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A Study on the Structure of Industry in North Korea

By **Choi, Soo-Young**

KOREA INSTITUTE FOR NATIONAL UNIFICATION

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The Analyses, comments and other opinions contained in this monograph are those of the authors and do not necessarily represent the views of the Korea Institute for National Unification.

TABLE OF CONTENTS

• TABLES

Ⅰ. Introduction

Since the collapse of the socialist bloc, production in North Korea has been declining drastically due to sluggish industrial activities in the 1990s with factories not running properly. Stagnation of industrial production has been fundamentally caused by a shortage of energy and resources. As their economic difficulties mount, the North Korean people even risk leaving their workplace to find food and to fulfill basic needs as a means of survival. Declining working motivation and morale of the North Korean people as well as workers leaving their workplace are directly connected to the fall of productivity. Economic difficulties in North Korea caused by the stagnating industrial production are serious enough to threaten the continuity of the regime.

North Korean industry faces problems such as overall technological backwardness, outdated industrial facilities linked to shortage of investment resources, a lack of work motivation in workers, and an imbalance in the manufacturing industry. With-

in the North Korean manufacturing industry, heavy industry takes up a significantly high proportion. As the limited resources have been disproportionably allocated in the areas of national defense and in the military-industrial complex, it hindered the development of light industry. Even the productivity in this highly-invested in heavy industry sector is extremely low because it has been heavily relying on its own technology. Moreover, energy shortages brought about a high level of idleness of the North Korean industrial facilities.

There have been significant changes in the North Korean industrial structure in the last 50 years. The change was most conspicuous in the 1990s when the economic difficulty was at its height. Considering that change in the industrial structure is closely related to the North Korean economy, devising a development plan for the North Korean economy should be predicated on analyzing the causes and shape of such a change in its industrial structure. Through analyzing the changes in the industrial structure in North Korea, this study aims at proposing an inter-Korean cooperation scheme that encourages development of the North Korean industrial base.

As in other areas, North Korea does not publish periodic data on its industrial structure. North Korea published some data related to the industrial structure until the mid 1960s, but data after the 1960s is hard to find. Up to the late 1980s, there only exist some fragmentary data produced by Russia based on the information published by North Korea intermittently. Since the 1990s, the Bank of Korea has been publishing estimated data related to the North Korean industrial structure. The data provided by the Bank of Korea and those produced by North Korea and Russia, however, employ different categorization schemes of industrial

sectors, which limits a comprehensive analysis of the combined data. This study, therefore, examines changes in the industrial structure in North Korea by dividing it into two different time periods: The first period covers up to 1989 based on the data produced by North Korea and Russia; and the second one covers the period from 1990 onwards with the data of the Bank of Korea. For the latter period, the study again split into two periods for investigation. Firstly, it looks at the period between 1990 and 1998, in which North Korea showed a minus growth rate. Secondly, it studies the period since 1999 when North Korea experienced a positive growth rate.

Ⅱ. Changes in the Industrial Structure (1): 1946-1989

1. The Basic Economic Policies

North Korea has been stressing construction of a self-supporting national economy as the basic goal of its economic policies. Following the policy line of developing a self-supporting national economy, North Korea carried out a land reform and nationalization of the key means of production. By the end of the 1950s, North Korea had completed transformation of all the production relations to form a socialist system through nationalization and collectivization of farming. Concurrently, it maintained a policy of closed economy premised on the principles of self-reliance as a way to establish a people's economy without any influence from the outside. In other words, North Korea's economic development line pursued formation of a closed self-sufficient economy, which has some elements of a classic socialist economy.

Self-sufficiency in the economy was further accentuated from

the late 1960s when the '*Juche*' ideology was firmly established. In the midst of the Sino-Soviet conflict, independence in politics and ideology, self-sufficiency in economy, and autonomy in national defense were regarded as essential conditions. North Korea pursued a self-reliant economy in which basic investment resources were supplied indigenously to increase productivity while carrying out technology revolution internally, improving real wages and living standard of the people as well as satisfying the demand of the various economic components. A self-sufficient economy, however, does not mean the ability to self-supply internally to meet all the domestic demands.

Within the basic framework of building a self-supporting national economy, North Korea pursued simultaneous development of light industry and agriculture through the inward-looking industrialization with the priority on heavy industry. Additionally, it consistently promoted a policy of carrying on economic construction and defense development in parallel. Although it was the most isolated and conservative state, North Korea devised different, though limited, forms of development strategy depending on the internal and external economic circumstances, the progress with the development plan, and the international, political, economic conditions.

It is certain that the policies of prioritizing heavy-industry, inward-looking, and parallel economic and defense development, which were all directed towards construction of a self-supporting national economy, may have had a great impact on the North Korean industrial structure. However, these basic economic policies that were endorsed from the beginning of the Socialist Command Economy lost their momentum with the collapse of the socialist bloc in the late 1980s. In the 1990s, North

Korea proposed a revolutionary economic strategy for economic development, through which it attempted to adjust the economic structure and to correct the industrial imbalance.

2. Production Sector for the Means of Production and the Consumer Goods

In 1949, prior to the Korean War, the proportion of the production sector for the means of production (heavy industry) was 59%, 18% higher than the production sector for consumer goods (light industry). Most of the industrial facilities in North Korea, however, were destroyed during the war, which caused the proportion of the means of production sector to fall to 38% in 1953. Later, with restoration of the industrial facilities and pursuit of industrialization based on heavy industry, the share of the means of production sector in the total industrial output increased from 47.1% in 1954 to 55% in 1960.

Table 1. Composition of the Means of Production Sector and the Consumer Goods Sector (1)

(Unit: %)

	1946	1949	1953	1954	1955	1956	1957	1959	1960
Production Sector for the Means of Production	52.0	59.0	38.0	47.1	51.7	54.0	54.2	55.0	55.0
Production Sector for the Consumer Goods	48.0	41.0	62.0	52.9	48.3	46.0	45.8	45.0	45.0

Source: Ministry of National Unification, *North Korean Economic Statistics* (Seoul: MNU, 1996), p. 324.

Until the mid-1960s, North Korea's economy grew constantly and its economic structure changed as in other socialist states, placing a high priority on industrialization. Economic growth based on the policy of prioritizing heavy industry, however, soon reached its limit because of decreasing assistance from the former Soviet Union and China plus its weighty dependence on quantitative mobilization of the production force rather than technological innovation. At the same time, the policy of prioritizing heavy industry resulted in serious imbalances among the different economic sectors, generating a retarded development of light industry and agricultural sectors, in particular.

A slow down in production of consumer goods was another consequence of the crippled economic structure and declining assistance. The major goals of the first Seven-Year Plan (1961-1970) were to improve people's living conditions and to carry out parallel development of the light industry and agriculture. The size of the means of production sector decreased to 51.2% in 1965, but mostly due to a cut down in assistance generating a difficulty in importing foreign capital. Moreover, there were not many facilities left for restoration, which could increase productivity only with maintenance in the level of investment. New investment was inevitable to increase production in the heavy industry sector.

North Korea stressed that the growth of heavy industry should accompany a parallel development of light industry and agriculture, but in actual economic practice, North Korea exclusively concentrated on heavy industry that supplies a production base for a greater production capacity. The policy of prioritizing heavy industry in North Korea, thus, continued, and by the 1970s, the production sector for the means of production accounted for 62%.

Table 2. Composition of the Means of Production Sector and the Consumer Goods Sector (2)

(Unit: %)

	1965	1970	1975	1980	1982
Production of the Means of Production	51.2	62.0	63.7	63.9	64.8
Production of the Consumer Goods	48.8	38.0	36.3	36.1	35.2

Source: RINU, *Politics and Economy in North Korea* (Seoul: RINU, 1988), p. 99.

During the period of the second Seven-Year Plan (1978-1984), North Korea emphasized the goals of self-reliance, modernization and scientific development of the people's economy and comprehensive development of all sectors of the economy based on its creation of new industrial sectors and active employment of indigenous raw materials. The plan may have reflected North Korea's realization that importation of the capital and technology needed for its economic development was becoming more difficult and that economic development could not be achieved by concentrating on one particular sector of the heavy industry.

In the performance report of the Second Seven-Year Plan, North Korea only announced the achievements of textile manufacture in regards to the consumer goods production sector. It may be deduced from this fact that retarded consumer goods production directly linked to the people's living conditions persisted and little progress was made on balancing the development of different industrial sectors. Stressing the need for sector by sector balance in the Second Seven-Year Plan, however, North Korea did manage to restrain a significant growth of the means of production sector from the 1970s. The share of the means of production sector did not change much in 1975 and 1982, which respectively accounted for 63.7% and 64.8%.

3. The Composition of the Total Industrial Output by Sector

Unlike in South Korea, North Korea included mining, forestry, and fishery in the industrial sectors in its published data. Accordingly, the ore mining industry is added to the mining industry and forest and lumber-processing industry is incorporated into the forestry industry. Due to the inclusion of such sectors, North Korea's total industrial output tends to be over-estimated, which makes the sector by sector proportions smaller than the actual figure. Nevertheless, the study employs the original data published in North Korea in order to follow the change in the composition of the total industrial output by sector.

The production structure of the North Korean industry is comprised of a high proportion of heavy industry, particularly related to military industries (i.e. the machinery & metal industry and the petroleum chemical industry), and a low proportion of light industry. The machinery and metal industry made up over 20% of the total output in 1959, then increased to 33.7% in 1980. Though production in this sector decreased slightly at the end of the 1980s, it remained around 27%. Machinery and metal industries have been the most important part in the North Korean industrial sector.

The metallurgical industry comprised about 6-8% of the total industrial output between the mid 1950s and the 1960s, except in 1961. Its production, however, increased constantly from the early 1960s, and accounted for 10.5% in 1970, 12.0% in 1980, and 15.3% in 1989. The production level of the chemical industry also increased from 3.1% in 1954 to 8.3% in 1963, then to 9.5% in 1980, but its share did not alter much after 1980.

