Innovative Application of PFI to Korea

by

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Abstract

In accordance with recent world trends, Private Financing Initiative (PFI) has been introduced and tried on projects in Korea. As a new way of financing, PFI was expected to solve insufficient fund problems in developing infrastructure projects in Korea. But few infrastructure projects in Korea have been going well with application of PFI as planned. To cope with the global market and to attract foreign investment in Korea, more sophisticated ways of project financing in terms of risk management should be considered.

The objective of this thesis is to identify the current situation and problems of Korean PFI, compared with successful PFI application in other countries. The basic scheme and key factors of the PFI will be reviewed at the beginning. Also, this thesis analyzes the Incheon International Airport Railroad Project, one of the pioneer PFI cases in Korea in order to identify the current status of PFI application in Korea. As key factors of the project, financial structure and risk management will be mainly dealt with. Based on the analysis of these key factors, this thesis will discuss about insufficient preparation, expensive cost, and unskillful risk management as problems and lessons from the pioneer case of Korea. Furthermore, the Korean government's clarification of the PFI Act and direct subsidies for PFI projects, and PFI stimulation with small projects will be suggested as proper solutions for the above problems.

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Chapter 1. Introduction

Innovative Application of PFI to Korea

Private Finance Initiative (PFI) on the infrastructure projects in Korea has been the hottest topic in Korea recently, similar to the global trends. The PFI is to use private sector's resources such as capital, technology, management and human resource in the public projects. The private sector proceeds with the project as a project taker in the public project especially on infrastructure projects, which had been traditionally performed by the government. The reason for utilizing PFI in infrastructure projects is that the government cannot take charge of the entire public big infrastructure projects with limited government's budget these days. The inefficiency of the public sector in performing the infrastructure service is another reason.

The Korea government has strived to activate PFI in Korea since mid the 1990s. After economic crisis in the late 1990s, effort for the PFI by the Korea government has been accelerated more than ever, benchmarking the successful system of other countries such as U.K. and Japan. To identify the current situation in Korea and find out proper response for the problems are the critical homework for Korea at this point. For this purpose, this thesis will consist of following chapters.

In the first chapter, the introduction and the structure of this thesis will be addressed.

Chapter 2 will analyze the basic concept and general knowledge of the Private Finance Initiative (PFI). In accordance with the purpose of privatization, proper guidelines and the process will be generally discussed in addition to a general definition of PFI. Also a quick review of the PFI status of other successful countries such as the United Kingdom and Japan will be given.

In the third Chapter, the general environments and current status of Korea PFI in infrastructure facilities will be analyzed and discussed. The unique background of Korean economy and construction situation will be provided first. Then, background and advent of PFI and government's point of view for PFI will be depicted as well.

As a pioneer PFI case in Korea, Incheon International Airport Railroad project will be examined in the fourth chapter. All aspects such as project structures, financial schemes, and risks allocation will be analyzed. Finally the lessons and problems of this project will be proposed at the end of this chapter.

Finally the innovative ways of the PFI application to Korea will be suggested in the conclusion. A quick summary of this thesis will also be contained in this final chapter.

Chapter 2. PFI in the Infrastructure System

2.1 Definition of Private Finance Initiative (PFI)

Traditionally the public sector has been responsible for constructing and operating most infrastructure facilities, which are also called Social Overhead Capital (SOC) used for the public. The characteristic of infrastructure facilities for the public, the huge scale of projects, and tremendous amount of capital have been the main reasons that the public sector has played an important role in infrastructures. However, recent global trends about infrastructures have been changing. To reduce failure probabilities of huge infrastructure project by only the public sector, privatization of infrastructures has been introduced. The global trends of decrease in public parts, privatization of railroads, powers, and communications, and mitigations of related regulations is aimed at the above intentions and Private Finance Initiative (PFI) is the one of those trends.

PFI, different from the concept of privatization, which mostly means selling, consigning, and outsourcing of existing public companies, is to use private capital to construct, operate, and maintain prospect infrastructure facilities. PFI associated with infrastructures can be categorized as BOT (Build-Operate-Transfer) or BOO (Build-Operate-Own) in terms of ownership. In addition, BOOT (Build-Own-Operate-Transfer), RLT (Reconstruction-Lease-Transfer), and ROT (Reconstruction-Operate-Transfer)

are also the forms of PFI modified from BOT.[1]

The objective of PFI, irrespective of its forms, is to provide service of high quality to the customer by increasing efficiency of resource allocation, which is called Value for Money (VFM), through application of private sectors' creativity to the public projects. Also it helps to decrease the financial load of the government as well as allocate various risks such as market risks, currency risks, operation risks, and force majeure to various parties, which can eventually increase the competitive force of the country. Under PFI, the private sectors can get the guarantee of profits by working efficiently by taking advantage of their creativity.

With the application of PFI, the government can resolve the fund raising problem with limited its budget in infrastructure projects as well. Financial institutions, private companies, and other parties can invest more easily in the PFI project than projects done by the government because participation of private sectors will help to enlarge the project's profitability with their creativity and efficiency. By this financial advantage, many countries, not only advanced but also developing countries, have endeavored to develop and apply PFI efficiently.

The typical structure and participants of the PFI project are described in the Figure 2-1 below. The project company is the crucial party of the project and lead the project during the whole period, including planning, constructing, operating, and maintaining.

