice, staple food, to eradicate rural poverty and to modernize agricultural sector, together with a rapid development of non-agricultural sector. In 1960s to 1970s when food shortages existed, production-boosting policies were implemented to attain a self-sufficiency of food. Agricultural marketing modernization policy began in the 1970s and agricultural trade liberalization was implemented from the 1980s. In addition, direct payment systems to support farm income were introduced from 1990. The key agricultural policies had been changed over time, reflecting the changing economic and agricultural environment.

Comparing various agricultural policies implemented in Korea with the current state of agriculture in Kazakhstan, a priority of agricultural policy in Kazakhstan should be placed on improvement of agricultural productivity and marketing modernization. A set of production and marketing policies will be recommended hereafter without mentioning other kind of policies such as trade policy, rural development policy, etc. Together with these policies, a reform of the mind-set is also necessary to improve living conditions in the agricultural sector and rural society. Therefore, “New Village Movement” in Korea will be briefly introduced, as it was implemented as a way to improve living conditions in the rural society. An attempt will be made to identify lessons from the Korean experiences that can be applied to Kazakhstan. Of course, some of the Korean experiences may be directly applicable to Kazakhstan, while others may not. The similarities that these two countries bear are in that they both have implemented agricultural policies on the basis of free market economy, and that they have both made a target to promote agricultural production, thus, eradicating rural poverty.

Before discussing the Korean experience, it is meaningful to identify lessons from global market trends as Kazakhstan’s economy and agricultural sector is also affected by the world at large.

Globalization has rapidly transcended the economic and financial sectors, while the agricultural sector is affected by trade liberalization following the Uruguay Round Agreement. National borders acted as barriers, blocking free trade between countries until the late 1980s. However, the world economy has been moving towards a single unified market since the late 1980s, facilitating the movement of commodities, services and capital between and/or among countries. That is, many countries have gradually removed trade barriers by reducing protectionist policies for certain industries and commodities. Along with a growing degree of international free trade, the global trend is such that only producers with a comparative advantage can and will survive in severely competitive markets. All producers - including farmers - in every country, have no alternative but to prepare themselves to face stiffer

competition from suppliers throughout the world. Consumers, however, benefit, as they have more opportunities to buy high-quality goods at a lower price. In summary, competition in agricultural markets is becoming tougher due to globalization, pushing the market towards a new paradigm, namely that of a consumer-oriented market, which is led by consumer sovereignty and preference. In Kazakhstan, however, agricultural productivity is comparatively low, and agricultural production continues to decline. This is a challenge for the Kazakh agricultural sector and the country should work to overcome these issues.

The international division of labor is progressing in the agricultural sector, in line with the wider globalization trend. Now, agricultural production and marketing is a combination resulted from various areas of studies and technologies, and advance in these studies and technologies accelerate agricultural production, marketing, development, etc. For example, progress in biotechnology has helped to develop genetically modified organisms in agriculture. Advances in electronic engineering and control technology have helped to introduce automation to agricultural production. Improvements in transportation and storage technologies have helped to reduce transportation costs, leading to an increase in trading volume between countries. Information technology enables farmers and agri-businessmen in developed economies to comprehend the full scale of global agricultural production systems, and to perform farm management and agricultural marketing more effectively and efficiently throughout the world. Agriculture, therefore, has been transformed, from a labor-intensive industry to a capital- and technology-intensive industry. That is, agricultural productivity, especially in developed economies, is improving and will do so at a faster rate in the future so that their comparative advantage will grow further. Competition in agricultural markets will increase and become fiercer.

The technological advances have brought the possibility of the international division of labor into agriculture, where developed economies have a stronger comparative advantage due to their better technology. In this sense, it is meaningful to review and analyze the decline of agricultural production in Kazakhstan over the past 20 years. Furthermore, it seems evident that over time Kazakhstan's agricultural sector will face ever stiffer competition in grain export markets. This suggests that Kazakhstan must place a high priority on the improvement of agricultural productivity and marketing.

Agricultural development is important to contribute to the economic development of Kazakhstan. Kazakh agriculture, however, is characterized by extensive farming. Irrigation systems are insufficient, and systems to ensure farmland fertility are under-developed. Seed quality is low, while better seeds in terms of reproduction, are in short supply and high-priced. The use of agricultural inputs such as fertilizer and agro-chemicals is uncommon, and extension services to disseminate new agricultural technology to farmers are not well-established either. Land productivity, expressed in terms of average yield or production amount per hectare, therefore, is lower and far below its potential. It is important to increase agricultural production

by improving agricultural productivity. As agricultural production increases, agricultural exports including wheat increase as well, while agricultural imports such as fruits and vegetables, and meat and livestock products, can be reduced. Of course, an increase in export and decrease in imports result in an increase in rural income.

In Korea, during the 1960s and 1970s, the achievement of self-sufficiency in rice and a reduction of rural poverty were the most important issues in agricultural policy, because food shortages existed and farmers were unable to break out of the vicious cycle of poverty. Therefore, an increase in the output of agricultural products was the most urgent issue at the time. Even though Kazakhstan is an exporting country of cereals such as wheat, more production of other agricultural products is important, because the country imports various kinds of farm products such as fruits and vegetables, meats and dairy products, sugar and vegetable oils, etc. It is important to produce more agricultural products, because additional production can lead to an increase in exports and replace imports. In this sense, the Korean policy experience meant to produce more of agricultural products can provide a good lesson to Kazakhstan.

In Korea, an increase in agricultural production yield was particularly important, as the size of farmland was small and limited. Production policy was, therefore, based on intensive farming, mainly focusing on an increase in the utilization rate of farmland, the expansion of irrigation facilities, the development of new high-yield varieties of seeds, increased use of agricultural chemicals such as fertilizer and pesticide, etc. It should be noted, however, that an increase in the utilization rate of farmland cannot be a good target for agricultural policy in Kazakhstan, since farmland is abundant. It should therefore be stressed, that, based on the Korean experience, expansion of irrigation facilities, development of new high-yield varieties of seeds and the greater use of agricultural chemicals, agricultural mechanization, and greenhouse cultivation should primarily be employed in Kazakhstan to increase yield and improve agricultural technology.

Irrigation is important for farming, especially for paddy farming, as farmland with irrigation facilities is usually more productive. Korean agriculture was largely dependent on paddy farming, due to the fact that rice is a major staple there. However, most farmers were engaged in rain-fed farming until 1960s due to a lack of irrigation facilities, and most farmland was dependent on favorable weather conditions. Irrigated land area by comparison was small, only 14 percent over total farm land. This indicates that Korean agriculture was very vulnerable to unfavorable weather conditions. Therefore, the expansion of irrigation facilities was urgent, and it was one of the major farmland infrastructure development projects. Projects included farmland expansion, farmland consolidation, expansion and pavement of farm roads, drainage improvement, etc. As a result of farmland infrastructure development projects, irrigated paddy fields increased from 538 thousand hectares in 1965 to 893 thousand hectares in 1980, and to 859 thousand hectares in 2006, resulting in the share of irrigated paddies as a percentage of total

paddy fields to increased from 42 percent in 1965 to 79 percent in 2006. In combination with an increase in irrigated paddy fields, rice farming became stable, irrespective of weather conditions. Of course, the increase contributed to a self sufficiency of rice and therefore, to a "Green Revolution" in rice farming.

Table 5-12 | Irrigated Paddy Field

(Unit: 1,000 Hectares)

	Total Paddy (A)	Irrigated Paddy (B)	B/A(%)
1965	1,286	538	42
1980	1,307	893	68
2000	1,149	880	77
2006	1,105	859	79

Source: Ministry for Food, Agriculture, Forestry and Fisheries, "Major Agricultural Statistics", various year

A high-quality, high-yield seed contributes to an increase in agricultural production and improvement in the quality of farm output. Therefore, the development and distribution of this kind of seed is a pre-condition to boost production and therefore, should be an important part of agricultural development policies. In Korea, a series of policy efforts were focused on the development of new, high-yield seeds of rice and other crops. The Office of Rural Development (now Rural Development Administration), which was established in 1962, played a key role in the development process of this high-yield rice seed, named Tong-il. The development of the Tong-il variety greatly contributed to the achievement of self-sufficiency of rice by remarkably increasing yield per hectare. In addition to the development of new rice seed varieties, the Rural Development Administration provided extension programs to farmers for new farming technology, including farming techniques for the new seed varieties, fertilizer application, pesticide control, etc., with the goal of increasing agricultural productivity. The administration, it can be said, greatly contributed to the development of agricultural technology by developing new seed varieties, transferring scientific knowledge to agricultural and rural societies by demonstrating the powerful effect of scientific knowledge and technique to agricultural environments, which trained farmers and local leaders could employ to improve their farming techniques at the micro level.

The National Seed Management Office, which was established in 1974 and has since been in charge of the production, processing, and distribution of certified seeds of the National Varietal List Crops, including rice and barley, etc. The certified seeds are those seeds, which are produced by the Office, using only the Registered Seeds, and inspected by the qualified inspector from the National Agricultural Products Quality Management Service of the Ministry of Agriculture and Forestry. The supply of certified seeds by the Office increased from 927 tons in 1976 to 8,265 tons in 1990, and to 14,028 tons in 2004. The annual rate of seed renewal also increased from 1.9 percent to 28.5 percent over the same period. Farmers, could thereby replace degraded seeds with new high-yield seeds, and increase their yield in farming.

Table 5-13 | Seed Supply Record of Improved Varieties of Rice in Korea

(Unit: 1,000 Hectares)

	Cultivated Area(1,000 Ha)	Demand(ton)	Supply(ton)	Rate of Seed Renewal(%)
1976	1196	47,848	927	1.9
1980	1220	48,792	2,035	4.2
1990	1242	62,090	8,265	13.3
2000	1055	52,750	12,982	24.6
2004	984	49,180	14,028	28.5

Source: National Seed Management Office, 2004

The continuous improvement of the Tong-il type high-yield rice by the Rural Development Administration and the increase in the distribution of certified seeds to farmers were the key factors that helped Korea to achieve self-sufficiency in rice following 1970s. The rice production yield per hectare increased from 2.9 tons in 1965 to 4.9 tons in 1977. It is worth mentioning that the yield level was the highest in the world at the time. This remarkable achievement is often called the "Green Revolution" in Korea.

An increase in the use of agricultural inputs was another factor that helped to improve agricultural productivity and increase farm output. Industrialization enabled further production of agricultural chemicals such as fertilizers and pesticides, and greater production output of agricultural machineries and equipments. For example, fertilizer production increased from 590 thousand tons in 1970 to 1,795 thousand tons in 1994. Since then, fertilizer production has shown a downward trend to 1,159 thousand tons in 2006. Production of agricultural chemicals also increased from 8,642 tons in 1975 to 29,569 tons in 2000, and has shown a downward trend to 22,847 tons in 2006. This recent downward trend in the production of fertilizer and agricultural chemicals can be explained by the spread of environment-friendly farming that employ fewer agrochemicals.

The nationwide Agricultural machinery pool increased from 153 thousand in 1970 to 3.38 million in 2000. This remarkable increase in machinery holdings contributed to an increase in labor productivity in farming while it was under challenge from labor shortages caused by the migration of farm people to urban areas. However, the holdings showed a downward trend after 2000, implying that the holdings were saturated and fully distributed to farm households.

Table 5-14 | Production and Holdings of Agricultural Inputs

	1970	1980	1990	2000	2006
Fertilizer (1000 ton)	590	1,345	1,648	1,546	1,159
Agricultural chemicals (ton)	8,642[1]	17,431	26,610	29,459	22,847
Holdings of Machinery and Equipment	152,699	1,069,213	2,475,119	3,386,883	2,504,554

Note[1]: Production in 1975
Source: Ministry for Food, Agriculture, Forestry and Fisheries, "Major Agricultural Statistics", various year

The greater use of agricultural inputs played a key role in improving agricultural productivity and boosting agricultural production. Agricultural chemicals contributed to an increase in crop yield and farm output, and agricultural machineries contributed to improving labor productivity by overcoming the problem of labor shortage caused by out-migration of rural population. Rice production increased from 3.0 million tons in 1962 to more than 6 million tons in 1988. As the policy focus switched away from increasing production volumes towards higher quality products in the early 1990s, rice production witnessed a downward trend, decreasing to 4.7 million tons in 2006. Vegetables production increased rapidly from 1.3 million tons in 1962 to 11.3 million tons in 2001, and to 10 million tons in 2006. Fruits production showed a consistent upward trend from 196 thousand tons to 2.5 million tons over the same period.

The "White Revolution" was another factor which helped to improve agricultural productivity and increase agricultural production, especially in fruits and vegetables. Although demand for fresh fruits and vegetables increased hand in hand with the economic development of the nation, they could not be grown in the open field during the winter season. It was, therefore, difficult to supply fresh fruits and vegetables during the winter season. Greenhouse (polyethylene film) cultivation was therefore introduced for winter farming of fruits and vegetables. Farmers were encouraged to engage in farming activity to generate income during the winter season. That is, greenhouse farming contributed to the supply of fresh products even during the winter season and to the creation of farm income. Greenhouse farming activities spread across the country, and production of fresh fruits and vegetables increased rapidly. As shown in Table 5-15, the area of the facility vegetables was on the rise from 1,746 hectares to 48,853 hectares in 2000, representing a 28 fold increase. The production amount of facility vegetables was also on the rise from 137 thousand tons to 3.2 million tons over the same period, or a 24 fold increase. Production remained at such levels (3.1 million to 3.3 million tons) even after 2000. This technological innovation was called the "White Revolution" in Korea, because the color of polyethylene film (houses) in the farming fields was white.

Table 5-15 | Production of Facility Vegetables

	1970	1980	1990	2000	2006
Area of Facility (Hectare)	1,746	7,142	23,698	48,853	49,828
Cultivated Area (Hectare)	6,618	17,890	35,994	90,627	73,372
Production Amount (1,000 Tons)	137	412	1,017	3,247	3,077

Source: Ministry for Food, Agriculture, Forestry and Fisheries, "Major Agricultural Statistics", various year

The major problems in agricultural production in Korea and the major actions implemented are summarized in the following.

A. Rain-fed farming and lack of irrigation facilities

Major problems:
(1) Farming was vulnerable to floods and droughts.

Major actions:
(1) Small-scale and large-scale irrigation development
(2) Maintenance and repair of irrigation facilities, water supply facilities, irrigation canals, etc.
(3) Drainage improvement

B. Green revolution and development of high-yield seed
Major problems:
(1) Low productivity in crop production
(2) Deficit of food supply and rice import

Major actions:
(1) Establishment of Rural Development Administration, and development of high-yield seed (Tong-il paddy)
(2) Establishment of National Seed Management Office, and distribution of certified seeds to farmers
(3) Extension service of new farming technique

C. Agricultural input use
Major problems:
(1) Lack of fertilizer and agricultural chemicals use as well as low land productivity
(2) Lack of agricultural machineries, equipment and low labor productivity

Major actions:
(1) Expansion of production capacity of fertilizers and agricultural chemicals, and stable supply to farmers at a lower price
(2) Agricultural mechanization programs and expansion of production capacity of agricultural machineries and equipments. The programs included power tillers, tractors, rice planters, combines, etc., and are centered on rice production.

D. White revolution and production in the winter season
Major problems:
(1) Difficulties in supplying fresh fruits and vegetables during the winter season
(2) Price fluctuations between harvest season and hungry season

Major actions:
(1) Encouragement of greenhouse farming with polyethylene film houses for establishment of year-round production and supply system. (A wide-spread of

greenhouse farming is called “White revolution” in Korea.

(2) Provision of extension service for new farming technologies and techniques.

The above is a summary of the major problems in agricultural production Korea faced after the 1960s and the major actions it implemented to resolve these problems. Government efforts to increase production, quickly resulted in rice production increasing to a level of national self-sufficiency. Rice yield per hectare shot up to become the highest in the world in 1970s and 1980s. However, the production of food crops, except for rice, was in a steady decline as the greatest part of agricultural policies and investments were focused on rice, and the self-sufficiency ratio of other grains fell from 80.5 percent in 1970 to 27.7 percent in 2006. Vegetables production was on the rise, leading to some exports, while fruit production has constantly been increasing. This Korean experience holds some lessons for the agricultural development of Kazakhstan.

The Foreign Agricultural Service (FAS) of the United States Department of Agriculture already pointed out that the two main barriers limiting agricultural production in Kazakhstan were the lack of investment in 1) new equipment and 2) in production input. This means that agricultural machineries are outdated, and production inputs seem to be generally high-priced. It is believed that a high oil price on the international markets contributed to capital inflows that benefited the agricultural machinery sector. However, the data to test this hypothesis is not available, and it is doubtful whether or not this inflow of capital can reduce the price of agricultural machineries at the farm level.

In addition to the deterioration of agricultural equipment, the draft “Master Plans on Sugar and Oilseeds” reveals that lower quality seeds, high dependence on seed import and supply shortages of seeds with good reproduction characteristics are all major problems in these industries. As shown in a comparison of international crop yields in Tables 5-8, 5-9 and 5-10, crop yields in Kazakhstan are relatively low. It is true for every country that the development and distribution of high-quality seeds is a precondition to improvements of agricultural technologies and agricultural development. In this sense, it is important, in Kazakhstan, to build an institutional framework for the development and distribution of high-quality and high yield seeds. As mentioned in the Korean experiences part, the Rural Development Administration and National Seed Management Office were in large part responsible for the development and distribution of new, high-quality seeds, and played a key role in achieving self-sufficiency of rice and the “Green Revolution”. This suggests that an effort at the government level is necessary for development and distribution of new high-quality seeds in Kazakhstan.

Expansion of irrigation facilities as shown in the Korean experiences can be another interesting lesson for Kazakhstan’s agriculture. As described earlier, the expansion of irrigation facilities can be a good idea to increase production of agricultural products in Kazakhstan, as its comparatively dry weather with an average precipitation of about 300 mm is relatively

unfavorable for farming. Of course, a review of the natural environment including rainfall, altitude, geographical conditions, etc., is necessary in order to make recommendations about irrigation systems in Kazakhstan. In addition, there is a difference in farming (method) between Korea and Kazakhstan. That is, farming in Korea is primarily based on paddy fields, while farming in Kazakhstan is concentrated on upland. This can result in a difference in needs for irrigation systems and facilities among the two countries. However, a it seems valid to recommend the expansion of irrigation facilities and systems, based on the Korean experience as it shows that the expansion of irrigation systems is a factor that lead to an increase in (rice) production yields, and because Kazakhstan's agriculture is characterized by extensive farming, while irrigation systems are insufficient, bringing lower yields in crop production. It is generally believed in agricultural societies that the introduction and/or expansion of irrigation systems can increase agricultural productivity by increasing yield, and can have a significant impact on reducing unit production cost through an increase in production volume. This is particularly true in production of fruits and vegetable. This suggests that irrigation facilities should be expanded to increase yield in crop production and decrease in unit production cost in Kazakhstan. The expansion of irrigation facilities, through the development of underground water, expansion of reservoirs is, therefore, necessary to improve agricultural productivity in Kazakhstan.

