



# **The Republic of Korea's Infrastructure Development**

## **Experiences and Some Lessons for Africa's Developing Economies**

*Okyu Kwon*



THE  
**GROWTH**  
DIALOGUE



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Infrastructure Development:  
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# The Republic of Korea's Infrastructure Development: Experiences and Some Lessons for Africa's Developing Economies

*Okyu Kwon*<sup>1</sup>

## I. Introduction

Infrastructure development plays a crucial role in economic growth, poverty alleviation, and enhancing the competitiveness of developing countries. However, many developing countries don't have the necessary infrastructure, and investment in infrastructure is urgently needed. According to the research done by the Infrastructure Development Finance Company (IDFC), a private investment company, overall infrastructure investment in developing countries needs to be doubled from the current 2–3 percent level of GDP to at least 5.5 percent per annum.<sup>2</sup> The problem is particularly acute in Africa's developing economies, which continue to lag far behind in areas such as telecommunication, electricity, roads, and sanitation.<sup>3</sup> As a result, potential growth as well as delivery of basic welfare services has been substantially limited.

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<sup>1</sup> This paper was prepared for the forum "Regional Infrastructure for Africa's Transformation and Growth" (June 7, 2011, Lisbon, Portugal).

<sup>2</sup> According to estimation of IDFC, in 2008 1 billion people were without access to roads, 1.2 billion without safe drinking water, 2.3 billion without reliable energy, 2.4 billion without sanitation, and 4 million without modern communication. (Source: M.K. Sinha, "Challenges in Infrastructure Development in Emerging Markets," IIA Seminar on Investing in Infrastructure Assets, 10–12 June 2008, Singapore.)

<sup>3</sup> The following are the OECD's estimates:

	Africa	East Asia	Eastern Europe	South America	Middle East and North Africa	South Asia
Teledensity*	62	357	438	416	237	61
Electricity (%)**	24	88	99	89	92	43
Roads (%)***	34	95	77	54	51	65
Sanitation (%)**	36	49	82	74	75	35

\* Fixed line and mobile subscribers per 1,000 people.

\*\*% of population with access to electricity or improved sanitation.

\*\*\*% of rural population living within 2 kilometers of all season road.

Source: Promoting Pro-Poor Growth, OECD, 2007.

The purpose of this paper is to introduce the Republic of Korea's experiences in infrastructure development, which had successfully supported economic development. Lessons learned from Korea's experiences during the second half of the twentieth century can be shared with currently developing economies of Africa.

The paper is organized as follows. Section II discusses Korea's experiences in infrastructure development in the 1960s, the 1970s-80s, and the 1990s and thereafter. Section III focuses on public private partnerships (PPPs) with a discussion of how PPPs were successfully adopted in Korea. The section also touches upon the impact of the recent global financial crisis on PPPs. The paper concludes with some lessons for African developing countries.

## **II. Korea's Experiences in Infrastructure Development**

The Korean economy has performed remarkably well over the past 50 years. It has grown from a war-devastated, subsistence-level economy to an advanced industrial economy. Korea has the world's thirteenth largest GDP and is the seventh largest exporter in terms of value. It is the largest producer of many high-tech products such as semiconductors, LCDs, and mobile phones and has an average per capita GDP of more than US\$20,000. Korea also has shown its economic strength by overcoming the recent global financial crisis ahead of other advanced countries.

Korea's infrastructure development has played a key role in terms of fast growth and alleviation of poverty. Development has progressed through distinct stages. First, in the 1960s, the top priority was to meet the most urgent infrastructure needs, particularly in the transportation and energy sectors. Second, during the 1970s and 1980s, under the medium- to long-term development framework, preemptive and sufficient supply of infrastructure was available. Third, during the 1990s and thereafter, PPPs were widely adopted to complement limited government budgets for infrastructure investment.

### **1. Characteristics of Infrastructure Development in the 1960s <h2>**

In the early 1960s, Korea had a typical poor agrarian economy with most of the industrial facilities of the colonial legacy devastated by the Korean War. Per capita GDP stayed at around US\$60-80 and a vicious circle connecting low investment to low production, to low income, and again to low investment prevailed. More than 40 percent of the government revenues were concessionary aid from a few donor countries.

In 1962, the military government started the First Five-Year Economic Development Plan (1962-67) based on the following principles: First, market mechanisms and economic principles were well respected, but for key industries substantial government intervention was to be allowed through the planning process. Second, considering the narrowness of the domestic market and the



paucity of domestic natural resources, an outward-oriented development strategy was adopted by fostering export industries that utilized labor, the only abundant resource. Third, foreign capital inducement was encouraged to cover capital shortages.<sup>4</sup>

Major indicators of economic performance for the First and Second Five-Year Development Plans were remarkably good as is shown in Table 1.

**Table 1. Major Indicators of Performance, 1962–71**

	1961	1971	1962–71 average growth rate
GNP growth rate (% , 1975 constant price)	5.6	9.4	8.7
Per capita GNP (US\$)	82	278	13.0
Investment ratio (%)	13.2	31.5	—
Domestic savings ratio (%)	3.9	14.2	—
Commodity export (US\$ million)	41	1,132	39.3
Commodity import (US\$ million)	316	2,178	21.3

Source: Handbook of Korean Economy, Economic Planning Board, 1980.

Key characteristics of infrastructure development of this era are as described below.

First, infrastructure investment was made in advance under the framework of the overall economic development plan. The First Five-Year Development Plan, enacted in 1962–66, was aimed at enhancing independent growth away from depending on foreign aid and enlarging the base for industrialization. In terms of infrastructure, investment was focused on the security of energy supply including electricity, construction of industrial sites, and building transportation capacity in order to ensure that infrastructure shortages would not cause bottlenecks on the path to economic growth. The success of Five-Year Development Plans in Korea was mainly the result of efforts and hard work of a government ministry called the Economic planning Board (EPB). The role of the EPB and main tenets of the Five-Year Plans are described in Box 1 and Box 2.

<sup>4</sup> Foreign capital played an important role to maintain Korea's relatively high investment ratio. During the early stage of development, the investment ratio stayed at around 15 percent of GDP, half of which was financed by foreign capital. In the late 1960s the investment ratio jumped to around 25 percent, and around 40 percent of investment was financed by foreign capital since domestic savings began to pick up as income had grown. In the 1970s, the investment ratio once again jumped to around 30 percent of GDP and foreign capital accounted for around 25 percent of the investment in the early 1970s. As domestic savings grew, the role of foreign capital diminished from the late 1980s, as the balance of payment position turned to surplus, capital inflow changed to outflow.

	1961	1962–66 average	1967–71 average	1972–76 average	1977–81 average	1982–86 average	1987–91 average
Investment ratio (%)	13.2	16.3	26.3	28.6	29.4	29.4	31.7
Domestic savings ratio (%)	2.9	8.0	15.6	20.3	24.8	28.6	36.9
Foreign savings ratio (%)	8.6	8.6	10.1	6.8	3.8	0.7	-5.9

Note: Numbers are on the current price basis.

Source: Handbook of Korean Economy, EPB, 1980 and Major Statistics of Korean Economy, EPB, 1992.

**Box 1. The Economic Planning Board (EPB)**

The EPB was established in July 1961 and merged with the Ministry of Finance to form the Ministry of Finance and Economy in December 1994. The main function of the EPB was to pursue a systemic economic development plan with a long-term goal, which had the utmost importance especially at the beginning of development. To this end, the head of the EPB took the position of the Deputy Prime Minister (DPM) as well as the chair of Economic Ministers Meeting. He had full power in coordinating economic policies, mobilizing financial resources including budget and foreign capital (which was one of the scarcest resources), and hosting a monthly economic conference and reporting to the President. This meant that the DPM could effectively coordinate economic policies and support development plans by taking a strong hold on financial resources. Without any clients or vested interest group, the EPB maintained its unrivaled position as a leading, neutral, and professional organization in economic policy making. The success story of the EPB was also indebted to continuous overseas training opportunities given to its staff using almost 10 percent of foreign loans rendered to the Korean government during the development era.

**Box 2. The Five-Year Economic Development Plan**

Korea's First Five-Year Development Plan (1962–66) started in 1962 and the Sixth (1992–96) was the last, finished in 1996. The government-led industrialization was possible mainly thanks to high-caliber government officials inherited from the traditional Confucian culture, strong financial and tax incentives, ample supply of skilled manpower, and government-funded R&D activities. The target-oriented Five-Year Plans worked well in Korea, but a more important tenet of the plan was to conduct policy-planning exercises that anticipated the future policy environment. During the planning procedure, the relevant government officials, government think tanks, the private sector including business federations and research organizations, and even journalists and academia experts joined together seriously thinking about the future. Through this process, the participants had opportunities to consider advanced country models as benchmarks and prepare for the necessary changes. To materialize five-year plan goals and targets, every year the EPB formulated the annual economic management plan reflecting changes in the environment. In the late 1990s as private sector capabilities grew, five-year planning was replaced by longer-term spatial planning that has continued to this day.

Second, the symbolic importance of large-scale infrastructure projects to stimulate people's desire and will to develop cannot be overemphasized. In case of Korea, it was the Kyungbu Expressway, the first cross-country expressway of 428 kilometers connecting Seoul, the capitol city, and Busan, the largest seaport on the Korean peninsula. It was initiated by late President Park, who was much impressed by German autobahns. Naysayers among the experts doubted the economic feasibility of the project, citing expectations of low traffic on the route. However, President Park followed his own expectations of a much bigger increase. He also saw that the new expressway would symbolize the country's strong will to develop, and would shorten the travel time between cities and rural areas, an essential factor of modernization. This project demanded a tremendous amount of money, equivalent to more than 4 percent of the total annual government budget. The president himself drew detailed routes through aerial surveys in helicopters. With the president driving the project, the biggest project till then in Korean history was completed in just two and a half years, from February 1, 1968 to July 7, 1970. Of course, supply created demand so that the capacity of the road was saturated rapidly. After that, a series of expressway construction projects followed, eventually forming a nationwide network that included the Kyungin Expressway (constructed March 1967–December 1968), the

Honam Expressway (constructed April 1970–November 1972), and the Yungdong Expressway (constructed March 1971–October 1975). Thanks to these efforts, the first round of expressway networks was finished and dispersion of industrial site development was further promoted.

Third, sufficient investment on infrastructure could be realized thanks to successful financing. The portion of infrastructure investment in gross fixed capital formation during 1962–71 was more than 30 percent (Table 2). For financing, a Special Account was introduced for infrastructure investment. Revenues in that account came from a petroleum tax, tolls, government road bonds, and borrowings from international financial organizations such as the World Bank and Asian Development Bank. Commercial loans were also actively utilized. Of course, all these efforts could not have brought sufficient investment on infrastructure without the government’s healthy operation of public finances.

**Table 2. Share of Infrastructure in Gross Fixed Capital Formation**

(KRW billion in 1970 constant price)

	1962	1965	1968	1971
Gross fixed capital formation (A)	133.9	195.3	498.3	680.6
Electricity, water, sanitation	14.0	11.4	55.1	60.0
Transportation, storage, telecom	30.9	37.1	131.2	177.8
Sub-total (B)	44.9	48.5	186.3	237.8
B/A (%)	33.5	24.8	37.4	34.9

Source: *The Korean Economy: Six Decades of Growth and Development*, Korea Development Institute (KDI), 2010.