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[1] Miller, John B (2000): "Principles of Public and Private Infrastructure Delivery", Kluwer Academic Publishers

Various companies or individuals can be the sponsors of the project company, which takes most responsibilities of the project. The government places an order for the project and the financial institutions lend the money for relatively high repayment from the project. There are also construction and other resources providing companies, and advising parties associated with legal issues, regulation, economy, and management in the PFI project. The public using that prospective facility is the consumer of this structure.[2]

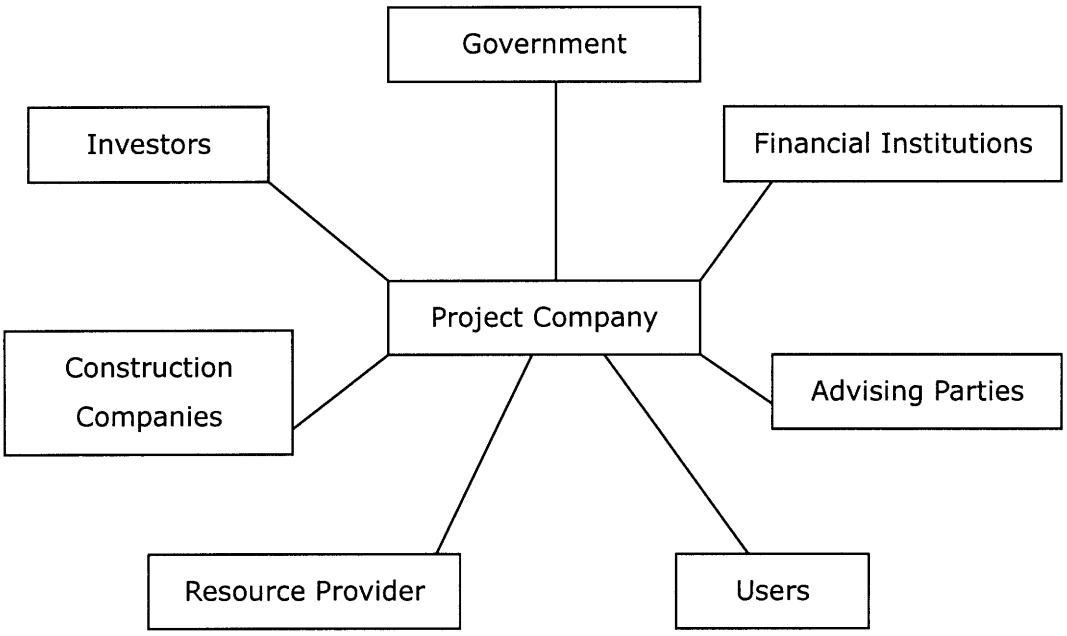


Figure 2-1 Structure of the PFI Project

[2] No, Kisung & Jung, Wonho (1997): "Improvement of the System for Private Financing on Infrastructure in Korea", Korea Development Institute

2.2 Project Finance in PFI

When the government propels the PFI project, the critical issue is how the participants can raise the project money. Usually Project Finance is used in huge projects requiring huge amount of money and risks simultaneously. In this chapter, basic knowledge about project finance will be reviewed and analyzed.

2.2.1 Characteristics of Project Finance

Definition of Project Finance is the finance for a specific project, whose sources of repayment of capital and interest are limited to cash flows generated in the project, and whose collaterals are limited to the assets of the project. The non-recourse or limited-recourse financing is one of the most significant characteristics of project finance with which financing institutions take over same level of responsibilities the project company. In other words, the project company and the financiers cannot require the parent companies to repay the debt. From the perspective of the parent company, the project financing prevents the company from being exposed to the financial risks that affect its balance sheet (i.e., off-balance), except for the initial equity contribution to the project. The collateral of the project financing is, in practice, the summation of cash flows of the project, that is, project financing is cash flow lending.[3]

Project finance is also a structured finance, with which every participant proactively

[3] Kato, Koji (2001): "Private Finance Initiative and Major Construction Firms in Japan", MIT

structures the project through a variety of contracts, which properly allocate surrounding risks. Throughout the negotiation process of risk sharing and conditioning of a project, project financing is structured as a consequence of diverse and dynamic processes for sponsors and lenders, together with respective advisors, with tremendous compensations for both project and financial structures. One such structure requirement is that a project company should be a single purpose company (SPC) so that the financed project does not include additional uncertainties of multiple projects.[4]

2.2.2 Financial Institution's Perspective

Lender's incentives for project financing are the following four:

- A requisite function for international wholesale banks
- Clarification of risks (a borrower must be an SOC and must report cash flows more strictly)
- High profitability
- A Competitive advantage in the marketplace.

2.2.3 Finance Conditions[5]

Interest rates are expressed as LIBOR (London Inter Bank Offered Rate) plus

[4] Tinsley, Richard (2000): "Advanced Project Financing: Structuring Risk", Euromoney Books
[5] Ban, Kiro (1998): "Project Finance", Korea Banking Institute

spread or a rate of a specific national bond plus spread. The lender sets a yield by adding upfront fees and agent fees to the interest spread in order to make the finance more profitable and to attract other financial institutions to the syndicate. Pricing, or the yield, is dependent on the lender's expected return-on-equity (ROE) and policy on risk management. Pricing experiences for past deals (same kind, same scale projects) are the base indexes.