Table 3. Composition of the Total Industrial Output by Sector (1)

(Unit: %)

	1946	1949	1954	1956	1959	1960	1961	1962	1963
Developmental Industry	3.4	1.6	0.6	0.7	0.3	0.3	0.3	0.3	0.2
Fuel Industry	4.6	4.1	0.7	1.8	1.3	1.3	1.2	1.1	1.2
Mineral Mining Industry	6.7	8.1	9.3	6.1	3.9	4.0	3.9	3.1	3.2
Metallurgical Industry	9.5	11.0	1.8	8.6	6.2	6.8	3.9	6.1	7.4
Machinery and Metal Processing Industry[1)]	5.1	8.1	15.3	17.3	20.6	21.3	22.7	22.0	25.6
Chemical Industry	10.1	9.5	3.1	4.7	5.5	5.4	6.1	7.0	8.3
Pharmaceutical Industry	0.3	1.0	2.3	1.5	3.6	4.0		2.5	
Building and Construction Industry	1.0	2.5	1.4	4.8	6.3	5.9	5.2	4.9	5.7
Textile Industry	5.5	11.4	25.7	18.4	17.4	16.8		16.8	18.6
Glass and Ceramics Industry	0.8	0.4	0.9	1.2	1.7	1.7			
Forestry and Lumber Processing Industry	12.4	6.4	7.7	6.1	3.4	2.9			2.9
Pulp and Paper Industry	3.2	2.2	0.9	2.5	2.4	2.6			2.2
Printing and Publishing Industry	1.9	1.2	1.4	2.1	2.0	1.8			
Stationary and Miscellaneous goods Industry	0.9	1.6	2.2	3.1	4.8	5.8			6.6
Leather and Shoe-making Industry	0.2	1.4	3.0	2.4	1.5	1.5			1.3
Rubber industry	0.3	2.3	1.5	1.4	1.2	1.2			
Fishery Industry	2.7	6.2	2.3	3.1	2.1	2.1			
Food processing Industry	27.2	19.4	18.5	13.2	15.6	14.4			13.7
Oil and Fats Industry	0.4	0.2	0.5	0.7	0.2	0.2			0.2

Footnote 1: The proportion of the machinery manufacturing and metal processing industries was 25.8% in 1964 and 31.4% in 1967.

Source: Ministry of National Unification, *North Korean Economic Statistics* (Seoul: MNU, 1996), pp. 326-327.

Until the early 1960s, textile and food processing industries within the light industry showed considerably high proportions. The textile industry had the highest share with 18.4% in 1956 and 18.6% in 1963. In the case of food industry, the proportion continued to decrease from 18.5% in 1954 to 13.7% in 1963. The stationary and miscellaneous goods industry (daily necessities industry), on the other hand, increased in its share from approximately 2% in the early 1950s to 6.6% in 1963. The composition of the pulp and paper manufacturing industry remained a little above 2%, while that of the leather and shoe making industry decreased from over 2% to a little over 1%. Since 1970, the share of light industry (textile, shoe making, daily necessities, and paper industries) did not fluctuate much and remained around 15-16% (16% in 1970, 15% in 1980, 15.9% in 1989). In

Table 4. Composition of the Total Industrial Output by Sector (2)

(Unit: %)

	1970	1980	1987	1988	1989
Electricity	0.3	0.7	1.5	1.5	1.2
Fuel	1.02	1.5	1.6	1.6	1.5
Mining	-	1.8	1.8	1.8	1.8
Steel	10.5	12.0	14.8	15.2	15.3
Machinery and Metal	-	33.7	27.5	27.2	27.2
Chemical and Petroleum	8.0	9.5	9.8	9.6	9.6
Construction Materials	-	9.5	8.3	8.4	8.5
Forestry and Lumber Processing	-	2.0	2.0	2.0	2.0
Light Industry[1)]	16.0	15.0	15.2	15.8	15.9
Food Industry	13.0	10.0	9.9	9.6	9.7
Others	-	6.0	7.6	7.3	7.3

Footnote 1: The light Industry includes textile, shoe-making, daily necessities, paper industries.

Source: Soviet Research Institute for International Economy and Politics, *A General Survey of the North Korean Economy 1989-1990.*

the same period, the proportion of the food industry dropped from 13% in 1970 to 10% in 1980, then remained constant below 10%.

4. Changes in the Industrial Structure

From the mid 1960s, North Korea rarely publicized its economy-related statistics. It is, thus, almost impossible to analyze the changes in the industrial structure in detail. The composition of the sectors other than industrial and agriculture sectors is virtually unknown.

Owing to the policy of prioritizing heavy industry, the North Korean economy achieved rapid industrialization in the early days. The share of industry in the total social production output

Table 5. Changes in the Industrial Structure (1946~1983)

(Unit: %)

	1946	1949	1953	1956	1960	1962	1963	1964	1965	1970	1983
Industry	23.2	35.6	30.7	40.1	57.1	61.0	60.6	62.3	64.2	65.0	66.0
Agriculture	59.1	40.6	41.6	26.6	23.6	21.3	21.5	19.3	18.3	20.0	20.0
Transportation and Communication	1.6	2.9	3.7	4.0	2.2	2.8	2.8	2.8	-	-	-
Construction	-	7.2	14.9	12.3	8.7	9.1	9.2	9.8	-	-	-
Commodity Distribution	12.0	9.4	6.0	10.8	6.0	3.6	3.8	3.8	-	-	-
Others	4.1	4.3	3.1	6.2	2.4	2.2	2.1	2.0	-	-	-

Source: Ministry of National Unification, *North Korean Economic Statistics*, 1996 (Seoul: Ministry of National Unification, 1996), p. 124; John Holliday, "North Korean Enigma," in Gordon White et al., eds, *Revolutionary Socialist Development in the Third World* (Sussex, U.K.: Wheatsheaf Books, 1983), p. 125; Ministry of National Unification, *Politics and Economy in North Korea* (Seoul: Ministry of National Unification, 1988), p. 96.

increased from 23.2% in 1946 to 35.6% in 1949. As socialist industrialization was pushed forward in the post-war period, composition of the industry was further increased from 40.1% in 1956 to 57.1 % in 1960. Growth of the industrial sector slowed down eventually, however, its proportion was still comparatively high in 1965, marking 64.2%.

A rapid period of progress of industrialization from the late 1940's and a relatively high degree of growth in the industrial sector were possible because the North Korean industrial sector at the early economic stage was in a very poor state. A weak economic foundation, in particular, acted as a catalyst for the exceptional industrialization in the late 1950s. However, the main contributing factors were substantial assistance from other socialist states during the period of post-war construction, particularly from the Soviet Union and China, and compulsory mobilization of the labor and idle capital.

The growing trend of the industrial sector in the North Korean economy nearly stopped from the late 1960s. Since then, there has not been any noticeable change in the share of the industrial sector - 65% in 1970 and 66% in 1983. This indicates that the North Korean developmental strategy based on heavy industry no longer bounced off from the end of the 1960s. Industrialization in North Korea, however, was carried out at the cost of a shrinking of the agricultural sector. The agricultural sector took up 59.1% of the total social output in 1946, but fell to 26.6% in 1956. The share of the agricultural sector in 1970, however, slightly increased from 1965 to 20%.

There was little change in composition of the transportation and communication sector and the construction sector in the early

1960s. The former remained around 2% while the latter showed an insignificant growth more-or-less around 9%. The commodity distribution sector, however, experienced a considerable decrease from 10.6% in 1956 to 6.0% in 1960, then to 3.6% in 1962. This trend may have been associated with diminished individual transaction with the completion of nationalization and agricultural collectivization in the North Korean socialist system by the end of 1950s, which brought about a shrinkage of the commodity distribution sector.

Ⅲ. Changes in the Industrial Structure (2): 1990-1998

1. Changes in the Economic Base: A Revolutionary Economic Strategy

The third Seven-Year Plan was a failure, in which overall results fell far short of the proposed targets. Even the North Korean authorities admitted the failure of the third Seven Year Plan in realizing its goals at the 21st plenary session of the 6th Party Congress Central Committee convened on 8 December, 1993.[1] Reasons for the failure were pointed out as the collapse of the Soviet Union and the Eastern European socialist countries, which imposed setbacks to the actual implementation of trade agreement with these states and economic cooperation.

[1] Report of the plenary session of the Korean Workers' Party Central Committee on the third Seven Year Plan achievements, *Rodong Sinmun*, 1993.12.9.

The Ministry of National Unification of South Korea announced that the third Seven-Year Plan of North Korea achieved 51.8% of the targeted GNI (Gross National Income) and the total trade volume declined from 5.2 billion USD in 1988 to 2.6 billion USD in 1993.[2] Achievements in the key industrial sectors were particularly disappointing, meeting only about 20-50% of the production targets. According to North Korea's report, the target of industrial production was estimated to be 1.9 folds increase, but only achieved 1.4 folds, recording 78.9% of achievement. Considering that the growth target of the third Seven-Year plan was set lower than any other previous plans, its failure was simply undisputable.

An external factor that contributed to the failure of the third Seven Year plan, as North Korea correctly pointed out, was the disintegration of the socialist market that began at the end of the 1980s. System collapse of the socialist states led to actual abrogation of North Korea's long-term trade agreements with these states, which consequently led to declining supply of equipment parts, petrol, raw materials that North Korea depended upon import from these countries. This was a primary cause for a decrease in industrial production and trade recession in North Korea. Furthermore, a resource supply scheme of the third Seven-Year Plan was premised on the Soviet support based on the "economic and technological cooperation agreement between the USSR and the DPRK" signed in December 1985. A substantial part of the

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[2] North Korea set goals to increase GNI by 1.7 folds and the amount of foreign trade by 3.2 folds during the third Seven-Year Plan period. According to the assessment of the Ministry of National unification, however, GNI actually fell by 0.88 folds as well as the amount of trade by 0.74 folds. Ministry of National Unification, *Comprehensive Assessment of the third Seven-Year Plan in North Korea*, 1994, p. 145.

promises, however, was not delivered upon by the Soviet Union due to its own aggravating economic situation under Gorbachev's leadership.

The failure of the third Seven Year plan also accounts for some internal factors such as limited capacity to supply financial resources, deepening distortion in allocation of resources, and diminishing motivation to work. Even before launching the plan, North Korea did not have enough capacity to increase mobilization of the domestic capital. While economic growth continued to slow down, North Korea kept expanding it's compilation of the budget every year. Despite the aggravation of its finances, the real military expenditure was never downsized and allocation of resources was distorted by continued spending on the non-production sectors, particularly on the projects related to the personality cult of the two Kims and large-scale constructions of monuments. In addition, people's daily living conditions continued to deteriorate due to a decrease in real wages and a shortage of consumer goods supply, which deprived people of motivation to work.