Fourth, efficient infrastructure construction was possible thanks to well-established institutions and an effective legal framework. Traditionally infrastructure was provided by government-controlled monopolies in many countries and because of that, infrastructure investment faced many weaknesses such as high costs and poor performance of infrastructure investments, bureaucratic decision making leading to delays in infrastructure construction, underpricing of services due to political interests, opaque legal frameworks that led to collusion and corruption, and so on. In the case of Korea, however, well-established institutions and an effective legal framework allowed the country to avoid such common pitfalls. The public corporation in Korea, as a monopoly supplier of infrastructure, could attract high-quality manpower by offering adequate compensation and job security. A legal framework, particularly the bidding system, also could prevent collusion and corruption to some extent.<sup>5</sup>

<sup>5</sup> For example, in international open bidding when foreign loans were used, a very strict rule-compliance was required from feasibility study to execution drawing to construction supervision, which helped prevent collusion and corruption. In addition, as famous foreign engineering companies were invited, domestic companies could learn from them through joint participation, which provided stimulus and a momentum for development of domestic construction industry.

## **Characteristics of Infrastructure Development in the 1970s and 1980s**

After the successful completion of the First and Second Five-Year Economic Development Plans, priority was given in the 1970s and the 1980s to manufacturing facility expansion and infrastructure construction to support it. The dominant goal of the Economic Development Plan, i.e. an outward-oriented industrialization, was maintained. Also, after experiencing oil shocks, energy security issue became top priorities. Characteristics of infrastructure investment of this era were as follows.

First, the infrastructure investment plan was formulated under a longer-term and more comprehensive framework. The First (1972–81) and Second (1982–91) Ten-Year Long-Term Comprehensive National Land Development Plans provided that framework. According to the vision of national land set forth in the Plan, dispersion of industrial sites, construction of utility network including energy, and comprehensive transportation network connecting roads, railways, harbors, and airports should be determined with the same long-term strategy.

In the case of roads, the nationwide expressway network was expanded, followed by the construction of national roads (a lower-class road below expressways that the central government constructs and maintains) to link industrial sites, ports, and big cities. The goal was to address potential traffic increases; enlargement and pavement of roadways were also emphasized. For financing purposes, a Road Construction Special Account was introduced and for its revenue, a Special Excise Tax on Petroleum was levied as an object tax.

Development in regions that had lagged behind could now be substantially promoted thanks to the nationwide expressway network, which made possible dispersion and connection of industrial sites as well as improved mobility of people. In addition, deep-rooted regional conflicts between the southeast and southwest parts of the peninsula were moderated thanks to these dispersion and connection functions of the new roads.

In the case of railways, in order to expand transportation capacity, railway electrification projects continued, and the metropolitan subway system was built in the Seoul area in 1974 as well as in five other big cities: Busan, Daegu, Incheon, Gwangju, and Daejeon.

Second, after experiencing the first and second oil shocks, securing a stable energy supply became a top priority. To cope with such circumstances, a comprehensive approach was undertaken as described in Box 3.

Third, development of the construction industry by actively participating in overseas construction could bring in higher levels of technology, and, as a result, greatly contribute to efficient domestic infrastructure development and to the successful adoption of PPP in later stages. Korean construction companies had a comparative advantage due to their abundant supply of high-quality skilled workers, strong work discipline, and relatively low wages. Wages were at least by 10 percent less than those of competitors, and therefore, in 1982 alone, overseas construction orders exceeded US\$13 billion. Korean construction companies were

then able to learn advanced construction technology, construction management skills, financial know-how, etc. from their advanced foreign partners, which contributed to more efficient domestic infrastructure development.

### Box 3. Energy Supply

From the beginning of economic development, the energy issue has had top priority because Korea's energy endowment was extremely poor. As is seen in the Table 3, per capita energy consumption in 1961 was a meager 0.38 thousand tonnes of oil equivalent (TOE), and more than 50 percent of that was from wood charcoal. During the First Five-Year Plan period, the Korea Electric Power Corporation (KEPCO) and Korea Coal Corporation, both government corporations, played a key role in securing energy supply by maximizing development of domestic energy sources such as coal mining and hydroelectric generation.

**Table 3. Composition of Energy Sources at the Beginning of Development**  
(Unit: Thou. TOE, %)

	1956	1961	1966	1971
Total Consumption	8,756 (100)	9,711 (100)	13,057 (100)	20,868 (100)
Coal	1,634 (18.7)	3,103 (32.0)	6,029 (46.2)	5,872 (28.1)
Petroleum	518 (5.9)	809 (8.3)	2,167 (16.6)	10,559 (50.6)
Hydro power	129 (1.5)	163 (1.7)	246 (1.9)	330 (1.6)
Wooden charcoal	6,473 (73.9)	5,636 (58.0)	4,611 (35.3)	4,101 (19.7)
Per capita consumption	...	0.38	0.44	0.64

Note: Shares of composition are in the parenthesis.

Source: Korea Energy Resource Institute, *Annual Yearbook of Energy*, 1984.

From the Second Five-Year Economic Development Plan, the government started to foster heavy and chemical industries, which demanded high energy intensity. Although during 1967–68 there were occasional shortages in power generation capacity due to rapidly increasing demand, the government put the highest priority on power supply security. By allocating more funds from the budget and foreign loans, the government successfully promoted an ambitious plan to secure power supply. As a result, by 1971, power generation capacity had increased to 2.63 million kilowatts, which was less than 4 percent of generating capacity in 2010, but seven times more capacity than in 1961. Most of the increase in electricity supply was from new thermal power generation plants due to exhaustion of hydro generation potential. In addition, since energy security was closely related to independence from global major petroleum companies, many Korean conglomerates, such as LG, Lotte, Hyundai, Ssangyong, and Hanhwa, made joint ventures with global petroleum companies as well as with suppliers in the Middle East to construct refinery plants.

After experiencing the first oil crisis, the government established the Ministry of Power and Resources in 1978, and formulated the Long-Term Power Resource Development Plan. According to the plan, energy supply structure was to be changed away from the highly petroleum dependent system toward a more diversified system. Since then, liquefied natural gas (LNG) and flaming coal have been actively imported and utilized. Particularly, the government began to build nuclear power plants to meet rapidly increasing electricity demand. In 1978, the first nuclear power plant was put in commercial operation and a total of six units were constructed during the 1970s. Of course, at the beginning, Korean companies did not have any experience in constructing or operating nuclear power plants, and advanced country contractors constructed plants on a turnkey basis.

Soon, however, many Korean companies, which jointly participated in construction of nuclear power plants, accumulated relevant experiences and technologies. Later, KEPCO established its own Korean standard model and Korean companies fully localized construction technology including turbines and plant operational know-how. Currently, 28 nuclear power plants are being operated in Korea, which is the fourth highest number in the world after the United States, France, and Japan.

*(Box continues on next page)*

**Box 3 (continued)**

In 2009, Korea won a US\$4 billion bid to construct and operate four units of nuclear power plants for the United Arab Emirates by Korean standard model. In Korea, a stable electricity supply was possible during most of the development era thanks to continuous construction of nuclear power plants, and the share of nuclear power is now around 43 percent of the total supply of electricity.

In terms of financing, the government established the Petroleum Business Fund, the revenue of which came from surcharging on petroleum. Although high oil prices eventually subsided, by maintaining high domestic oil prices, the government could secure a substantial amount of money to invest in the construction of nuclear power plants. KEPCO also successfully issued global bonds with the government's repayment guarantees and secured enough funds to expand power supply capacity. The government's high energy price policy for KEPCO to cover investment costs also helped KEPCO make a continuous timely expansion of power supply capacity.

**Table 4. Major Indicators of Electricity Supply**

	1980	1985	1990	1995	1998
Generation capacity (MW)	10,375	17,640	24,056	35,356	47,983
Generation quantity (GWh)	40,078	62,667	118,461	203,546	237,197
Supply buffer ratio (%)	40.1	31.3	8.3	7.0	14.9
Shutdown min. per household	891	523	295	39.2	21.2

Source: KEPCO, Korea Electricity Statistics, 1999.

**Characteristics of Infrastructure Development in the 1990s and Thereafter**

During the 1980s, infrastructure investment lagged behind the pace of development. Therefore distribution costs and congestion costs increased substantially, resulting in a deterioration of national competitiveness. The share of infrastructure investment in GDP in 1990 was 2.28 percent, which was considered very low compared to the 1970s. As a result, distribution costs as a percentage of GDP were estimated to be 15.4 percent in 1993, and private companies' average distribution costs compared to sales value to be 17 percent.<sup>6</sup> Congestion costs were also estimated to be 6 percent of GDP. All this contributed to the deterioration of industrial competitiveness. Therefore, the government put a higher priority on expenditure for infrastructure investment and began actively utilizing private capital through PPP. Characteristics of infrastructure development of this era were as follows.

First, in order to save distribution costs, the government substantially increased investment on transportation (Table 5).

**Table 5. Share of Transportation Investment in GDP**

	1990	1993	1996
Transportation investment/GDP (%)	2.28	4.30	4.33

Source: *The Korean Economy: Six Decades of Growth and Development*, KDI, 2010.

<sup>6</sup> These numbers were considered to be extremely high compared to that of the United States and Japan, estimated at 7 percent and 11 percent respectively (*The Korean Economy: Six Decades of Growth and Development*, KDI, 2010.)

However, due to political pressure, infrastructure investment was somewhat skewed toward some roads and airports, which led to delays in construction of other urgent infrastructure projects and brought about inefficiencies since those less urgent projects only handled small amounts of traffic.

Second, facing government budget constraints, PPP was introduced in 1994 and thereafter widely used. Success factors of PPP in Korea are as follows; (i) various government supports such as financial support, risk sharing structures, credit guarantee schemes, and tax incentives were provided; (ii) the Public and Private Infrastructure Investment Management Center (or PIMAC) was established to provide professional services throughout the PPP procedure including feasibility studies, value for money (VFM) tests, proposal evaluations, and support for negotiations; and (iii) foreign investors were successfully invited. Details of Korea's PPP experiences will be discussed in the next section.

### **III. Korea's PPP Experiences and Impact of Financial Crisis on PPP**

#### **Major Functions of PPP**

Korea introduced Public-Private Partnership programs with the enactment of the Act on Promotion of Private Capital into Infrastructure Investment in 1994.<sup>7</sup> Major functions of PPP that the Korean government expected were as follows: (i) to be an effective alternative to tackle the financial constraints that the government faces; (ii) to provide better and more efficient public services by taking advantage of the private sector's know-how and creativity; and (iii) to create stable and long-term investment opportunities for private investors by providing safe and reliable places to invest. Toward this end, the government role in PPP projects is to plan, evaluate, approve detailed execution plans of the concessionaire, and support implementation of the projects, while the private partner's role is to design, build, finance, and operate the facilities.