2.2.4 Legal Aspects and Agreements

A project company has some restrictions, such as those about additional borrowing from other financial institutions but the lenders, additional investment, production schedule, and a variety of covenants. In case of default, the lender retains the right to control the project's assets, which include not only fixed assets such as production plants but account receivables, cash flows, the concession agreement in BOT (Build-Operate-Transfer) projects, rights to use its infrastructure, and so on. The lender may have senior position against a third party as collateral, and control of sales agreement.

2.3 Risks in PFI[6]

Efficient risk analysis and allocation are critical for PFI. Efficient risk allocation is made when risks are supposed to be taken by the parties with the best ability to manage them. Each party wants higher rewards for taking higher risks. Risk analysis consists of 4 stages: risk recognition, risk influence rating, risk probability assumption, and calculation of financial influence.

2.3.1 Risk recognition

General types of project risks in PFI are as shown as in Table 2-1.

Table 2-1 Types of risk

Types of risk	Case of risk
Availability risk	Insufficient quality of service listed in the contract.
Construction risk	Incompletion of the construction in accordance with the contract.
Demand risk	Insufficient real demand for the service.
Design risk	Failure of design to meet the criteria of the project.
Inflation risk	Higher inflation than expected
Legislation risk	Cost change due to change of legislation
Maintenance risk	Difference between real and expected maintenance costs

[6] Kim, Jaehyung (2000): "Reformation of the Financial Support Regulation for Private Financing Projects", Korea Development Institute

Occupancy risk	Difference between real and expected occupancy rate
Operation risk	Deficit of real operation cost, insufficient operation results, or lack of operating services.
Planning risk	Different ways of proceeding with the project as planned
Policy risk	Change of policy without supporting of legislation
Residual risk	Uncertainty of residual value at the end of concessionaire
Technology risk	Insufficient service provided due to change of technology
Volume risk	Difference between real and expected volume of customers

2.3.2 Rating of risk influence

This process means quantitative valuation of each risk's influence on the project after recognition of related risks. Risks are categorized as 'catastrophic', 'critical', 'serious', 'marginal', and 'negligible'. Although it is not easy to value risks in terms of quantitative criteria, we can do it through using past experiences or advice of experts. In addition, it is very dangerous to apply the same way of valuation for all risks because the purpose of this process is to exclude optimistic projections in estimating project costs.

2.3.3 Assumption of risk

Assumption of risk is just one of the difficult, not impossible, processes. As similar way of rating risk influence, past experience and advice from the expert should be

used. Levels of the probability of risk are 'frequent', 'probable', 'occasional', 'remote', and 'improbable' with probability data.

2.3.4 Calculation of financial influence

In this process, expected costs are calculated in terms of each risk and sensitivity analysis is also provided.

2.3.5 Risk allocation

Risk allocation between private sectors and the government is the final objective of the risk analysis. We can judge the financial effect from the government's point of view when taking a specific risk by risk analysis. If the government cannot give the sufficient compensation to the private sector for transferring the risk, it will be appropriate that the private company take over the project directly. The risks can be sorted as transferable risk, negotiable risk, and responsible risk in terms of the types of bearing risks.

The basic principle of risk allocation is that the best risk bearer should take the risks with proper compensation for the risks. General relationship between risk allocation and Value for Money (VFM) is described the Figure 2-1 below.

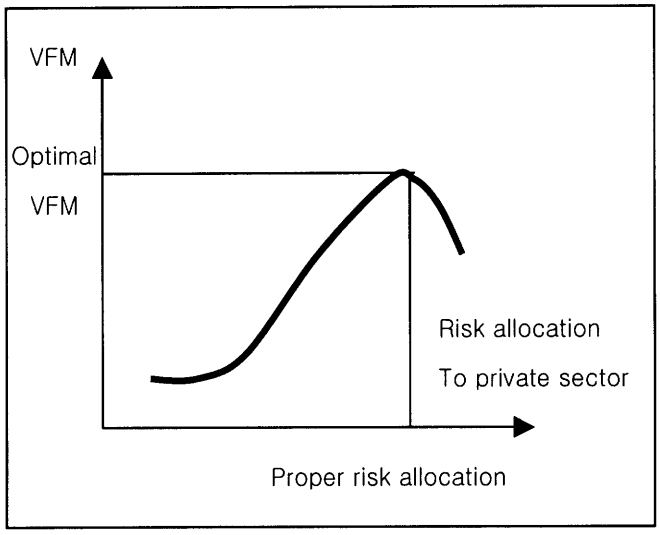


Figure 2-2 VFM and risk allocation[7]

Typical risk allocations between the public and private sector are as follows.[8]

- Demand risk

Demand risk is the crucial part out of the whole risk allocations. Public and private sector negotiate about this risk allocation seriously. In independent profitable projects such as toll roads, the private sector bears the demand risk. The public sector takes or shares the risk with private sector by negotiating in other cases when demand forecasting of the project is uncertain for all participants.

- Construction and design risk

Generally the private sector takes the construction and design risk of the project due to change of design and construction incurred from unexpected change of

[7] Source: National Audit Office, U.K. (1999): Examining the Value for Money of Deal under the Private Finance Initiative

[8] International Finance Corporation (1996): "Financing Private Infrastructure", The World Bank

geological conditions and so on. Therefore, the private sector should initially prepare the design in accordance with Requirement For Project (RFP) from the public sector, and complete the construction with planned budget in time to avoid the pay cost overrun.