The use of fertilizers and agricultural chemicals was low in Kazakhstan. It is noteworthy that cereal production reached 29.5 million tons in 1992 and decreased to 16.5 million tons, recently. It is said that one of the main reasons for the sharp decrease in cereal production is a withdrawal of government subsidy. The withdrawal led to a lower use of fertilizer and agricultural chemicals, and therefore, a sharp decrease in crop production. This indicates that the price of fertilizer and agricultural chemicals is generally too high, resulting in lower use of agricultural inputs at farm level. Recently, however, the use of fertilizers is on the rise again due to a new government subsidy for fertilizers. In other words, cereal production depends largely on the subsidy of agricultural input materials, including fertilizer, agricultural chemicals, fuels, etc. In this sense, input subsidy policy is important to improve agricultural productivity and increase agricultural production in Kazakhstan. Of course, a budgetary measure to subsidize agricultural inputs, should be introduced by the government.

Recently, the import of fruit and vegetables is increasing in correlation with increases in incomes. However, the supply of these products is usually short, especially, during the winter season when these products are not grown in the open field. Since the winter season is cold and long in Kazakhstan, it is difficult to supply fruit and vegetables during the winter season, implying that prices are generally higher. This suggests that more production of fruit and vegetables is required to meet the rising demand trend. The Korean experiences show that greenhouse cultivation with polyethylene film houses contributed greatly to the supply of fresh fruits and vegetables even during the winter months, while at the same time increasing farm income. This particular cultivation method was called the "White Revolution" in relation to the "Green Revolution" which is referred to the development of high-yield seeds of rice. Such a

"revolution" may be necessary in Kazakhstan as well, as the supply of fruits and vegetables is short in winter season, which results in high prices and large price variations between the seasons. It seems feasible to achieve such a "revolution", if sufficient energy, including electricity is supplied and financial supports to producers are provided by the government. If the "revolution" is realized, the harvest of fruits and vegetables will be increased even in the winter season and imports of these products can be decreased. In addition, winter farming activity would contribute to an increase in rural income.

Production of poultry meats should be increased in order to meet a rising trend of meat consumption as well as to reduce imports of poultry meats. As mentioned in the previous part, the major problems in poultry industry include a higher production cost compared to those reigning in other producer countries, shortage of working capital, outdated equipment and low level of technology. Since feed is represents about two-thirds of production cost, it is important to reduce feed cost in poultry meat production by supplying feed grain at al lower price, or subsidizing feed (price), etc. The provision of financial assistance is also important in order to replace outdated equipment with new ones, as well as to cope with a shortage of working capital, and to upgrade to better technologies. An increase in conversion ratio of feed to poultry meat is also important to enhance competitiveness of poultry production. In addition the integration of the total value chain, from the feed industry to the slaughtering and marketing of poultry meats as well as breeding and hatchery would be another way to enhance competitiveness and development the poultry industry.

The next item on the list is agricultural marketing. Although the free market economy system has been adopted in Kazakhstan since its independence in 1991, there are still many factors that limit free competition. Since agricultural marketing is directly related to market and/or market structure, it is important for both, producers and consumers Farmers are concerned about the prices they pay and receive, because production cost depends on the price of agricultural inputs and farm income depends on agricultural products prices. Consumers are also concerned about prices they pay, because standard of living of consumers is affected by food prices. Therefore, modernization of agricultural marketing is important for both producers and consumers. However, the agricultural policy regarding agricultural marketing seems to be less important at this time, and there are few direct government interventions in agricultural markets. Nonetheless, government officials working for the agricultural sector in Kazakhstan expressed their concerns on markets, prices, and outlook. It should be noted, here, that the wholesale prices for tomatoes and cucumbers fluctuated a lot between harvest season and "hungry" season. Consumers and producers benefited from stable prices, making government interventions a necessity when prices fluctuate a lot. In this sense, agricultural marketing seems to be at the beginning stage of development in Kazakhstan, and some lesson(s) can be derived from the Korean experience on agricultural marketing.

One of the typical problems in agricultural marketing has been price instability in both

developed and developing economies. Price instability comes from the inelastic demand and supply of agricultural products. Because agricultural production depends on weather conditions, the production can sometimes be good and sometimes be poor, while food consumption is relatively stable throughout the year. This indicates that the supply side is unstable, and thus a small change in the quantity supplied brings a sharp rise and/or rapid drop in price. That is, the price instability of agricultural products usually comes from the supply side rather than the demand side. This phenomenon frequently occurs in agricultural markets in Korea. Whenever price instability arises, the Korean government has been asked to stabilize prices by intervening in the agricultural markets, and attempt to improve the agricultural marketing system.

A high priority in agricultural policy has been placed on agricultural price stabilization during the period of 1960s to 1970s when food was short. The stabilization of rice prices has been important, since rice is staple food and the Engel coefficient was high. In a situation in which agricultural prices were said to lead to an increase in the general price level, rice price should be stabilized for general price stabilization. But there was a limit to the amount that the rice price could be stabilized, because rice supply was short until the late 1970s. Therefore, the government also had a policy to control demand in an effort to assure price stabilization. The policy to control demand took various forms including the encouragement of "eating rice mixed with other cereals", the prohibition of using rice in making processed food, etc. These kinds of demand control policies continued until the late 1970s when self-sufficiency of rice was achieved as a result of the Green Revolution. On the other hand, a demand expansion policy introduced from the late 1980s, when rice began to be in an excess supply. Despite the fact that price instability usually lies in the supply of agricultural products, demand control as well as production boosting has been implemented in order to stabilize rice price.

Due to limited storage capabilities for fruits and vegetables, price instability for fruits and vegetables is much higher than grain, and the magnitude of price fluctuations is much bigger. Even though there are seasonal variations in price between harvest season and "hungry" season, the variations are sometimes beyond our expectations. In the period where the processing industry of fruits and vegetables was less developed, price stabilization policies were sought by identifying the cause of price fluctuations. Among the policies implemented in Korea, a typical policy has been "the purchase and resale program by government," which has been implemented since the mid 1970s. Under this program, the government purchases some of the harvest crop when prices fall sharply due to a good harvest, and resells it when price go up suddenly during the "hungry" season. The Korean government established the "Price Stabilization Fund of Agricultural Product" and has tried to stabilize the price of fruits and vegetables by purchasing excess supply during the harvest season and selling in the hungry season. This program is useful and meaningful in the sense that prices tend to stabilize due to government purchases in the harvest season and through government resale in the hungry season. However, this program has been criticized when the government imported foreign agricultural products due to a higher price caused by bad crop in domestic production. Despite

this kind of criticism, the program has been one of the most important factors to achieve price stabilization of fruits and vegetables.

Although the government purchases at a lower price in the harvest season and resells at a higher price in the hungry season, such a program cannot be profitable due to the huge indirect costs associated with storage, administration, transportation, etc. Therefore, the goal of the governments purchase program in terms of management cost is to minimize financial losses. For such a program to be effective, the government must limit its purchases to products with a good storage capability such as garlic, onions, etc. In addition, the Fund should be big enough to purchase a large amount of the product in order to support the price in the harvest season and to control the price in the hungry season. The storage facilities also need to be large enough to store the purchased products for a certain period of time. Therefore, the government needs to expand the Funds available and its marketing facilities.

There have been public critiques regarding agricultural marketing, including complex marketing channels, excessive marketing margin, unfair trading, manipulation of price by middlemen in the marketing channels, etc. Therefore, it is important manage these negative perceptions and make the process transparent.

In sum, the basic direction of the agricultural marketing policy in Korea is to stabilize demand and supply of agricultural products, by sharing the burden of agricultural marketing modernization between the government and producers' organizations, such as agricultural cooperatives as well as to introduce incentives that lead to a mechanism that ensures a fair price by expanding marketing facilities and correcting the institutional problems, if any. The major actions to be implemented until now include strengthening of the marketing function of producers' organization in the producing area, construction of public wholesale markets in major cities and provision of incentives for fair trading, expansion of direct trading between producers' organizations and consumers' organizations including retailers, strengthening of price stabilization function by adjusting demand and supply, production of reliable agricultural marketing data and its rapid dissemination to market participants, prevention of unfair trading by improving the agricultural marketing systems, etc.

The major problems in agricultural marketing in Korea and major action which have been implemented to solve the problems are summarized, here, in the following:

A. Marketing in producing areas

Major problems:

(1) Low bargaining power of farmers

(2) Lack of marketing facilities

Major actions:

(1) Improvement of farmers' ability for joint shipment

Farmers are encouraged to cooperate in joint shipment, through producers' organization.

(2) Expansion of marketing facilities

Rice processing complexes have been established for collecting, drying, storing and packaging of rice.

Agricultural Produce Packing Centers have been established for collecting, sorting, storing, and processing for fruits and vegetables.

(3) Strengthening of marketing function of agricultural cooperatives

Agricultural cooperatives have expanded their business in marketing.

(4) Expansion of the shipment of packaged and graded products

B. Building public whole sale markets

Major problems:

(1) Lack of public wholesale markets even in big cities

(2) Lack of auction systems

Major actions:

(1) Construction of more wholesale markets in major cities

(2) Improvement of the operation of wholesale market including introduction of auction system.

C. Expansion of direct trading between producers' and consumers' organizations

Major problems:

(1) Lack of connections between producers' and consumers' groups

(2) Lack of marketing facilities of producers' group to sell to consumers

Major actions:

(1) Establishing direct trading systems between producers' and consumers' groups

(2) Opening of "Weekend Farmers' Markets" in city area

(3) Building distribution centers for farm products in urban area

D. Stabilization of demand and supply of farm products, and price stabilization

Major problems:

(1) Repeated overproduction and underproduction in fruits and vegetables

(2) Lack of storage and processing facilities of producers' organizations

Major actions

(1) Production and supply control by crop characteristics

(2) Strengthening of the role of local governments and producers' organizations in agricultural marketing

(3) Expansion of storage and processing function of producers' organizations

(4) Expansion of the “Price Stabilization Fund of Agricultural Products”

E. Strengthening of agricultural marketing information service

Major problems:

(1) Lack of basic agricultural marketing statistics

(2) Lower confidence in marketing information

Major actions:

(1) Upgrading the agricultural marketing statistics to official level of statistics

(2) Establishment of the office in charge of agricultural marketing information

(3) Efficient use of agricultural marketing information

F. Strengthening of marketing education and public relations of marketing

Major problems:

(1) Lack of professional personnel in agricultural marketing

(2) Consumers’ low concern on agricultural marketing

(3) Lack of concern for fair trading among market participants

Major actions:

(1) Fostering of professional personnel in agricultural marketing

(2) Strengthening of public relations for consumers protection

(3) Strengthening of education to market participants

The above is a summary of the major problems that agricultural marketing in Korea faced over the past years and the major actions the government took to solve the problems. Strenuous efforts by the government, producers’ organizations and producers greatly contributed to the modernization of agricultural marketing, including the expansion of marketing facilities, improvement of trading patterns, and so on. In spite of the remarkable performances made in agricultural marketing over the last three decades, there are still many problems to be solved. That is, farm prices for certain products are still unstable due to the imperfect adjustment of market supply. The mismanagement of agricultural marketing facilities due to a lack of management talent is another problem that is difficult to foresee and control.

It is meaningful to share Korea’s experiences on agricultural marketing modernization with Kazakhstan, because similar problems persist in both countries. Major problems, among others, within agricultural marketing in Kazakhstan have been high seasonal and regional price fluctuations, a lack of marketing facilities such as storage and distribution channels, and even a lack of production capacity. Fortunately, it is believed that many of the Korean experiences may be applicable to Kazakhstan. This is because Korean marketing policies have been implemented under the free market economy and have been targeted for price stabilization and improvement of economic status of farmers. In this sense, there would be many similarities in terms of the

direction of the agricultural marketing modernization between Korea and Kazakhstan, suggesting that the basic direction can be shared between two countries.

As shown in the previous section, wholesale prices of tomatoes and cucumbers were higher in the winter season and lower in the harvest season, fluctuating considerably between seasons. The situation is similar for other fruits and vegetables, as these crops cannot be grown in the open field during the winter months. A draft "Master Plan : The Development of the Production and Processing of Fruit and Vegetables" by the Ministry of Agriculture suggests the creation of service-storage centers as a method to counter high prices in the mid-season, while also suggesting the construction of a vertically integrated supply chain as a possible solution. The role of these service-storage centers is to provide services for agricultural producers in production, storage, processing and sales of their produce. Agricultural Product Packing Centers in Korea have played a similar role to the service-storage centers currently envisioned in Kazakhstan.

It is believed that the creation of service-storage centers and the construction of a vertically integrated supply chain may be enough to solve the problem of high fruit and vegetable prices during the mid-season, yet may not be sufficient to modernize agricultural marketing practices.. Given that agricultural marketing covers all economic activities that take place from the time producers sell their product to the time consumers buy it, the scope of agricultural marketing is broad, including the collection of goods in the production areas, packaging, transportation, inspection, advertisement, market analysis, price formation, etc. As in the example of prices, many functions of price should be considered. Furthermore, prices should be "fair" for market participants, and the prices in Astana and/or Almaty should be a reference for base prices throughout the country. The operation of the "Price Stabilization Fund of Agricultural Products" in Korea can provide further lessons for price stabilization.

Many of the major actions chosen by Korea to enhance its agricultural marketing are applicable to Kazakhstan as well and may help to improve agricultural marketing there. The major actions can be summarized as the strengthening of the marketing function of the producers' organizations in producing areas, the construction of public wholesale markets in major cities and the improvement of their operational efficiency, the expansion of direct trade between producers' organizations and consumers' organizations including retailers, the stabilization of prices by adjusting demand and supply, the census of reliable agricultural marketing data and its rapid dissemination to market participants, etc. In particular, major efforts should be made to ensure the reliability of statistical data as currently many discrepancies can be found between the FAO and Kazakh data. Reliable agricultural statistics, especially marketing data, is vital for market participant and the government itself to describe the current situation and derive future policy directions. It's accuracy, therefore, should be as high as possible.

The Kazakh economy is still in a transition from a planned-economy to a free market economy, and markets are still a work in progress. Agricultural marketing is directly related to markets and market structure. It covers all economic activities between production and consumption. Therefore, agricultural marketing is very complex and its scope is broad. Market participants are sensitive to changes in market environments. In other words, marketing policy should be implemented in a broad sense. Since agricultural programs under the "Innovative program of development for the period of 2010-2014" employed the commodity-based approach, a review of agricultural markets and market structures is necessary in order to draw a complete picture of current agricultural markets and marketing systems. An integrated approach to agricultural marketing modernization, for most agricultural products would be most helpful.

In addition to agricultural production and marketing policies, it may be necessary to reform the mindset of the agricultural and rural societies towards agricultural and rural development in Kazakhstan. That is, a reform of the reigning mind set's may be a pre-condition to awaken a consciousness to develop the agricultural and rural community. In regard of this, the "New Village Movement" in Korea can provide a good lesson to the agricultural community in Kazakhstan.

The New Village Movement in Korea was a broad movement from the 1960s to 1980s to develop agriculture and modernize the rural community and society. The movement itself was initiated as a movement to improve living conditions, and its basic ideas were "diligence, self-reliance, and cooperation". These three virtues have been highly valued in Korea. "To work more" through diligence, "to help ourselves" through self-reliance, and "to help each other" through cooperation, therefore, became the basic pillars of the movement. Government support for this movement was limited to the supply of materials such as cement, steel bars, rods, etc. Development projects were selected at the village level itself on the basis of town-hall meetings. The most common projects were the building and/or repairing of small-scale irrigation facilities, construction of rural roads, bridges and work on town-halls and the village itself. Of course, people at the village level contributed by providing their labor and oftentimes even their own capital to achieve these projects. The expansion of rural roads through this movement contributed to a rapid transformation of farming from traditional ways to commercial farming. As a result, the movement contributed to increasing farm income, and farmers began to have confidence that they could enhance their living conditions and escape from absolute poverty.

The movement that began at the village level was taken to higher levels, i.e. the rural community and society as a whole. That is, the word "village" was extended to cover organizations and/or society, and the word "New Village" was re-interpreted as the "reformation of organization, community and society". The result of the movement's expansion to higher and broader levels was that a spirit of cooperation at the village level was extended to the whole rural community, acceleration the modernization of rural community and society. Furthermore, a "can-do-spirit" was instilled in the rural community and it played an important

role for agricultural and rural development.

Farmers in Kazakhstan suffer from relative poverty, and have a desire to enhance their living conditions. In that sense, the three pillars of the "New Village Movement", "diligence, self-reliance, and cooperation", are important for Kazakhstan farmers to escape poverty and achieve a better socio-economic position. Diligence and cooperation are important factor a better-environment of rural villages and development of rural community. That is, the "New Village Movement" can be helpful for agricultural and rural development in Kazakhstan.

In addition, the movement can be extended to cover the whole agricultural society in Kazakhstan, because cooperation between/among individuals and organizations is important to achieve a certain goal. It currently seems, however, that cooperation between individuals and organizations is often lacking. For example, an outside perspective of the Ministry of Agriculture and the Ministry of Industry and Trade suggests that the cooperation between these institutions is not in a good state, indicated by the KazAgro and ACEPAS (Analytical Center of Economic Policy in Agricultural Sector) not sharing documents and data on the agricultural sector when devising the Innovative Program of development for the period 2010-2014. Officials from the Ministry of Agriculture did not participate in meetings hosted by the Ministry of Industry and Trade, although these meetings covered agricultural issues, and officials of the Ministry of Industry and Trade did not participate in meetings held at the Ministry of Agriculture, although these meeting were arranged by the Ministry of Industry and Trade. While these observation may be unfortunate, isolated cases in the grander scheme of things, it should be emphasized that cooperation between individuals and organizations should be enhanced for a more efficient and effective way of working and/or planning. It is true that cooperation and/or collaboration in any field will make things easier. In this sense, the Kazakh version of the New Village Movement would help to spread cooperation among the agricultural society and help them to achieving their goals.

In conclusion, the agricultural sector in Kazakhstan has great development potential. However, the production of most agricultural products has been declining since the early 1990s, and the decline is said to be due to the withdrawal of government subsidies. At the same time, imports of agricultural products and food from foreign countries have grown, implying that domestic agricultural resources have become idle. In addition, agricultural productivity remains low, while the rural population is excessively high, leaving these people to suffer from relative poverty. Agricultural marketing systems are less-established, and social overhead capital in rural areas is less-developed. In general, greater attention and more investments are necessary to develop the agricultural sector in rural areas.