#### **Evolution of the PPP Act**

Just before adoption of the PPP Act, the government introduced the Total Project Cost Management System to control the ever-increasing cost of infrastructure investment by escalation clauses or changes in design. In 1994 when the PPP Act was introduced, the government seemed to consider PPP projects based on the existing type of business permit with strong government discretion. However, when the Incheon Airport Expressway project, which was the first PPP project in Korea, was undertaken, it was based on an execution agreement that defined

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<sup>7</sup> In 1994 when Korea seriously introduced PPP for the first time, Korea's per capita GDP was US\$9,727. In 1998 when more market contract-oriented PPP was introduced, per capita GDP deteriorated to US\$7,607 due to Asian financial crisis.

several important market contract-oriented components, including profitability. Since then, every year the government has formulated the Basic Plan for PPP, but the actual number of projects undertaken was small.<sup>8</sup>

In 1998, the Act was revised and clearly stipulated that the PPP projects were to be undertaken on the basis of execution agreement between the relevant ministry and concessionaire. In this agreement, the concessionaire's responsibility was increased and at the same time many supporting measures were introduced such as the minimum revenue guarantee (MRG),<sup>9</sup> request for government's buyout, credit guarantee expansion, etc. In particular, the Private Infrastructure Investment Center of Korea (PICKO), a supporting agency, was established under the Korea Land Institute, a government think tank, to undertake feasibility studies and provide other necessary services. Thanks to these reform measures, the PPP contracts could take on more characteristics of market contracts and lead to an open and fair competition through public participation procedure.

In 2003, in order to promote competition further, other market-type measures were allowed, including participation of financiers, the introduction of an infrastructure fund, a proposed compensation scheme for dropout of concessionaires, relaxation of concessionaire's floor plan, and so forth. In 2005, additional reform measures were undertaken: private proposals without effective competition were not to be selected and in evaluation, and the price factor came to take on more than 50 percent weight.

Changes of the Act after the global financial crisis are described in a later section.

### **Implementation Methods of PPP Projects in Korea**

In Korea, the most sought-after PPP implementation methods were Build-Transfer-Operate (or BTO) and Build-Transfer-Lease (or BTL). In the beginning, PPP projects were centered on transportation infrastructure using BTO. After the revision of the PPP Act in 2005, the PPP projects also used the BTL method to cover social infrastructure projects such as schools, healthcare facilities, culture and sports centers, and public rental housing. In BTO projects, the private partner realized a reasonable return on its investment by charging a user fee, while in BTL projects the private partner recovered its investment through payments made by the central or local government. According to the PPP Act and its Enforcement Decree, 46 types of facilities in 15 categories were defined as eligible infrastructure types for PPP projects (see Annex 1.)

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<sup>8</sup> During 1995-98, despite the government announced 45 projects amounted to 35 billion US dollars, only 10 projects were actually undertaken.

<sup>9</sup> MRG contributed at the beginning to vitalization of PPP by lessening the burden of the concessionaire. However, MRG was weakened after 2003 and finally abolished in 2009 due to the moral hazard problem created by concessionaire demand and continuously increasing fiscal burdens.



## Achievements of PPP in Korea

Private investment has been continuously increasing since the introduction of the PPP Act and has played a key role in providing infrastructure in a timely manner, complementing public investment. The proportion of private investment to public investment in infrastructure increased from 3.9 percent in 1998 to 15.4 percent in 2009. By the end of 2009, 461 PPP contracts had been awarded, of which 106 BTO and 145 BTL projects were completed to provide services to the public.

**Table 6. Share of PPP in Government Infrastructure Investment**

(Unit: KRW trillion, %)

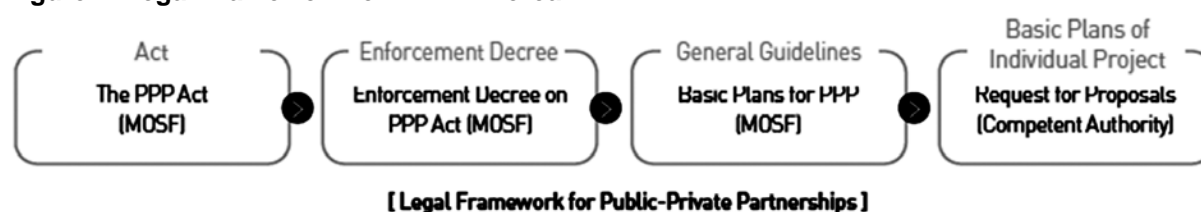
	1998	2003	2005	2007	2009	Sum
Private investment by PPP	0.5	1.0	3.0	6.0	9.6	70.9
BTO	0.5	1.0	2.9	3.0	3.1	51.1
BTL	—	—	0.1	3.0	6.5	19.8
Share in gov't investment	3.9	5.6	16.1	17.0	19.7	—

Source: *The Korean Economy: Six Decades of Growth and Development*, KDI, 2010.

## Success Factors of Korea's PPP Projects

First, the PPP Act provided a very clear legal framework. According to the Act, the Ministry of Strategy and Finance (MOSF), considered to be the most competent government ministry, was designated as the main regulator to draw up the Basic Plan for PPP and to direct government policy. Implementation of procedures, rights and obligations, as well as a risk-sharing mechanism, are clearly defined in the Act to effectively reduce potential business risks for private sector participants.

**Figure 1. Legal Framework for PPP in Korea**



Second, the supporting agency was established under government think tanks. PICKO in the 1988 Act was initially established under the Korea Land Institute, providing services such as feasibility studies. Later, PICKO was expanded to become the Public and Private Infrastructure Investment Management Center (PIMAC) by the 2003 Act under the Korea Development Institute (KDI) in order to provide a wide range of professional support for PPP projects and to conduct research on PPP policies as the demand for professional services increased and as experiences were accumulated. PIMAC consists of experts from various fields including economics, finance, accounting, law,

engineering, urban planning, and more, and is providing various professional services throughout the entire PPP procurement process such as carrying out feasibility studies and VFM tests,<sup>10</sup> formulating the Request for Proposal (RFP), evaluating proposals, and supporting negotiations. PIMAC also offers training programs for government officials, and explores cooperation opportunities with international organizations and foreign countries.

In short, thanks to PIMAC, PPP implementation conditions are thoroughly considered, while transparency can be enhanced with a competitive bidding process for the selection of private partners.

Third, the government has rendered strong support to stimulate investment in PPP projects. There are two types of support to the private sector: financial support and risk-sharing measures. Six measures that can be considered as financial supports and/or risk-sharing supports are being provided:

- (i) *Support for land acquisition by concessionaires.* Concessionaires are granted land acquisition rights as well as the right to use national and state or public land free of charge. Concessionaires can entrust the relevant government authority with the execution of land purchase, compensation of loss, resettlement of local residents, and other related administrative tasks.
- (ii) *Financial support.* In order to maintain an appropriate user fee level, the government covers 100 percent of land acquisition costs for any projects, and construction subsidies to the concessionaire, if necessary.<sup>11</sup>
- (iii) *Risk sharing.* When PPP projects are terminated for unavoidable reasons during construction or operation, the government takes over management and operation rights of the facility, and offers a certain amount in termination payment to the concessionaire.<sup>12</sup> The concessionaire could request a government buyout of the project if termination of construction or operation of facility was due to unavoidable incidents including force majeure. However, some of the measures, adopted to invite more foreign capital right after the Asian financial crisis, were all abolished to avoid moral hazard. Measures abolished included foreign exchange rate risk sharing and the minimum revenue guarantee. Excessive incentives to attract capital,

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<sup>10</sup> A feasibility study evaluates and determines whether or not to pursue a project, while a VFM test determines whether it is more beneficial to pursue it as a PPP project rather than a government-funded project.

<sup>11</sup> For road projects, the subsidy is given up to 30 percent of the total investment. For railway projects, it's given up to 50 percent of the total investment. For ports, it's given up to 30 percent of the total investment.

<sup>12</sup> The government guarantees redemption of the minimum costs of the projects which are the private investment capital plus investment return ratio that is comparable to the interest on government bonds.

when combined with inaccurate prospects for interest rates, exchange rates, or demand, may result in a substantial future fiscal burden, the opposite of a PPP's intended purpose.

- (iv) *Credit guarantee.* Credit guarantee schemes can be given by the Korea Infrastructure Credit Guarantee Fund (KICGF) according to the PPP Act to provide credit guarantees for concessionaires who obtain bank loans from financial institutions or issue infrastructure bonds for PPP projects. The maximum guarantee limit is KRW 300 billion, with guarantee fees being determined within the range of 0.3–1.3 percent, depending on the degree of the project risk and the company's credit standing. The guarantee for subordinate debt is up to 20 percent of the total guaranteed amount.
- (v) *Tax benefits.* Various tax benefits are granted for PPP projects including the following:
- A zero percent value-added tax is assessed for construction services of revertible infrastructure facilities.
  - Acquisition and registration taxes for BTO projects are exempt.
  - A separate tax rate of 14 percent is applied to income generated from the interest on infrastructure bonds with maturity of 15 years or longer.
  - A separate tax rate is applied to dividends from infrastructure fund investment. (The 5 percent tax rate is applied to investments below KRW 300 million, and the 14 percent to investments above KRW 300 million. The dividends from the SPC are tax-exempted if more than 90 percent of their profits are distributed as dividends.)

Fourth, success in inviting foreign investors is also an important factor. Foreign investors are treated the same as domestic investors and further entitled to additional benefits including tax credits and financial support. Additional support for foreign investors is provided as follows:

- When foreigners invest more than US\$10 million to build PPP facilities in a Foreign Investment Area, tax breaks are granted in the areas of corporate tax, income tax, acquisition tax, registration tax, and property tax.
- When foreign exchange losses arise from loans in foreign currency for construction due to fluctuation in the foreign exchange rate, the government can offer subsidies or long-term loans.
- For projects in which foreign investments account for a significant portion of the total investment, each foreign investor's position is respected to the fullest extent with respect to language and provisions for conflict resolution in the concession agreement.

Table 7 shows the extent of some foreign participation in projects.