As the third Seven-Year Plan failed, North Korea set a 2-3 year buffer period and proposed a revolutionary economic strategy to prioritize developments in three areas - agriculture, light industry, and trade. Facing the situation where rising public discontent over shortages of food and consumer goods could possibly hamper power succession or even threaten the safety of the regime, North Korea attempted to improve people's living standards and to increase exports through facilitating agricultural, light industry, and trade. The revolutionary economic strategy during the buffer period, thus, mirrors North Korea's sense of urgency to solve problems in the areas of severe difficulty. At the same

time, the three-area-first policy was a corrective measure to adjust its economic structure, in which the imbalance caused by the previous heavy industry centered policy was hampering economic development.

2. Domestic Production and Foreign Trade

In the 1990s, North Korea experienced an unprecedented economic deterioration. A rapid decline in foreign trade relations owing to the collapse of the socialist bloc plus shrinking of domestic production activities, led North Korea to recording a minus economic growth rate in nine consecutive years from 1990 to 1998. The trade volume, which reached 4.17 billion USD in 1990, fell by 1/3 to 1.44 billion USD in 1998. In the same period, North Korea's exports decreased from 1.73 billion USD to 560 million USD while its import decreased from 2.4 billion USD to 880 million USD.

Table 6. Economic Growth and Trade Volume in North Korea (1990-1998)

(Unit: %)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Economic Growth Rate	-3.7	-3.5	-6.0	-4.2	-2.1	-4.1	-3.6	-6.3	-1.1
Trade Volume (billion USD)	4.17	2.58	2.56	2.65	2.10	2.05	1.98	2.18	1.44
Export	1.73	0.94	0.93	0.99	0.86	0.74	0.73	0.91	0.56
Import	2.44	1.64	1.62	1.66	1.24	1.31	1.25	1.27	0.88

Source: Bank of Korea, "Comparison of main economic indicators between South and North Korea."

A decline in domestic production activity was linked to reduced supplies of energy and raw materials.[3] In respect to energy, coal production in North Korea dropped from 33.1 million tons in

1990 to 18.6 million tons in 1998. In the same period, electric power production fell from 27.7 billion kWh to 17 billion kWh. About 8.9 million tons of petrol was imported in 1991, but the amount of imported petrol fell to a mere 609 million tons in 1998.[4] Such a cutback in production and supply of energy left the foundation of North Korea's domestic production activity in a state of near collapse.

Production output of major mineral and industrial products in the period between 1990 and 1998 was as follows: among the mineral production, iron ore production fell from 8.43 million tons to 2.89 million tons, non-steel metal from 241,000 tons to 97,000 tons. Of the industrial products, steel production fell from 3.36 million tons to 0.94 million tons; cement from 6.13 million tons to 3.15 million tons; fertilizers from 889,000 tons 392,000 tons. In terms of chemical fiber products, the production volume increased slightly from 50,000 tons in 1990 during the buffer period, in which development of light industry was actively pursued, but dropped considerably in 1998 to 35,000 tons. Grain production marked the lowest record ever in 1995 and 1997, which was the time of the most severe natural disaster, respectively with 3.45 million tons and 3.48 million tons.

Data on the employment-population by industrial sector in North Korea is hard to find. In the 1990s, however, North Korea has published employment related data as shown in the table below. The total employment-population in the 1990s was a little over 1.1 million in North Korea. There was little change in the

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[3] For data on domestic productions in North Korea, see Bank of Korea, *Major Economic Indicators of South and North Korea*.

[4] KOTRA, *Trend in North Korea's Foreign Trade in 2004*.

employment composition by sector. The employment composition of the industrial and agriculture sectors was noticeably larger than other sectors. The total employment-population of 1995, for instance, was made up of 38.2% in industry, 30.8% in agriculture, 7.7% in education, culture and health sectors, 4.6% in commerce, 4.1% in construction, 3.7% in transportation and communication, 2.3% in administration, and 8.6% in other sectors.

Table 7. Employment-Population in North Korea by Sector

(Unit: Thousand)

	1993			1995			1999		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Industry	4,118	1,922	2,197	4,284	2,001	2,283	4,410	2,063	2,347
Agriculture	3,382	1,718	1,664	3,454	1,751	1,703	3,567	1,806	1,761
Construction	464	352	112	460	350	110	482	367	115
Transportation & Communication	402	285	117	415	294	121	434	310	124
Commerce	509	161	348	514	161	353	529	169	360
Education, Culture & Health	844	339	504	863	348	515	886	356	530
Administration	251	153	98	258	157	101	265	161	104
Others	1,035	631	403	966	612	354	954	614	340
Total	11,005	5,562	5,443	11,214	5,674	5,540	11,527	5,846	5,681

Source: Central Bureau of Statistics DPRK, *Tabulation on the Population Census of the Democratic People's Republic of Korea* (31 December, 1993); *The Population Census of the DPRK*, 1995, p. 513; United Nations Economic and Social Council, E/1990/6/Add.35 (15 May, 2002), p. 6.

A noticeable feature from the data was a relative high employment rate of women with little gender difference in employment. Of the total employment population, there were about 150,000 more men than women, marking a 1% difference. While women were widely employed in the industry, commerce, and educa-

tion, culture and health sectors, employment of men was more concentrated in the agriculture, construction, transportation & communication, and administration sectors.

3. Changes in the Industrial Structure

The negative growth of the North Korean economy was primarily caused by a constant decline in the real economic sectors such as mining, manufacturing and construction industries during the economic recession period. Within the manufacturing industry, the minus economic growth rate was greater in the heavy industry sector than the light industry sector for two reasons. Firstly, the light industry sector was relatively less dependent on energy supplies or imported raw materials. Secondly, the new economic strategy of prioritizing light industry along with agriculture and trade brought significant attention from the state to production in the light industrial sector compared to the past.

Fluctuations of the growth rate were manifested in the agricultural sector, but the production output of marine products decreased consistently. The electric, gas, and water sector also declined considerably each year, except for 1994. The service industry declined slightly in 1998 with -0.5%, but overall, it showed a rising trend. The trend owes much to the growth of the governmental service sector, which had a significant share in the service sector as a whole.

With a new economic strategy of prioritizing three areas during the buffer period, North Korea attempted to improve people's living conditions, facilitate exports, and correct the industrial imbalance, a byproduct of the previous heavy industry first policy.

Table 8. Growth by Industry (1990~1998)

(Unit: %)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Agriculture, Forestry, Fishery	-9.7	2.8	-2.7	-7.5	2.7	-10.4	0.5	-3.8	4.1
Mining& Manufacturing Industries	-4.0	-11.7	-15.1	-3.3	-4.1	-4.2	-9.7	-16.1	-3.9
Mining	-5.5	-6.8	-5.7	-7.2	-5.3	-1.2	-11.9	-13.8	-6.1
Manufacturing	-3.5	-13.1	-18.1	-1.9	-3.7	-5.2	-8.9	-16.8	-3.1
(Light Industry)	-0.7	-3.9	-6.8	4.3	-0.2	-4.3	-6.8	-12.5	-0.2
(Heavy Industry)	-4.3	-15.6	-21.6	-4.2	-5.2	-5.6	-9.8	-18.8	-4.6
Electricity, Gas, Water	-3.2	-4.4	-5.4	-8.6	4.2	0.1	-7.7	-9.5	-9.2
Construction	5.9	-3.4	-2.2	-9.7	-26.9	-3.2	-11.8	-9.9	-11.4
Services	0.9	3.0	1.3	1.4	2.4	1.7	1.1	1.3	-0.5
(governmental)	1.2	4.4	2.4	2.2	3.3	2.8	1.8	2.2	-0.3
(others)	0.4	0.3	-0.9	-0.3	0.5	-0.6	-0.5	-0.7	-1.1

Source: Bank of Korea, *Statistics related to GDP in North Korea.*

Continuing economic regression, however, hampered realization of these proposed goals. As the shrinkage of the real economy deepened, the industrial structure transformed itself; featuring a relatively substantial expansion of the service sector.

The changes in the North Korean industrial sector during the economic recession period manifested the following features. Firstly, the mining and manufacturing industries and the construction industries, which were directly affected by the declining supply of energy and raw materials, showed a constant decrease in proportion. The mining and manufacturing industries accounted for 40.8% in the North Korean industry in 1990. In the final year of economic recession, however, it fell to 25.6% as a result of constant falling of production in these sectors. Of the industrial composition in North Korea, mining dropped from

9.0% to 6.6% and manufacturing from 31.8% to 19.0%. The share of the construction industry also fell from 8.6% in 1990 to 5.1% in 1998.

Secondly, a forced alleviation of the industrial imbalance between light industry and heavy industry was evident. Although production in the light industry recorded minus growth during the economic recession, except for 1993, its share in the industrial composition did not vary much and remained between 6.2% and 7.0%. On the contrary, production in the heavy industry fell sharply during the period of economic recession. As the share of heavy industry dropped more than half from 25.6% in 1990 to 12.6% in 1998, the composition ratio of light industry and heavy industry dropped from four fold in 1990 to two fold in 1994. In effect, the production gap between the two industries narrowed. Alleviation of the severe industrial imbalance in North Korea was, therefore, achieved by a relatively sharp fall of production in the heavy industry rather than the growth of the light industry sector following the proposed light industry-first policy. In this sense, the problem of the imbalance between heavy and light industries was solved in a way unintended by the North Korean authorities.

Thirdly, the service sector expanded considerably. Unlike other sectors, the service industry grew during the economic recession. The service industry, or the third industry, increased in composition from 18.0% in 1990 to 35.6% in 1998. Expansion of the governmental service industry, which increased in composition from 11% in 1990 to 25.3% in 1998, was the major contributing factor for the phenomenon. Other service industry sectors, however, rose weakly from 7.0% to 10.3% in the same period.