Rural poverty and out-migration of farm population should be managed through economic and industrial policies, not solely through agricultural policy, because agricultural GDP is about 5 to 6 percent over total GDP and rural population is about 46.9 percent of total population.

Rural overpopulation, when compared to the economic activity in these areas leave rural incomes at an inevitably low level. It is necessary to absorb the excess in the rural population through the development of the non-agricultural sector in urban areas.

Considering the current state of the Kazakh agricultural sector and the various agricultural policies implemented in Korea, Kazakhstan should place agricultural policy priorities on the improvement of agricultural productivity and marketing modernization. Kazakh agriculture is characterized by extensive farming. Farmland is huge while irrigation systems are insufficient and agricultural inputs such as fertilizer and agricultural chemicals are not widely employed. Average crop production yield, as a result, is far below its potential. It is, therefore, important to increase agricultural production by improving agricultural productivity. Korean experiences with agricultural policies suggest that the expansion of irrigation facilities, the development of a new, high-yield seed varieties, greater use of fertilizer and agricultural chemicals and agricultural mechanization are important factors to increase yields in Kazakhstan. The expansion of irrigation facilities can be a good policy target, since Kazakhstan is characterized by dry weather and limited rainfall of about 300 mm (relatively low for farming). The development and distribution of high-yield seed varieties is the basis to boost production of agricultural goods. An increase in the use of agricultural inputs is another factor to improve agricultural productivity. The factors above were identified as the main drivers for the "Green Revolution" in Korea, and will be important factors to achieve an agricultural revolution in Kazakhstan. Therefore, the government should take budgetary measures to investment in these areas.

The Korean experience with agricultural marketing also suggests that the strengthening of marketing functions by producers' organizations, the construction of public wholesale markets in major cities, the expansion of direct trade between producer and consumer groups, the price stabilization through the adjustment of demand and supply, the census of reliable agricultural marketing data and its rapid dissemination to market participants are all necessities for agricultural marketing modernization in Kazakhstan. In addition, social overhead capital (SOC) such as transportation, road, communication systems, etc, should be expanded to reduce agricultural marketing cost and enhance marketing efficiency. A stable supply of energy is necessary to establish year-round production systems for fresh fruits and vegetables through greenhouse cultivation. Greenhouse cultivation can contribute to an increase in supply of fresh produce in the winter season, and thereby act as a price stabilizer and source of additional income for farmers.

The existing import policies for sugar and its raw materials need to be reviewed, as the objective of agricultural policy normally is to increase domestic production and expand income sources for farmers in order to improve their socio-economic status. There currently is no restriction on the import of raw material, but a 30 percent duty on the import of sugar.

A mind-set reform within the agricultural community and rural society is important to achieve a higher quality living environment. The “New Village Movement”, which was initiated as a movement to enhance living conditions in Korea, can be helpful in increasing farm income and to improve the environment of rural villages by promoting cooperation with each other. By doing so, farmers can have confidence enhance their living conditions, escaping from absolute poverty. Of course, the movement can be extended to the whole agricultural society, because cooperation between individuals and organizations is important in order to achieve goals being pursued.

Currently, an agricultural development plan is being prepared for the end of 2009 as part of the Innovative Program of Development for the period 2010 to 2014. It is hoped that progress will be achieved in agriculture by implementing the Innovative Program successfully.

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Industrial-Innovative Development Plan
of Kazakhstan

Annex 01

Heavy-Chemical Industrialization Promotion Policy

Annex 01

Heavy-Chemical Industrialization Promotion Policy[5]

Sae Won Lee (KDI)

1. Definition of the 「Heavy-Chemical Industrialization Promotion Policy」

(1) A policy to promote the heavy and chemical industries (All industries excluding the light industry)
For the heavy and chemical industrial promotion to succeed, financial support, scientific technology, training technical manpower as well as social overhead capital facilities such as building harbors, roads, railways and developing land are necessary.

(2) A State led Heavy-Chemical Industrialization Promotion Plan was set up as it was seen to be the most suitable for Korea's circumstances at the time as well as having the greatest chance of success. The contents of the policy are clearly shown in the「Industrial Structure Reform according to the Declaration on the Heavy-Chemical Industrialization Promotion Policy」which was settled on January 30, 1973.

2. Master Plan Guide

This is a guide of the Master Plan as listed in the Industrial Structure Reform:

(1) Prepare a national industrial basic model with a target goal of 10 billion U.S. dollars of exports, 1,000 U.S. dollars of per capita income

5) This chapter is a translated summary of the book, 'Korea's Industrial Development and Heavy-Chemical Industrialization Promotion Policy' written by Kwang-mo Kim

- The model deals with industrial structure issues and quantitative issues for the goal year

- This model is prepared so that the resources are used comprehensively and rationally in the long term from the state perspectives.

(2) In order to successfully build the basic model for the 1980's, the starting stage is important. Accordingly, starting method should be researched.

(3) A long-term Plan, to be achieved in 10 years, should be formulated and the overall process should be broken down into yearly sub-plans.

- A goal cannot be attained with the current development method or plan. A yearly plan needs to be made, and matters that need to be taken care of beforehand should be solved without delay. (e.g. It takes 10 years to train technicians)

(4) Prepare a government-led plant construction plan.

- Looking back at Korea's past 10 year experience in the 1960's, it was successful when the government established and strongly drove a specific plant construction plan, a plant complex plan, and a specific support policy.

(5) A national grand development policy should be promoted.

- The plan should be promoted nationally as the targeted goal cannot be attained by defining individual businesses objectives.

- There are many problems to solve in the industrialization process of a developing country. The government needs to actively solve these problems in the planning stage or during the implementation period.

(6) The government needs to make the goal clear. In the early stages, the following issues also need to be addressed:

▶ Issues to be addressed

a. The state of Korea's industry in the goal year (qualitative, quantitative industrial structure)
b. Research the way the plan shall start
c. Establishment of the yearly industrial construction plan
d. Examining the problems (The problem of governmental support)

3. The Master Plan

In order to achieve the goal of "10 billion U.S. dollars of exports, 1,000 U.S. dollars of per capita income," the「Heavy-Chemical Industrialization Promotion Policy」was declared and a Master Plan was necessary. This Master Plan needed to be a long term plan of 10 years, with the long term plan broken down into yearly plans for it to have the possibility of being realized. Therefore, from the starting point of the Heavy-Chemical Industrialization Promotion Policy, a Master Plan was made and the policy was implemented according to the plan. However, it was meant to be revised during the implementation process.

The main contents of the Heavy-Chemical Industrialization Promotion Policy Master Plan may be summarized into the following nine items:

3.1. Leading Sectors of the Heavy-chemical Industry

- Not all sectors could be fostered at the same time and it was inevitable that Korea selected the leading sectors to be intensively supported. The following 6 industries were selected:

1) Iron and steel, 2) non-ferrous metal, 3) ship-building, 4) machinery, 5) electronics and 6) chemicals

were selected as the leading industrial sectors.

Even in each of the main sector, those sectors that needed to be particularly fostered were selected and developed. Those sectors that had already developed considerably were excluded as well as those sectors that were being operated normally within the private sector. The sectors that were judged impossible to develop at the time were equally excluded.

For example, in the steel industry, integrated steel mills were promoted, excluding the general steel industry, while in the chemical industry, petrochemical industry and its related industries were promoted, excluding the general chemical industry.

Thus, this leading sector was made to lead the other sectors' growth and development. Machinery industry promotion was very important and was especially chosen as the priority leading industry.

The machinery industry is an industry which starts from raw material and produces a high value added product. However, Korea's machinery industry was still at an immature stage compared to other industries and most quantities were dependent upon imports. When you look at the export structure that Japan had reached when it achieved the 10 billion U.S. dollars export heights in 1967, the machinery industry occupied 43% of industrial production. In contrast, Korea was importing as much machinery, indicating the urge to develop the machinery

industry. Moreover, the machinery industry needed to be fostered in order to promote the defense industry as well. If not for the machinery industry, the defense industry would not have developed.

For example, arms and weapons are derivatives of the machinery industry, the ingredients for gun powder from fertilizer and petrochemical plants, gun barrels from special steel plants

3.2. Establishing Specific Implementation Plans.

The success of the first and second plan was due to the goal being clear and there being a specific implementation plan. It was for this reason that 6 industrial sectors were selected for the Heavy-Chemical Industrialization Promotion Policy and specific yearly plans were to be established for 9 years from 1973-1981. A sectoral implementation plan was already made then with a 10 billion U.S. dollars sectoral export plan. The purpose was to establish the plan first, and then make changes according to the conditions when necessary in the implementation process.

Table 1 | **10 billion U.S. dollars Export Structure**

(A Tentative Plan by the Ministry of Industry and Trade)

Ligher Industries	USD 3.67 billion
Heavy and Chemical Industries	USD 5.63 billion
Others (Agriculture, Water, Mining Industries)	USD 700 million
Total	USD 10 billion

Source: Industrial Structure Reform

Table 2 | Planned Target Export Structure of the Heavy-Chemical Industries

Industry Sectors	Target Plan
1. Ship-Building	USD 985 million Large-scale Ship Fishing Boats Shipping Components Ship Repairing
2. Electronics	USD 2.4 billion TV Radio Tape Recorder Electronic Components Electric Machine
3. Industrial Machine	USD 330 million Textile Machinery Sewing Machine Machine Tools Electric Machine
4. Metals	USD 930 million Iron and Steel Steel Processing (paper, wire, pipe, specials) Nonferrous Manufactured and Semi-Manufactured
5. Transportation Equipments	USD 420 million Automobile (bus, specific purpose) Motor-cycle Passenger Car Locomotive wheels
6. Precision and Opticals	USD 120 million
7. Chemicals	USD 445 million Fertilizer Cement Ceramics Pharmaceuticals Medicine
Total	**USD 5.63 billion**

Table 3 | Yearly Export Plan for Manufacturing Products (Ministry of Industry and Trade)

Unit: million USD

Year / Industrial Class	'72		'73		'74		'75		'76		'77		'78		'79		'80	
	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%	Amount	%
Manufacturing Products	1,584	100	2,080	100	2,680	100	3,370	100	4,160	100	5,100	100	6,230	100	7,620	100	9,300	100
1. Heavy-Chemicals	427	27.0	650	31.3	970	36.2	1,330	39.5	1,830	44.0	2,460	48.2	3,270	52.5	4,300	56.4	5,630	60.5
a. Chemicals	79		85		110		160		208		251		303		365		445	
b .Metals	120		150		190		250		333		435		570		725		930	
c. Machines	16		22		34		40		59		124		202		305		450	
d. Electronics	169		323		490		660		830		1,100		1,450		1,900		2,400	
e. Motor Vehicles	43		70		150		220		400		550		745		1,005		1,405	
2. Light-Chemicals	1,157	73.0	1,430	68.7	1,710	63.8	2,040	60.5	2,330	56.0	2,640	51.8	2,960	47.5	3,320	43.7	3,670	39.5
a. Textiles	722		860		1,020		1,230		1,430		1,640		1,840		2,050		2,280	
b. Others	435		570		690		810		900		1,000		1,120		1,270		1,390	

3.3. Introducing the Concept of 「Economy of Scale」

The goal of the promotion policy for selected industries was to build international competitiveness in regard to quality and price. Despite the unprecedented venture of business into the heavy-chemical industries, this plan is distinctive in that the export of products was targeted from the beginning. To pursue the objective, a large scale production system was pursued to achieve economies of scale.

To elaborate, if the production capacity of a targeted plant did not reach the economy of scale, the construction was not attempted, and had to wait until it reached the economy of scale. The only sectors that could start construction were the ones that the production demand could achieve the economy of scale.

If the plants are built according to the domestic market where the scale is small, it would eventually fail as it would have no international competitiveness. Therefore, the factories needed to be built according to the economy of scale regarding the export market from the beginning as they could have international competitiveness and have the capability to export. Generally, as the domestic demand market becomes larger, the exported amount of materials converts to the domestic market. Also, it is a strict rule that in building a factory, an economy of scale plant needs to be built but in consideration to the expansion scope. This may be common sense, but very difficult to abide by in reality as it is nearly impossible to exactly set the domestic demand about a product that does not produce at all.

Table 4 | Sectoral Production Scale Planned in the Heavy-Chemical Industrialization Promotion Policy

Industrial Sector	Unit (Annual Production)
Steel	10 million tons
Chemicals	ethylene 400~500 thousand tons
Non-Ferrous Metals	
Aluminum	100 thousand tons
Ship-Building	1 million tons

With this, the Chemical and Textile sector were to shift from the smallest unit into international first class corporations.

3.4. Upgrading the Industrial Structure

With respect to industrial development, technology-intensive industry was pursued to step-by-step replace labor-intensive industries. In its form, raw materials and intermediate materials were introduced and it was made sure to upgrade so that all was produced domestically from raw material production to product construction (assembling). It was planned so that the structural basis was strong in the industries.

3.5. Training Technical Manpower and Technology

Technological development needs to be accompanied in Heavy-Chemical Industrial Promotion and the basis for technological development is in training the technical manpower. Therefore, policies directed to bring up technical manpower were pursued as a national program (A national Declaration on Scientification on March 23, 1973).

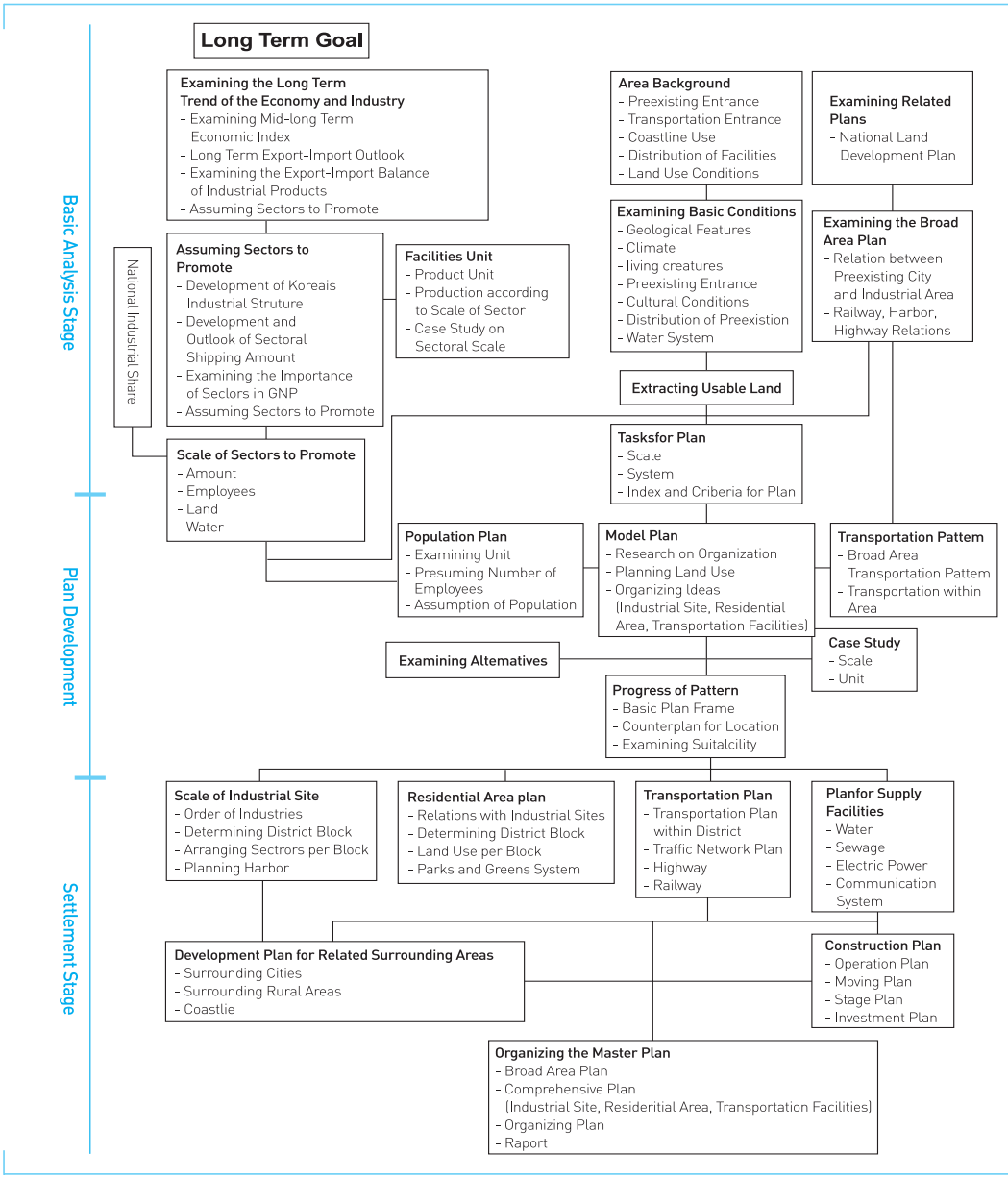
An industrial high school system was introduced to produce technician manpower through a regular education program. Additional registration quotas were granted to science and engineering departments of universities. Educational curricula were remodeled from theoretical education to practical hands-on education. Programs of practical technology-priority policy were pursued: reinforcement of vocational education institutions, establishment of technical proficiency certification schools, establishment of a technician proficiency certificate system, social preferential treatment of engineers and technicians, and the active participation in the International Vocational Training Competition.

Also, the whole-nation-science-technology-enhancement movements were pursued, such as the establishment of the government's sponsoring of research institutes, construction of Daeduk Research Estate, promoting science-technology development in private research institutes.