**Table 7. Foreign Participation in Projects**

Instrument	Projects
Equity	Busan New Pore Phase 1 (25%), Incheon Bridge (23%), Yongin LRT (26%), Busan New Port Phase 2, 3 (18.5), Daejeon Riverside Expressway (67%), Songdo-Mansu Sewage Treatment Facility (80%), Busan Aquarium (100%)
Debt	Busan New Port Phase 1 (43%), Daejeon Riverside Expressway (83%), Daegu-Busan Expressway (10%), Seoul Beltway (11%), Busan Aquarium (100%)

Lastly, since the recent financial crisis, Korea's PPP projects have been allowed to use flexible financing conditions. For example, for the financial security of the project, private partners need to maintain a minimum required equity ratio. Thus, during the construction period, project companies are required to maintain an equity ratio of at least 20 percent for a BTO project, or 5 percent or more for a BTL project. However, when the investment ratio of financial investors is above 50 percent of the total equity, the minimum required equity ratio during construction could be lowered from 20 percent to 15 percent. The concessionaire is also allowed to refinance according to changes in the macroeconomic environment, project risk, and so forth. Refinancing gain is shared between the concessionaire and the government to benefit both parties. The refinancing gain can be used to lower the user fee so that facility users can also benefit from refinancing. Financing through the Infrastructure Fund is also encouraged to diversify investor profile.<sup>13</sup>

### **Impact of Recent Financial Crisis on PPP**

#### *Global PPP trend after the financial crisis*

The global financial crisis that began in 2008 has made financing for PPP projects more difficult to secure. Both existing and planned PPP projects have been affected through various channels, such as availability and cost of credit, lower growth, and unforeseen exchange rate movements. Depending on the contractual arrangement between the public and private parties, changed distribution of risks can shift the cost burden between parties, weakening the attractiveness of PPP projects. As a result, some planned PPP projects have been delayed, restructured, and to a lesser extent, cancelled. Transport and energy have been the worst affected sectors so far, while middle-income countries have been the most affected, especially in the Eastern Europe and Central Asia region where the domestic capital market was dominated by severely hit western financial institutions. In comparison to these regions, East Asia, Sub-Saharan Africa, and the Middle East and North Africa returned to a stable position in PPP

<sup>13</sup> The Infrastructure Fund is an indirect investment facility that collects funds from investors to lend and invest in PPP projects, while also distributing profits to multiple investors. Regulations on asset management and financing have been eased to promote the use of the Infrastructure Fund. Investments through the Infrastructure Fund increased from KRW 80 billion in 1999 to KRW 3.3 trillion in 2008, with a total of 10 funds being managed at present.

investments after a short period of stagnation. Latin America and South Asia were the least affected and even attracted higher investments. In most of the region, recovery has been driven by large PPP projects, where there was enough liquidity in domestic financial markets and government assumed more risk sharing.<sup>14</sup>

### *Government responses*

Most countries, with their objectives to support their PPP programs, are revising their basic risk assignment framework and financing role. The tendency appears to be for the government to assume either a larger share of the risks or assume risk that otherwise would not have assumed. For example, more governments are taking the following measures:

- reviewing their PPP framework including strengthening of PPP laws and units to provide solutions in an equal and timely manner;
- allowing a minimum revenue guarantee either in an absolute level or an annual basis and increasing the level;
- facilitating bank lending or even providing it through government financial institutions or infrastructure investment fund;
- providing broader guarantees covering a broad reach of contract terms; and
- providing upfront government payments to facilitate private sector financing.

### *Korea's policy responses*

In the case of Korea, the impact of the financial crisis on PPP was also substantial at the beginning by decreasing PPP project profitability, leading to a sharp decline in the number of new PPP projects as well as failures of pipeline project financing closure. Facing these difficulties, the government implemented the PPP Revitalization Plan twice, in February and August, 2009; the main objective was to provide liquidity and mitigate the risks. The February measures included the following:

- providing a special loan program in collaboration with Korea Development Bank, i.e. a one-year bridge loan to be redeemed upon formal financial closure with a guarantee by the Korea Infrastructure Guarantee Fund;
- increasing the guarantee limit per project from KRW 200 billion to KRW 300 billion, and for subordinate debt guarantees, from 4.5 percent to 20 percent of the total amount guaranteed;
- lowering the ratio of required equity to total project costs by 5 to 10 percent;

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<sup>14</sup> Luis Guash, "PPPs: Impact and Responses to the Crisis and Moving Forward," (ASEM PPP Conference, Seoul Korea, October 2009).

- shortening resettlement period for the base bond rate from five to two years, in order to reduce the risk of interest rate fluctuation; and
- introducing a new compensation standard for the gap between the base bond rate and interest rate for loans by allowing sharing of the upside and compensation of the downside.<sup>15</sup>

Thanks to the February 2009 measures, BTL was substantially revived, but BTO needed additional measures. Therefore, the August 2009 measures were implemented as follows:

- encouraging supplementary projects to improve profitability;
- increasing the coverage for compensation on termination for unavoidable reasons from up to 55 percent to 85 percent of the investment cost; and
- developing a risk-sharing system for the government to undertake more risks by compensating the raw cost of projects.

Additional measures in the August plan to improve financing conditions included the following:

- revitalizing infrastructure bonds by expanding the scope of eligible institutions for bond issuance and securing guarantee support from Korea Infrastructure Credit Guarantee Fund; and
- establishing the Public Infrastructure Fund in which both public and private institutions may participate with greater tax incentives for investors.

However, as mentioned above, the government does not intend to adopt extreme supportive measures such as a general buyout right, foreign exchange rate risk sharing, and minimum revenue guarantee.

Having recorded a fast recovery from the global financial crisis ahead of other advanced countries, and thanks to appropriate policy adjustments made in a timely manner, Korea has shown a very positive rebound of PPP projects.

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<sup>15</sup> For risk-sharing, the government set up a new standard called the risk-sharing revenue. This is the amount of operation revenue that guarantees the investment return ratio that is comparable to the government bond's rate of return. If actual operation revenue falls short of the risk-sharing revenue, then the private sector's internal rate of return (IRR) is less than government bond's rate of return, which is not satisfactory to the concessionaire. So, in this case, the government will pay the amount of shortfall to the concessionaire. Vice versa, if actual operation revenue exceeds the risk-sharing revenue, government subsidies will be redeemed on the basis of the realized payments.

On the part of private sector, they also should share the risk. So, if actual operation revenue is less than 50 percent of the risk-sharing revenue, the government assumes it as private sector's delinquency and therefore does not provide subsidy for the amount of shortfall. All in all, the concessionaire must also try to keep up the revenue level above 50 percent of the risk-sharing revenue.

### III. Some Lessons for African Emerging Economies

Considering Korea's successful implementation experiences in infrastructure development, some lessons can be drawn for current African developing economies suffering from shortages in infrastructure.

First, efficient infrastructure development requires that the government formulate a concrete vision for the future of the nation, which can be laid out in a high-quality, medium-term comprehensive economic or land development plan. Since infrastructure is closely related to current and future industry placement, urbanization, and daily lives of the general public, and since it takes considerable time to arrange infrastructure investment, a comprehensive and medium-term approach is essential.

Unfortunately, many African countries lack planning and implementation capacity, and institutional infrastructure is frequently inhospitable to business. Under these circumstances, it would be useful to establish a strong planning organization, or strengthen an existing one. An example is the Economic Planning Board of Korea in the development era, which had full power in economic policy coordination and a strong hold on domestic and foreign finance. In addition, it is also important to provide continuous training opportunities for staff of that organization. In this regard, Korea's knowledge sharing program could draw upon the country's own experiences to provide planning exercises, a roadmap for a national agenda, guidelines for institution building, and on-the-job training for staff of planning organizations. Another institution that helped Korea's fast transformation was KDI, a government think tank established in 1971. The researchers at KDI were recruited with a good compensation and included PhD degree holders educated in developed countries like the United States, United Kingdom, Germany, France, and Japan. Once a strong planning organization and a supporting think tank are set up, a high-quality medium- to long-term infrastructure development plan can be formulated in a close consultation with international financial organizations.

Second, a leading role of infrastructure development for economic growth as well as poverty alleviation should be emphasized. In order for infrastructure not to be a bottleneck for economic development, preemptive, sufficient, and steady infrastructure investment is necessary. If infrastructure is neglected at any stage of development, future social costs such as deterioration of competitiveness, loss of opportunities for more equitable development by region, or congestion cost would be tremendous. To this purpose, as the private sector does not have enough capacity to get involved yet in many African countries, the government should take initiatives and a top-down approach is essential. Capital should be attracted from developed countries, and foreign companies should be

encouraged to jointly work with local companies.<sup>16</sup> Through these efforts, the local private sector could accumulate relevant experiences and technologies. In order to avoid collusion and corruption, a transparent bidding procedure as well as strict construction supervision is essential.

Third, in the case that infrastructure is still provided mainly by government-controlled monopolies, it is desirable to adopt a wide use of PPP. This surely provides a useful solution to many problems that the public sector has faced such as inefficiency and low capital availability. For the government, infrastructure services are essentially monopolistic in nature and, therefore, outright privatization may not be a good public policy option since efficiency versus equity issues arise. In addition, as budget constraints are being intensified in many countries, PPP, with government supervision, could provide competition, efficiency, and capital. In the case of Korea, PPP started to be utilized when Korea reached the middle-income level, not because PPP is relevant to income level, but because the country came to know PPP at that time. Therefore, it seems that current African countries need not to wait until they reach middle-income levels of development; regardless of income level, there should always be a possibility to use PPP. If domestic companies do not have the capacity to supply infrastructure development, then foreign suppliers can become development partners and domestic partners can learn from joint participation as many Korean companies did in the past.

In Asia as a whole, regardless of income level or market maturity, PPP is widely used. This also indicates that there is potential for African countries to adopt PPP once better environments for PPP are provided.<sup>17</sup>

Fourth, for vitalization of PPP, it is essential to establish a strong framework to coordinate the interests of different stakeholders involved in PPP. The government is interested in ensuring the growth of infrastructure and formulating effective public policy while the private sector is interested in maximizing the return on their investment. PPP regulators are interested in ensuring transparency and balancing interests of different stakeholders while consumers seek to realize their value for money. Considering the diverse

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<sup>16</sup> In cases where infrastructure construction is funded by foreign aid and carried out by the donor country's workers, it is necessary for domestic companies to join together with local workers. Without a joint participation of local companies and workers, the effects of foreign aid will be limited in fostering domestic construction companies and skilled workers.

<sup>17</sup> According to the UK subsidiary of RREEF, the real estate division for the asset management activities of Deutsche Bank AG., attractiveness of infrastructure investment depends on population, market size, GDP growth rate, interest rate, country risk, legal framework, and maturity of market. In this regard, India and China, as medium-matured markets, are the key infrastructure investment destination in terms of power generation, electricity distribution, water, ports, airports, road, and railways. For high-matured market like Korea and Taiwan, China, power, water, ports, airports, road, and railways have potential to attract PPP. For other high-matured markets like Singapore, power, ports, and road have potential. For low-matured market like Vietnam, power, ports, road, and railways have potential. (Peter Hobbes, "The Opportunities and Challenges Associated with Investing in Asian Infrastructure," IIA Seminar paper, 10-12 June 2008, Singapore).



interests of different stakeholders, a good framework for coordination should be established. The framework should include the following elements:

- The role of policy makers should be given to the most competent government organization, like the Ministry of Strategy and Finance in Korea, in order to formulate transparent, predictable, and streamlined policies. All the important aspects of PPP, such as planning, financing, and implementation should be handled by this organization, which will help minimize regulatory risks.
- The regulatory framework should be clearly stipulated by law as in Korea's Act of Private Participation in Infrastructure of 1998, a revised version of the original 1994 Law, and Presidential Decrees under the Act.
- A transparent and efficient PPP process should be put in place, which may need an independent and professional regulator like Korea's PIMAC providing professional services throughout the PPP process to ensure transparency and efficiency. However, it is noteworthy that the regulatory capacity of PIMAC had to be developed from modest beginnings. At an initial stage, PICKO could only provide limited services like feasibility study. As experience accumulated and capacity was developed, PIMAC expanded to provide a wide range of professional services.
- A reasonable level of incentives is necessary to attract domestic and foreign private investors by securing an appropriate rate of returns. Note that the private sector also faces challenges in pursuing PPP such as high up-front costs, late returns on investment, multi-faceted risks and uncertainties, and limited access to financial markets. Therefore, the government may need to find innovative ways to resolve financial bottlenecks and to achieve optimal risk allocation and mitigation between the parties, if necessary. Given Korea's positive outcomes, the six government support schemes—support for land acquisition, credit guarantee, termination payment, risk-sharing structure, tax benefit, and construction subsidy—seem to be well designed.