Table 9. Changes in the Industrial Structure in North Korea (1990~1998)

(Unit: %)

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Agriculture, Forestry, Fishery	27.4	28.0	28.5	27.9	29.5	27.6	29.0	28.9	29.6
Mining & Manufacturing Industries	40.8	38.0	33.8	32.9	31.4	30.5	28.0	25.5	25.6
Mining	9.0	9.0	9.2	8.2	7.8	8.0	7.1	6.7	6.6
Manufacturing	31.8	29.0	24.6	24.7	23.6	22.5	20.9	18.8	19.0
(Light Industry)	6.2	6.2	6.3	6.8	7.0	6.8	6.9	6.5	6.4
(Heavy Industry)	25.6	22.7	18.3	17.9	16.6	15.7	14.0	12.3	12.6
Electricity, Gas, Water	5.1	5.0	5.1	4.8	4.8	4.8	4.3	4.3	4.2
Construction	8.6	8.2	9.1	8.5	6.3	6.7	6.4	6.3	5.1
Services	18.0	20.9	23.5	25.9	27.9	30.3	32.3	35.0	35.6
(governmental)	11.0	13.0	15.0	16.8	18.6	20.7	22.5	25.1	25.3
(others)	7.0	7.9	8.6	9.0	9.3	9.6	9.7	9.9	10.3

Source: Bank of Korea, *Statistics related to GDP in North Korea.*

Ⅳ. Changes in the Industrial Structure in North Korea (3): 1999-2004

1. Changes in Economic Directives: A Revolutionary Economic Policy

North Korea announced domestically and internationally a new goal of the Kim Jong Il era by proposing "building a strong and prosperous nation - Kang Sung Dae Kuk" in a *Rodong Sinmun* editorial in August 1998.[5] North Korea defined "Kang Sung Dae Kuk" as a "Socialist State of *Juche*," and argued that "only an independent and socialistic path can lead to genuine prosperity and resurgence of the state and the nation." In another *Rodong Sinmun* editorial, "Let us construct a great powerful socialist nation under the Party leadership," North Korea again emphasized that revitalizing its economy and establishing a self-supporting economy are the primary task for building an ideologically, politically, militarily strong state.[6]

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[5] "Kang Sung Dae Kuk," *Rodong Sinmun* editorial, August 22, 1999.

In its publications, North Korea hinted at the needs for change in its economic policies in order to build a strong and prosperous nation. A joint editorial of *Rodong Sinmun* and *Kunroja* under the heading of "Let us adhere to the line of building an independent national economy," for example, stresses an "our-style economic structure."[7] It explains: "our independent economic structure is equipped with all the economic sectors in good harmony and with its own strong heavy industry at the core." It further argues: "we will in the future, too, adhere to the basic line of socialist economic construction, the keynote of which is to give priority to the development of heavy industry and develop light industry and agriculture simultaneously, in order to steadily increase the potential of our economic structure."

The economic strategy of the buffer period was carried on after 1996, and the New Year's joint editorial of 1997 still called for strictly implementing the policy of giving primary importance to agriculture, light industry and foreign trade, as demanded by the Party's revolutionary economic strategy. In 1998 and 1999, however, the most important economic policy specified in the New Year's editorials shifted to solving the problem of food shortages through increasing agricultural production and normalizing production in the leading sectors. In short, agriculture continued to be a task of priority for North Korea, even though the term 'agriculture-policy' was no longer to be seen, whereas light industry and trade lost their importance in practice. Instead, a primary task for solving economic difficulties focused on

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6 "Let us construct a great powerful state of socialism under the Party's leadership," *Rodong Sinmun* editorial, September 9, 1998.

7 "Let us adhere to the line of building an independent national economy," joint editorial in *Rodong Sinmun* and *Kulloja* (The Workers), September 17, 1998.

developing the leading sectors and maximizing the production potential of the key industries.

North Korea attempted an economic revival during the buffer period by emphasizing the importance of agriculture, light industry, and trade, but economic difficulties still continued. It also attempted improvement of the sub-work team management system in the agricultural sector and some reform measures in the Rajin-Sonbong region, but achieved little. At the same time, its stringent external relations made it nearly impossible to promote an inflow of foreign capital, import of energy and raw materials, or to expand the export market. The buffer period's economic policy failed to produce tangible results because regressing investment capacity due to drained domestic resources was not complemented by an inflow of foreign capital. Moreover, too much emphasis on regime maintenance hindered implementation of appropriate policies of reform and openness. During the buffer period, in which priorities on three sectors (agriculture, light industry, and trade) were stressed and some measures were taken for partial structural adjustment, the North Korean economy faced a phenomenon of growth in the informal sectors and shrinkage in the planned economy sectors.

As a countermeasure to the problems of accumulating economic difficulties and shrinkage in thee planned economy sectors, North Korea shifted the priority of its economic policy in 1998 from concentrating on the three sectors to solving the food supply problems and normalizing the leading sectors. For the normalization of the leading sectors, North Korea adhered to the basic line of socialist economic construction, which prioritizes heavy industry, and strengthened the North Korean style economic structure for building a powerful nation. North Korea's

official position on the policy of prioritizing heavy industry is well reflected in the *Rodong Sinmun* editorials "Pushing ahead with a forced march for final victory," and "The basic line of economic construction that we should adhere to."[8] For building a powerful state, North Korea returned to the previous strategy of giving priority to the heavy industry while simultaneously developing light industry and agriculture.[9]

The economic development strategy suggested by Kim Jong Il after 1998 is expressed as a revolutionary economic policy that replaces the revolutionary economic strategy of the buffer period. The term "revolutionary economic strategy" disappeared from the New Year's joint editorial in 1998. Instead, the most cardinal task in socialist economic construction was defined as "to boost agriculture, coal industry, electric power industry, railway transport and metal industry decisively and give full play to the potential of the independent national economy built at the cost of blood and sweat of our people." From this point onwards, the revolu-

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8 "Pushing ahead with forced march for final victory," *Rodong Sinmun*, January 8, 1998; "The basic line of economic construction that we should adhere to," *Rodong Sinmun*, January 20, 1998.

9 Regarding the basic line for construction of a Socialist Economy, North Korea officially announced at the 6th Korean Workers' Party Central Committee plenary meeting, which convened in August 1953, that it had adopted a policy line of prioritizing heavy industry and simultaneously developing light industry and agriculture. But, conflicts within the party about the priority order of heavy and light industry manifested after the sixth plenary meeting. At the third Party Congress in April 1956, however, Kim Il Sung made a statement that the Five-Year Plan should promote "rapid development of agriculture and light industry on the basis of placing priority on the development of heavy industry." The statement implicitly disclosed that the conflict surrounding the development line had been resolved by 1956, and that the line for construction of a socialist economy based on heavy industry had been finally established.

tionary economic strategy entailed development of agriculture, the leading sectors and the metal industry, while reconfirming the basic line of construction of an independent national economy. The revolutionary economic policy, which prioritizes solving the food shortages problem and normalization of production, shifted its policy focus on agriculture and electric power supplies.

2. Economic Reform Measures

North Korea enforced the Economic Management Improvement Measures from July 1, 2002 (hereafter called July 1 measures). Through the measures, North Korea steeply raised prices and wages. The state set prices were raised at an average of 25 fold, the cost of living was increased by an average of 18 fold, and the exchange rates were adjusted upward of 70 fold. Additionally, it increased the management autonomy of the enterprises, strengthened material incentives, and abolished the distribution system. North Korea's economic reform measures attempted to differentiate distribution, improve productivity and to reduce the state's financial burden.

Following the July 1 measures, North Korea continued to introduce additional economic improvement measures. In the second half of 2002, North Korea expanded the regions for openness by designating the Sinuiju special economic district, the Gumgang mountain tourist region, and the Gaesong industrial complex. In 2003, North Korea expanded the farmer's market into a synthetic-consumer's market and granted management of state run shops to individual enterprises. There have been some economic measures in the commercial sectors to permit individual business in the service sector (i.e. restaurants). From 2004, North Korea car-

ried out some representative cases of family-operated farming in the agricultural sector and partial enterprise reform measures in the industrial sector.

Prior to the July 1 measures, North Korea had already sought change in the economic management by developing thoughts on economic reform and stressing "new thinking" and "practicality." It proposed a "new way of thinking" in January 2001, followed by new theories such as "the seed revolution," "new self-reliance," and "stormy leap forward." In October 2001, Kim Jong Il proposed the "directive for improving economic management," which served as the basis for the July 1 measures. He specified the basic principle of economic reform as "maintaining the socialist principle while pursing practical gains." The major content of the directive encompassed decentralization of planning, administration of the socialist goods exchange markets, profit-based evaluation of the enterprises, performance-based distribution, linking science technology and production, readjustment of the prices and wages, and abolishment of unreasonable social security.

The introduction of the July 1 measures and the additional measures appears to be a response to the prevailing recognition in the North Korean society that change is inevitable to overcome the economic difficulties. At the time, North Korea encountered challenges such as various social problems caused by the spread of the unofficial economy (black markets) and disintegration of the official economy, declining productivity caused by side effects of the equal distribution system and lack of an incentive system, and limitation of the rationing system caused by exhaustion of the state finance and economic difficulties. With the economic measures, significant changes took place in North Korea.

Firstly, the change of attitude at the individual and enterprise level became apparent in the overall society with growing understanding of a market economy and rising working motivation. Such change of attitude owes to increasing market function and profit-based enterprise management as well as reduction of state planning and public assistance. At the same time, a system of equal distribution of wages was replaced by an incentive system of the labor wages and a distribution system based on performance.

Secondly, a market mechanism has been introduced and diffused in North Korea. The North Korean authorities officially pronounced the function of state's control over prices. However, in practice, a price mechanism based on the basic supply-demand principle was operating in the North Korean economy. A market mechanism applies almost strictly in the commerce and distribution sector. A market mechanism is widely practiced in the general markets and partially introduced to the state-run shops for state distribution which had to compete with the markets. The socialist goods exchange market, which opened to allow trade of raw materials among enterprises, also operates under the market principles with some restrictions.

Thirdly, productivity in some industrial sectors, such as agriculture and light industry, has improved with the activation of commerce. A shortage of investment resources, energy, and raw materials continued even after the July 1 measures, which hampered an increase of production in the overall industry. However, agriculture, light industry, and commerce sectors were on a rising trend. In the agricultural sector, production of cereals increased constantly owing to improvement of land use and growing farming motivation. In the industrial sector, managers have been focusing more on creating profits with the growth of manage-

ment autonomy in factories and enterprises. In the commerce sector, the growth of wholesale and retail businesses reached 9.8% since the activation of the general markets, and accounted for over 1.8% of the total growth rate.

Fourthly, the rise of incomes for (some) individuals became possible in North Korea. Practice of a distribution system based on performance allowed an increase of the actual income for some individuals among factory workers, employees in the service sectors, and farmers of collective farms. The exemplary cases are 2.8 Jikdong youth mining miners, Uiam Restaurant employees, and Chong-san collective farm workers. Nevertheless, it is not common to find factories, enterprises, or collective farms in North Korea that produce profits large enough to pay the wages based on performance to their workers. In fact, there still exist many North Korean factories that are too poor to pay the basic wages for their workers.