3.6. Construction of Industrial Sites Based on the National Land Development Plan

Integrated national land development plans were laid in accordance with industrial sites to be constructed. Heavy-chemical industry is a large-scale plant industry, which requires spacious land, and has far-reaching forward and backward linkage effects. Thus, it is efficient to

Figure 1 | A Master Plan for the Heavy-Chemical Industrial Site Construction

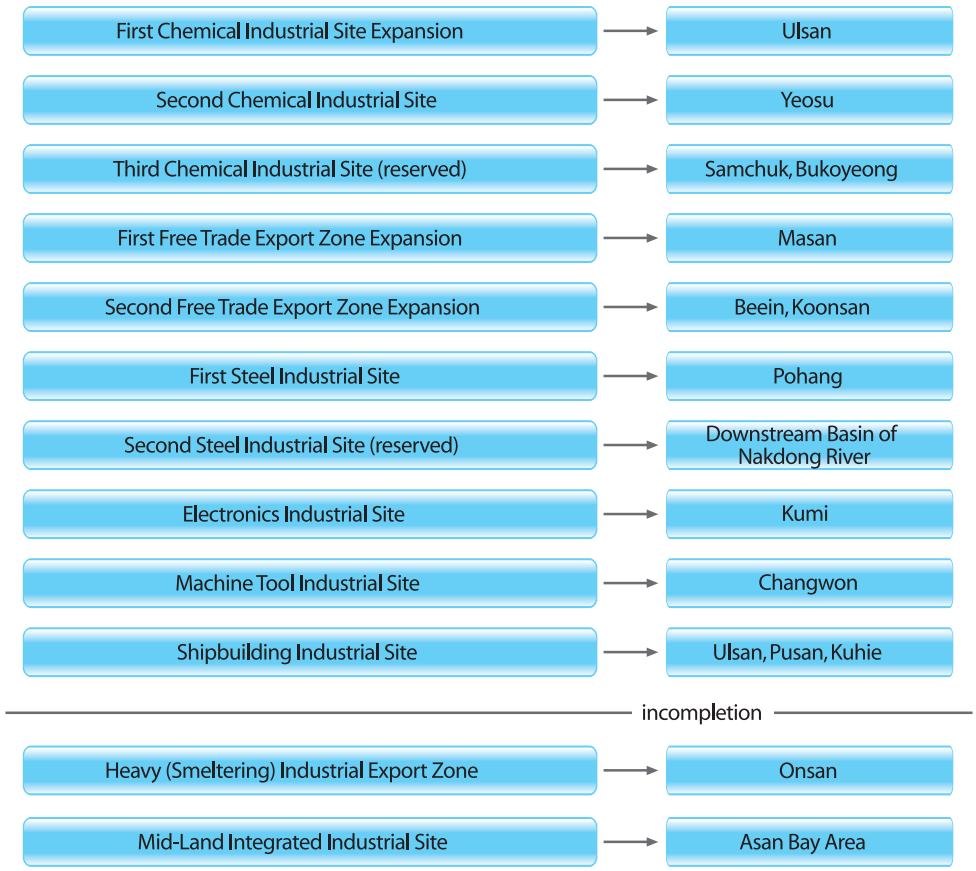


Source: Heavy-Chemical Industrialization Promotion Policy Planning Board

concentrate the location of related plants into a single site and change it into an industrial complex. The geomorphologic regions, which meet tough conditions of location pertinent to heavy-chemical industries, are likely limited to a few places in the whole country. Therefore, the choice of industrial sites should be preceded by the ordinance of integrated national land development plans.

The development of large-scale industrial sites requires not only land development, but also the provision of Social Overhead Capitals (SOC's), such as road, port, industrial water, and electricity. Besides, the location of schools, research institutes, office of public administration, banks, hospital, and other public service institutes should be taken into consideration. Bed towns, which provide residents' housing facilities, should be constructed. The plan of the Heavy-chemical industrial sites is a spinal skeleton of the Heavy-Chemical Industrialization Promotion Plan.

Figure 2 | Heavy-Chemical Industrial Site Construction Plan



Source: Industrial Structure Reform

3.7. Mentality Reform such as Wiping Out the ‘Reasonablism’

Reasonablism must be prohibited in the industrial production activity, thus, needed reform in Korea. As mentality reform takes a long period of time, an epochal policy was needed for Heavy-Chemical Industrialization Policy which needed to start immediately. This is why a thorough inspection system came into place.

This was applied primarily to the defense industry plant as reasonablism could not be allowed in weapons production. The defense industry plants were the first ones to be made to go through strict check-ups. One of the plans to institutionalize this was to place inspection devices in production companies and to put an inspection agency under national control which is later to become the National Functional Inspection Corporation.

3.8. Establishing a Governmental Support System.

The total government promotion system was prepared with respect to financial resources, tax incentives, and public administration. Investment financing was the biggest obstacle of the HCIPP. A scheme to settle this financing problem was a joint venture with foreign investors, mostly at an advised joint ratio of 50:50, from which foreign capital as well as technology was demanded. In case domestic financial resources could not be supplied from the firm’s internal resources, a long-term low-interest rate policy financing fund, such as industry rationalization fund, was established. The National Investment Fund was established to provide financial resources to heavy-chemical and defense industry firms.

3.9. Forming an All-out System among the Whole Nation

The Heavy-Chemical Industrialization Promotion Plan was the most important national project, and thus, could only succeed with the active and focused efforts of the whole nation. For the Heavy-Chemical Industrialization Promotion Plan, the government made principles such as: 1) To accomplish it within a short period of time; 2) To raise the investment effects; 3) To promote in a rational way possible from the overall national perspective, and decided to execute the early stage must-do’s such as releasing funds and completing governmental support projects. Each ministry and office of the government were made to cooperate well and the private sector to follow the government voluntarily.

All in all, the Heavy-Chemical Industrialization Promotion Plan started off with a goal and ambition to become an advanced country. It was a national comprehensive long term development plan that had been researched and worked on for a long period of time. It was a policy project that had to be fulfilled, accomplished and overcome whatever the difficulties. Therefore, the Master Plan started off with the idea of realizing a Heavy-Chemical Industrialization era like as follows:

Table 5 | The Realization of the Heavy-Chemical Industrialization Era

	1972	1976	1981
GNP per capita	$302	$488	$983
Heavy-Chemical Industry Ratio	35.2%	41.8%	51.0%
Heavy-Chemical Industry Export Ratio	27.0%	44.0%	65.0%
10 billion U.S. dollars of exports, 1,000 U.S. dollars of per capita income			
Reduce Foreign Dependency			
International balance of payments			
Self-reliant Economy			

4. Master Plans and Attained Performance by Sector

4.1. Iron and Steel Industry

4.1.1. Master Plan

The master plan for the advancement of the iron-steel industry consists of two-staged projects. The first stage was the expansion of POSCO's production scale to an annual 8.5 million tons of crude steel production. The second stage was to launch the construction of a second plant with an eventual scale of annual 12 million tons of production.

1) Expansion of the POSCO Plant
First Term Project (1,032 thousand M/T): April 1st, 1970 - July 3rd, 1973
Second Term Project (1,032→2,600 thousand M/T): December 1st, 1973 - May 1976
Third Term Project (2,600→5,500 thousand M/T): August 2nd, 1976 - December 8th, 1978
Fourth Term Project (5,500→8,500 thousand M/T): February 1st, 1978 - June 2nd, 1981

2) Construction of the Second POSCO Plant
First Term (3,000 thousand M/T): February 1982 - November 1984
Final scale (12,000 thousand M/T): June 1991

3) Construction of an Integrated Special Steel Plant
Special Steel (250 thousand M/T): December 1977 completion

4.1.2. Attained Performance

The iron and steel industry required the largest investments in the Heavy-Chemical Industrialization Promotion Policy but also made the most distinct achievements. The

construction process had also finished on schedule. After the integrated steel mill was completed in 1973 with an annual capacity of one million tons, it had gone through several more expansions and developments resulting in an international scale plant with an annual production capacity of 9.6 million tons. As POSCO imported up-to-date technology and facilities and had a large-scale integrated production system in its possession, Korea became an iron-steel supplier which was capable of producing the most economical steel products in the world.

Table 6 | International Rank of Iron and Steel Production

Year	Capability of Facilities	Rank (77' statistics standard)
1977	4,280 (production value)	23
1978	7,778 (production value)	17
1981	13,000 (plan value)	12
1986	20,000 (plan value)	9

Technical Innovation

Table 7 | Converter Ratio

Japan	USA	West Germany	Korea		
1977	1977	1977	1977	1979	1982
81	62	74	58	70	71

The production ratio (%) of electric steel in crude steel production

Table 8 | Molding Ratio

Japan	USA	West Germany	Korea		
1977	1977	1977	1977	1979	1982
41	12	34	33	33	43

The ratio (%) of molding steel in crude steel production

Ministry's Energy

Table 9 | A Blast Furnace Coke Ratio (Japan in 1977 = 100)

Japan	USA	West Germany	Korea		
1977	1977	1977	1977	1979	1982
100	138	112	102	101	100

The consumption rate (%) of pig iron per ton coke in blast furnace

Ministry's Resources

Table 10 | Ratio of Steel Production net profit

Japan	USA	EC 6 countries	Korea		
1976	1976	1976	1977	1979	1982
85	71	81	83	84	85

The ratio (%) of steel production to crude steel production

4.1.3. Development Process

The Korean government had repeatedly tried to create an integrated steel mill, even setting-up a Steel Advisory Commission within the Ministry of Industry in the period of formulating a 5 year plan in 1961. However, it failed to secure the required capital through foreign loans.

Two early plans involved establishing steel mills with annual production capacities of 300 thousand and 500 thousand tons of crude steel respectively. Unfortunately, they both failed to materialize. For the latter plan, it involved the consortium, Korea International Steel Associated (KISA), consisting of 8 members (e.g. Koppers of USA, DEMAG from West Germany) from 5 countries (USA, France, West Germany, England, Italy). According to the contract between KISA and the Korean government in October 1967, KISA was to have raised an international loan by 1969 and dedicated the integrated mill by 1972. The expected capital requirements for the equipment and facilities were estimated to be about USD 100 million. However, the consortium was dissolved in 1969 because Koppers, the leading consulting firm, could not raise the required investment capital and because KISA, due to its complicated composition, could not make prompt decisions.

After this and other failures in securing funds, the Korean government shifted its strategy to raising a foreign loan for construction. It established POSCO, a state enterprise, and successful negotiations were undertaken with Japan. Agreement to support the project was made at the annual conference of Korean and Japanese ministers in August 1969 and detailed inter-government negotiations were conducted during the rest of the year. According to the contract signed, Japan would provide loans to Korea, a total of USD 123 million, as well as all the major technology and facilities.

After the government's efforts that began in 1962, the construction of an integrated steel mill with the annual production of 1.03 million ton began in April 1970 and was completed in July 1973. The construction of the Integrated Steel Mill, not only the actual plant itself but the total scale of around 3 million pyeong (1 pyeong approximately equals to 3.3 square meter) of governmental support facilities such as land development, harbor facilities, industrial water

facilities and subsidiary facilities, was truly enormous and grand for that time.

4.2. Non-ferrous Metal Industry

4.2.1. Master Plan

The Onsan Industrial Site was constructed to develop the non-ferrous metal industry that produced the following four strategic items: zinc, copper, lead, and aluminum.

1) First Stage
   Zinc smelter: production 50 thousand M/T (completed in 1978)
   Copper smelter: annual 80 thousand M/T (completed in 1979)

2) Second Stage
   Lead smelter construction
   Aluminum smelter construction (plan reserved)

4.2.2. Onsan Non-Ferrous Metal Industrial Site Construction

Onsan is an area in the South-West, bordering Ulsan, and is stretched out from North to South along the coastline. It was a suitable place for plants as the water is deep, permitting large vessels to come in and out. Furthermore, the area along the coast is flat and spacious. This area was also known to have a mild weather and known to be where the cold and warm currents join. Therefore, this area was selected to be the industrial complex for non-ferrous metals, oil refineries, and any other related plants where raw materials could be imported in large quantity. On a side note, the large concentration of industries in that area allowed for pollution problems to be solved more efficiently. This was to concentrate on dealing with pollution so that pollution could be effectively blocked.

4.2.3. Attained Performance

Iron, copper, aluminum and lead, which are indispensable materials in the metallic material industry, were now able to be produced. It is significant in the sense that it indicates the capability to independently supply metallic industrial materials. It also implies the capability to supply metallic materials critical to the defense industry. The ripple effects were the construction of copper extension plant, aluminum smelter plant, and production base for lead-related products. The non-ferrous metals industry is an industry that entails a large amount of pollution. Controls for such issues, in addition to purification facilities, were set up from the inception of such facilities. Residence facilities were concentrated and allocated exclusively to the Onsan Non-ferrous Metal Industrial Complex so that the spread of polluting facilities to the whole nation was prevented.

4.3. Ship-building Industry

4.3.1. Master Plan

Targets planned to raise the ship-building industry into an export industry, thereby localizing vessel tools and machinery and fostering the growth of the machinery industry:

1) Shipbuilding facility expansion: (2,670 thousand G/T in 1977 ⟶ 4,250 thousand G/T in 1981)
   Hyundai (expansion): largest vessel of 1,000 thousand DWT completed by September 1975
   Daewoo (construction): largest vessel of 1,000 thousand DWT completed by December 1980
   Samsung (construction): largest vessel of 65 thousand DWT completed by December 1979
   Samsung (expansion): largest vessel of 100 thousand DWT completed by December 1980

2) Ship Repairing Capacity Expansion (10,680 thousand G/T in 1977 ⟶4,600 thousand G/T in 1981)
   Hyundai-Mipo Ship-Repairing (construction): 8,000 thousand GT / year completed by December 1977

4.3.2. Attained Performance

The ship-building industry attained the goal set in the Master Plan while also becoming the tenth strongest ship-building country in the world. Eventually, shipbuilding became the leading export industry.

Such a production system was built so that steel plates needed for ship-building would be supplied from integrated steel mill suppliers. Vessel tools and machinery eventually came to be supplied locally, which contributed to the upbringing of the machinery industry.

4.4. Machinery Industry

4.4.1. Master Plan

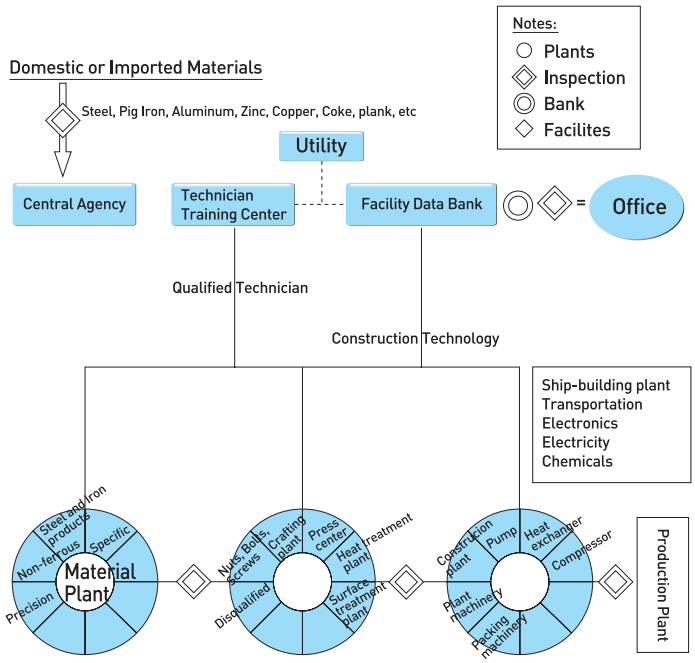
The Master Plan of the machinery industry was for the machinery industry to have international competitiveness in its quality and price. The targeted goal was to foster the machinery industry into a leading export industry. Thus, expansion of scale, efficient technology, establishment of specialized plants and large quantity production methods were adopted as a national plan and management from the beginning. The basic guide is as follows:

1) Production of high class / export products
   (a) Improvement of technology and planning capacity (introduction of technology, development)
   (b) Establishing specialized plants (up-to-date equipments, specialized machinery)
   (c) Securing skilled workers (qualified people, mentality reform)
   (d) Quality inspection (international standards, state management)

2) Low-priced/ inexpensive production by improvement of industrial structure
   (a) Fully equipped for mass production (bigger, single factories by product)
   (b) Reduction of investment costs (reduction of initial investment, stage by stage construction)
   (c) Healthy/ sound financial structure (equity capital 30%)
   (d) Strengthening governmental support (land, water, electricity, materials, tax system, financial support)

3) Achieving desired results within the set period
   (a) Reducing the period of time (state plan, intensively fostered)
   (b) Industrial site construction (Single Window)
   (c) Early start (government construction, advanced plants)
   (d) Attracting sites of preexisting plants

Figure 3 | Machinery Industry Structural Plan



With the above guide, the machinery industry promotion policy is outlined as follows:

1) Changwon Machinery Industrial Site construction
   Systemized upbringing program of machinery industry (37 items selected to be hosted): Materials, parts-components, industrial machinery, precision machinery, electronic machinery, vessel machinery, motor vehicles machinery, etc.

2) Construction of individual machinery production plants
   - Large scale machinery production plants
   - Small-Medium type specialized machinery production plants
   - Motor vehicle parts and components production
   - Special machinery (machine tools, textile machines, etc.)

3) Machinery industry fostering program
   - Technician manpower: establishing machinery specific high school,
   - Machine-specific engineering university
   - Setting up of quality control system
   - Experimental research facilities: machine metals, electronic equipments

4) Tax and financial incentive programs.

4.4.2. Changwon Machinery Industrial Site Construction

Selecting a good location was very important as the machinery industry was the most important sector among the HCI and as the plan was to build the largest artificial machinery industrial complex in the world from scratch. In this sense, Changwon was selected for the following reasons:

1) A suitable climate to foster the machinery industry with mild weather and appropriate amount of rainfall

2) Neighboring Masan and the proximity of cities such as Busan, Jinhae and Daegu made it easy to supply the manpower that the machinery industry needed. Historically, this area is also skilled in precision manufacturing, thus, manpower being qualified in both quantity and quality.

3) Transportation is very convenient for/ in Changwon. It is connected to the whole country as well as its surrounding cities by highways, national highways and railroad systems, has a good harbor like Masan, and has an area where harbor construction is possible.

4) Changwon is located in the middle of the Southern coast industrial center where heavy

and chemical industries such as steel, ship-building, petrochemical, non-ferrous industries are concentrated.

5) Changwon is made like a valley and ideal for a machinery industrial site where it could accommodate both an industrial complex and an industrial city by developing land of about 15 million pyeong.

The case of building the Changwon Machinery Industrial Site is outlined as follows:

18 Cases and Analyses of the Heavy-Chemical Industrial Promotion Policy (1973-79) in Korea

1) Population and employment
Population: 300 thousand - 500 thousand
Employment: 148 thousand

2) Scale of site space: total area 14,700 thousand pyeong
Industrial area 7,960 thousand pyeong
Rear area 6,740 thousand pyeong

3) Supporting facilities
Rail road: movement of existing railway 11km (3 stations opened)
Industrial water: 200 thousand M/T
Port: 20 thousand DWT level 7 vessel seats (completed by 1981)

Telecommunication:
East Masan telecommunication switching office (construction by 1976)
Local telephone 5,000 circuits
Long distance automatic switching telephone 1,500 circuits
(construction on October 9th, 1976)
Telex 55 circuits

Electricity: 154KV switching equipments

4) Educational or training institutions
Machinery specific high school: 4 departments 45 classes (opened on March 28, 1977)
Vocational training institutes: 4 engineering departments 760 persons (annual) (opened on September 1st, 1977)
Functional college: 7 departments 22 classes 880 persons (2 years) (launched by April 1978)

4.4.3. Attained Performance

1) By systematically fostering the machinery industry, the industrial base was strengthened, contributing to the development of machinery industry towards the 80's (there were integrated steel mills, nuclear power plants, petrochemical plants, cement plants, construction and transportation equipments where all industrial machines could be produced.)