However, overly protective incentives, such as a minimum revenue guarantee, an unconditional government's buyout scheme, or foreign exchange rate risk sharing, are not desirable since they may cause moral hazard and may increase future fiscal burden when combined with inaccurate predictions of interest rates, exchange rates, or demand. This would be the opposite of the intended result of PPP.

Soft infrastructure also needs to be developed in terms of legal, accounting, taxation, capital markets, banking, etc. to provide a stable environment for PPP development. This also cannot be completed overnight, and therefore continuous efforts are necessary to upgrade the relevant framework.

Fifth, investment of foreign capital, including loans from international financial organizations, needs to be encouraged. It not only complements domestic capital shortages for infrastructure development but also provides a momentum to adopt international standards in infrastructure development, from bidding to construction management to supervision, which are essential elements for efficient infrastructure investment. Domestic companies will have opportunities to learn from their foreign partners by joint participation.

Lastly, many developing economies may face political pressure in the decision-making process for infrastructure investment, just like Korea did in the 1980s. To avoid political pressure, a transparent and professional decision-making process is necessary. For example, the PPP Act clearly stipulates a strict compliance to the law. Furthermore, all projects should be subject to neutral and a professional organization's study results such as PIMAC in Korea. A two-step feasibility study (including a preliminary feasibility study and reassessment of feasibility study), a VFM test, and reassessment of demand forecast are all necessary to contribute to commercial decision making based on economic principles. Vigorous surveillance by civic groups to alleviate political pressure also could be a great help.

# Annex 1. Korea's PPP Implementation Process

## Institutional Framework

*Ministry of Strategy and Finance.* The Ministry of Strategy and Finance (MOSF) is responsible for directing and coordinating major economic policies and formulating fiscal policies including budget formulation, treasury management, and the tax system. As the central body in charge of national PPP programs, major roles of the ministry include the development of PPP policies and the establishment of comprehensive investment plans. MOSF is responsible for administering the PPP Act and its Enforcement Decree, as well as the Basic Plan for the PPP. It also chairs the PPP Review Committee, which deliberates on matters concerning the establishment of major PPP policies and makes key decisions about the implementation of large-scale PPP projects.

*Procuring Ministries.* Procuring ministries are responsible for establishing and coordinating sector-specific PPP investment plans and policies. They also implement and monitor PPP projects.

*Public and Private Infrastructure Investment Management Center (PIMAC).* PIMAC was established under the PPP Act in order to provide comprehensive and professional support for the implementation of PPP projects. Its main duties are as follows:

- support the government in developing PPP policies and guidelines;
- provide technical assistance throughout the procurement process of PPP projects including VFM tests, formulation of request for proposals (RFPs), evaluation of project proposals, and negotiations with potential concessionaires;
- organize capacity-building programs and provide support for foreign investors through investment consultation; and
- promote international cooperation for knowledge sharing.

PIMAC, which is also in charge of the ex ante evaluation of public investment projects, contributes to enhancing efficiency and transparency in national infrastructure planning through comprehensive and systematic management of both public and PPP investment for infrastructure.

*Korea Infrastructure Credit Guarantee Fund (KICGF).* KICGF is a public fund established under the PPP Act in order to guarantee the credit of a concessionaire that intends to obtain loans from financial institutions for PPP projects. It is managed by the Korea Credit Guarantee Fund (KODIT) and funded by MOSF.

## Comparison of BTO and BTL

In BTO projects, the private partner realizes a reasonable return on its investment by charging a user fee, while in BTL projects the private partner recovers its investment through payments made by the central or local government.

## Types of PPP

According to the PPP Act and its Enforcement Decree, 46 types of facilities in 15 categories are defined as eligible infrastructure types for PPP projects (Table A1.1).

**Table A1.1. Types of Eligible Infrastructure Activities**

[ Types of Eligible Infrastructure Facilities ]

Sector	Infrastructure Type
Road (4)	Road and ancillary facilities, non-road parking facilities, intelligent transportation system, transfer centers
Rail (3)	Railway, railway facilities, urban railway
Seaport (3)	Seaport facilities, fishing port facilities, eligible facilities for new port construction
Airport (1)	Airport facilities
Water resources (3)	Multi-purpose dams, river-affiliated ancillary structures, waterworks
Communications (5)	Telecommunication facilities, information communication system, information super-highway, map information system, ubiquitous city infrastructure
Energy (3)	Electric source facilities, gas supply facilities, collective energy facilities
Environmental (5)	Excreta treatment facilities and public livestock waste-water treatment facilities, waste disposal facilities, waste-water treatment facilities, recycling facilities, public waste-water treatment facilities
Logistics (2)	Distribution complex and cargo terminals, passenger terminals
Culture and Tourism (9)	Tourist site or complex, youth training facilities, public / professional sports facilities, libraries, museum and art galleries, international conference facilities, culture centers, science museums, urban parks
Education (1)	School facilities
National defense (1)	Military residential facilities
Housing (1)	Public rental housing
Welfare (3)	Senior homes and welfare medical facilities and facilities for remarried seniors, public health and medical facilities, childcare facilities
Forestry (2)	Natural recreational resorts, arboretums

## Implementation Process of BTO and BTL

### *Proposal*

Both the government and a private company can initiate a PPP project.

**1. Solicited projects:** The government finds a potential PPP project and then seeks concessionaires. Competent authorities develop a potential project after considering related plans and demands for the facility. They then weigh the procurement options in order to determine whether the PPP procurement is more efficient than the conventional procurement.

Major points to consider before making decisions on a PPP project are as follows:

- Is the facility qualified for a PPP project prescribed in the PPP Act and the Enforcement Decree?
- Is the project a high priority for medium- and long-term infrastructure investment plans?
- Does it offer more timely benefits than a conventional government-procured project that has budget constraints?
- Will operational efficiency and services improve by taking advantage of creativity and know-how from the private sector?
- Will it be profitable considering the level of user fees and subsidies (for BTO projects)?

An appropriate implementation method (BTO, BTL, etc.) is selected with regard to the nature of the project, profitability, and other related factors.

BTL projects can only be implemented as solicited projects.

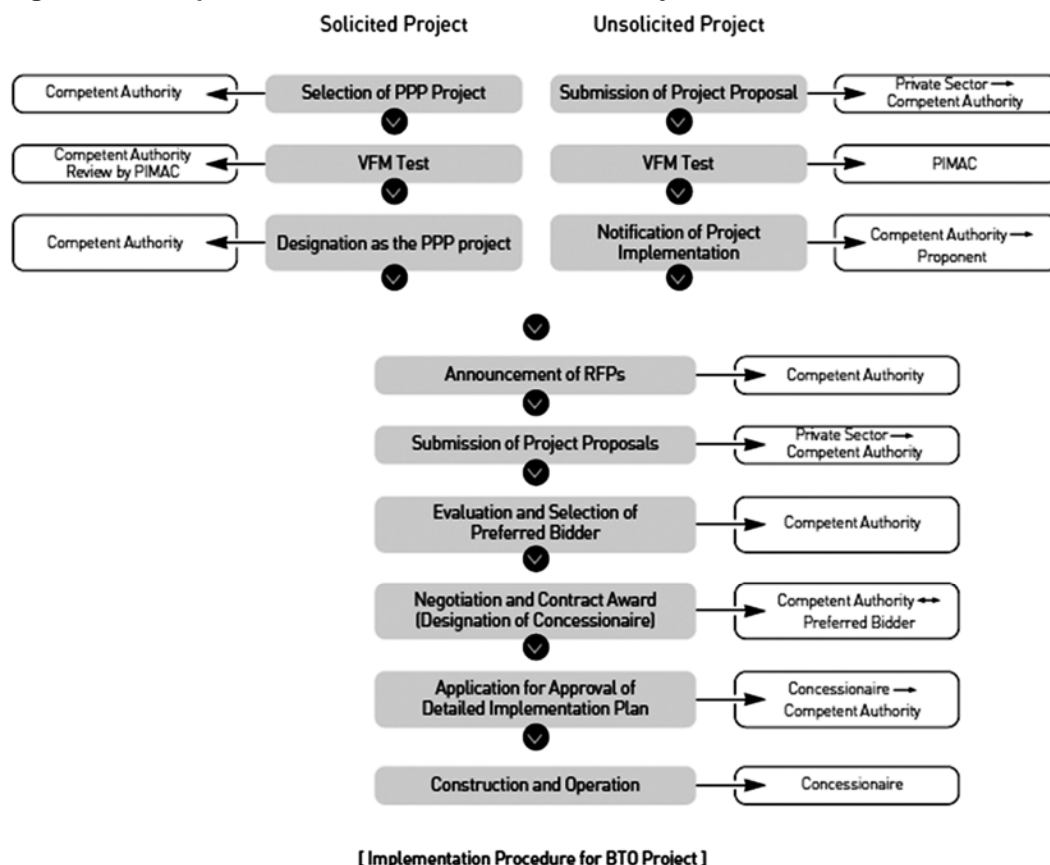
**2. Unsolicited project:** The private sector can propose a PPP project that is in high demand but has been delayed due to government budget constraints. After considering factors such as demand, profitability, project structure, construction and operating plans, and funding, the private partner creates a project plan and submits the proposal to the competent authority. The private sector may propose profitable and creative ancillary/supplementary projects related to the main PPP project.

The competent authority reviews and evaluates the contents and value for money of the private proposal.