3. Domestic Production and Foreign Trade

The North Korean economy experienced positive growth at the end of 1999, putting an end to its nine consecutive years of negative growth. Since recording 6.2% economic growth in 1999, North Korea has been achieving a degree of consistent annual economic growth - at least, until 2004. Such economic recovery accounts for the increase of production volume as a result of normalization effort of the leading industrial sectors and the metal industry, a core of the revolutionary economic policy. During the economic recovery period, North Korea's foreign trade also increased constantly. Accordingly, the trade volume of 2004 reached 2.86 billion USD (export 1.02 billion, import 1.84 billion

USD), marking twice the trade volume of 1998.

Coal production picked up from the lowest level of 1998, and increased to 23.1 million tons in 2001. Although it decreased slightly, the production output in 2004 recovered to the 2001 level with 22.8 million tons.[10] The output of electricity was on a rising trend, in spite of some fluctuations, to 2.06 billion kWh in 2004. Imports of petrol fell to the lowest with 317, 000 tons in 1999, but has maintained around 600,000 tons since 2001.[11] With an increase of the overall domestic production of energy and steady petrol imports above the lowest level, the base of domestic production activities developed to a certain extent.

Table 10. Economic Growth and Trade Volume in North Korea (1999~2004)

(Unit: %)

	1999	2000	2001	2002	2003	2004
Economic Growth	6.2	1.3	3.7	1.2	1.8	2.2
Trade Volume (billion USD)	1.48	1.97	2.27	2.26	2.39	2.86
Export	0.51	0.56	0.65	0.74	0.78	1.02
Import	0.96	1.41	1.62	1.52	1.61	1.84

Source: Bank of Korea, "Comparison of main economic indicators between South and North Korea," and "Report of Estimated Economic Growth in North Korea 2004."

From 1999, the actual output of the main mineral and industrial production differs depending on the items. Production of iron ore continued to increase, and recorded 4.57 million tons in 2004. Non-steel metal production, on the other hand, rose to 111,000

[10] For the performance of the domestic productions in North Korea, refer to the Bank of Korea's "Main Economic Indicators of the South and North Korea."

[11] KOTRA, *Trends in North Korea's Foreign Trade of 2004*.

tons in 1999, but fell to 98,000 tons in 2004, equivalent to the production level of 1998. Steel production reached 1.24 million tons in 1999, and then remained around 1.10 million tons. For cement, the production output constantly increased to the level of 5.63 million tons in 2004. Domestic fertilizer production was 572,000 tons in 1999, but soon showed a falling trend. In 2004, fertilizer production was about 434,000 tons. Nonetheless, the overall output of the main mineral and industrial production recovered from the lowest level during the economic recession period. For some items such as iron ore and cement, the production output increased drastically. The output of cereal production was at it's lowest in 2000 with 3.59 million tons, but managed to produce 4.31 million tons in 2004. The output of marine products consistently increased to 1.17 million tons by 2004.

Table 11. Export Items in North Korea (2000~2004)

(Unit: %)

	2000	2001	2002	2003	2004
1. Animal Products	17.3	24.4	35.5	37.0	33.0
2. Vegetable Products	5.4	6.5	3.7	3.2	2.7
3. Mineral	7.6	7.8	9.5	7.1	14.9
4. Chemical & Plastics	7.9	6.9	5.8	4.0	3.8
5. Wood	1.9	0.9	1.4	2.0	1.6
6. Textiles	24.8	21.6	16.7	17.1	11.3
7. Precious Metals	1.7	2.2	2.0	2.1	0.6
8. Non-metallic	7.8	9.3	7.8	11.5	16.1
9. Machine and Electrical	18.6	15.1	11.6	12.0	11.9
10. Others	7.0	5.6	5.9	4.0	4.1

Source: KOTRA, *Trend in North Korea's Foreign Trade 2001-2004.*

Regarding North Korea's export items of the 21st century, increased exports of animal and non-metallic products and

decreased exports of textiles are the noticeable features. The increased level of animal product exports in the new century accounts for the sharply increasing exports of the first products, especially fishery and marine products, which have been North Korea's prime export items. Exports of iron ore and zinc rose from 2003, contributing to expansion of export of mineral and non-metallic products. On the contrary, export of textiles as well as machine and electrical goods declined or became stagnant. The primary product oriented feature of the export structure in the 21st century indicates that North Korea's industrial structure is degenerating.

Table 12. Import Items in North Korea (2000~2004)

(Unit: %)

	2000	2001	2002	2003	2004
1. Animal Products	1.4	4.6	6.8	6.7	8.7
2. Vegetable Products	11.3	13.6	7.8	7.5	7.6
3. Oils and Fats, Prepared Food	6.3	5.5	4.9	6.0	9.4
4. Mineral	12.2	14.3	15.5	20.9	22.3
5. Chemical	7.7	7.6	8.0	6.5	5.8
6. Plastics	4.8	4.1	4.3	4.4	4.2
7. Textiles	12.2	12.6	10.4	7.9	5.1
8. Non-metallic	6.1	6.2	5.8	10.7	7.0
9. Machinery	14.6	15.0	15.4	17.5	14.3
10. Vehicles and Equipment	10.4	5.5	5.0	3.8	4.2
11. Others	13.0	11.0	16.2	8.2	11.3

Source: KOTRA, *Trend in North Korea's Foreign Trade 2001-2004*.

One major feature in the composition of import items in North Korea is an increased importation of energy resources or mineral products. The amount of petrol imports did not vary much for many years, but North Korea has imported a large amount of

petroleum mainly from Russia and China. Another feature is the composition of the machinery imports between 2000 and 2004, which remained roughly at the same level between 14.3% and 17.5%. Taking into account that the total amount of imports doubled during the specified period, this implies that the importation of machinery doubled as well. It may be assumed that North Korea was placing the priority on import of machinery as a way to supplement the equipment needed for the normalization of its industry.

4. Changes in the Industrial Structure

The economic policy of North Korea during the economic recovery period was concentrated on resolving the food problem and normalization of the leading sectors. Such a revolutionary economic policy has partially brought some achievements since it led to a consistent, though small, positive economic growth since 1999. The July 1 measures and other following measures, which have been implemented since July 2002, can also be evaluated positively since they improved efficiency of the economy despite some negative effects. Changes in the economic policy and its consequences evidently had an impact on North Korea's industrial structure.

Looking at the growth rates by industry, all the sectors except for the services sector exhibited high growth rates in the first year of the recovery period. The construction industry, in particular, marked a high growth rate of 24.3% while the mining industry recorded 14.1% of growth. The overall economic growth slowed down afterwards, though continued to be positive, and recorded lower than that of 1999.

A noticeable trend in the growth rates by industry is a constant growth of the construction industry and stagnant growth of the services sector. This is mirrored in the changing trend in North Korea's industrial structure, which displays an increasing share of the construction industry and a shrinking composition of the services sector. The mining industry maintained an overall rising trend, except in 2002 when it recorded a minus growth (-3.8%), which indicates possible expansion of the mining sector in composition.

Table 13. Growth Rates by Industry (1999-2004)

(Unit: %)

	1999	2000	2001	2002	2003	2004
Agriculture, Forestry, Fishery	9.2	-1.9	6.8	4.3	1.7	4.1
Mining and Manufacturing Industries	9.9	2.2	3.9	-2.5	2.8	1.0
Mining	14.1	5.8	4.8	-3.8	3.2	2.5
Manufacturing	8.5	0.9	3.5	-1.9	2.6	0.4
(Light Industry)	2.4	6.2	2.3	2.5	2.6	-0.2
(Heavy Industry)	11.6	-1.5	4.1	-4.4	2.6	0.7
Electricity, Gas, Water	6.8	3.0	3.6	-3.8	4.2	4.5
Construction	24.3	13.6	7.0	10.5	2.1	0.4
Services	-1.9	1.2	-0.3	-0.2	0.6	1.4
(governmental)	-4.5	0.5	-0.4	-1.3	0.2	0.0
(others)	3.9	2.5	-0.1	2.4	1.7	4.6

Source: Bank of Korea, *Statistics related to GDP in North Korea.*

The North Korean industrial structure during the economic recovery period moved to a positive direction compared to the economic recession period. The sectors that set the basis of domestic production — mining and construction — achieved a significant growth, which led to a favorable change. The service sector, which expanded excessively during the economic reces-

sion period, stayed stagnant. This tendency is desirable for the North Korean industrial structure. One problem that persists in North Korea is a lack of expansion of the manufacturing sector, which was supposed to lead the growth of the North Korean economy as a core industry.

The industrial structure in North Korea displays the following characteristics. Firstly, the share of the construction industry and the mining industry rose. Composition of the construction sector jumped from 6.1% in 1999 (5.1% in 1998) to 9.3% in 2004, owing to some improvement in production of raw materials related to construction (e.g. cement) and some progress in construction of houses and non-residence buildings. Composition of the mining industry also rose from 7.3% (6.6% in 1998) to 8.7% due to a constant increase of coal and mineral production. North Korea's effort to concentrate on the normalization of the leading sectors seemed to have paid off.

Secondly, the share of light industry increased slightly despite little compositional change in the manufacturing sector. Although North Korea emphasized the leading industry, the overall industrial conditions did not allow significant improvements in the key manufacturing industries. Outdated facilities in the heavy industry sector desperately called for an introduction of new technology, but North Korea did not have enough resources to modernize this sector. In the light industry sector, on the other hand, production increase through modernization of the facilities was easier since the scale of investment requires for the modernizing was relatively small. The output increase through enhancing productivity in some light industry sectors after the July 1 economic measures might have contributed to the expansion of the light industry sector.

Thirdly, the share of the service sector changed little. It recorded the highest figures in 1998 with 35.6%, but remained around 32% between 1999 and 2004. Deflation of other sectors during the economic recession period caused the relatively excessive expansion of the service sector. Commercial distribution was activated and the wholesale and retail business increased in North Korea following the July 1 economic measures, but the significantly large governmental service sector remained constant in size. The July 1 economic measures and other additional measures did not have much impact on the size of the service sector.

Table 14. Changes in the Industrial Structure (1999~2004)

(Unit: %)

	1999	2000	2001	2002	2003	2004
Agriculture, Forestry, Fishery	31.4	30.4	30.4	30.2	27.2	26.7
Mining and Manufacturing Industries	25.6	25.4	26.0	25.7	26.8	27.2
Mining	7.3	7.7	8.0	7.8	8.3	8.7
Manufacturing	18.3	17.7	18.1	18.0	18.5	18.5
(Light Industry)	6.1	6.5	6.7	6.9	7.0	6.7
(Heavy Industry)	12.2	11.2	11.4	11.0	11.5	11.8
Electricity, Gas, Water	4.5	4.8	4.8	4.4	4.5	4.4
Construction	6.1	6.9	7.0	8.0	8.7	9.3
Services	32.4	32.5	31.8	31.6	32.8	32.3
(governmental)	22.8	22.6	22.2	22.0	22.9	22.6
(others)	9.6	9.8	9.7	9.7	9.8	9.7

Source: Bank of Korea, *Statistics related to GDP in North Korea.*

Fourthly, the share of the agriculture, forestry, and fishery sector was declining. It recorded the highest figures with 31.4% in 1999, but reduced to 26.7% in 2004. Despite the growth of the overall agriculture, forestry, and fishery sector, the composition

of this primary production sector in the total industry diminished. This could be viewed as a desirable phenomenon in the North Korean economic context.