- Operation risk

Operation risk is about how the completed facility is operated and maintained well. Also, the private sector as an operator bears the operation risk.

- Residual risk

After the private sector's concessionary period with sufficient collection of the upfront investment, the ownership of the infrastructure will be automatically transferred to the public sector. At this time, the infrastructure should be maintained in good condition.

- Technological risk

This risk is associated with how the technology will be improved for the service or maintenance provided in the infrastructure. Also, whether the system will become obsolete is the related issue for this risk.

- Policy risk

Although generally the risk incurred from the trivial change of the policy and regulation belongs to the private sector, the public sector bears the risk associated with the big changes of the policy. The responsibility for detail development approval is

transferred to the private side, whereas the public side takes the responsibility for outline development approval.

- Financial risk

The private sector bears the financial risk during the project period because project financing is generally used for PFI project. In the project financing, the project company is responsible for all the financial matters, which might shake the project and even suspend it in the worst case. To prevent this worst situation, the public sector and lender should be very cautious to decide upon the qualifications of the private sector.

However, the public sector shares the financial risk with the private sector in some countries where PFI has just introduced by providing direct subsidy during the construction or guaranteeing debt to the financial institutions. This risk sharing is to attract the private sector into PFI field at the beginning of PFI introduction.

2.4 PFI in U.K. and Japan

The United Kingdom (the U.K.) is the most successful country in application of PFI so far. Sustainable research for developing new forms of PFI and continuous trials of new ways of PFI make the U.K. the best example of PFI activation. Also, lessons from PFI in Japan, which has similarly social and cultural situations to Korea, will be helpful to looking for innovative PFI ways of Korea. The general background and system of PFI, current situations and experiences, and unique solutions for the problems will be discussed below.

2.4.1 PFI in U.K.

(1) Background of PFI in U.K.

The U.K. government was forced to keep budget deficit within 2 percent and government debts below 60 percent of GDP (Gross Domestic Product) set in the Maastricht Treaty, which set the structure of Europe unification. Under this circumstance, the U.K. government introduced the PFI, which is aimed at utilizing the private sector's creativity, efficiency, management, and capital for the public parts.[9]

The initial approach toward the PFI was begun in the United Kingdom by the

[9] Department of the Environment, Transport and the Religions, U.K. (1999): Public/Private Partnerships and the Private Finance Initiative

Thatcher government, which adopted "small government" as its slogan. The Major government, which succeeded the Thatcher government in 1990, introduced the way of thinking of the value for Money (VFM) and first proposed the PFI scheme. For example, the Treasury Taskforce was established as one of the recommendations in 1997 and has roles such as providing guidelines for the PFI and arrangements of projects.

(2) PFI application in the U.K.

Types of PFI projects

The British PFI contains the following three types:[10]

- Services sold to the public sector type

The private sector finances, design, builds, operates, and provides services to the public sector such as hospitals, prisons, and roads, for which the public sector pay the private sector. To date this type of PFI activity has been the primary focus. This type is suited for Hospitals, prisons, roads, and sports facilities.

- Financially free standing projects type

The private sector supplier designs, builds, finances and then operates an asset, recovering costs entirely through direct charges on the private users of the asset rather than from payments by the public sector. Public sector involvement is limited to enabling the project to go ahead through assistance with planning,

[10] The Treasury Taskforce, U.K. (1997): Partnerships for Prosperity – The Private Finance Initiative

licensing and other statutory procedures. There is no government contribution or acceptance of risk beyond this point and any government customer for the specific service is charged at the full commercial rate. This type works on the projects such as roads, roads, museums, and high-speed railroads.

- Joint ventures type

The costs of the project are not met entirely through charges on the end users but are subsidized from public funds. In many cases, the public sector subsidy secures wider social benefits not reflected in project cash flows (e.g. reduced congestion, economic regeneration). However, there could also be service benefits (e.g. from a shared facility) or direct financial rewards. The subsidy can take a number of forms, but the government role is limited to a contribution to asset development. Operational control rests with the private sector. This type is usually used for channel, tunnel, and urban development projects.

The basic concept of PFI is that the public sector sets the level of services and the private sector provides the services and operates the necessary facilities. Different from mere privatization, the public sector retains an important role in the PFI.

Driving forces

Main driving forces of the PFI for the British government are as follows:

- Value for money
- Infrastructure needs

- Risk mitigation
- Debt saving
- Reduction of the government's responsibilities
- Philosophical reasons
- The innovation expectation

Among the above factors, value for money, reduction of responsibilities of the government, and philosophical reasons were important in the U.K.[11]

Public Sector Comparator

The U.K. government has used unique financial analysis, which is called Public Sector Comparator (PSC), for PFI projects in order to examine the VFM of the prospective project suggested by private bidder at the beginning of the stage. PSC[12] is a public project model, suggested by the government, which includes hypothetical risk-adjusting costing emerging when the government is the service provider in terms of output specification. In other words, PSC means the financial analysis of the project and presents Net Present Value (NPV) of the prospective project assuming traditionally the government proceeds the project with taking over entire risks of the project.[13]

As a first step for initiating PFI, PSC is used for critical factors in the PFI process

[11] Japan Project-Industry council (1998): Public-Private Relationship in British and Australian PFI Projects

[12] Generally the PSC contains overview of the project, assumption of third party revenues, assumption of residual value at the end of concessionaire period, types of risks, risks matrix, discounted cash flow, sensitivity analysis, and appendices.