2) Strengthening the international competitiveness of machinery industry by concentrating all facilities in one complex and increasing the effectiveness of the machines

3) Setting the basis for higher value-added precision machinery industry, mechatronics production and hi-tech machine production.

4) Building the production system for defense products (Fostering the machinery industry and producing defense products contributed to strengthening military power. By producing defense products, precision machine products were built.)

According to the Economic Planning Board's "Mining and Manufacturing Industry Census 1986," the machinery industry occupied 30.7%, nearly 1/3 of the whole manufacturing industry shipping amount. This shows how the machinery industry had risen to become the main industry and upgraded the industrial structure of Korea.

Table 11 | Structure of Mining and Manufacturing Industry by Sector

	Actual Results of 1986		
	Number of Companies	Employees (thousand)	Shipping Amount (1 billion KRW)
Mining and Manufacturing Industry	52,035 (100)	2,833 (100)	92,168 (100)
Mining Industry	1,948 (3.7)	95 (3.4)	1,168 (1.3)
Manufacturing Industry	50,084 (96.3)	2,738 (96.9)	91,000 (98.7)
Food and Beverage, Tobacco	4,776 (9.2)	209 (7.4)	10,495 (11.4)
Clothing and Leather	13,095 (25.1)	746 (26.3)	14,596 (15.8)
Wood and Furniture	2,849 (5.5)	67 (2.3)	1,290 (1.4)
Paper and Printing	3,630 (7.0)	116 (4.1)	3,758 (4.1)
Compound Petroleum Rubber and Plastic	5,356 (10.3)	373 (13.1)	19,235 (20.8)
Non-ferrous Mining	3,067 (5.9)	114 (4.0)	3,573 (3.9)
First Metal	1,179 (2.3)	107 (3.8)	7,914 (8.6)
Constructed Metal Machinery Equipment	13,720 (26.4)	889 (31.4)	28,306 (30.7)
Others	2,415 (4.6)	119 (4.2)	1,830 (2.0)

Source: The Economic Planning Board
* ( ) indicates component ratio

4.5. Electronics Industry

4.5.1. Master Plan

In regards to strategies aimed at fostering the growth of the electronics industry, the following baseline program was drawn up as a master plan and promoted. This plan designated Kumi Industrial Site as an electronics industry complex and was set to provide intensive incentive measures.

1) Set to target strategic export industry
   Production of parts and components meeting global quality standards
   Development of technology intensive high quality products

2) Construction of high-tech precision electronics products
   Production system
   Intensive fostering of semi-conductor and computer industry Production of high-tech electronics products

3) Expansion of electronics industrial sites
   Site 1, 2, 3 at Kumi

4) Promotion of intensive development projects
   Items: 57
   Firms: 151
   Production: 1.5 billion USD (exports .8 billion USD)

4.5.2. Kumi Electronics Industrial Site Construction

Site 1 of Kumi Electronics Industrial Base which is 3,152 thousand pyeong was constructed and completed during the years of 1969-73. Site 2, with a size of 1,200 thousand pyeong, had been constructed between July 1977 and December 1979. In case of the need for Site 3, a plot of 3,100 thousand pyeong was set aside.

4.5.3. Attained Performance

Table 12 | Electronics Industry of the 1980's

Technological innovation Strengthening international competitiveness	Localization of components Large-scale construction Semiconductor Computer systemization High technology industrialization	Strengthening export support Export leading industrialization
Electronics industry model of the advanced countries Export USD 9 billion (Fifth in the world)		

4.6. Petrochemical Industry

4.6.1. Master Plan

Table 13 | Basic Direction

Subject	Contents
Creation of an Industrial Complex and the System	Construction of the Yeochon Base Expansion of the Ulsan Industrial Site
Construction of a Large Scale State of the Art Plant	Self-supporting Petrochemical Products Strengthening International Competitiveness
Full-scale Promotion of Fine Chemistry Industries	Becoming the World's Greatest Country in Chemical Industries

Table 14 | Master Plan

First Stage	Second Stage
- Expansion of the Ulsan Industrial Site (Ethylene 150 thousand MT/Y) - Promoting the Selection of Yeochon (Methanol, Proportion of 7) - Construction of the Yeochon Petrochemical Base (First Site)	- Construction of the Second Yeochon Petrochemical Site

Table 15 | **Production Plan**

Projects		Size (Thousand MT/yr)	Period		Remarks
			Launch	Launch	
Ulsan	Yukong (existing)	100	1970.11	1972.11	
	Yukong (expansion)	50	1976.8	1977.12	
	Subtotal	150			
Yeochon	Site 2	350	1976.11	1979.6	Real Max Capa: 400 th. MT/yr
	Site 3	350	Early 1979	1982.12	Real Max Capa: 400 th. MT/yr
Subtotal (Ulsan, Yeochon)		850			
Site 4 (new)		350	1983	1986	Ulsan or Onsan
		350	1985	1989	Others
Total		1,550			Top 10 in the World

Table 16 | **Completed Plant at Yeochon Petrochemical Site**

Company Name	Funds			Product	Production Scale (ton/ year)
	Domestic (100 mill. KRW)	Domestic (100 mill. KRW)	Domestic (100 mill. KRW)		
Honam Ethylene	862	198	1,822	Ethylene	350,000
				Propylene	187,000
				Compound C Fractions	128,000
				Benzene	96,000
				Compound Xylene	52,000
				Steam (ton/time)	600
				Electricity (kw)	60,000
Honam Petrochemical	716	126	1,330	Highly Densified Polyethylene	70,000
				Ethylene Glycol	80,000
				Polypropylene	80,000
Hanyang Chemical	239	90	674	Highly Densified Polyethylene	100,000
				Vinyl Chloride Monomer	150,000
				2 Ethylene Dichloride	286,000
Korea Dowchemical	275	107	795	Chlorine	210,000
				Mint Soda	231,000
Korea Synthetic Rubber	110	28	249	Butadiene	50,000
				Butadiene Rubber	25,000
Total	2,202	549	4,870		

Specific plans were drawn up to carry out the construction for the Yeochon Petrochemical Site. First, leading sectors were selected and construction began early for them. The government's intentions were to show its determination to carry out the construction and establish the Yeochon Site as evidence. The seventh fertilizer plant and the methanol plant were selected as leading sectors. Second, feasibility plans were made for the construction of the petrochemical industries such as making the main plants and naphta cracking plants state-run while the affiliated plants were jointly run with foreign countries. Third, having received positive comments from abroad when planning the Yeochon Petrochemical Site, the Korean government went into negotiations with the partner companies directly.

4.6.2. Yeochon Industrial Base

Yeochon has strong geographical conditions and was nominated as an industrial site from the early stages of planning. The whole area is flat and smooth, suitable for an industrial site construction. Furthermore, there is Gwangyang bay where the water level is deep while being surrounded by land, thus, having no danger of being hit by typhoon.

One of the characteristics of the Yeochon Industrial Site can be stated as the construction of a Yeochon Back-up City in order to maintain the relationship between the industrial site and the residential site similar to Changwon Industrial Site. A new city of 5.89 million pyeong for 100 thousand residents was planned. This was the second time after the Changwon Site that a planned city was built on an industrial site.

4.6.3. Attained Performance

Through the establishment of a petrochemical industry:

a) self-sufficiency rates of petrochemical products were enhanced.

b) petrochemical industrial requisites of life were supplied at a reasonable price.

c) the inter- and intra-industrial systematization of Ulsan and Yeochon petrochemical industrial sites were enhanced.

d) the foundation for the country to step forward to an annual production capacity of 1.5 million MT was laid.

e) the underlying foundation required in establishing high value-added fine chemistry was laid.

Figure 4 | Ulsan Petrochemical Industrial Site

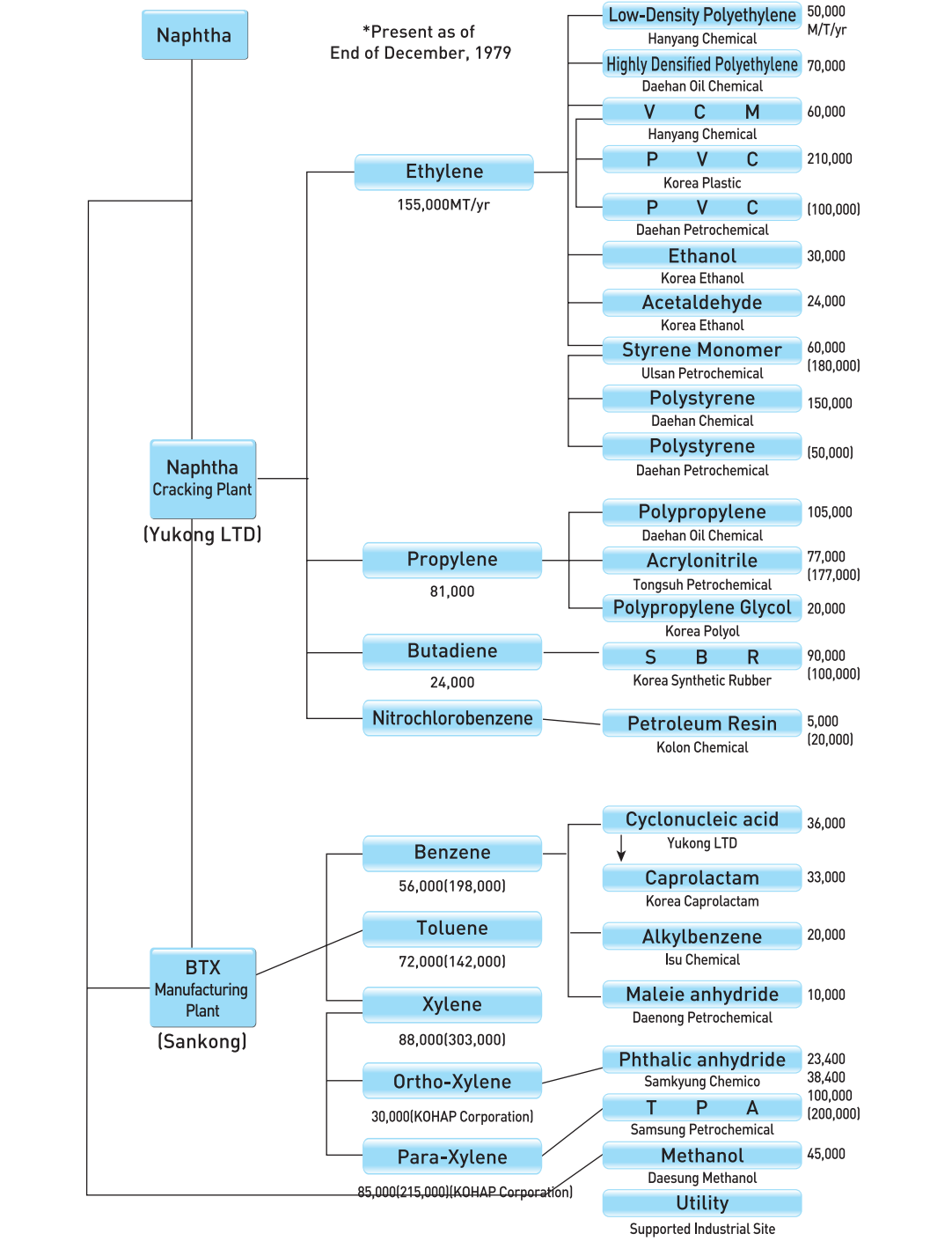
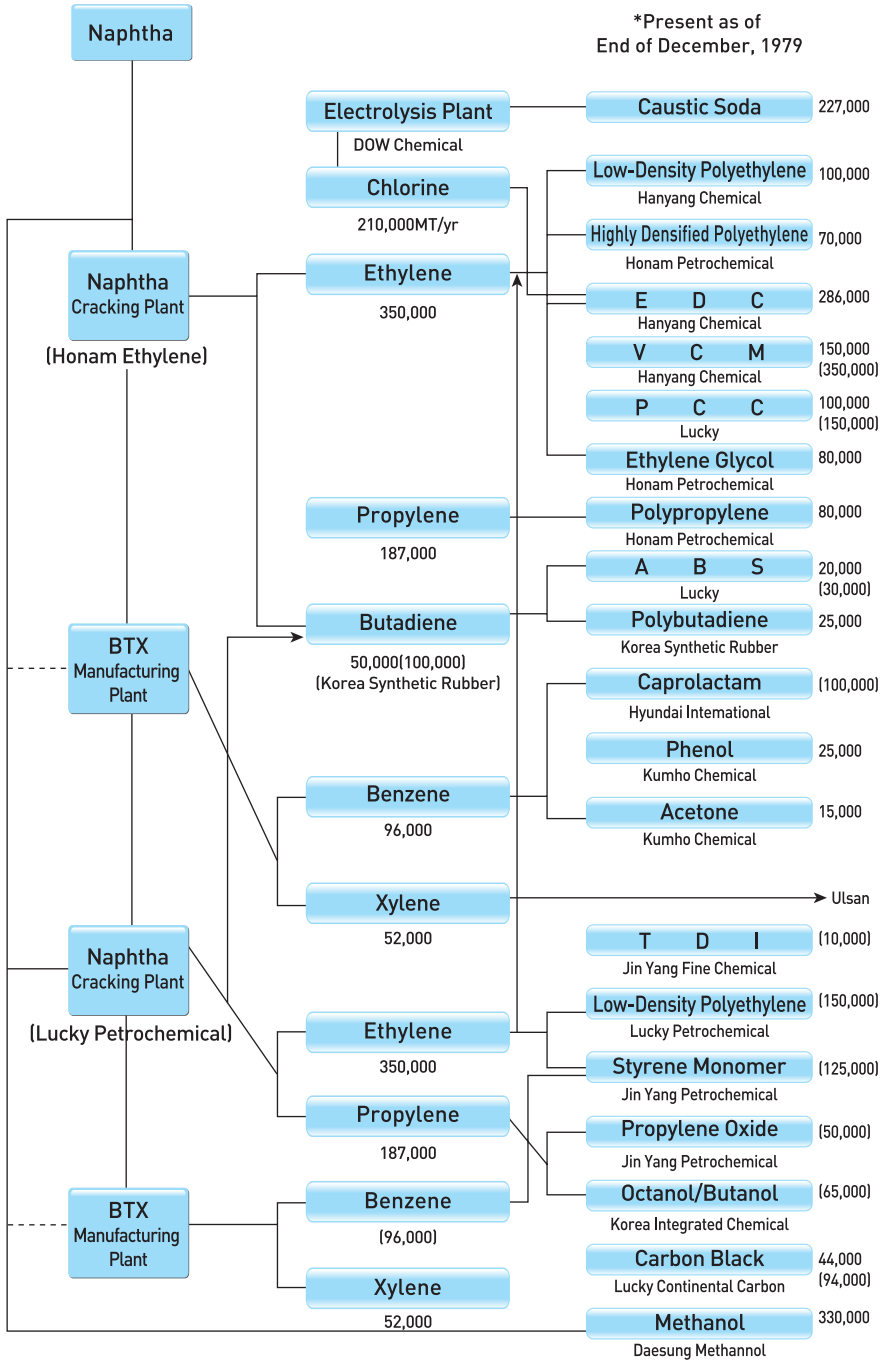


Figure 5 | Yeochon Petrochemical Industrial Site



Note: 1. ( ) indicates 'establishment' or 'scale after expansion'
2. The existing scale includes those completed work as of end of December 1979.

4.7. Upbringing Technical Manpower

4.7.1. Master Plan

Korea did not have the benefit of natural resources but possessed high quality human resources which Korea could be proud of. This was also recognized globally. However, the standard of technical manpower at the time of implementing the Heavy-Chemical Industrialization Promotion Policy was still too low in quantity and quality. An epochal plan was needed to train the technical manpower. Preparation was necessary beforehand as a long period of time would be needed to properly bring up the technical manpower.

4.7.2. Basic Goal

Industrial demand for science-technology manpower was expected to reach about 2 million in 1981, which was double the figure of 1975 and quadruple that of 1969, thus a supply plan was drawn up accordingly.

Table 17 | Increase in the Number of Technical Manpower

Category \ Year	1969	1975	1981
Technical Manpower	20,000	60,000	110,000
Field Workers	50,000	80,000	150,000
Technicians	340,000	980,000	1,200,000
Total	410,000	1,090,000	1,960,000

Table 18 | Demand and Supply Plan of Engineers

(Unit: Thousand people)

Category \ Year	Total (77-81)	75	77	78	79	80	81
Demand	-	132.1	164.5	181.9	200.9	221.8	245.5
Supply Needed (A)	124.7	-	22.6	21.8	24.0	26.6	29.7
Current Supply Capacity (B)	118.1	-	24.9	24.7	23.7	22.6	22.2
Science and Engineering Universities	62.4	-	11.3	12.1	13.0	13.0	13.0
Professional Schools	55.7	-	13.6	12.6	10.7	9.6	9.2
Difference between Demand and Supply (A-B)	△6.6	-	2.3	2.9	△0.3	△4.0	△7.5

Table 19 | Demand and Supply Plan of Technicians

(Unit: Thousand people)

Category	Year	Total (77-81)	1977	1978	1979	1980	1981
Demand			1,179	1,280	1,412	1,548	1,700
Supply Needed	Total (100%)	843	158	147	161	179	198
	1. Level 2 Technicians (33%)	280	49	48	54	61	68
	2. Technicians	280	49	48	54	61	68
	3. Basic Technicians	283	60	51	53	67	62
Supply Method	Level 2 Technicians						
	Technical High School	259	46	52	52	53	53
	Vocational Training	77	14	15	15	16	17
	Total	336	63	67	67	69	70
	Excess or Deficiency	56	14	19	13	8	2
	Technicians						
	Vocational Training	365	59	54	72	79	81
	Excess or Deficiency	75	10	16	18	18	13
	Basic Technicians						
	Short-Period Vocational Training in Corporations	283					

Source: Heavy-Chemical Industrialization Promotion Policy Planning Board

4.7.3. Upbringing Method

1) Technicians and Technical High School Education

Technological manpower was subdivided into technicians and engineers (skilled workers), and a supply plan was supposed to rely upon public school education. To begin with, the training of technicians relied upon the establishment of technical high schools.

The main points of the Development System for technicians through the education provided at technical high schools were as follows:

(1) To acquire certificates of qualification in the education process
(2) The increase in Practice hours and executing specialization education by sector in the education method (e.g. Machinery Technical High School)
(3) To be able to adapt easily onsite - the facilities should be made similar to the ones on site and there should be training courses on site (in the factories)
(4) In accordance with the area development, technical high schools must be specialized

(specialized technical high schools)

(5) The teaching materials should be made according to circumstances, but the national treasury should publish them.