There was little change in the composition of the employment-population by sector in the 1990s, however, a significant change took place in the North Korea industrial structure in terms of value added output during the economic recession period. When comparing the composition of industrial sectors based on the output and the composition of industrial sectors based on the employment-population, at least in some comparable sectors (industry, agriculture, and construction), the following features are identifiable.

In the industrial and agricultural sectors, the proportion based on the production output tends to be smaller than that based on the employment-population. In 1999, the industrial sector (including the mining industry) comprised of 25.6% by output, but 38.3% by employment-population. In the agricultural sector, the composition based on the production output was 31.4%, even including forestry and fishery. However, the composition of the agricultural sector alone based on the employment-population accounted for 30.9%. Such a phenomenon could be explained by the relative low labor output per person in the industrial and agricultural sectors in North Korea. In the construction sector, its share by the production output (6.1%) tends to be higher than the share by the employment-population (4.2%).

Table 15. Changes in Composition of Employment-Population by Sector

(Unit: %)

	1993	1995	1999
Industry	37.4	38.2	38.3
Agriculture	30.7	30.8	30.9
Construction	4.2	4.1	4.2
Transportation & Communication	3.7	3.7	3.8
Commerce	4.6	4.6	4.6
Education, Culture & Health	7.7	7.7	7.7
Administration	2.3	2.3	2.3
Others	9.4	8.6	8.3
Total	100.0	100.0	100.0

Source: Calculated from Table 7.

Ⅴ. North-South Cooperation for Industrial Development in North Korea

1. Selective Industrial Cooperation

A. Encouraging Labor-Intensive Light Industry

North Korea could achieve economic development and normalization of industry by following the general growth model of developing countries which first concentrates on increasing exports of light industry products through promoting the labor-intensive industry. Since North Korea can provide cheap reserved manpower, promoting the labor-intensive light industry could give North Korea an advantage of price competitiveness. In the structural adjustment process for normalization of the industry, light industry does not require much capital whereas modernization of facilities in heavy industry necessitates massive capital.

The textile industry and the electrical and electronic industry are the promising industries for export strategies. For its economic

development, North Korea should utilize its manpower effectively and promote labor-intensive industries (textiles, garments, footwear, electric and electronic equipment) to be the export and processing base. As the cases of the South Korean enterprises that have moved or hope to move to the Gaesong industrial complex demonstrate, North Korea should encourage the development of manufacturing industries that produce light industry goods.

The North Korean textile industry has a relatively good production base and technological skills as well as active foreign trade. The textile industry is a representative labor-intensive industry that could employ the manpower, the only productive factor in North Korea, and could be developed into an export industry in a short period of time with relatively small-scale investment. In actuality, North Korea has been proceeding with modernization of factory equipment in sewing bonded processing factories and export clothing factories, and has increased investment in this sector.

The electric and electronic industry is another sector that countries adopting export-oriented growth strategy concentrate on following the development of labor-intensive light industry. Although the production base and technological skills of North Korea's electric and electronic industry are relatively backward, it has many labor-intensive processes such as production and assembly of parts. Considering that export in this sector is recently growing and there is a possibility of development with a primarily small-scale investment, it is important to facilitate the electric and electronic industry to improve the overall technological level of the economy.

North Korea's labor-intensive light industry, particularly in the manufacturing sectors of textiles, garments, toys, and footwear, and its electric and electronic industry are the areas which could possibly grow through inter-Korean cooperation. North Korea could draw lessons from South Korea's experience of export-oriented industrialization and take advantage of technology and capital transfer from South Korea through the inter-Korean industrial cooperation. For the industrial cooperation, South Korea should transport more idle equipment and facilities into the industrial regions in Hwanghae province and Pyongnam province near the Gaesong industrial complex, and encourage private investments in the regions. In the mid to long term, South Korea's investment should be made in these regions to build modernized high tech light industrial factories. As a part of the inter-Korea industrial cooperation, South Korean enterprises that are in the areas of textiles, home appliances, and miscellaneous goods should set up an organic cooperative system such as facilitating technical cooperation with similar types of business in the North. Furthermore, both North and South Korea could pursue division of labor in the products and manufacturing processes in order to maximize product efficiency in the labor-intensive light industry sector.[12]

During the 10th meeting of the Inter-Korean Economic Cooperation Promotion Committee (July 9 to 12, 2005, Seoul), the South and the North agreed to strengthen cooperation to fill each other's needs in the form of South Korea's support for North Korea's

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12 For example, a division of labor type is possible through making a network between the Gaesong industrial complex and industrial complexes in the satellite cities (Ansan and Sihung) in the metropolitan region. Lee Suk-Gi, "The Full-fledged Gaesong Industrial Complex Project," (January 24, 2005), p. 35.

light industry and development of underground resources for raw materials in the North.[13] This specified economic cooperation projects of a new kind expanding the scale of economic cooperation and takes the economic features of the South and the North into consideration. The inter-Korean economic cooperation project now combines economic elements of resources, capital and technology that the North and the South possess, moving beyond the mere trade of finished products. The South provides the North raw materials needed for the production of light industry goods while the North ensures South Korea's investment in the development of underground resources in North Korea and supplies the products. Utilizing such a method, deepening industrial cooperation between the South and the North for promoting labor intensive light industry in North Korea could be achieved.[14]

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[13] The first article of the agreement at the 10th Meeting of the Inter-Korean Economic Cooperation Promotion Committee (July 12, 2005 in Seoul) specifies the following: The South and the North will pursue economic cooperation projects in a new manner by combining their economic elements such as resources, capital, technology, etc. so as to achieve balanced development of the national economy. First of all, the South will provide the North with raw materials needed for the production of goods such as garments, footwear, soaps, etc that the North urgently needs. The North will ensure that the South will invest in the development of underground resources such as zinc, magnesite, apatite concentrates, coal, etc. In addition, the two sides will examine and review ways of expanding economic cooperation projects in a gradual manner. In this regard, the South and the North will have a working-level consultation in August of this year in Pyongyang to discuss technical issues that can be raised.

[14] Sungnam electronics, a South Korean enterprise investing in North Korea, has taken in zinc lumps produced in the North as a substitute for collecting bonds from North Korea for its compact lamp production. With an increase of the amount of zinc lumps imported, the company is expected to bring in other additional raw materials from North Korea in the future.

B. Modernization of the Key Industries

Along with the development of labor-intensive light industry, North Korea has to develop an industrial base for heavy industry through selective modernization and through a structural adjustment focused on key sectors that could become internationally competitive in the mid to long term. This is to facilitate heavy industry in being the key industry with a high degree of competitiveness. For the production normalization of the heavy and chemical industry, North Korea should actively pursue modernization of the outdated production equipment with international cooperation. In order to ensure industrial competitiveness, a bold structural adjustment is needed in the process for the factories and enterprises with equipments and technology that are too worn-out to be repaired.

Most of the major facilities and factories in the heavy industry were constructed with Soviet support. Therefore, modernizing these old and outdated factories is crucial for economic development in North Korea. The need for repair and modernization of the outdated industrial facilities in the heavy industry sector and a joint management in North Korea have been stressed for a while. When the former prime minister of Russia, Viktor Chernomyrdin, visited Seoul in 1995, he mentioned that 17 Soviet-supported North Korean factories had stopped operating due to a shortage of raw materials and parts, and suggested South-North joint cooperation to revive these factories. On the occasion of President Putin's recent visit to North Korea, Russia's attention was brought to re-working and modernization the industrial facilities in North Korea. This opens a possibility of cooperation between the South and the North along with Russia in this area.

Within this context, South Korea can consider a cooperation form for the modernization of North Korea's heavy industry facilities, in which South Korea offers capital, Russia supplies materials, equipment and experts, and North Korea provides manpower. Since most of the industrial facilities in North Korea operate on the basis of Russian materials, parts and technology, cooperation among the three parties (South Korea, North Korea, and Russia) is more effective than South Korea's exclusive investment. At the same time, such a form of cooperation would be received more favorably by North Korea. Manufactured products resulting from the cooperation among the three parties could be exported to Russia, to the North Korean market, and to third countries.

In reality, a pivotal issue in the modernization of North Korea's heavy industry facilities is the supply of materials. Russia has a positive view of the three-party cooperation among the two Koreas and Russia in modernizing the North Korean industrial facilities, but Russia expects South Korea to buy Russian-made equipment and facilities with its own funding. It is not easy for South Korea alone to mobilize a large-scale fund needed for the modernization of North Korea's heavy and chemical industry. Therefore, a strategy is needed to modernize selective promising key industries in the heavy and chemical industrial sector in North Korea.

The metallurgical and machinery industries could be pinpointed as the strategic industries for modernizing the key industries in North Korea.[15] These industries are the biggest industries that

[15] Lee, Suk-gi, "Experience of South Korea's economic development and Searching for North Korea's economic development strategy," in *Grand*

have chain reactions in every direction and have a considerable level of production base plus superior technological level or technological system to any other heavy and chemical industries. Therefore, with structural advancement and modernization through inter-Korean cooperation, these sectors could possibly develop into an export industry.

The machinery and metallurgical industry in South Korea has a large proportion of small or medium sized enterprises, among which are 3D businesses that suffer from a serious shortage of manpower. These businesses are likely to move to the Gaesong industrial complex or to the North Korean region. For inter-Korean industrial cooperation, the metal processing sector which is regarded as a 3D business in South Korea should move its equipment to the Gaesong industrial complex or to other regions, and utilize North Korea's manpower. Additionally, what is needed is the promotion and building of large-scale modernized machinery and metallurgical factories through investment in North Korea.[16] An option of transforming factories and enterprises in the machinery and metallurgical industrial sector in the Haeju and Pyongyang industrial complexes to a South-North partnership type could also be considered.