[13] Treasury Taskforce PFI Technical Note No. 2, U.K. (1999): Public Sector Comparators and Value for Money

for judging whether the project is suitable for PFI project by the private sector or for the general public project by the government. The government can take advantage of PSC in deciding the maximum level of subsidy on the project as well[14]. Thirdly, PSC can be used in comparing the proposals from each bidder during the bidding process. The fourth merit is to help figure out proper ways of risk allocation of the project. In addition, the government can use PSC as a basic data when comparing real operation data after contract period.

(3) Current status of PFI

The innovative PFI ways of U.K. has been applied to a wide range of the public projects such as transportation, welfare, national defense, public facilities, information system, prisons, education, water resource system and urban development since introduction in 1992. Detail information of PFI project in U.K. is described in the following Table 2-2.

The projects related environment, transportation occupy about 60% of the total projects. The U.K. government has been currently trying to enlarge the scale of PFI project affected by the success of the PFI projects so far.

[14] Under PFI in the U.K., the government should compare PSC of the applicant PFI project and VFM method is not used in PFI project unless government subsidy is provided.

Table 2-2 Summary of PFI projects in the U.K.[15]

Ministry	Cases	Amount
Environments, Transportation, and Region	DBFO Road, Channel Tunnel Rail Link, Trum Dockland, bridges, lights, rail ways, and public houses	6,363(58.4%)
Defense	Military School and Communication Facilities	967(8.9%)
Home Office	Prisons and Data Handling of Passport	390(3.6%)
Welfare	Public Hospitals	908(8.3%)
Education	Redevelopment of School and Sports Facilities	405(3.7%)
Social Welfare	National medical insurance data system	740(6.8%)
Scotland	DBFO road, bridges, hospitals, and Water Resource System	792(7.3%)
Others	Medical Facility of North Ireland and Public Museum	327(3.0%)
Total		10,892(100%)

(in billion £: £ 1.6 = $1)

2.4.2 PFI in Japan

(1) Background of PFI in Japan

In the 1980s, Japan aggressively tried to examine the ways of applying the private sector's technology, capital, human resources, and information to public sector's projects in order to increase domestic market demand, averting the country from deepening financial deficit. The effort for activating privatization in 1980s, however,

[15] Source: The Treasury Taskforce, U.K. (1999): The PFI: Construction Performance

faced limits in terms of bad situation in economy incurred from collapse of the bubble economy in the 1990s and lack of confidence in the Japanese companies' and local government's financial structure. After the first mistrial, the Japan government changed the privatization ways with creative application of the U.K.'s successful PFI to its unique situations.

The Japanese government promulgated the PFI Act in July 1999 and enforced in September 1999. This law was aimed at promoting new business mainly related to infrastructure projects in order to recover from serious economic recession by utilizing the private sectors' financial, managerial, and technical capabilities for building, maintaining, and operating public facilities. The Japanese Ministry of Economy has decided to consider applying PFI preferentially to new projects with highly economic effect from the cost-benefit analysis since 2000. With the PFI, higher VFM was expected. The Prime Minister determined and published The Basic Policies in March 2000 as a framework to implement any individual PFI project. [16]

(2) The Basic Policies[17]

There are five fundamental rules and three basic principles of the PFI projects. PFI projects are required to have following attributes:

- The public use rules: making projects into public facilities.

[16] Construction Industry Research & Information Association (2000): The plan for the participation of Japanese PFI Market

[17] Kato, Koji (2001): "Private Finance Initiative and Major Construction Firms in Japan", MIT

- The private resources utilization rule: utilizing the private sector's financial, managerial, and technological resources.
- The efficiency rule: making use of the private sector's autonomy and creativity.
- The justice rule: ensuring fairness in selecting a project or an undertaker.
- The transparency rule: making the whole process visible to the public.

Several principles are mandatory in implementing the projects:

- The objectiveness principle: ensuring objectivity in the evaluations and decisions for the implementation of the PFI.
- The contract principle: providing explicit contracts to define roles and responsibilities of the participants.
- The independence principle: assuring the undertaker's independence of other business contracts.

(3) Current situation in Japan

In Japan, not only the central government but also the local governments are aggressive in promoting PFI for balancing the development of entire Japan. They made the committee for local projects by joining the central and local government and private sectors. The main reason for aggressive participation of local government was to overcome financial deficit status due to the collapse of the bubble economy. The trend of the opening of the local governments' public administration was another major

propulsive factor of promoting PFI. Although most of the local governments still have difficulties in measuring costs, a critical factor of PFI, and in having ability of authorities to handle the entire project such as risk allocation, the local governments have strived to overcome those problem by appropriately adopting financial, legal, and engineering advisory firms. For example, Kanagawa Prefecture has set an evaluation committee, including fixed professional members, only for the PFI evaluation. Also, Tokyo Metropolitan Government and several surrounding local governments contracted with respective consortia for their pioneer PFI project. With these efforts, the PFI will be popular in Japan if some prototype PFI projects come out successfully and the private sectors initiate the PFI project spurred by these accomplishments.