(6) With the expansion of practical education, mental education should be strengthened so that precision skills are accustomed.

(7) In order to allow study opportunities, Mechanic Universities and Night Professional Schools should be set up.

(8) Model Schools, Specialized Technical High Schools, Machinery Technical High Schools should be selected and put into effect from 1973. General Technical High Schools should be put into effect in the near future.

(9) In order to be fully equipped for practical training, the government's budget should be especially allocated and a pan-national campaign should be spread (e.g. Rack sending movements)

(10) Necessary measures should be made in order to give preferential treatment to technical manpower.

Table 20 | Technical High School Management System

Type	Management Goals	No. of Assigned Schools	No. of Students in 1979
Machinery Technical High Schools	Upbringing of high quality skilled workers to improve precision in the machinery industry as well as the defense industry	19	13,920
Model Technical High Schools	- Training technicians for overseas expansion - Leading role of general technical high school's education	11	9,360
Specialized Technical High Schools	Training high quality technicians who could adapt to specialized industries (e.g. electronics, chemicals, construction, iron and steel manufacturing, railways, etc.)	10	5,750
General Technical High Schools	Training technicians from various fields that could adapt to general industries	55	56,300
Total		**95**	**65,290**

- National: 4 Schools - Public: 50 Schools - Private: 41 Schools

2) Upbringing of Engineers and University Education

Training engineers relied upon the department of science and technology at universities. The goal of university education was in training engineers that possessed both theory and practical techniques that the industrial society required so that the Heavy-Chemical Industrial Promotion Policy could be effectively executed.

To enumerate the Reform System in the Engineering College Education:

(1) Securing excellent students
(2) Reforming the curriculum
(3) Increase in the education time
(4) Changing into the primacy of practical training
(5) Securing and training excellent professors
(6) Fostering research institutes
(7) Promoting industrial cooperation (Corporation support)

The industrial society was in desperate need of training engineers but the university education system could not immediately satisfy the needs. Therefore, the specialized systems (one specialized area to be selected by each university and intensively investing into that field in order to mass-produce manpower from that area) were arranged in national universities first and the general universities were made to gradually follow this system. The point was to make a single specialized engineering college such as a machinery college or chemicals college.

A plan was also made for the upbringing of high quality engineers such as masters or doctorate degrees by making each university revitalize their graduate schools. Moreover, a Heavy-Chemical Industry Specialized Major was newly established in the Korea Advanced Institute of Science and made to increase its students in order to have many graduates. A system was made for universities to supply the research institutes with necessary manpower and for the research institutes to give specialized trainings to the specialized high quality students.

4.8. Research Development Plan

4.8.1. Basic Plan

An epochal development was necessary for the execution of the Heavy-Chemical Industrialization Promotion Policy. It was inevitable for the government to take the initiative in cultivating the research development capabilities. Distinguished national research institutes like KIST (Korea Institute of Science and Technology) were only few and could not all manage the enlarged requirements in research development. Therefore, the establishment of specialized advanced institutes was planned in each field of the heavy-chemical industry such as machinery, electronics, metal, ship-building and chemical. Machinery research institutes and metallurgy institutes were located in Changwon Machinery Base whereas electronics research institutes were located in the Kumi Base. Ultimately, science towns were constructed for specialized research institutes and by the end of 1979, four specialized research institutes stood in Seoul, one in Kumi, two in Changwon and nine in Daeduk.

4.8.2. Daeduk Specialized Research Site

The Master Plan for Daeduk Specialized Research Site was drawn up in early 1973. The location was determined in November of the same year. Individual research institutes began to move into the site from 1978. The land use plan of the sites included the construction of new towns with a total area of 8.4 million pyeong and 50 thousand people. A site of 3.5 million pyeong, equal to a quarter of the site's total size, was built to host research and educational institutes.

4.9. Defense Industry

4.9.1. Master Plan and Basic Direction

The basic policy and direction for promoting the defense industry lies in producing the military supplies manufactured by private companies in a timely manner. The basic direction of the defense industry promotion plan is as follows:

1) Localization of key weapons, equipments and supplies for national self-defense capabilities
2) Preparation for supplying high quality products at low price in a timely manner
3) Parallel promotion with the government's Heavy-Chemical Industrial Promotion Plan and the Economic Development Plan
4) Defense Industry should be private-led and the construction of military arsenal should be rejected.
5) Domestically available resources should be fully utilized and existing domestic companies should be tied in in order to minimize investments. Accordingly, the capabilities of existing companies should be evaluated and selected as defense companies.
6) Companies suitable for weapons and equipments should be separately selected while defense companies should be those that assemble those products.
7) The productivity of defense companies should be improved by producing defense products and civil products to a ratio of 30:70.
8) Profit margins should be guaranteed for the production of military products by defense companies.
9) The precision level of production from defense companies should be maintained at its best for the possibility of interchangeability of components.
10) Defense Science Research Institutes should be greatly reinforced and all researchers from domestic and abroad should be mobilized.
11) The private companies and research institutes will be financed through the National Investment Fund while tax benefits would be given. Furthermore, engineers and technicians engaged in military duties should be exempt from tax.

The overall goal was to establish a defense system that surpassed North Korea by 1981, establish a R&D and Production system for the localization of conventional basic weapons including ammunition from 1972 to 1976, and to produce high precision weapons while developing independent weapons and equipments suitable for the national circumstances as well as the nation's geographical conditions.

4.9.2. Promotion and Support for the Defense Industry

The production of weapons by the defense industry was made in 3 stages - planning, testing, and mass production. The most important factor in promoting the defense industry was technology. However, as the U.S. opposed Korea's defense industry promotion and did not share technologies, thus, Korea had to develop its own technologies by securing all the capable manpower within and out of Korea. In 1972, the Agency for Defense Development (ADD) was aggressively expanded by drawing in national defense engineers as well as engineers from abroad. The ADD's role was centered on developing technologies to produce precision weapons and to mass produce basic weapons.

In the early days, there were hardly any engineers capable of designing weapons. In order to solve this problem, subcommittees were formed according to weapon systems and those who had some knowledge were appointed as members. These became the advisory bodies to the ADD and made recommendations for appropriate weapon systems. Reverse Engineering method was used as the U.S. did not share any design plans. Finally, when Korea came to the production stage, U.S. started supplying design plans and raw materials after recognizing the Korean nation's capability and potential.

The Ministry of Commerce and Industry of Korea selected appropriate companies and designated them as defense companies after investigating all the production facilities of the companies in Korea. As for funding, a defense tax was introduced to support the promotion of the defense industry.

In February 1973, a 'Special Law in Obtaining Military Supplies' was passed to promote the defense industry more systematically. Profits were guaranteed by reducing income and corporate tax, levying only a small rate of VAT. Financial support was given through the national investment fund which allowed deposits and intermediate payments via a long term contract system and approved research and development expenses in calculating the production cost of the military supplies.

The whole Defense Industry Plan underwent various stages of examination and review. The Ministry of Commerce and Industry of Korea established a division for the defense industry where it took full charge of the defense industry and the military supply production. A Committee on Defense Industry Relations was also created in the Blue House where it

examined the Plan made in the military to obtain equipments. It supervised implementation and offered support for plans. After being fully revised at the Committee of Defense, the Plan finally got reviewed by a 5 Person Committee within the Blue House and was approved by the President.

The most effective support for the promotion of the defense industry was, however, the nation wide atmosphere. The private defense organizations including companies and research institutes that served the defense industry took pride in being pillars of the defense industry. President Park's support by visiting these organizations especially affected the people greatly.

4.9.3. Attained Performance

Mass produced weapons were delivered after being tested and having gone through showcases. The biggest event was the 'Demonstration on the Firepower of the Domestically Produced Weapons' held in March 1977. All sorts of weapons including recoilless rifles, vulcans, armored cars and even helicopters were displayed and demonstrated. Within 5 years by 1977, Korea's capability had surpassed that of North Korea's. Subsequently, a preview on various guided weapons was held in September 1978.

The advancements were proven between 1977 and 1979 when many U.S. national defense officials including Minister Brown were greatly surprised by Korea's developments after visiting the Heavy-Chemical Industry plants and the defense industry facilities. It is said that due to these visits and afraid of Korea turning into communists where the weapons would fall into communists' hands and eventually lead to a big threat to the world, the U.S. decided not to withdraw its troops.

5. Investment Resource Requirements for the Heavy-Chemical Industry

A tentative plan on the Heavy-Chemical Industrialization Promotion Plan was announced in June 1973. Approximately a month later, following an evaluation period, the investment resource requirements were charged with a plan to provide finances. From 1973 to the target year of 1981, the amount of capital required to run the Heavy-Chemical Industrialization Promotion Policy was estimated to be around 9.6 billion USD. This can be seen in Table 26 below.

Table 21 | Required Investment Estimates for Each Field of the Heavy-Chemical Industrialization Promotion Policy (1973~81)

(Units: Million USD)

Fields	Foreign Capital	Domestic Capital	Total	Composition(%)
Metallurgy	1,502	674	2,172	22.7
Non-ferrous	222	123	345	3.6
Machinery	1,049	1,137	2,186	22.8
Ship-building	416	352	768	8.0
Electronics	593	599	1,192	12.4
Chemicals	1,523	662	2,185	22.8
Sub-total (Composition)	5,305 (59.9)	3,547 (40.1)	8,852 (100.0)	92.3
Others	468	273	741	7.7
Total (Composition, %)	5,773 (60.2)	3,820 (39.8)	9,593 (100.0)	100.0

Source: Heavy-Chemical Industrialization Planning Board

For the plan to provide finances, the domestic funds were to be provided by: 1) Development Finance Funds, 2) promoting capital markets, and 3) nation's savings fund that was raised from a pan-national savings movement. The foreign funds were to be provided from joint venture investments and foreign loans and were only to be used for importing materials that were necessary for the modernization of facilities and securing advanced technologies. Ultimately, the foreign funds were to be no more than 60% of the total requirements.

Table 22 | Plan to Provide Finances for the Heavy-Chemical Industrialization Promotion Policy

Required Amount	
Foreign Capital	5.8 billion USD (50~60%)
Domestic Capital	3.8 billion USD (40~50%)
Total	**9.6 billion USD**

In the financial structure, the Heavy-Chemical Investment firms were made to secure 30% or more from their own capital so that the ratio between capital and debts would maintain at 30:70. This was to prevent corporations from becoming insolvent.

In summary, after careful examination by the relevant ministries such as the Economic Planning Board, the plan to provide finances seemed sufficiently capable. It must be emphasized that the capability of funds required and the plan to provide them for the Heavy-Chemical Industrialization Policy were thoroughly examined first and only then executed.

6. Investment Situation and Analysis Summary

The investments that were made in the heavy and chemical industry between 1973 (Declaration of the Heavy-Chemical Industrialization Promotion Policy) and 1979 (Year of Substantial Completion) amounted to a total of 4 trillion 135.7 billion KRW.

Table 23 | Accomplished Investments in the Heavy-Chemical Industrialization

Fields	Domestic Capital	Foreign Capital	Total	Firm's Financing	Ratio
Total	Mill. Won 2,523,266	Thou. USD 3,294,890	Mill. Won 4,135,795	Mill. Won 1,279,537	% 30.9
Plant Facility	2,006,648	3,158,672	3,552,804	1,207,043	34.0
Metallurgy	601,319	1,374,939	1,268,164	593,910	46.8
Non-ferrous	112,634	177,866	199,447	48,149	24.1
Ship-building	150,067	120,698	208,605	75,979	36.4
Chemicals	492,750	1,211,995	1,095,357	200,829	18.3
Machinery	452,394	258,120	577,521	165,175	28.6
Electronics	196,484	15,054	203,710	123,001	60.4
Overhead Facility	200,737	-	200,737	-	-
Site Development	154,882	-	154,882	72,546	46.8
Tech Manpower	71,214	56,395	95,565	-	-
Research Development	89,785	79,823	128,807	-	-

Source: Heavy-Chemical Industrialization Planning Board

The results of the analysis are as follows:

1) Achieved the expected goal by using 86% of the budgeted amount.

Table 24 | Comparison between the Plan and the Real Situation

Real Situation (73~79)	8.27 billion USD (4 trillion 135.7 billion KRW)
Plan (73~81)	9.6 billion USD
Real Situation / Plan	86%

2) The investments for the Heavy-Chemical Industries were merely 19.1% of the whole manufacturing industry investments.

Table 25 | Investment Ratio between the HCI and the Whole Manufacturing Industry

Heavy-Chemical Industries	4 trillion 135.7 billion KRW
Whole Manufacturing Industry	21 trillion 565 billion KRW
HCI / Whole Manufacturing Industry	19.1%

3) The investments for the Heavy-Chemical Industry facilities represented 36.5% of the whole manufacturing industry facility investments.

Table 26 | Comparison between the Facility Investments

Heavy-Chemical Industries	3 trillion 552.8 billion KRW
Whole Manufacturing Industry	9 trillion 712.8 billion KRW
HCI / Whole Manufacturing Industry	36.5%

4) The investments into the Heavy-Chemical Industry facilities were focused on the steel and petrochemical industries.

Table 27 | Investment Focus

Steel Industry	35.7%
Petrochemical Industry	30.7%
Total	66.4%

5) It was a sound and steady investment as the capability to provide own capital was relatively high (Own funds kept a 30% share in the whole investments as planned originally)

6) Foreign Capital Investments did not exceed 39% of total investments

Table 28 | Foreign Capital Investment Ratio

Foreign Capital	3.29 billion USD
Funds in Total	8.27 billion USD
Foreign Capital / Funds in Total	39.0%

It was assumed in the Plan that foreign capital would account for 5.77 billion USD or 60% of the total 9.6 billion USD investment. However, only 39% of the foreign capital was used in reality.

7. Investment Situation by Sector and Evaluation

7.1. Iron and Steel Industry

Among all the Heavy-Chemical Industries, focused investments were made into the iron and steel industry. A total of 1 trillion 268.2 billion won, 601.3 billion won (47.7%) from domestic capital and 1 billion 374.94 million US dollars (52.6%) from foreign capital, was raised to invest into the facilities. This was a total of facilities investments used for the Korean Integrated Special Steel Plant and the POSCO plant, including the construction for the fourth term expansion to achieve an annual crude steel production of 8.5 million tons. To note, 593.9 billion won, or 46.8% of the total investment fund, was raised independently, which proves a relatively high self-reliance ratio in raising funds. Ultimately, from 1970 to 1978, the iron and steel industry was able to achieve a high annual growth rate of average 29.9%.

Table 29 | Iron and Steel Industry Investments

Sector	Investment Fund (~1979, Unit: 1 million won)				
	Domestic	Foreign (1,000 USD)	Total	Independent	Ratio
Total	601,319	1,374,939	1,268,164	593,910	46.8%
(1) POSCO	536,987	1,369,439	1,201,164	580,300	48.3
(2) Special Steel (Changwon)	64,332	5,500	67,000	13,610	20.3

7.2. Non-ferrous Metal Industry

The total investments made into the non-ferrous metal industry were 199.4 billion won including 146.1 billion won for the construction of copper and zinc steel mills and 53.3 billion won for related manufacturing facilities such as zinc manufacturing and copper processing plants. A domestic capital of 113.6 billion won (57.0%) and a foreign capital of 177.87 million US dollars (43.0%) were raised.

Table 30 | Non-ferrous Metal Industry Investments

Sector	Investment Fund (~1979, Unit: 1 million won)				
	Domestic	Foreign (1,000 USD)	Total	Independent	Ratio
Total	113,634	177,866	199,447	48,149	24.1%
(1) Zinc Smelting	20,678	25,000	32,800	9,797	29.9
(2) Copper Smelting	60,326	98,285	107,545	27,600	25.7
(3) Copper Processing	9,156	33,657	25,480	4,002	15.7
(4) Aluminum Manufacturing	23,474	20,924	33,622	6,750	20.0

7.3. Ship-building Industry

For the ship-building industry, investments were made in order to expand the ship-building facilities and the ship repairing capacities. A total of 208.6 billion won was invested into shipyard construction and the expansion of Hyundai Shipbuilding in Okpo and Jukdo. Domestically, 150.1 billion won (71.9%) of capital was raised, while 120.7 million US dollars (28.1%) was raised by foreign capital. Independent capital amounted to 76 billion won, a 36.4% of the total investments.

Table 31 | Ship-building Industry Investments

Sector	Investment Fund (~1979, Unit: 1 million won)				
	Domestic	Foreign (1,000 USD)	Total	Independent	Ratio
Total	150,067	120,698	208,605	75,979	36.4%
(1) Hyundai (expansion)	15,291	29,588	29,641	9,866	33.3
(2) Daewoo Okpo (construction)	73,512	74,450	109,620	38,430	35.0
(3) Samsung Jukdo (construction)	45,647	13,672	52,278	17,500	33.4
(4) Hyundai Mipo Repairing	15,617	2,988	17,066	10,173	59.6

7.4. Machinery Industry

Investments in the machinery industry had the goal of increasing machinery self-sufficiency level to 80% by 1986 and attaining exports of 10 billion US dollars. Total investments into the machinery industry were not more than 16.2% of the total heavy-chemical industry investments which had amounted up to 577.5 billion won. This was a total of 452.4 billion won (78.3%) which was raised by domestic capital and 258.12 million US dollars (21.7%) by foreign capital. It is interesting to note that 324 billion won, 56.1% of the total machinery industry investments, was invested into the construction of 6 plants (Samsung Heavy Industries, Hyundai International, Hyundai Heavy Equipment, Daewoo Heavy Industries, Hyosung Heavy Industries and Daelim Corporation) within the Changwon Machinery Industrial Site.