*Procedure*

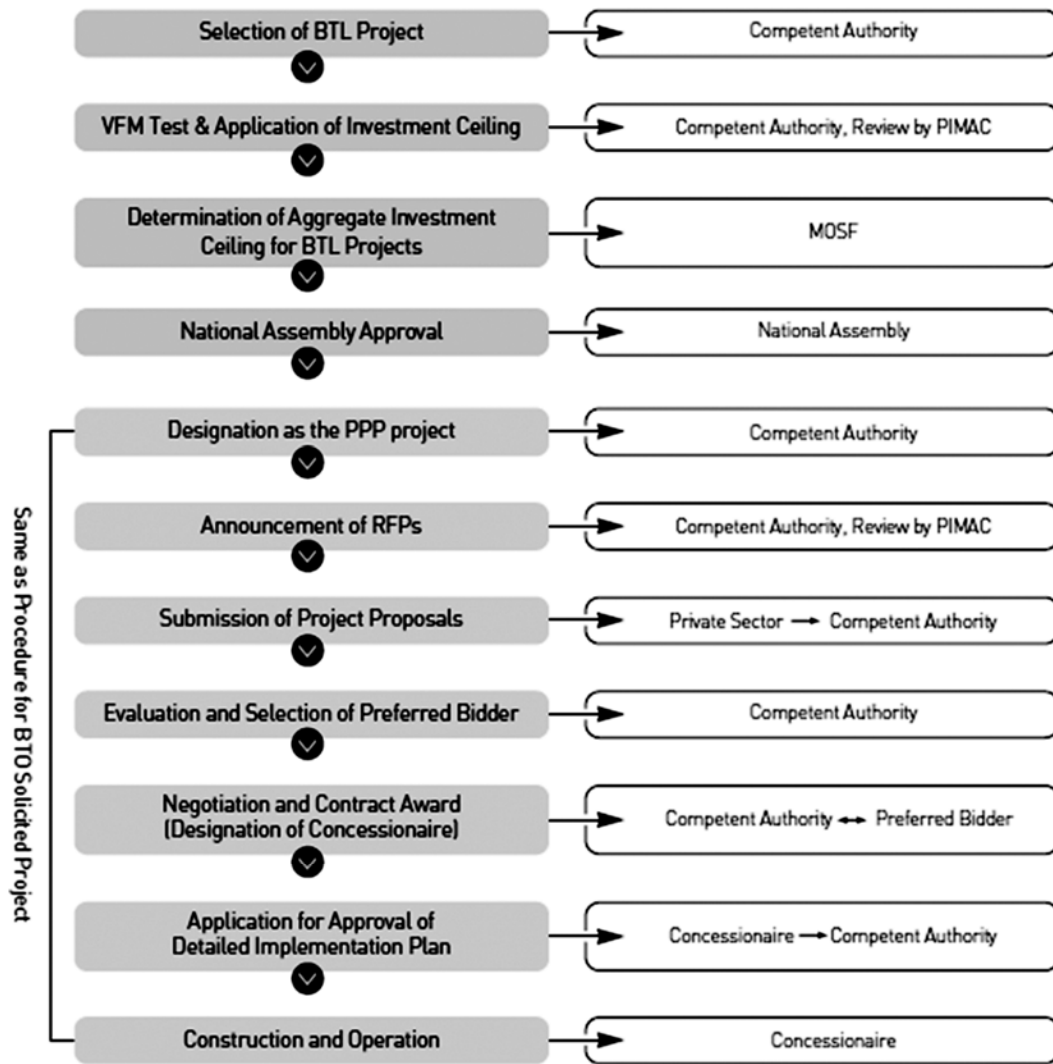
**1. BTO projects:** After conducting a VFM test to evaluate its potential as a PPP project, competent authorities announce Request for Proposals (RFPs) and evaluate proposals for selection. RFPs include the project plan and implementation terms and conditions, such as the project outline, total project cost, operational profit, construction and operation plans, and government supports. Figure A1.1 shows the BTO implementation procedure.

**Figure A1.1. Implementation Procedure for BTO Project**



**2. BTL projects:** A BTL project is initiated by the competent authority, reviewed by the Ministry of Strategy and Finance to decide on an aggregate investment ceiling for BTL projects, and then approved by the National Assembly. The investment ceiling for BTL projects is the aggregate BTL investment cost for the fiscal year. An amount detailing the total limit of all BTL projects as well as the limits for each facility type is submitted to the National Assembly along with the budget plan. Figure A1.2 shows the BTL implementation procedure.

Figure A1.2. Implementation Procedure for BTL Project



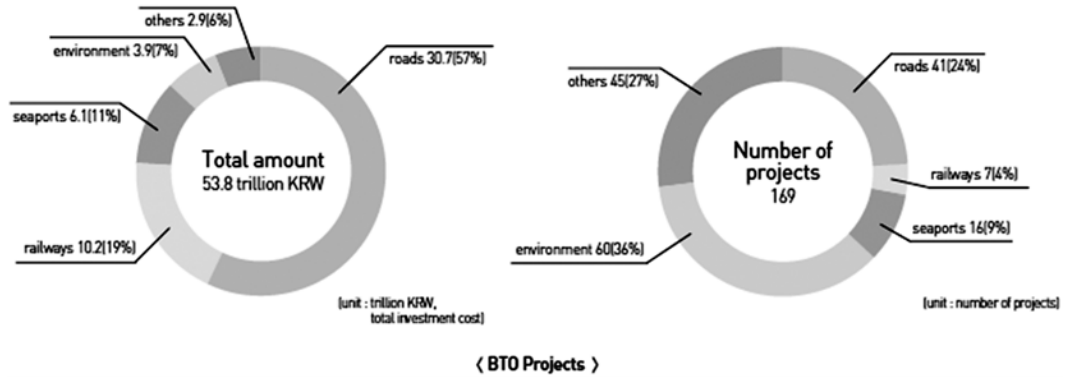
[ Implementation Procedure for BTL Project ]

### Performance of Korean PPPs

BTO projects are centered on transportation services including roads, railways, and seaports (Figure A1.3).

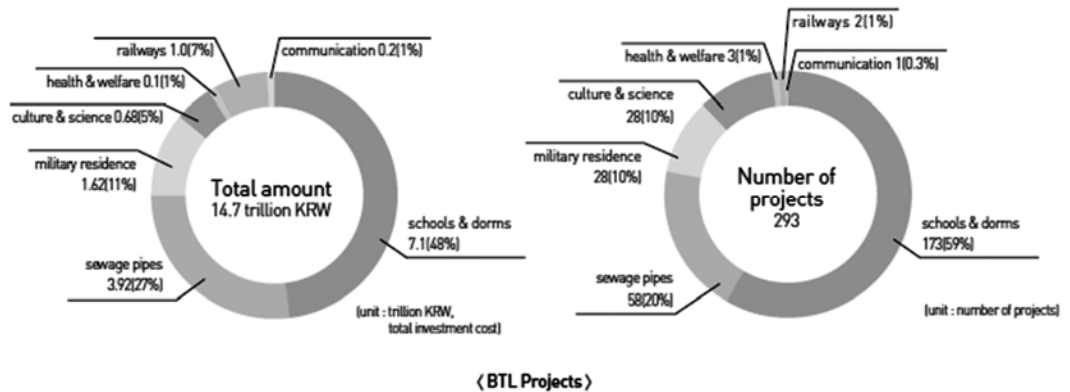
Road projects account for more than half of all investment, and environmental facilities top the list for the highest number of projects (while having the least cost per project).

**Figure A1.3. BTO Projects**



BTL projects, which first began in 2005, have been actively pursued especially in building and reconstructing old educational facilities like elementary and middle schools, vocational colleges, and university dormitories (Figure A1.4). Furthermore, BTL projects are making a great contribution to expanding and improving sewage systems and military residences, as well as to building new railways.

**Figure A1.4. BTL Projects**





## Project Case Studies

### *BTO Projects*

#### **1. Incheon International Airport Expressway**

Incheon International Airport Expressway was the first BTO road project carried out under the 1994 PPP Act. It originally started as a government-financed project but was turned into a BTO project later on to help ease the fiscal burden. Its early completion has played a significant role in the successful operation of Incheon International Airport. Since its completion in 2000, the project has undergone a refinancing process and now all equity holders are financial institutions.

- Total project cost: KRW 1,334 billion
- Length: 40.2 kilometers, 8 lanes
- Competent authority: Ministry of Land, Transport, and Maritime Affairs
- Construction period: 1995~2000
- Operation period: 30 years
- Capital structure: Equity/Debt/Subsidies = 25%/59%/16%
- Major shareholders: MKIF (Macquarie Korea Investment Finance, 24.1 percent) and other 10 financiers mostly life insurance companies of Korea

#### **2. Incheon Bridge**

Incheon Bridge is a cable-stayed bridge with the world's fifth longest main span, and the first PPP project in Korea led by AMEC, a UK company. The private sector implemented the construction of 12.34 kilometers section of the bridge, while the government took charge of 9.04 kilometers section, which includes the access road. The bridge connects the Second and Third Kyungin Expressways and Seohaean Expressway, thereby reducing the travel time to and from Incheon International Airport and south of Seoul by more than 40 minutes.

- Total project cost: KRW 1,096 billion
- Capital structure: Equity/Debt/Subsidies = 10%/41%/48%
- Length: 12.3 kilometers, 6 lanes (21.4 kilometers including access road)
- Competent authority: Ministry of Land, Transport, and Maritime Affairs
- Construction period: 2005~2009
- Operation period: 30 years
- Major shareholder: AMEC and 7 Korean construction companies

#### **3. Busan New Port Phase 1**

The project aims to expand and improve Busan's dilapidated ports, establishing a logistics hub port for Northeast Asia. Nine of the 30 berths have been allocated as BTO projects, with the first six of them completed in 2006 and 2007. In addition to Korean contractors and financial institutions, DP World of the UAE, a

global port developer and operator, holds a 29.6 percent equity stake to participate in its operation.

- Total project cost: KRW 1,640 billion
- Capital structure: Equity/Debt/Subsidies = 20% /55%/25%
- Work scope: 9 berths (50,000 tons), 3.2 kilometers
- Competent authority: Ministry of Land, Transport, and Maritime Affairs
- Construction period: 2001~2009
- Operation period: 50 years
- Major Shareholders: DP World (29.6%), Samsung Construction (23.9%), Korea Container Terminal Authority (9.6%), four Korean construction companies and others (36.9%)

### *BTL Projects*

#### **1. The Chungju Military Apartment Housing Project**

The Chungju Military Apartment Housing project was the first BTL project carried out in Korea. The modernization of military residential facilities had been delayed due to insufficient budgets, but was implemented at a rapid pace with the introduction of the BTL method. A total of 200 families moved into the 12 apartment buildings, with more than 95 percent of residents expressing satisfaction with the facilities in a survey.

- Total project cost: KRW 18.6 billion
- Work scope: 200 households and convenience facilities
- Competent authority: Ministry of Defense
- Construction period: 2005~2007
- Operation period: 20 years

#### **2. Ulsan National Institute of Science and Technology**

Ulsan National Institute of Science and Technology is the first campus ever built entirely by the BTL method utilizing a state-of-the-art, environmental-friendly, and digitized design. The project company is not only responsible for facility maintenance, management, cleaning and security, but also operates and manages the school's dormitories, gymnasiums, shops, and parking lots.

- Total project cost: approximately KRW 250 billion
- Work scope: site 1,028,200 square meters, total floor area 153,691 square meters
- Competent authority: Ministry of Education, Science and Technology
- Construction period: 2007~2010 (1st phase: 2007–February 2009)
- Operation period: 20 years

#### **3. Anhwa High School**

Anhwa High School is one of Korea's leading BTL school projects. In 2007 it was the recipient of an award in recognition of its excellent facilities from the Minister of Education and Human Resource Development. There are currently more than

1,000 students enrolled at the school, which opened in 2007 with state-of-the-art facilities and equipment, and is now under the management of the project company.

- Total project cost: approximately KRW 962 million
- Work scope: site 13,264 square meters, 5 stories above ground
- Competent authority: Gyeonggi Province Office of Education
- Construction period: 2006~2007
- Operation period: 20 years

## **Annex 2. Regional Cooperation in Infrastructure Development in Northeast Asia Region**

In the Northeast Asia region, there are many cooperative movements in infrastructure development. This annex discusses three initiatives in which Korea has been involved: (1) Great Tumen Initiative (GTI), (2) Northeast Asia Undersea Connection Initiative, and (3) Infrastructure Cooperation Projects between the Republic of Korea and the Democratic People's Republic of Korea.

### **Great Tumen Initiative (GTI)**

GTI is an intergovernmental consultative body in which Korea, China, the Russian Federation, and Mongolia are participating for regional cooperation. It started originally in 1992 as TRDP (Tumen River Development Program) under the auspices of the United Nations Development Programme (UNDP). Later in September 2005, TRDP strengthened its implementation system and changed its name as GTI by enlarging coverage of the region and installing a common fund. At the beginning, the Democratic People's Republic of Korea also joined, but withdrew in 2009 in resistance to international sanctions following its second nuclear test. Important decisions at GTI are made by the Consultative Commission, which consists of member countries' representatives at the vice minister level.