A number of PFI projects have been developed over the past couple of years. Most are related to building type projects and initiated by the local governments. The national government provided subsidies for some projects as an indirect participant. The following Table 2-3 shows the current status of the PFI projects in Japan.

Table 2-3 Summary of PFI projects in Japan[18]

Name of Concerning Agency	Outline
Kanamachi Co-generation Plant (Tokyo Metropolitan Government)	BOO of the co-generation system, Provide Tokyo with electricity and steam, Tokyo pays for them of 20-year term, ¥25 billion.
Kanagawa Prefectural University of Health and Welfare (Kanagawa Prefecture)	BTO of the university with 40,000 m^2 floor area, Prefectural pays by installments for it for 30-year term, ¥18 billion.
Kimizu Waste Treatment Plant (Cities of Kisarazu, Kimizu, Futtsu, Sodegaura)	BOO of the wastes interim treatment plant with capacity of 500t/day, 20-year term, ¥31 billion, Divided into two phases.
Hitachi-naka Port, Kita Pier Public Container Terminal Facilities (Ibaraki Prefecture)	Financially freestanding type project, 30,000 (initial)-250,000 (final) TEU/yr, Shipping agents pay for the facilities and services, 20-year term.
Chiba Consumers and Measure Inspection Center (Chiba City)	BOT, 2,500 m^2 floor area plus privately used facilities, City pays for the construction and operation, 30-year term.
Fukuoka Retained Heat Utilization Facility (Fukuoka City)	Joint venture type BOT, City provides with electricity utilizing retained heat from a wastes incineration plan
Kanagawa Sanitary Research Institute (Kanagawa Prefecture)	Building and maintenance of the renewal project, Prefecture pays for it for 30-year term, ¥8 billion.
Hibiki Container Terminal (Kitakyushu City)	Financially freestanding type project, 700m-15m berth and 340m-10m berth, Shipping agents pay of the facilities and services, 25-year term

($1 = ¥119 as of May 2003)

[18] Source: Kato, Koji (2001): "Private Finance Initiative and Major Construction Firms in Japan", MIT

Chapter 3. PFI in Korea

3.1 System and overview of Korean Infrastructure

Korea is the one of developed countries in East Asia. Its population is about 45 millions and GDP is over 400 billion dollars as of 2000, which resulted from sudden decrease due to the financial crisis of Asia in 1998. The statistics about the Korea macro economy are as follows.

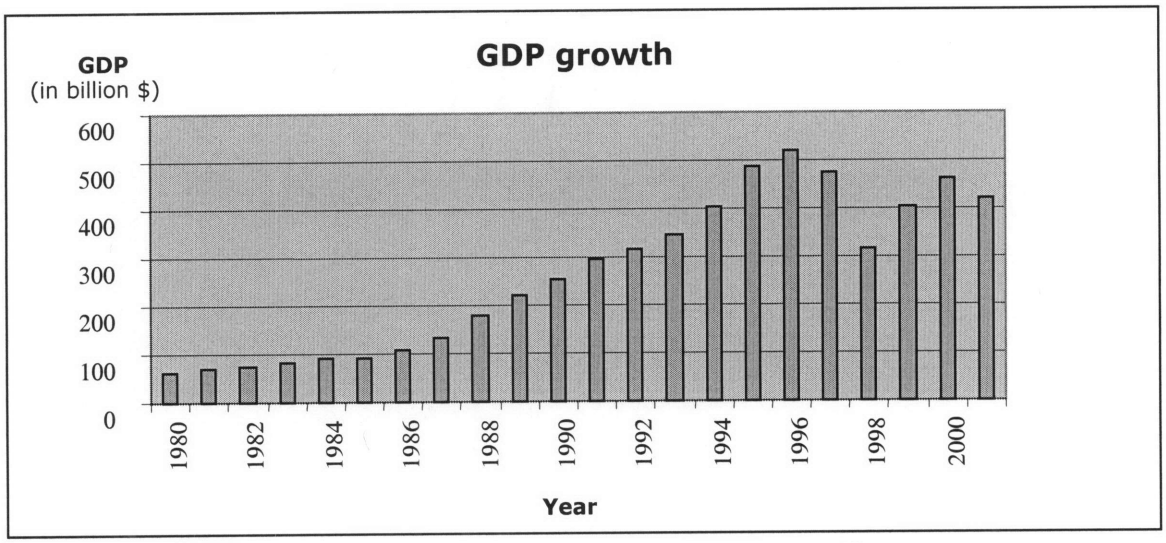


Figure 3-1 GDP growth in Korea[19]

Construction is the one of Korea's largest industries. The number of the companies reaches 11,000 and 3,500,000 is the number of construction workers,

[19] Source: National Statistical Office, Korea

which is 10% of the total workforce. Total construction investment in Korea was about 60 billion dollars in FY 2001, which is 10% of Korea's GDP. This is also including the tenth biggest construction market scale in the world[20]. In the Korea's total economy, the portion of construction industry is very high. Since the Korean War in 1950, the Korea government has endeavored to set up wide range of the infrastructure system, yet it is still at insufficient level compared with other developed countries. Fast development speed of the infrastructure system is unprecedented in the world. These factors have made the Korean construction market so big.