Table 32 | Machinery Industry Investments

Sector	Investment Fund (~1979, Unit: 1 million won)				
	Domestic	Foreign (1,000 USD)	Total	Independent	Ratio
Total	452,394	258,120	577,521	165,175	28.6%
(1) Main Machinery Plants (Changwon)	188,364	199,019	285,073	106,525	37.4%
• Samsung Heavy Industries (First Stage)	21,659	20,720	31,720	10,000	31.5%
• Hyundai International	101,666	90,236	145,430	59,142	40.6%
• Hyundai Motorcar	22,896	17,156	31,390	12,000	38.2%
• Daewoo Heavy Industries	8,673	9,000	13,038	4,258	32.7%
• Hyosung Heavy Industries	10,300	26,000	22,425	5,424	24.2%
• Daelim Corporation	23,170	36,907	41,070	15,701	38.2%
(2) Others	264, 030	59,101	292,448	58,650	20.2%

7.5. Electronics Industry

With the target of establishing the electronics industry as a strategic export industry, the production of international standard components and the development of high-tech quality products were pursued by constructing plants for semiconductors, computers, telecommunication devices, sound systems, color TV, electronic machines on the Kumi Electronics Industrial Site. The total amount invested into the electronics industry was 203.7 billion won. Out of this total, the greater part (196.5 billion won) was raised by domestic capital while independent capital occupied 60.4% of the total investments, amounting to 123 billion

Table 33 | Electronics Industry Investments

Sector	Investment Fund (~1979, Unit: 1 million won)				
	Domestic	Foreign (1,000 USD)	Total	Independent	Ratio
Total	196,484	15,054	203,710	123,100	60.4%
(1) Main Electronics Plants (Kumi)	40,187	7,665	43,887	27,107	61.7%
• Goldstar	10,400	3,300	12,000	9,900	82.5%
• Goldstar Cable	3,100	4,365	5,200	2,020	38.8%
• Daewoo Electronics	2,687	-	2,687	2,687	100.0%
• Daehan Electric	24,000	-	24,000	12,500	52.0%
(2) Others	156,297	7,389	159,823	95,894	60.0%

won. Even though a relatively small amount was invested into the electronics industry, it recorded an annual average growth rate of 37.2% since 1970. The reason for this is because the electronics industry is more technology-intensive than capital-intensive.

7.6. Chemical Industry

Investments were focused on the development of fine chemistry policies to promote Korea as the world's best chemical industry country and for the construction of a large scale factory in order to self-supply petrochemical products. A total of 1 trillion 95.4 billion won, the second highest after iron and steel industry, was invested into the chemical industry with 492.8 billion won (45.0%) being raised by domestic capital and 1.212 billion US dollars (55.0%) by foreign capital. Investments were especially focused on the petrochemical industry and the construction of the seventh fertilizer plant in Yeochon and Ulsan. However, regardless of all the investments, the petrochemical industry only showed a relatively low annual growth rate of 16.8% (1970-1978 annual average).

Table 34 | Chemical Industry Investments

Sector	Investment Fund (~1979, Unit: 1 million won)				
	Domestic	Foreign (1,000 USD)	Total	Independent	Ratio
Total	492,750	1,211,995	1,095,357	200,829	18.3%
(1) Petrochemical	316,184	776,981	709,761	151,072	21.3
(a) Yeochon Site	209,936	516,674	460,023	81,342	17.7
Honam Ethylene	101,712	181,584	189,780	51,920	27.3
Honam Petrochemicals	60,169	150,194	133,013	20,000	15.0
Hanyang Chemicals	22,067	77,700	59,752	7,832	13.1
DOW Chemical Korea	25,988	107,196	77,978	1,590	2.0
(b) Methanol	14,640	32,458	47,098	3,000	6.4
(c) Related Business	44,757	65,125	76,342	28,991	38.0
Lucky	13,194	18,280	22,660	13,817	60.9
Kumho Chemicals	9,106	13,021	15,421	4,500	29.1
Korea Plastic	10,843	5,200	13,365	4,100	30.6
Korea Synthetic Rubber	11,014	28,624	24,896	6,574	26.4
(d)Ulsan Site	46,851	162,724	125,798	37,739	29.9
Naphtha	4,429	9,943	9,276	2,783	30
Affiliated Plants	42,422	152,781	116,522	34,956	30
(2) Fertilizers	76,991	263,310	202,744	25,123	12.4
Namhae Chemical (Proportion of 7)	76,991	263,310	202,744	25,123	12.4
(3) Oil Refinery	60,477	122,929	120,098	8,265	6.9
Han-Yi Petroleum	60,477	122,929	120,098	8,265	6.9
(4) Chemical Pulp	39,098	48,775	62,754	16,369	26.1
Donghae Pulp	39,098	48,775	62,754	16,369	26.1

7.7. Investments for Human Resources Development

A total of 98.6 billion won was invested into a qualitative and quantitative upbringing of human resources in science and technology, which was to be the key in promoting heavy-chemical industries. As the upbringing of human resources in this field was promoted by school education, investments were mainly made in Technical High School and Engineering College education, while parts were made into vocational training institutes.

7.8. Investments for Research Development

A total of 128.8 billion won was invested mainly into constructing specialized research institutes in the Daeduk Research Site in order to organize an effective research system and systemize research capacities, while promoting a planned national research project. Investments in human resources and research development can be seen as the most basic yet important investments for high growth. However, investments made on human resources and research development for heavy-chemical industries amounted to 227.4 billion won which is only 0.3% of the total GNP (74 trillion and 82.3 billion won) from 1973 to 1978. This seems to be a very low rate compared to advanced countries that put in more than 2% into this sector.

Table 35 | Research Development Investments

Sector	Investment Fund (Unit: 1 million won)		
	Domestic	Foreign (1,000 USD)	Total
Total	89,785	79,823	128,807
Research Institute Construction	86,329	79,626	125,255
Daeduk Research Site Construction	3,456	197	3,552

7.9. Investments for Industrial Site Construction

Total investments made for the construction of heavy-chemical industrial sites were 154.9 billion won with 83.4 billion won (53.9%) being invested into the Changwon Industrial Site, 20.8 billion won into the Yeochon Industrial Site, 12.8 billion won into the Onsan Industrial Site, 23.4 billion won into the Kumi Industrial Site and 14.5 billion won into the Pohang Industrial Site. For the site constructions, 82.3 billion won was raised by the National Investment Fund and 72.5 billion won (46.8%) independently. The businesses within the sites could pay back the National Investment Fund in 5 years with a 2-year grace period which was quite useful at the time.

Table 36 | Industrial Site Construction Investments

Industrial Sites	Investment Fund (Unit: 1 million won)			
	National Fund	Independent	Total	Independent (%)
Total	82,336	72,546	154,882	46.8
Changwon	47,880	35,561	83,441	42.6
Yeochon	12,710	8,048	20,758	38.7
Onsan	7,386	5,402	12,788	42.2
Kumi	13,860	9,504	23,364	40.6
Pohang	500	14,031	14,531	96.5

7.10. Investments for Governmental Support Facilities

Investments made in governmental support facilities for the 5 heavy-chemical industrial sites including Changwon, Yeochon, Onsan, Kumi and Pohang amounted to 200.7 billion won, which was completely supplied by financial funds. 104.6 billion won (52.1%) was invested into harbor construction, 67.6 billion won (33.7%) into water facilities, 19.1 billion won into road construction and 9.4 billion won into railway construction.

Table 37 | Governmental Support Facility Investments

Industrial Sites	Investment Fund for Each Project (National Treasury, Unit: 1 million won)				
	Water	Harbor	Road	Railway	Total(%)
Total	67,594	104,624	19,129	9,390	200,737
Changwon	6,640	13,150	4,345	5,110	29,245
Yeochon	19,125	12,662	3,401	-	35,188
Onsan	19,100	15,128	4,276	4,280	42,784
Kumi	3,579	8,940	2,753	-	15,272
Pohang	19,150	54,744	4,354	-	78,248

The data was collected from ministries and private companies and administered by the Heavy-Chemical Industrialization Promotion Planning Committee in the first half of 1979 in order to comprehensively evaluate the First Stage Plan of the Heavy-Chemical Industrialization Promotion Plan which was to be completed by the end of the year. This paper has reorganized the above information.

Annex 02

Advisory Work on the "5-Year Industrial Innovative Development Plan" of the Republic of Kazakhstan

Annex 02

Advisory Work on the "5-Year Industrial Innovative Development Plan" of the Republic of Kazakhstan

Hyung Koo Lee (Ministry of Labor)

1. Introduction

Together with the Knowledge Sharing Program (KSP) team of the Korea Development Institute (KDI), I arrived in Astana on September 2nd as a Resident Advisor for Kazakhstan. On September 3rd, a 'Launching Seminar' was held at the Ministry of Industry and Trade where I made a presentation on "Effective Planning: Lessons from Korea" and the Economic Research Institute of the Ministry of Economy and Budget Planning explained the "State Forced Industrial Innovative Program of Development, 2010-2014."

At the seminar, I focused on the theoretical side of the general economic development plan and the Korean experiences. I tried to explain the Korean experiences in detail to the seminar participants and to the officials of the Ministry of Industry and Trade during the afternoon sessions focusing on the following points:

- Major characteristics of Korea's economic development plan
- Evolution of Korea's economic development plan from the 1st plan to the 6th plan
- Implementation of the plans

In order to facilitate a competitive industrial structure and achieve rapid economic growth, the Kazakh government seemed to be planning a very aggressive and comprehensive industrial development program. Like what Korea experienced in the early 1970's, this may well be an effective strategy in uniting the nation to work together in order to achieve economic development. Korea took a selective-base industrial policy, the so-called heavy and chemical industry (HCI) drive, targeting 6 major industries, which departed from the practice of the previous economic development plans with government support for high-performing companies across the industries.

Since September 4th, the KSP team and the Kazakh team met in various types of meetings to discuss about the Kazakhstan Development Plan. I engaged in the overall plan contents of frameworks and integration on macroeconomic and sectoral programs using the tools of ICOR (incremental capital-output ratio) and I-O (input-output) table coefficients. This work is still ongoing at the Economic Research Institute.

Meanwhile, the Ministry of Industry and Trade plans to complete their working-level plan preparations in order to submit the drafts to the Prime Minister by October 2nd, 2009. All the officials in the economic ministries seem to be focused on this work.

I would like to leave here the results of my work as a Residential Advisor to the Kazakh government (for 4 weeks) on the "5-Year Industrial Innovative Development Plan of Kazakhstan," also known as the "State Forced Industrial Innovative Program of Development for the Period 2010-2014."

2. Overview of the Kazakh Economy

Kazakhstan seems to have great development potential owing primarily to its large territory (12 times the size of the Korean peninsula), fairly low population density (about one-fifth that of Korea), and high literacy rate. An abundance of natural resources as well as its strategic geographical position, as the link between Eastern Europe and Western Asia, represent great assets for the future economic development of Kazakhstan. The strong leadership of the government coupled with it being a fairly young country of 18 years can also be seen as an advantageous precondition for rapid development. In fact, from 2003 to 2008, the Kazakh economy had a high and stable growth rate of 7~8 % which is not surprising. On the other hand, the so-called 'Dutch disease' (lagging behind with a plenty of natural resources) cannot be ignored.

In trying to overcome the global financial crisis of 2008, the Kazakhs have faced the following three challenges:

- Significant slowdown in over-heated sectors of the economy: construction, credit, and banking
- Decline in external demand influencing the export sector and overall investment activities
- Turndown in the manufacturing sector and decline in the industrial growth rate

3. Process of Plan Preparation

The Kazakh government is in the process of preparing a “5 year Industrial Innovative Plan” which will cover the period between 2010 and 2014 under Strategy 2030 and Strategy 2020, a long-term master plan for the economic development of this country. This plan preparation was assigned to the Ministry of Industry and Trade, Ministry of Economy and Budget Planning and other related ministries to complete the work by the end of 2009. According to the time schedule, the ministries concerned, including the Ministry of Industry and Trade, are to complete their working level preparations by October 2nd, 2009.

During my 4 weeks in Astana, I gave my observations about the plan preparations twice to the Vice Minister of Industry and Trade, Nurbek Rayev, in writing. Together with these, Vice Minister Rayev and I often had the chance of discussing what areas should be improved within the plan.

Regarding the framework, I recommended several times to Vice Minister Rayev as well as the Economic Research Institute to focus on simplification and clarification in the documents for the plan. The draft was too complicated in the priority set-up as well as in the contents of sectoral programs. On the other hand, I suggested coordination work to be conducted between the macroeconomic and sectoral plans in order to make this new plan in line with the comprehensive economic development plan structure. Until now, the preliminary documents of the framework still seem to resemble the traditional sectoral plan structure. However, as it is still under revision and in the process of being simplified, I expect an improved structure to result in the final version.

If not, I would rather suggest this state forced industrial innovative program to be characterized as a special plan with a higher priority put on implementation. This would resemble the Korean heavy and chemical industry development plan in the 1970s. In other words, plan preparation work should be more focused on the special sectoral plan of industrial innovative program rather than trying to become a comprehensive economic development plan in itself. The government of Kazakhstan should choose between the above two alternatives.

4. Observations

4.1. Complexity

The Kazakh government has had approximately 130 economic plans such as the 2020 and 2030 long-term plans. They all look well designed in written forms. These are the leftovers from the Soviet Union planned economy. However, no comprehensive economic development

plan has been prepared in this country.

It seems that everything starts with plans, without any consideration to their use or implementation. Therefore, most ministries and most departments of government organizations seem to have their own individual plans. They are all highly target-oriented without respect to the equilibrium between sectors.

The terminology of the plan is also complex. The terms, plans, programs, projects and perspectives, are confusing and it is difficult to distinguish one from another. Therefore, every organization can be called a planning center in Kazakhstan, but a planning center for comprehensive plan preparation and implementation is hard to find. At worst, this '5-year Industrial Innovative Plan' appears to be simply another new sector plan among Kazakhstan's 130 plans, and of little concern to government officials with the exception of the Ministry of Industry and Trade.

4.2. Responsibility

What I find interesting here is that most officials seem to be young, not only in their age but also in their career, in all posts within the government. Even higher positions of the government— Minister, Vice Minister, Director or Division Chief of a department— are occupied by the young generation with merely several months of career experience. This could be a strength as well as a weakness in preparing the plan.

I have also found a centralized planning center to be absent here in Kazakhstan since the plans appear to have been drafted independently based on a long set of practices and history within the individual organizations. This means that every organization has the role of a planning center, whereas a centralized organization for planning is not necessary since Kazakhstan does not have a comprehensive economic development plan anymore.

During the plan preparation of the '5-Year Industrial Innovative Development Plan,' similar problems occurred as to which ministry would be responsible for these matters, the Ministry of Industry and Trade, the Ministry of Economy and Budget Planning or any other Ministry of concern. I was told that the Ministry of Industry and Trade and the Ministry of Economy and Budget Planning would both be responsible for this plan. This would mean that they would have to share responsibilities. I don't want to argue this matter theoretically at this point, but would rather like to emphasize the importance of accountability.

4.3. Comprehensiveness

The types of the plan can be divided into an indicative plan and a state-initiated detailed project-based plan. The former is derived from market indicators, based on market demand and

supply which help to establish the appropriate policy direction and assign incentives to be given to certain sectors, while the latter focuses on detailed projects which are directed and enforced by the state. For the latter type, the government is also responsible for everything related to project implementation. This kind of plan is not clear in reality, and therefore, has little meaning. Rather, a clarification of the indicative plan, which is more focused on macroeconomic factors and emphasizes equilibrium among sectors, is a more meaningful way of planning.

Kazakhstan's plans seem to be closer to project-based sector plans. It appears that Kazakhstan has never had a comprehensive economic development plan where the equilibrium between macroeconomic and sectoral plans, within industries, regions, urban centers and rural areas, etc. is respected.

Even now, the Kazakh government seems to have developed a comprehensive 5-year development plan without having clarified the basic concept of the plan, whether it be indicative, that is, integration between sectors in a sense of equilibrium, or not. The result of the Kazakh plan seems to be in the middle, sometimes macro, sometimes innovative sectors, sometimes transportation and human capital. All are prepared independently without considering integration among sectors. Lack of equilibrium in planning may create problems in implementation.

4.4. Uncertainty

In order to have a comprehensive plan, integration among sectors is inevitable. The problem seems to be that the Kazakh government has little experience and does not want to immerse itself in in-depth plan integration work. To some extent, I am in doubt over the capabilities to conduct this type of work successfully.

Integration work should begin by an assessment of the equilibrium between the financial sector capability and investment requirements of the industrial sectors. I am unsure if the financial plan has been prepared and evaluated as to its capacity to meet the industrial innovative program investment requirements. It seems to me that the plan in preparation is more focused on supplying incentives such as favorable credit ceilings and tax breaks to certain innovative programs without too much consideration on the financial sector capability.

In practice, the industrial investment requirements in expenditure of GDP on macro economy with industrial sectors can be consistently checked. For a certain rate of economic growth, macro-level work can check the level of investments needed by using tools like the incremental capital-output ratio (ICOR). In this plan, industrial innovative programs are needed in order to check consistency within the industry and with other industries. Using coefficients of industries in input-output tables will be easy to access. This would be a coordination work

between the macro economic and sectoral plans.

The other coordination efforts can be made for industries, regions, and infrastructure. This could be seen as a balance check between sectors.

In this industrial innovative plan, I believe that the following three kinds of coordination work should be done: 1. Coordination among the financial sector of macroeconomic factors with industry's total investment requirements 2. coordination between GDP expenditure and sector investment requirements 3. coordination between transportation infrastructure and human capital with industry. However, all of those are technical matters. Since being here, I tried to give consultations on the second one, without any success. The two barriers in my achieving this were lack of time and enthusiasm for work from technicians. It remains uncertain whether or not it would be possible to put the results into this current plan. I think it would possibly have to be included into the next plan.

5. Major Contents of the "5-Year Industrial Innovative Development Plan" Draft

On September 22nd, 2009, the Kazakh government prepared its preliminary version of the plan draft, a big volume of more than 80 pages, which provided detailed information on strategic industries. It was difficult to understand the detailed contents of the plan but I could gather what this government was going to emphasize in the plan. There were four parts to the plan draft:

5.1. Goals and Directions of Policies to Achieve this Plan

The Kazakh government tried to clarify general policy directions for the plan. First, the industry developments to focus on domestic and regional markets, meaning a kind of import substitution strategy for certain sectors. Second, to enhance the development of traditional export sectors by product diversification and vertical integration. Third, to develop high-tech industries. Fourth, the rational spatial organization of industrialization potential, interdisciplinary integration.

5.2. Implementation Mechanisms

The Plan is divided into two parts: one is a general basic measure of industrial development stimulation; and the other is selective measures of state support for industrial innovative programs. General basic measure parts are composed of general macro policy such as monetary policy, fiscal policy and foreign trade policy, and so on. The selective measures of innovative programs are composed of financial and non-financial measures of state supports. To have been

able to divide general industrial support policies and special system for special programs into two is in itself is a great improvement

5.3. Priorities of Each Sector(7+3)

In this section, the plan prioritizes and highlights the following 10 sectors:
- agro industrial complex and agro processing
- construction industry and production of building materials
- oil refining and infrastructure of oil and gas sector
- metallurgy and production of the finished metal products
- chemical, pharmaceutical and defensive industry
- energy
- transport and telecommunications infrastructure
- engineering
- space industry
- tourism

5.4. Expected Results

The envisioned result is described in detail but there seem to be no numerical targets. There also appears to be too much conceptual and theoretical interpretation. The expected results of the plan are described as follows:

- maintenance of long-term steady economic growth
- diversification of the economy and export structure
- increase in productivity and reduction of energy intensity
- Improvement in human capital as well as in science and technology
- modernization of the industrial infrastructure in accordance with the international standard
- evolution in the role of the state in innovative industrialization: from a key investor to a responsible coordinator

6. Effective Planning - Lessons from Korea

6.1. Planning Process

6.1.1. Situation prior to the Economic Development Plan (1945 - 1961)

In 1945, when Korea attained independence from the Japanese colonial rule, very little of its industrial infrastructure remained and Korea was unable to properly operate its remaining facilities due to a lack of skilled labor and energy shortage.