Planning of Our Korea Policy for Peace, a paper presented at the Unification Issue Research Association and Kyonggi Development Institute co-organized conference for commemorating the 60th year of national liberation, p. 205.

16 Choo, Won-suh, "support for the normalization of the North Korean industry and plan for the inter-Korean cooperation," *KDI North Korean Economic Review*, Vol. 7, no.8 (August 2005), p. 23.

C. Promoting the Information-Technology Industry

North Korea attempts to achieve fast growth in a short term and to improve its production capability in the light industry and the heavy and chemical industry through concentrating on the development of technology-intensive high tech industry based on a small capital investment. However, the growth of technology-intensive industries, except for a few, requires a certain level of development of the overall industry. The Information Technology (IT) industry, to which North Korea places special attention, is not an exception. Unless the information-oriented society reaches a certain level of maturity, this sector cannot be developed to a point of bringing about a big leap in the whole economy.

Despite such a limitation, the IT industry in North Korea has strengths. It has acquired a high level of basic technology in some areas and highly-educated and well-trained manpower. Considering the size of the North Korea economy and the current stage of industrial development, it is not impossible for North Korea to achieve considerable progress in a relatively short period of time through concentrated development in some specialized areas. Both Koreas can realize the anticipated result if they develop North Korea's IT industry as a part of the second-phase development plan for the Gaesong industrial complex, which aims to invite basic high-technology related industries.

Since North Korea has excellent technological manpower, the IT industry is a promising high-tech industrial sector for inter-Korean cooperation. It is essential to start with development of the software sector, where North Korea has an advantage in terms of technology and manpower. The enterprises that have entered the Gaesong Industrial Complex could cooperate with North Korea

in a form of joint development or consignment. The cooperation areas of high priority could be pinpointed as the high value added and low risk sectors that produce games, animation, digital contents based on South Korea's capital and North Korea's skilled manpower. Cooperation in the hardware sectors, on the other hand, should be progressed taking account of the development of the electronic industry in North Korea and change in the internal and external environments. In this sector, various businesses that produce computer and peripheral equipment, printed circuit boards (PCB), semiconductor parts, switch equipment, fiber-optic cables, etc could be developed through supplying original resources and facilities to Pyongyang (or other areas) for manufacturing and division of work in connection to the Gaesong industrial complex.[17]

Pyonyang and Nampo regions in the Pyongnam province have high location potential for all the manufacturing industries. Taking into account that these regions should lead the simple manufacturing industry and research & development (R&D) of the North Korean industry, the R&D function of related enterprises should primarily be focused on these areas. The Nampo-Pyongyang regions should be developed to be a central point for high-tech industries such as the IT and electronic industries. In the case of the IT industry, the metropolitan (Seoul) area that has secured a high tech industrial base could carry out R&D, the Pyongyang region could carry out development of software and production and assembly of hardware parts, and Gaesong industrial complex could carry out major manufacturing processes. In the mid to

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[17] Kim, Young-yoon, "Inter-Korea economic cooperation and Prosperity in the Korean peninsula," *6.15 South-North Joint Declaration and Peace and Prosperity in the Korean Peninsula: Assessment and Prospect* (Seoul: KINU, 2005), p. 149.

long-term, such a form of labor division will enable the establishment of an IT axis that connects the metropolitan area-Gaesong-Pyongyang.

2. Strategic Infrastructure Cooperation

A. Energy Cooperation

North Korea should first solve the serious energy shortage problem for the normalization of the industry and economic development. Securing electricity, which is vital for industrial production activities, is a particularly pressing matter for North Korea. The electric generation output in North Korea at the end of 2004 was 20.6 billion kWh, accounting for 6% of South Korea's electric generation output of 342.1 billion kWh. The electric generation capacity in North Korea is 7.77 million kW, which is about 13% of South Korea's electric generation capacity of 59.96 million kW.

North Korea's electric power shortage is reflected in the development of the Gaesong industrial complex. South and North Korea reached an agreement on the supply of electric power to the Gaesong Industrial Complex (December 3, 2004), under which the South was to transfer electric power to the North and the Korean Electric Power Corporation (KEPCO) would be responsible for planning, construction, and operation. Accordingly, the South began to provide 15,000 kW of electricity through above-ground power lines (electric poles) to the complex's pilot zone from March 16, 2005. For the main complex, it is plan to supply 100,000 kW transmission volume through power-transmission towers.

There is an option of transmitting power from Russia to North Korea to fill in the power shortages. The two Koreas and Russia have discussed the technical side of energy trade and supply of power produced in the Russian Far East to North Korea through transmission lines. North Korea proposed a power exchange project in Yonhaeju, Russia, which entails a mutual supply of possibly existing idle electric power between the two parties. It also has asked Russia for 400,000 kWh electric power supply.[18] With the project, North Korea could use the electric power produced in the hydro-electric power plant in Bureyskaya, Russia. It is also possible to offer resources (coals) or development funds (with South Korea's financing) to the thermo-power plants in the Russia Far East region, and supply the produced electricity to North Korea.

However, it seems more effective for the South to directly support the electric power to the North than supplying Russia-produced electric power through three-party cooperation while South Korea bears the costs. On July 12, 2005, the South Korean government publicly unveiled its "important proposal" to North Korea, in which South Korea offers independent supply of the 2 million kW of electricity to the North, by means of power transmission, in exchange for North Korea's nuclear dismantlement. If the North accepts the proposal, South Korea will be able to transmit the electric power to North Korea within three years through construction of the transmission lines directly between Kyonggido Yangju and Pyongyang.[19]

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18 Kim, Sam-sik, "Prospect of North Korea's Foreign Economic Relations in 2003," KOTRA, 2003.

19 The cost for the power transmission to North Korea may differ depending on the methods of transmission, however, but it is estimated to be approximately KRW 1.5 trillion to KRW 1.7 trillion. Adding estimated annual

The electric power transmission to North Korea is going to proceed within the limit of the electric reserve rate specified in the second "basic electric power supply plan," therefore, it will not require construction of a separate power plant. On the technical side, plans may differ depending on the methods of power transmission. In the case of building connections by separating some of the regions in North Korea, a minimum level of improvement of some electric distribution network may be needed in order to protect the stability of South Korea's electric power system. However, this method significantly differs from providing an electric distribution network throughout the whole North Korean region.

When the North accepts South Korea's proposal of electric power supply as a means to solve the nuclear issues, the South has to begin preparing for the electricity transmission of 2 million kW. The power distribution network should gradually expand from the South-North connection network with Gaesong in the center to the connection network in the peripheral areas. With the power transmission project, North Korea could normalize operation of the Haeju and Pyongyang industrial complexes. In terms of electric cooperation, construction of the power plants in these areas with South Korea's support could be considered as an alternative to the power transmission project.

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expenses between KRW 600 billion and KRW 800 billion, the total cost is expected to be between KRW 7.5 trillion and KRW 9.7 trillion. Ministry of Unification, *North Korea Policy Focus*, September 8, 2005.

B. Expansion of South-North Transportation and Distribution Infrastructure

For the recovery and normalization of industry in North Korea, South Korea should support the repair of the railways and the transportation system as a way of expanding SOC. As this task requires considerable resources and time, an effective construction plan for SOC should be made through close cooperation with the neighboring countries - North Korea, China and Russia. South Korea should also support and cooperate with North Korea to expand the urgently needed transportation infrastructure. The South-North transportation connection and distribution network building should be promoted with the intention of it being a long-term plan to build a Eurasia goods distribution network that stretches to Europe through China and Russia.

Expecting some economic profit, South Korea moved some of its production and export base to geographically close areas in the North through Gaesong industrial complex. Profit can be maximized when transportation infrastructure is expanded and built in the North Korean areas adjoining the Gaesong Industrial Complex. The Gyongyi railway line and roads need to be opened to traffic and utilized for trade between the South and the North. The railway, in particular, should be prepared for a gradual extension to connect China and Russia. The transportation infrastructure in the Gaesong area also needs to expand quickly with South Korea's support in order to help the transport of goods.

The most pressing task is to complete the ongoing Gyongyi railway and road connection and to push modernization of railways and roads in the section between Gaesong and Pyongyang. In

one study, it is proposed that the Gyongyi line connection construction could be economically beneficial while the modernization plan may not be so.[20] Following this analysis, South Korea should focus on connecting the Gyongyi line and partial modernization of the infrastructure until North Korea improves its overall economic situation and realizes industrial modernization and development. South Korea should also attempt to develop the Hwanghae region along with the Gaesong industrial complex by building city links that connects Gaesong-Haeju-Sariwon within the Hwanghae Province.

Geographical closeness between the metropolitan area (Inchon) and the Gaesong Industrial Complex bestows economic advantages for goods distribution. Designating Shimchon as a special economic zone in the process of reform and openness, China made the most of geographical closeness to Hong Kong. Gaesong is located in a junction for both the Central corridor (Pyongyang-Gaesong-Seoul) and the West corridor (Pyongyang-Gaesong-Incheon). In the meantime, only the Central corridor is usable for goods transportation, owing to the Gyongyi railway and road connection project.

Failure to expand the transportation infrastructure could adversely affect the supply of raw materials and the outlet of produced goods from the Gaesong Industrial Complex, and consequently, could lead to a decline of competitiveness of the complex. Because the Gaesong region does not have an airport or harbors, it mainly relies on goods transport by land via railways and

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[20] Kim, Yeon-Kyu, "The South-North Railway Connection Plan to Link to the Continental Railroads," Papers presented at a 100 Experts Forum on the North Korean Economy, 2004.

roads. It is, thus, important to secure the first-phase distribution system for the products from the Gaesong industrial complex region through the ongoing Gyongyi railway and road connection project. As there is no harbor near the Gaesong Industrial Complex that can take care of a large scale transportation of goods, Incheon port may have to play such a role in the mid to long-term. However, it could save much time and expense if the quantity of import and export goods transportation from the Gaesong industrial complex could be directly dealt through the West corridor rather than through Incheon.

To facilitate the transportation of goods from/to the Gaesong Industrial Complex, opening a land route and a sea route that connects Gaesong and Incheon is essential.[21] Production from the Gaesong Industrial Complex could be transported to the south through the land or sear routes or directly exported to foreign countries by connecting the distribution axis between Gaesong and Incheon and by building large-sized warehouses for goods in the two regions. At the same time, diversification of the distribution system and promotion of efficiency are possible with direct supply of imported raw materials to the Gaesong Industrial Complex. It is important to build complex distribution bases in the Gaesong and Gae-poong region in the North and the Incheon and Ganghwa region in the South as well as a corresponding complex transportation system that provides roads and sea routes.