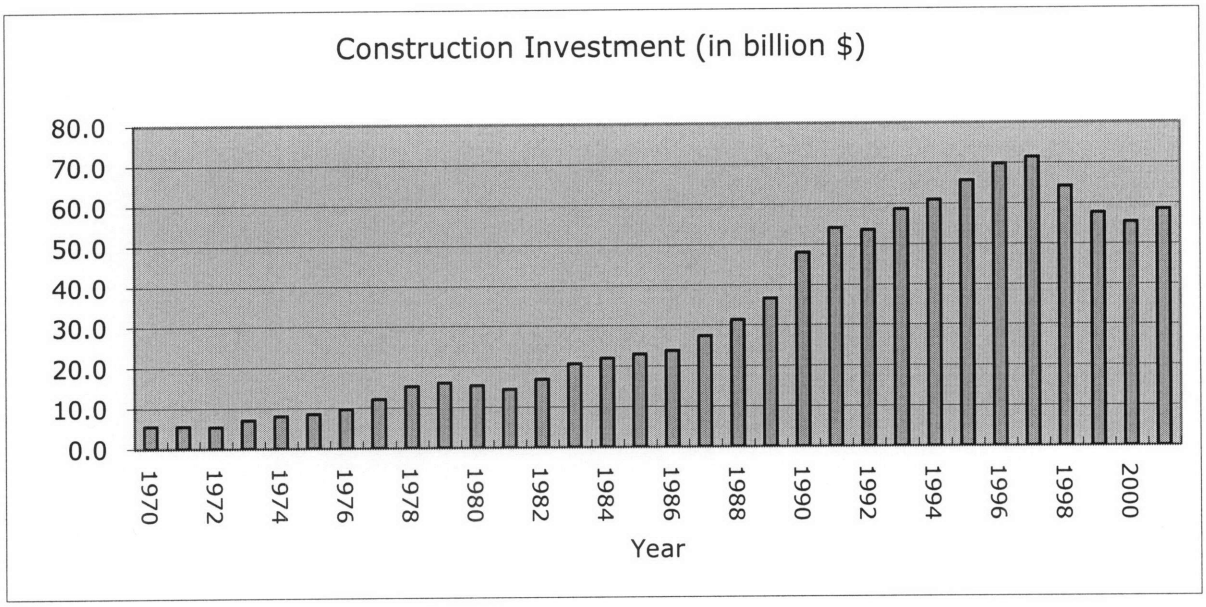


Figure 3-2 Construction investment in Korea[21]

Although steady increase of construction investment since 1970 was halted during the financial crisis in 1998, when two major construction companies faced lethal financial trouble, the construction industry has been recovering from the crisis.

[20] Source: Construction Association of Korea (2002): "Construction Statistics of Korea in FY 2001"
[21] Source: National Statistical Office, Korea

Public infrastructures were the main construction projects until 1985. Since then, more than 50% of owners of construction investment have been from private sectors. And since 1995, private fund inducement projects, mainly in the public sector, have been introduced in the market. Private fund inducement projects are growing with new delivery methods such as BOT, BTO etc. As of 2001, these projects shared about 6% of the total construction market. The recent trend of the ownership is depicted at the Figure 3-3 below.

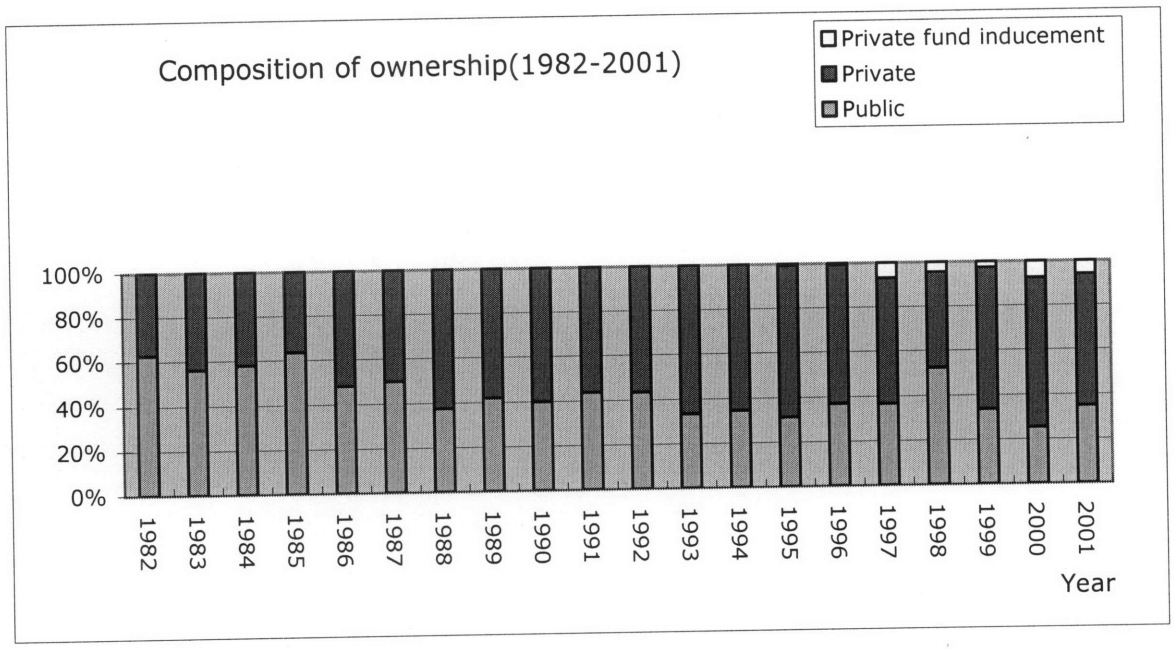


Figure 3-3 Composition of ownership in Korea[22]

[22] Source: National Statistical Office, Korea

3.2 Introduction and current situation of PFI in Korea

3.2.1 Introduction of PFI in Korea

As described in Chapter 2, construction of infrastructure facilities is the one of the government's main functions. However, the current government's financial situation is not enough to construct the infrastructure projects demanding tremendous capital.