To make matters worse, the Korean War (1950 - 1953) almost completely wiped out the country's production facilities and infrastructures. After the war, the situation was serious: First, the distribution of income was nearly flat because most people were equally very poor; Second, a massive relocation of people drastically increased the country's unemployment rate.

Therefore, Korea had to heavily rely on aid from its allies, such as the United States, and the nation's budget was supported by funds, obtained from selling those aid materials. The country's economy did not seem as if it could get back on track.

However, most Korean people, amidst of turmoil, poured everything they had into their children's education, in order to avoid handing down their poverty to the next generation. Due to this endeavor, Korea was able to nurture a high quality labor force, which became the driving force behind its remarkable economic growth in the 1960s.

6.1.2. Launching the Economic Development Plan (1962 - 1971)

To launch a comprehensive economic development plan in the 1960s, tremendous amounts of energy were devoted to the setting up of appropriate economic goals and the selection of proper strategies to achieve those goals.

Therefore, the government declared that the goal must be placed on pursuing a 'Self-reliant Economy,' which would get people out of their impoverished lives. Under this clear goal, the government established major development strategies which implied the following several key points:

First, Korea had to adopt bold export-oriented development policies to overcome its inherent disadvantages, stemming from a small domestic market and scarce natural resources.

Second, to carry out this export-oriented strategy, the development of labor intensive light industries, such as textile, plywood, wiggery, and footwear business, would be the best course of action in the initial stages, as those sectors would maximize employment, and require skills that are easy to learn.

Third, as the government fully devoted itself to the economic development plan, domestic savings expansion and foreign capital inducement were needed to meet the enormous investment requirements. To increase the domestic savings rate, the government modernized the nation's tax system and set a high interest rate policy. Also, a new department was installed, 'Foreign Capital Inducement Committee' for fluent foreign investment inflows.

6.1.3. Establishing Self-reliant Industrial Structures (1972 - 1979)

During this period, the main objective was to achieve a self-reliant and balanced economic structure, especially with regard to the various industrial and financial sectors.

Even though the Korean economy, due to the export oriented industrialization program, had achieved remarkable growth during the 1960s, the rapid development also came with considerable side effects that aggravated economic structural imbalances. The nation was suffering from conflicts in various economic and social entities, such as those between the manufacturing and agricultural sectors, urban and rural areas, and large and small companies.

To resolve this problem, the government began to develop policies, which included the strengthening of the first industry (agriculture), such as water resource development, paddy area rearrangement, and providing low interest rate loans and subsidies for people working in this industry. Also, the country's leader, late president Jung Hee Park, initiated a campaign, called 'Saemaul-Undong,' which focused on the modernization of the agricultural sector and building the spirit of diligence, self-reliance and cooperation.

At the same time, the government instituted policies to intensively foster the heavy industry as a strategic industry to correct the imbalance between the manufacturing business sectors and light industries. At the time, the country's light industry businesses were losing their competitiveness in price and technology, caused by external environmental changes.

In order to continuously expand the nation's exports, domestic production of raw and medium materials, which had production cost efficiency as a substitute for imported goods, was needed. Therefore, the government carefully selected six heavy industrial sectors as 'National Strategic Businesses'.

However, as the 'National Strategic Industries' were promoted, several problems occurred due to this policy, such as excess capacity and weak corporate finances. However, those problems had not been fully anticipated by the government and its strategic intention to balance different sectors more evenly actually produced such obstinate and persistent problems.

Table 38 | Strategic Industries in the 1970s

Industry	Large Factories and Industrial Estates
Steel	Establishment of Pohang Iron and Steel Company (1973)
Machinery	Changwon Machinery Industrial Complex (1974)
Ship-building	Establishment of Hyundai Shipbuilding Company (1973)
Petrochemicals	Completion of Ulsan Petrochemical Industrial Complex (1972)
Electronics	Kumi Electronic Industrial Estates (1971)
Automobiles	Establishment of Hyundai Automobile Company (1972 - 1976)

In order to achieve the nation's greater economic goal, namely a 'Self-reliant Economy,' the government needed to upgrade people's lives not only in terms of quantity, but also in quality. Thus, they set social development policies for fair income distribution coupled with economic development policies aimed at eradicating extreme poverty. A primary income distribution policy put emphasis on employment, education, health care, and so on. Furthermore, the government introduced a comprehensive tax system and expanded transfer payments as a secondary distribution policy.

6.1.4. Economic Stabilization Policy Implementations (1980 - 1987)

This period of time covers the last phase of the economic development plan of Korea. In this period, a tremendous transformation occurred in Korea, not only in terms of economic policy implementations, but also politically and socially.

From the late 1970s, the Korean Economy had faced high inflation and a fall in its international competitiveness, caused by economic mismanagement in the 1970s, such as the failure of liquidity control and over capacity of heavy industry development. Therefore, the nation's economy was in a serious situation faced with a low growth rate and a high inflation rate.

To break out of this vicious economic cycle, the restoration of growth potential and the enhancement of industrial efficiency had to be restored rapidly. Therefore, the government declared a slogan, 'Stabilization, Autonomy and Open Market,' and set, the so called, 'Stabilization Policies' to carry out price stabilization, balance of payment surplus, and high growth strategies.

Moreover, as the nation's economy had grown, its private business sectors began to play a greater role. Accordingly, the government decided to implement new economic policies focused on liberalization, market opening, and fair trade agreements to boost economic growth potential. This aggressive market opening program has been the backbone of the country's economic management policy since the late 1980s.

Major contents of 'Stabilization Policies' are as follows:
① Financial liberalization, squeezing liquidity, finance sector reform
② Strengthening national budget structure, role of public finance expanding
③ Upgrading import liberalization policy
④ Activating a fair trade system
⑤ Manpower development
⑥ Changes industrial incentive systems more efficiently
⑦ Stabilizing real estates prices

In the late 1980s, while the government was pursuing its 'Stabilization Policies,' the domestic price level stabilized, the external economic environment turned more favorable to the nation through a weakened dollar exchange rate (depreciation of Won currency), low oil prices, and low global interest rates. These circumstances resulted in a remarkable economic performance. In 1986, the country's current balance of payment account became positive for the first time in modern Korean history, and the nation's economy registered a high annual growth rate of 12 percent. Also, the industrial restructuring made headways. The share of manufacturing sector in total GNP rose up to 31.7 percent.

6.2. Implementation and Execution

The implementation and execution of plans are far more important, but also more difficult than the mere drawing up of economic development plans. In many cases, developing countries, which had well-designed economic plans, are still lagging behind in development due to their poor execution process.

In the case of Korea, the Economic Planning Board (EPB) was established in 1962 and as soon as the first economic development plan was declared by the government, it took the full responsibility for the execution and monitoring of the plan. Basically, these authorities should have been distributed among several specialized government bodies, but the government decided that a more powerful and comprehensive control system would be needed in the initial development stages.

As a super government ministry, EPB began to work on the details for the plan preparations, formulating the national budget, foreign capital inducements, and monitoring major strategic project implementations, under the responsibility of the deputy prime minister.

Since the evaluation of progress according to plan was very much emphasized by the president at that time, an evaluation team, 'Consulting Committee for Economy and Science,' summoned from various academic circles and expert groups, was set up. The team was composed of about 10 people and their activities were under the president's direct control.

About 10 years later, the government realized that more intense studies for the economic development plans were needed. Thus, as an affiliated organization of EPB, 'Korea Development Institute (KDI),' which consisted of brilliant experts from home and abroad, was established to carry out this mission.

In order to stimulate the plan's successful implementation, the EPB hosted regular meetings called, 'Plan Implementing Review Session,' once a month. The people who were responsible for the plans, such as the president, major national assembly members, government ministers, and the president's consulting committee members participated in these sessions to discuss the

most pressing issues. Since most issues could be settled right away in a very efficient manner, the sessions provided very efficient, time-saving decision making process to the government.

However, since most economic activity took place in the private sector, business associations and large companies were very crucial to the successful implementation of the development plans. Thus, the trade ministry also held regular meetings with major business people to discuss their problems related to the plan and suggested various solutions to resolve them.

7. Recommendations for Kazakhstan

The geographical facts of Kazakhstan, such as a big territory, a sizable population, and plenty of natural resources, are very different from that of Korea. However, every modern society seems to be required being an 'Open Society,' which emphasizes on investing social capitals that is different from traditional concepts of production factors like land, manpower, and capitals.

Therefore, I would like to offer some advice and provide some recommendations from my own experience, especially those drawn from my background as a participant of the planning of the Economic Development Plan of Korea, which I believe could be useful for Kazakhstan's economic situation.

7.1. Market-oriented Indicative Planning

As long as the Kazakh economy is based on market economy principles, the economic development plan should pursue market-oriented policies as well as an indicative approach to the market rather than ruling the market.

The Plan should pay more attention to market situations, not only domestically but globally, and try to make government proposals according to the demand and supply changes in the future market. The expected changes in the market situation should be explored in certain directions of policies during the planning period. The Plan emphasizes consistency, balance and efficiency in its preparation, but those can only be based on the role of the market.

An indicative approach to the market in the plan is very important. Incentives are the main measures in the plan to turn the market in the desired direction. However, if the market doesn't go in the direction as the plan sought with the help of incentives, there is no way in the free market system. Varying levels of incentives are chosen by the government in observation of fair trade rules and with the purpose of upgrading efficiency as well.

Questions about the legitimacy of a state-initiated or even forced project or program intervention under the indicative planning should be answered 'no,' but can sometimes be 'yes'. For example, space industries may, in certain countries, lie beyond the capability of the private sector, and otherwise, without government intervention, be left out. Rapid changes in technologies often leave private companies incapable of making a successful transition, sometimes justifying state initiatives or collaboration with the private sector.

7.2. Importance of Plan Implementation

Plan implementation is an integral part of planning. To some extent, it is more important and difficult for the governments to implement their plans. The surrounding environment has changed not only domestically but globally. Economical, social, political and ecological changes as well as technological changes have also occurred. Due to the limits of people's imagination in such a rapidly changing world, a 5-year, or even a 3-year plan horizon may be too long a period to ensure predictability. Adaptive implementation of the plans is an alternative to overcome this problem. My suggestions are as follows:

1) Rolling Plan system: Every beginning or end of the year, the plan is revised, reflecting the environment changes.
2) Monitoring system: Meetings should be held for the government to monitor major fields of plan execution.
3) Periodical meeting system presided by state leaders: Once a month, every quarter or half a year - according to situations.
4) Evaluation system: Evaluations of plan implementation reflected on to the next year rolling plan.

7.3. Full-fledged Master Plan by Industries

This "5-Year Innovative Industrial Development Plan" probably cannot go beyond a conceptual plan due to time constraints. In order to have a successful implementation of the plan, particularly where this plan is highly focusing on state forced industrial innovative programs, preparing a full-fledged master plan by industries is recommended to be implemented in 2010. Numerous industrial master plans seem to have been prepared by famous professional consulting companies in Kazakhstan already, but they do not seem to be fully connected to this 5-year plan. It will be necessary to accommodate the existing master plan to this 5-year plan as well as any additional working master plans by industries in the coming years.

7.4. Outward Oriented Policy

Accounting for low income levels and a small domestic market size, selecting an outward oriented policy that would boost the nation's export was the appropriate strategy to achieve

industrialization, technology development and rapid growth.

7.5. Transformation of Industrial Structure

Korea had been highly dependent on primary industries like agriculture. However, the economic plan required the nation to convert to the manufacturing industry. An economic development plan must give a country a chance to transform its industry structures, but the transformation process should be executed gradually step by step.

7.6. Solutions and Alternatives for Errors

On the downside of Korea's economic development success, the nation's economy had undergone a lot of trial and error, such as excess capacity and aggravated income distribution. Those mistakes also produced many side effects, which the Korean society still suffers from, such as corruption, mammonism (money worshipping), and loss of humanism. Therefore, a government should always strive to find solutions and alternatives to immediately fix errors as they occur.

7.7. Launching a Professional Research Institute such as the Korea Development Institute (KDI)

If the Kazakh government wants to have a more open market economy and a comprehensive economic development plan, launching a professional research institute like KDI is recommended. This research institute will have a leading role of modernizing the free market economy for Kazakhstan, not only supplying expertise in planning but being a partner with the government in making decisions for every major economic policy issue. It will also take the role as a window through which this economy could have good connections with the world's leading expert groups. Launching an organization such as KDI will be an asset to Kazakhstan's plan preparation.

7.8. Focusing on the Macro Economy through the Knowledge Sharing Program (KSP)

In preparing the economic plan for Kazakhstan, I believe that the macro economic sector needs more improvement, not only in terms of technological planning but also in approaching developments. It is also important for the government to implement and monitor the plans, which is a very formidable task.

From what I understand, the Kazakh government seems to pay more attention to the industrial development plans than to the capability of the economy and equilibrium between sectors in the plan. It seems to me that even research institutes are hesitating to coordinate the

work among sectors regardless of what has already been done. This is one of the legacies from the Soviet-era planned economy.

Ultimately, I would like to recommend Korea's Knowledge Sharing Program (KSP) to the Kazakh government to assist in the macroeconomic area, a specialty of KDI, in dealing with all aspects of this field as well as in the master plan preparation for the upcoming year of 2010.

8. Plan Preparations - Consultation Results for Kazakhstan

Vice Minister of Industry and Trade (MIT) of the Republic of Kazakhstan, Nurbek Rayev, asked me to make the plan preparation drafts more simply and systematically as these ongoing working drafts of plan frameworks were too complex and the priorities were not clear. Therefore, I started to give consultations on these issues to the economic research institute. Consultation issues were divided into two parts: 1) simplifying the plan framework; and 2) integration of macro and sectoral plans.

8.1. Simplifying the Plan Frameworks

Plan frameworks were composed of three parts: 1) Goals; 2) Strategies for achieving the goals; and 3) Priorities for plan implementations. Those frameworks were prepared by the institute to include multiple alternatives, but those were not clearly directed in contents to the objective, "Efficient Economic Planning." The research institute and I started to review the plan preparation process from the beginning. I presented the work process for plan preparation as can be seen below:

① Review on Macro-basis Economic Performances and Future Perspectives

1) Check up the major national account in recent years

$Y = C + I + (X - M)$

* Growth rate
* Marginal propensity of consumption (MPC)
* Marginal propensity of investment (MPI)
* Share of trade (export and import) to GDP
* Fixed capital formation
* Employment
* Balance of payment
* Etc.

2) Review of international economic situation changes

* Perspectives on international trade markets
* Perspectives on international capital markets

3) Macro-perspectives of plan period with macro model
   * Identifying advantages and disadvantages for development
   * What should the plan achieve?

② Setting Goals and Strategies for the Plan
1) Continuous discussions, consuming a lot of time and energy, are necessary for the settlement of Goals among the government and various professional groups.
2) To achieve these goals, strategies should be elaborated by the planning center and ministries concerned

③ Allocation of Investment Resources
1) Calculate the figure of the value added and total fixed capital formation during the plan period by macro frame works.
2) Divide the value added by industries in a target year. Primary industry [(ex) agriculture], manufacturing and SOC etc.
3) Calculate the investment requirement by industry based on the value added volume and the past trend of capital output ratio (ICOR).
   ICOR = I / +V I = ICOR * V
4) Feed back to the total fixed capital formations and investment requirement

④ Preparation of Major Policies and Projects
1) Ministries concerned in preparing major policy directions and formulating major projects in cooperation with private sectors.
2) Proving the major projects rationality through input output table (IO)

⑤ Discussions with planning center and Reconciliation with Macro Plan and Sectoral Plan
1) Finalizing macro frameworks
2) Setting major policy directions
3) Fixing priorities for major strategic projects

⑥ Administrative Procedures and Declaration of the plan

⑦ Writing plan documents and sector plan documents

For an efficient plan implementation, the following five factors are needed:

① Rolling plan system: Greater flexibility in planning, which allows for adjustments in light of rapidly changing economic and political circumstances on both domestic and foreign fronts. Revision of some contents of the original plan. Establishment of a super ministry and professional institutes to deal with the economic development plan.

② Monitoring system in the planning center: Monitoring major policy changes. Formulation and execution of strategic projects. Development of feasibility study method for project evaluation.

③ Evaluation of the overall execution of the plan: Institutional building. Reporting the result of regular evaluation by a professional team to top leaders.

④ Leadership of the nation's top leader: Expressing continuous concerns on the implementation of the plan.

⑤ Regular monitoring sessions about plan implementation progress presided by the President. Encouraging planners and spreading the consensus among people regarding the present situation. Raising confidence about development and the future to the people.

8.2. Allocation of Investment Resources by Industries

From the fixed capital formations on GDP expenditure by macro model, allocation works of investments by industries should begin in various ways. For instance, utilizing coefficients of incremental capital output ratio (ICOR) and industrial investment coefficients reflecting on Input-Output tables, etc.

8.3. Preparation of Major Policies and Projects

In the mean time, each ministry began preparing for their own major policy directions and formulating major projects in collaboration with the private sector, in addition to the ones from macro working of the planning center. Also, the ministries started to check the input-output coefficients in I-O tables to prove the rationality of their major projects.

8.4. Macro and Sectoral Integration Works

The planning center finalized the macro frame works and set up major policy directions. Simultaneously, they readjusted the priorities for strategic major projects through reconciliation of macro and sectoral integration works.

8.5. Instruments for Strategic Industry Investments Execution

Unfortunately, the integration work directed at drawing economic development plan for Kazakhstan was not very successful due to insufficient understanding of the researchers involved as well as time constraints for plan preparation.

The government asked me to prepare the detailed instruments for a strong execution of the plan while also setting the priority for this plan, drawn from the experiences of Korea's heavy and chemical development plan of 1972. Therefore, I suggested the following three items:

① Implementing organizations in the government for innovative programs
* Innovative program investment coordination committees
  - Minister level committees with working group committees
* Launching a so called 'innovative program investment fund'
  - Government budget
  - Treasury bond
  - International institution loan

* Kazakhstan Development Bank (KDB)
  - Bank bond issuing
  - Foreign capital introductions

② Incentives for individual programs
* Tax incentives: corporate tax, tariffs
* Favorable loans: Innovative program investment fund
* Foreign capitals Inducement Program

③ Foreign Direct Investments (FDI)
* Corporate tax exemptions for 5 years
* Government guarantee for sending principals and profits, etc.
* Logistical support by governments