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[21] For direct goods transportation between Gaesong and Incheon, the followings could be suggested: 1) construction of a harbor in the southern Gae-poong Gun for a sea route; 2) construction of roads connecting the southern Gae-poong Gun and the northern Ganghwa Province for a land route. These two routes can possibly link the Gaesong Industrial Complex to the Harbor, airport, railway, and roads of Incheon.

3. Technical Manpower Training Cooperation

The South Korean enterprises that moved into the Gaesong Industrial Complex have to follow the existing labor system of North Korea and employ appropriate North Korean personnel through full consultation with the North Korean government organization of labor management. However, the level of skill of the manpower supplied by the labor management organization does not often meet the level required by these enterprises. Many South Korean enterprises in the complex complain that the low level of skills and working concentration of the North Korean workers curtail productivity. Such an indirect employment method results in declining competitiveness in the Gaesong Industrial Complex.

In order to increase competitiveness, the Gaesong Industrial Complex should request the North Korean authorities to revise the labor regulation and to grant the enterprises autonomy in the employment procedure. Even if the enterprises in the Gaesong Industrial Complex obtain autonomy in employment, there still is a problem. Unless North Korean workers possess the level of skills required by the Gaesong Industrial Complex, the autonomous employment rights would not bring any desirable effect. The Industrial Complex should be able to employ workers among the skilled manpower in North Korea to improve its quality and productivity. For this purpose, both Koreas need to cooperate to cultivate economically and technologically competent manpower in North Korea.

Raising the level of skills of the North Korean workers is important not only for the inter-Korean industrial cooperation, but also for the development of the North Korean industry. It is, there-

fore, crucial to provide modern equipment and facilities to train the North Korean workers to improve their skills. In order to solve the problems arising from the North Korean worker's lack of technical and functional skills, South Korea should transfer its idle equipment to the industrial facilities and manufacturing factories in North Korea, which stopped operating, and send its technicians to reside in the North and train the workers. Additionally, a governmental plan to dispatch technical skill-training experts to teach production skills should be sought. Because the equipment currently provided to North Korea is limited to that which is used for local production of the enterprises operating in the complex, actual handing over of industrial skills to the North Korea personnel in various areas is not carried out properly.

The following inter-Korea exchange and cooperation plan in the work training area could be suggested to improve the technical and functional level of the North Korean workers.[22] The plan should entail a search for a realistic work training plan; effective training through raising workers' awareness for the needs of training; implementation of a step-by-step training program based on a gradual approach; devising a consistent government funding plan; practice of the plan prioritizing the areas that urgently need training; provision of preparatory training of the manpower and management techniques; and a parallel training for the whole manufacturing process.

Along with the technological and functional training, changing working attitudes through education is also important. It is necessary to help North Korean workers to understand the market

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[22] Kang, Il-Kyu *et al, A study of the South-North Exchange and Cooperation Plan in the Work Training Area* (Seoul: KINU, 2000).

economy mechanism. It will be difficult to transform North Korean workers' attitudes towards work in a short period of time to match that of South Korean workers who are familiar with a market economic system. In order to transform the passive attitude of the North Korean workers who are used to formalism and following orders given from above, the South Korean government and enterprises in the industrial complex should grant sufficient time and patience in their scheme aimed at changing working attitudes.[23]

The South Korean enterprises that moved to the North should be fully utilized for the quality improvement of the North Korean workers. Industrial cooperation should be expanded to teach manufacturing and management technology to North Korean workers who are engaged in consignment processing trade. At the same time, through establishing a stable business base for the enterprises investing in North Korea, along with producing model cases for cooperation projects, and through building mutual trust, the South could take this opportunity to promote North Korea's understanding of a market economic system and to cultivate managerial and technical personnel that can lead the inter-Korean economic cooperation.

As for cultivating economic and technological manpower that can lead the normalization of the North Korean industry, the South Korean government should devise a systemic plan, premised on cooperation with the North Korean authorities, to help labor power training and innovation of the five sectors (food, electricity, coal, machinery and metal processing, railway/transportation)

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23 Kim, Sung-Chol, "Problems with the North Korean Labor Power Employment," *Unified Economy*, No. 70 (October 2000), p. 103.

chosen by North Korea. This includes programs to support training of the North Korean workers by utilizing the technical training center, research facilities, and enterprises in the Gaesong Industrial Complex. The plan will enable mutual exchanges of technical manpower needed between the South and the North. Securing skilled technical manpower through inter-Korea cooperation, factories and enterprises in North Korea will be armed with increased productivity and competitiveness.

Ⅵ. Conclusion

North Korea has been concentrating on the revival of its economy through modernization of the key industries (electricity, coal, metal, etc.) and activation of the agriculture, light industry, and commerce sectors following the July 1 economic measures of 2002. North Korea has finally pulled itself out of the phase of negative economic growth, and has been showing a positive economic growth rate. Nevertheless, the North Korean industry still exhibits a low growth rate due to worn out equipment, shortage of energy, raw materials and foreign currency, and shortfall of Foreign Direct Investment due to the ongoing nuclear issues.

The industrial production capability in North Korea is greatly inferior to that of South Korea. Even this inferior industrial production capability is not operating properly due to stagnation of the energy sector (coal and electricity) and poor production in the basic materials industries (steel), limiting the development of

other industry sectors. Comparing the industrial production output of 2000 to that of 2004, the actual output remains at approximately10-30%, confirming the retarded industrial operating rate in North Korea. Comparing the technological level of different sectors in the South and the North, North Korea seems to lag behind South Korea by at least 5 to at most 30 years. The major problems of the North Korean industry, therefore, may be pinpointed as backward technology and outdated production equipment.

The past economic policy basis for constructing a self-supporting national economy, which encompassed the heavy industry-centered policy, the inward-looking development policy, and the military and economy parallel development policy, had a significant impact on the North Korean industrial structure. Such an economic basis began to lose its importance with the collapse of the socialist bloc at the end of the 1980s. In the 1990s, North Korea proposed a revolutionary economic strategy of prioritizing three areas (agriculture, light industry, trade), and attempted to adjust the economic structure and to correct the industrial imbalance for economic development.

North Korea achieved a rapid industrialization in its economic structure as a result of the policy of prioritizing heavy industry. After recording 64.2% in 1965, however, the share of the industrial sector remained constant with 65% in 1970 and 66% in 1983. The phenomenon proves that the development strategy of industrialization based on heavy industry was no longer working from the end of the 1960s. In the same context, the share of the means of production (the heavy and chemical industry) sector in the total industrial output ceased to increase from the 1970s and stayed around 63.7% in 1975 and 64.8% in 1982.

As the third Seven-Year plan failed to achieve its proposed goals, North Korea adopted and implemented a revolutionary economic strategy of concentrating on agriculture, light industry, and trade from the early 1990s. It stressed the urgency of solving problems in these three areas of grave difficulties in order to resolve the overall economic crisis in North Korea. Simultaneously, it attempted to adjust the economic structure and to correct the imbalance in the industrial structure caused by the previous heavy industry-centered policy, which hindered further economic development. Nonetheless, profound shrinking of the real economic sectors, like mining, manufacturing and construction, resulted in consecutive negative growth in the 1990s.

The industrial structure in North Korea changed significantly during the economic recession period (1990-1998). Firstly, the share of the mining and manufacturing sector and the construction sector, the sectors which were directly affected by supply of energy and raw materials, continued to decrease. The share of the mining and manufacturing sector fell from 40.8% to 25.6%, of which the share of the mining industry dropped from 9.0% to 6.6% and the share of the manufacturing industry dropped from 31.8% to 19.0%. The size of the construction industry was also reduced from 8.6% in 1990 to 5.1% in 1998. Secondly, the industrial imbalance of light and heavy industry was alleviated. During this period, the share of light industry did not alter, but the share of heavy industry dropped more than half from 25.6% to 12.6%. Thirdly, the share of the service sector (alias. the third industry) sharply increased from 18.0% to 35.6% with a significant expansion of the governmental service sector.

Facing these deepened economic difficulties during the buffer period and the shrunken planned economy sectors, North Korea

shifted its economic policy priority orders, in 1998, from development of the three areas to solving food problems and normalization of the leading sectors. Consequently, North Korea returned to the strategy of prioritizing the development of heavy industry while stressing a parallel development of light industry and agriculture. Development centered on heavy industry set the basic line for constructing a socialist economy and for building a powerful and prosperous country (Kang Sung Dae Kuk). Furthermore, North Korea implemented the "Economic Management Improvement Measures" on 1 July, 2002 and introduced further additional economic reform measures, through which North Korea attempted the abolishment of equal distribution, reduction of the state financial burden, and improvement of productivity. With such efforts, North Korea managed to turn its economic growth rate from minus to plus from 1999.

Changes in the North Korean industrial structure during the economic recovery period (1999-2004) display the following features. Firstly, the share of the construction industry and the mining industry expanded. The construction industry increased in proportion from 6.1% to 9.3% and the mining industry increased from 7.3% to 8.7%. Secondly, the share of the manufacturing sector changed little while that of the light industry increased slightly. Thirdly, the share of the service industry remained stable around 32% between 1999 and 2004. The relatively sharp growth of the service industry caused by the shrinking of other sectors during the economic recession period tended to limit the further growth of this sector.

For industrial development, North Korea has to solve challenges that face its overall industry. It has to break the bottleneck of energy and raw materials supply, which is directly linked to its

industrial activities. It also has to improve its capacity to supply raw materials and capital goods from the outside through increasing acquisition of foreign currencies by promoting exports. To increase productivity, North Korea has to facilitate structural adjustment and modernization of the heavy industry sector. In short, the industrial policy of North Korea should be directed towards solving the supply bottleneck, encouraging its export industry, and reorganizing the industrial structure.

Normalization and development of the North Korean industry could be achieved more quickly through expanding the inter-Korean cooperation projects. Both South and North Korea can carry out selective industrial cooperation, strategic infrastructure cooperation, technical manpower training cooperation for the industrial development in North Korea. On the basis of the selective industrial cooperation between the South and the North, North Korea may facilitate labor-intensive light industry and encourage modernization of the key industries as well as the IT industry. The strategic infrastructure cooperation entails inter-Korea cooperation in the energy sector, particularly in the electric power sector, and improvement of the infrastructure in North Korea in the areas of goods distribution and transportation that connects the two Koreas. The inter-Korean cooperation in cultivating skilled technical manpower is equally important for the improvement of competitiveness and productivity in the North Korean industry.