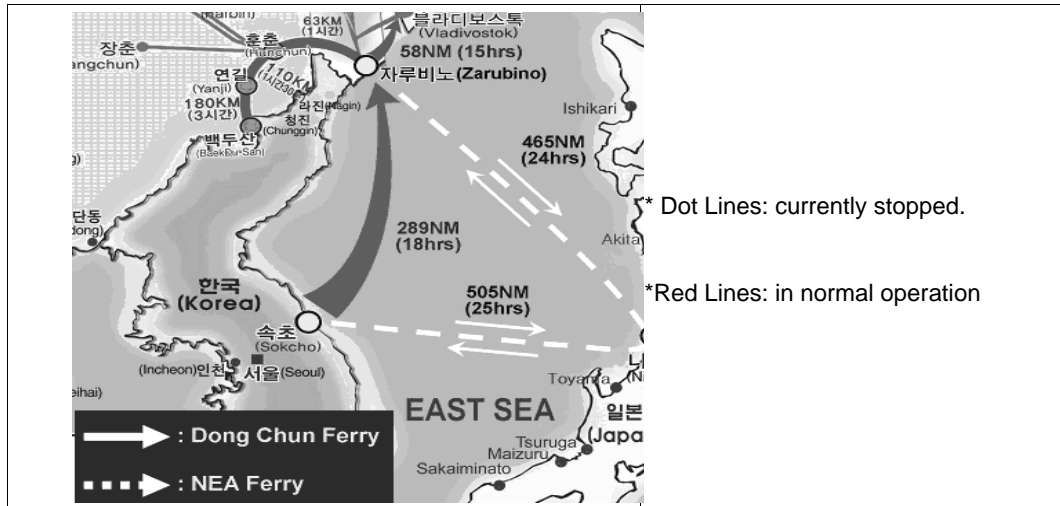
GTI has contributed to the formation of a regular consultation table for regional cooperative issues in the East Asia region, including the exchange of views and information on infrastructure investment. After the Ninth Consultative Commission Meeting at Vladivostok in 2007, 12 projects were identified for promotion in the transportation, energy, tourism, trade, and environment sectors. Currently, however, financial resources to undertake big projects are not available. Therefore, basic research work is ongoing, such as transportation system and environmental effects evaluation. The current status of the projects is discussed below.

#### **1. North East Asia (NEA) Ferry Project**

A shipping company, NEA Ferry, was established as a joint company comprising the Republic of Korea (Gangwon Province, Sokcho City, Bumhan Shipping), China (Hunchun City), Japan (Niigata City, North East Ferry), and Russia (Primoravtotrans). A test operation was made from July to September, 2009, but NEA gave up the business due to low demand for both passenger and freight, high visa fees from Russia, cumbersome entry procedures, and inconvenience at border checkpoints in Russia and China. Instead, the Sokcho-Zarubino line by Korea's Dongchun Shipping and Donghae-Vladivostok line by DBS Cruise are in normal operation (Figure A2.1). Discussion is going on to make NEA Ferry's

business more competitive compared to other transportation means by lifting cumbersome entry procedure and decreasing relevant costs.

**Figure A2.1. Ferry Operations**



## 2. Zarubino Port Modernization Project

Zarubino Port has strategic importance due to its location at the contact point of three country borders: the Democratic People’s Republic of Korea, China, and Russia. The port is also very important for Mongolia and Manchuria to secure a transportation route to proceed to East Sea (Figure A2.2). In 2004, the Zarubino Port Authority announced a modernization plan, and an agreement was made in May 2008 between the Zarubino Port operator and a Russian railway company to invest more than US\$100 million. In 2009, because the Russian railway company abrogated the agreement, GTI Secretariat contacted potential investors from the Republic of Korea and Germany. However, the chance of additional investment seems small because of the recent global financial crisis and a substantial decrease of freight due to Russia’s tariff increases.

**Figure A2.2 Zarubino Port**



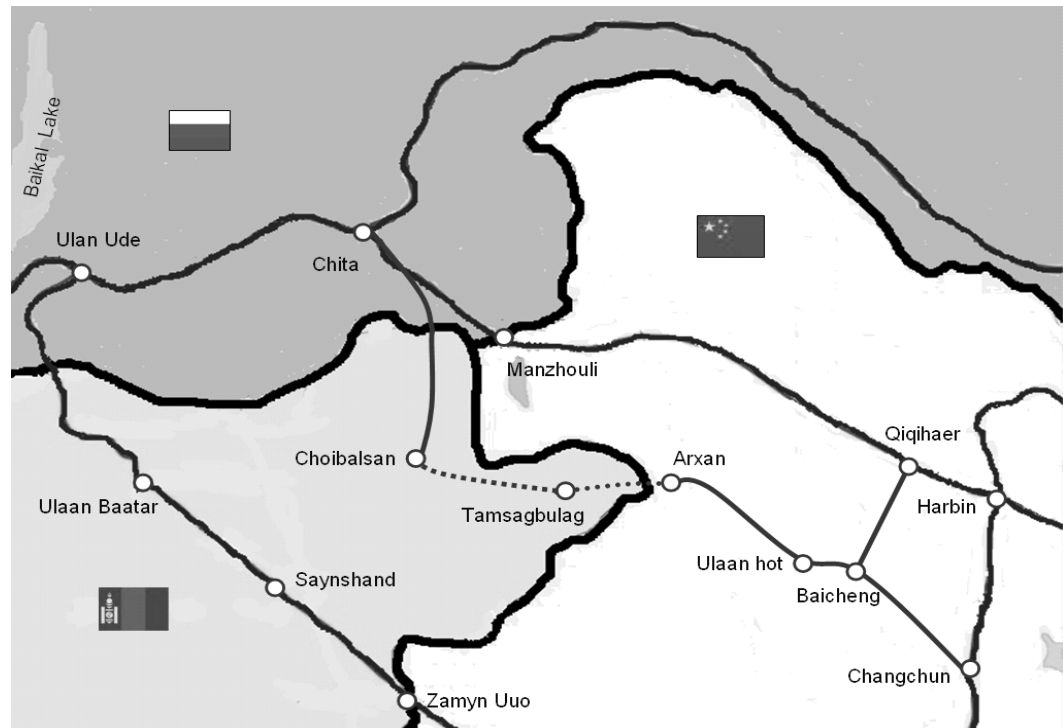
### 3. Mongol-China Railroad Project

In November 2007, China, Mongolia, and Japan agreed to construct a railroad of 443 kilometers named the Orient Grand Passage connecting Choibalsan of Mongolia and Arxan of Inner Mongolia, China (Figure A2.3). A feasibility study is nearing completion. Japan's motivation is related to importation of exploited mineral resources in East Mongolia such as coal, but there are still constraints to the use harbors of the Democratic People's Republic of Korea and Russia on East Sea basin. Therefore, it is not easy to invite private capital for the project.

In early 2010, China and Mongolia agreed to build Sino-Mongolia railroad by 2020, but due to low marketability, implementation of the project is also in a difficult situation for financing.

It is expected to take more time to solicit potential investors by securing marketability since development of mineral resources in Choibalsan region is now at an exploration stage.

**Figure A2.3. Mongol-China Railroad Project**

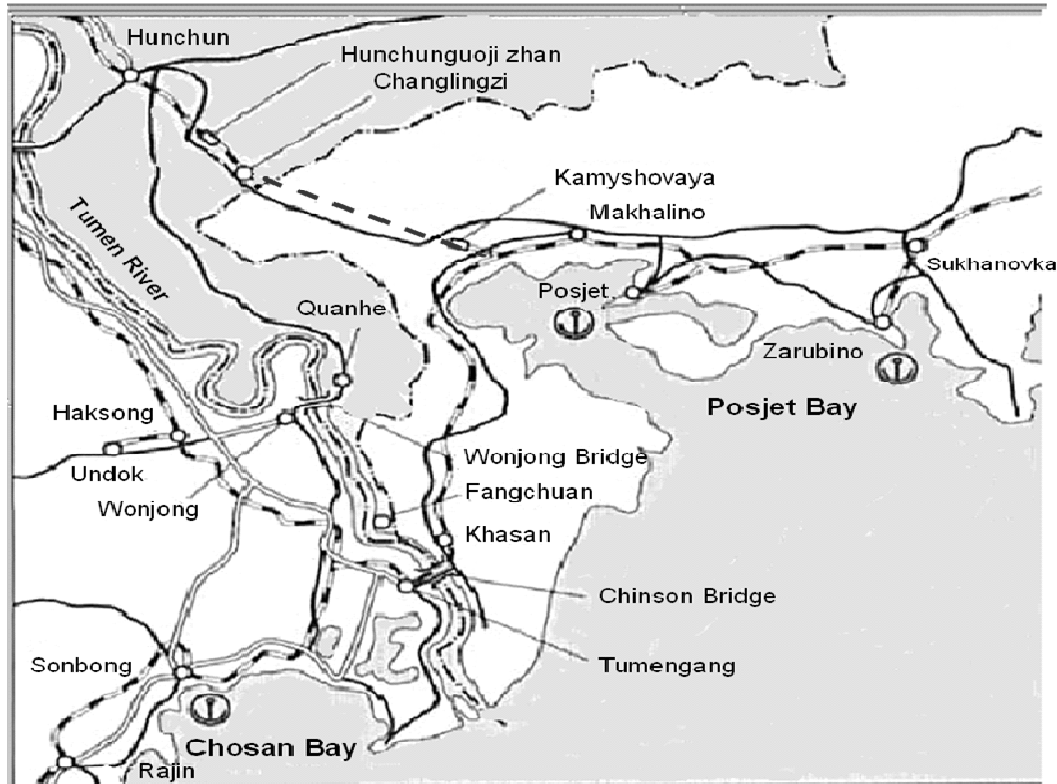


### 4. Reopening of Hunchun-Makhalino Railroad

In February 2000, the Hunchun-Makhalino Railroad opened to provide the shortest route to transport freights of Jilin Province to Russia's East Sea harbors (Figure A2.4). However, in September 2004, travel on the route was closed stopped due to legal disputes between two railway companies of Russia. The companies were running a branch line and TSR connection, respectively, without a business agreement. The companies brought the case to the court and it will take some time to fully settle. In 2008, at a working-level meeting between China

and Russia, both countries agreed to build Makhliino station by 2010 and help to expedite resolution of disputes between the two Russian companies by signing a business agreement promptly.

**Figure A2.4. Hunchun-Makhliino Railroad**



Notes: The gray dotted line is run by JSC Golden Link, a private railway company, from the Sino-Russia border to the Far East TSR branch. JSC Russian Railways owns the remaining portion as well as Makhliino station.

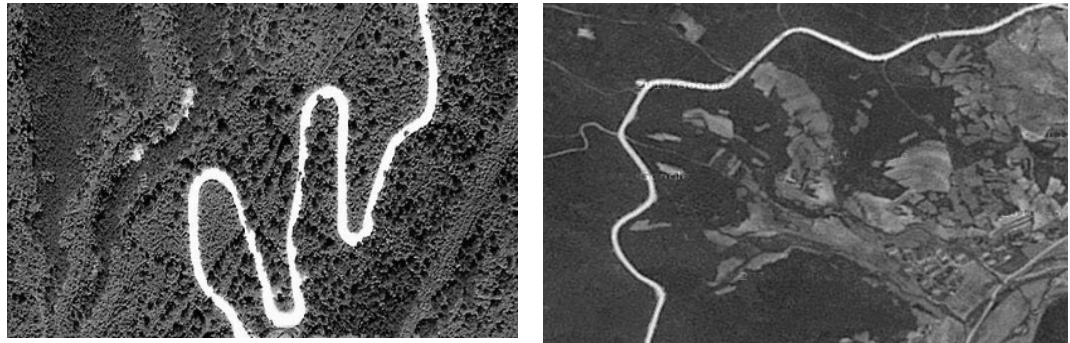
## 5. Utilization of Roads and Harbors of China at the Borders of China and the Democratic People's Republic of Korea

In 2008, the Democratic People's Republic of Korea and China signed the Agreement on Motor Vehicle Transportation to jointly use roads and harbors on borders of the Democratic People's Republic of Korea and China. However, because the Democratic People's Republic of Korea withdrew from GTI in 2009, this project became difficult to promote under the GTI framework. Instead, when Wen Jiabao, the Chinese premier, visited Pyongyang in October 2009, both governments agreed to give development rights of Rajin harbor to Qangli Group of China in return for construction of Hunchun-Rajin road costing 3 billion yuan. China wanted to use this road transport mineral resources produced in Jilin and Heilungkiang provinces through Rajin and Chungjin harbors of the Democratic People's Republic of Korea to the southern part of China. Haihua Group of China also acquired exclusive right to develop Chungjin harbor in return for \$US10 million for repairing Tumen-Chungjin railroad. Premier Wen Jiabao also

promised to construct a new Yalu River bridge and Sinuiju-Pyongyang express highway.

Basically, infrastructure cooperation projects the Democratic People's Republic of Korea and China were being promoted by local provinces of China. However, actual investments have not undertaken much because of poor demand forecast and high construction cost due to rough terrain. For example, in case of Rajin harbor, mass transportation would not be possible because large cranes could not be installed due to weak ground conditions of docks. In addition, electricity shortages and nonexistence of a distribution base mean it will take a long time to fully develop the harbor. In terms of freight forecast, rough mountainous road conditions between Hunchun and Rajin will limit operation of heavy duty trucks even though the roads are expanded and paved (see Figure A2.5)

**Figure A2.5. Satellite Picture of Hunchun-Rajin Road**



#### *Other GTI Projects under Promotion*

There are seven other projects in five sectors under the framework of GTI, which are as follows:

1. In the transportation sector, the Comprehensive Infrastructure Development Research Project is underway. This is to analyze bottlenecks in expanding physical interchange in GTI region and to suggest ways to overcome those bottlenecks on the basis of cost/benefit analysis.
2. In energy sector, two projects are being undertaken.
  - The GTI Energy Capacity Development Project: This is to minimize technical and institutional barriers that interfere with energy trade, to construct institutional structures for strengthening energy cooperation, and to provide training programs for bureaucrats of less developed countries.
  - The Construction of Energy DB in Northeast Asia Region and Publication of Statistics: This is to collect and provide basic data for energy cooperation in the region.



3. In the tourism sector, the Construction of Tourism Capacity Project is ongoing. This is to study standardization of the issuance of tourism visas, to produce tourist guidebooks, and to develop diversified Mt. Baekdu tourism.
4. In the trade sector, the Training Program for Trade Facilitation is ongoing. This is to provide training programs for bureaucrats to advance customs clearance procedures.
5. In the Environmental sector, two projects are ongoing.
  - The Cross-Border Environment Effects Analysis and Standardization of Environmental Standard: This is to evaluate environmental effects on the Tumen River border region and to standardize environmental standard in the Northeast Asia region.
  - The Feasibility Study on the Tumen River Water Resource Protection: This is to construct multilateral cooperation framework for environmental protection of the Tumen River region.

## **Northeast Asia Undersea Connection Initiative**

### *Motivation*

The twenty-first century is often referred to as the Era of Asia. Particularly, three countries in Northeast Asia, the Republic of Korea, China, and Japan, are at the center of global attention and make up one of the most dynamic regions of the world. It is estimated that as of 2010, the three countries account for one-fourth of the world's population, and for one-fourth of the world's economy with China ranking 2<sup>nd</sup>, Japan 3<sup>rd</sup>, and Korea 13<sup>th</sup> in terms of GDP. Some economic forecasts indicate that the three economies may even account for one-third of the global economy in less than next two decades. While China has continued to see fast growth of around 9 percent per annum since 1990s, the division of labor in Northeast Asia centered on Japan is also facing a new phase. Major cities in the region are competing with each other to dominate finance, distribution, and other knowledge-based services; therefore among these cities competitive as well as cooperative relations will be intensified. Considering rapidly increasing demand for transportation of passengers and freight in the region, it is an appropriate time to review the diversified comprehensive transportation network connecting China, Japan, and the Korean peninsula.

In this regard, the Korean government is considering building undersea tunnels with China and Japan, as a key component of an envisioned integrated Northeast Asia transportation network. The Ministry of Land, Transportation, and Maritime Affairs of Korea commissioned the state-sponsored Korea Transport Institute in 2009 to review the technical and economical feasibility of the projects. The results will be available soon. According to the proposal, three undersea tunnels for high-speed trains and automobiles are currently being

considered; the Mokpo-Jeju (167 kilometers) section, Incheon-Weihai (341 kilometers) section, and Busan-Fukuoka (222.6 kilometers) section (Figure A2.6).

**Figure A2.6. Undersea Tunnels**



Such projects were also mentioned in a plan prepared by the Korea's Ministry of Land, Transportation, and Maritime Affairs to expand the country's bullet train network by 2020, due to the increasing importance of so-called mega-regions in the global economy. If three high-speed trains—Korea's KTX, China's Hexiehao, and Japan's Shinkansen—are connected to each other to form a Northeast Asia high-speed train network, economic integration of the region could be accelerated. However, two major obstacles remain. The first is that the undersea tunnel projects should take at least 10–15 years to launch because such a project needs agreement with neighboring countries. (Discussions between local governments of the three countries have already started.) The other obstacle is the enormous cost of the projects. Each tunnel is likely to cost up to US\$80 billion, which should be shared by relevant parties. Despite these obstacles, the undersea tunnels will be needed to handle future demands, and therefore they should be carried out as mid- to long-term projects.

### *Undersea Tunnel Connecting the Republic of Korea and China*

Considering uncertainty regarding the Democratic People's Republic of Korea and the need to directly connect highly populated areas of the Republic Korea and China, it was proposed by Kyunggi Province to build an undersea tunnel connecting 374 kilometers between Weihai, China and Pyongtaek, the Republic of Korea. Currently China's share in Korea's export destination recorded around 25 percent and Korea's share in China's export destination 18 percent as of 2009. Within a decade, GDP size of China and the Republic of Korea is expected to be No. 1 and No. 10 respectively in the global economy. If the undersea tunnel is built, a high-speed train will take 1 hour and 15 minutes from Seoul to Weihai, 4 hours to Beijing, and 5 hours to Shanghai, which will be competitive compared to travelling by air.

### *Undersea Tunnel Connecting the Republic of Korea and Japan*

Compared to the recently evolved Korea-China Undersea tunnel project, this project idea was conceived long ago during the Japanese occupation at the turn of the twentieth century. Studies on the tunnel have been initiated mostly by private sector organizations such as the Korea-Japan Tunnel Project Association in Busan and the Japan-Korea Tunnel Research Institute in Tokyo, both of which are nonprofit organizations. Now, government support seems to be gaining pace, particularly in light of the role the tunnel is expected to play in accelerating travel and business exchanges. At the Summit meeting held in April 2008, the leaders of Korea and Japan agreed to undertake a joint study to prepare for vision of a new era of cooperation between their countries, which includes this undersea tunnel project.

According to the study, if constructed, the Korea-Japan undersea tunnel would be 235 kilometers in length, linking Busan to Geoje Island to Japan's Tsushima Island to Ikido and then to Kyushu. This tunnel would be four times longer than the 50 kilometer Channel Tunnel linking England and France and the 53.9 kilometer Seikan Tunnel in northern Japan. That means it would be the longest undersea tunnel in the world.

The tunnel will stimulate business, ease tensions, and promote political stability in East Asia. For example, Busan and its sister city Fukuoka could promote various projects to create a common economic zone.

However, the project also faces many hurdles before it can become a reality. Engineering and cost concerns are major hindrances. Construction costs are projected at around US\$60–80 billion and the project would take 7 to 10 years to construct.

## **Infrastructure Cooperation Projects between the Republic of Korea and the Democratic People's Republic of Korea**

### *Road and Railroad Connection Projects*

Two projects across the DMZ to connect the Republic of Korea and the Democratic People's Republic of Korea were completed based on the Basic Agreement on Motor Vehicle and Train Operation between South and North effective as of August 1, 2005. One project is on the western part of Korean peninsula to connect 27.3 kilometers of railroad between Munsan and Gaesung and 12.1 kilometers of road between Tongil Bridge and Gaesung Industrial Site, both of which are to support factories in Gaesung Industrial Site. The other project is on the East Sea coast to connect 25.5 kilometers of railroad and 24.2 kilometers of road, both of which are to support tourists visiting Diamond Mountain. All the costs were borne by the Republic of Korea, except labor cost for the construction in of the part in the Democratic People's Republic of Korea.

The future of infrastructure cooperation projects across the DMZ is so dim because the military of the Democratic People's Republic of Korea is strongly resist to developing any infrastructure behind their back at DMZ. In addition, the infrastructure of the North is so rugged that it will require tremendous amounts of money to modernize. Uncertainty is preventing investment the Republic of Korea, since any additional investment in the North may become a hostage in case tension increases with the South. A very cautious approach is inevitable. As a result, despite the 2008 Korea-Russia Summit meeting, which agreed to cooperate on railroad connections between the Korean peninsula and TKR and TSR, nothing has been achieved up to now.

### *Gaesung Industrial Site Construction*

Plans have been made to develop 6.6 million square meters at Gaesung. The first phase of construction—3.3 million square meters—was completed in 2007. Currently, more than 200 firms from the Democratic People's Republic of Korea are operating their businesses and total investment has reached US\$0.9 billion. The number of Northern workers at the site is around 45 thousand. However, this project also faces difficulties in future expansion due to recent, increasing uncertainties.

## **Concluding Remarks**

Potential for regional cooperation in Northeast Asia is vast considering the fact that the region's weight in the global economy is rapidly increasing. To this purpose, geopolitical stability should be regained first to materialize such a huge potential.





Infrastructure development plays a crucial role in economic growth, poverty alleviation, and enhancing the competitiveness of developing countries. However, existing infrastructure in many developing countries is inadequate, and more infrastructure investment is urgently needed. The problem is particularly acute in Africa's developing economies, which continue to lag far behind in areas such as telecommunications, electricity, roads, and sanitation. As a result, potential growth as well as the delivery of basic services has been substantially limited.

This paper introduces the Republic of Korea's experiences in infrastructure development, which have successfully supported economic development. Lessons learned from Korea's experiences during the second half of the twentieth century can be shared with the developing economies of Africa.

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