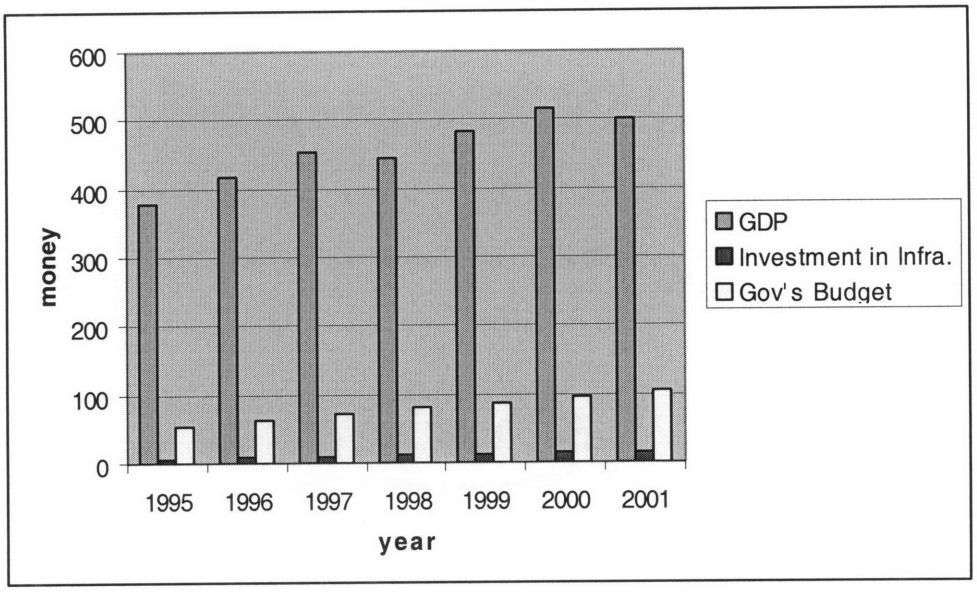
The current domestic demand for the infrastructure facilities is enormous. Gaduk-island Harbor, Kwangyang Harbor, Asan Harbor, Kyungbu High-speed Railroad, and Incheon International Airport are the representative examples of big projects under construction reflecting Korea's current huge demand for the infrastructure. Logistic costs were 47 trillion won in 1994, which was 15.5% of the GDP. Furthermore, the social profitability of the infrastructures was 24.4% reflecting high demand for those facilities as of 1998.[23] The investment in those infrastructure projects from the government's budget, which is the only capital source for the projects, is definitely insufficient due to latest order of the government's budget behind National Defense, Education, Welfare, and Social Development. The actual portion of construction budget for the infrastructures was only one-seventh of total government's budget as of 1997. This lack of government's investment in the infrastructures got worse after 1998, when Korea met with the national financial crisis.

[23] Ok, Dongsuk, Lee, Sangho, & Lee, hyuna (2000): "Improvement of Private Financing Initiative after Promulgation of the PFI Act", Construction & Economy Research Institute of Korea

For efficiency of operating infrastructure facilities, PFI was inevitable for Korea's situation. Although several public companies such as Korean railroad company, Korean water resource company, Korean road company, and Korean airport company have been exclusively taking charge of the infrastructure system of Korea so far, the innovations in the entire infrastructure system have been required in terms of service qualities because of their inefficiency and low.

3.2.2 Current situation of PFI in Korea

The Korean government has strived to attract the private investment in the big infrastructure projects, which is crucial for enhancing the competitive force of the entire Korean industry, in order to resolve insufficient capital problem only with the government's budget since the mid 1990s. The trends of investment in the infrastructure are illustrated in the Figure 3-3 below. The portion of investment in the infrastructure projects with government's budget has been increasing according to the increase of government's budget and demand for infrastructure facilities. However, the public capital is not enough to cover the entire infrastructure investments.



(in trillion won)

Figure 3-3 Trends of investment in infrastructures of Korea[24]

As a result, the Korean government and concerned ministries have tried to perform the infrastructure project with PFI aggressively and the number of new PFI projects has been increased suddenly. The general outline of Korean pioneer PFI projects are summarized in Table 3-1. Not only the central government but also the local governments are the concerned agencies, which is a good trend for stimulating of the PFI projects.

[24] Source: Ministry of Planning & Budget, Korea

Table 3-1 Current status of PFI Projects in Korea[25]

Concerned Authority	Projects	Cost
MOMAF[26]	Pusan New Port	55,898
KNR[27]	Incheon International Airport Railroad	55,074
MOCT[28]	Daegu-Daedong Highway	24,136
MOCT	Incheon International Airport Highway	20,175
MOCT	Cheonan-Nonsan Highway	18,463
MOCT	Kyungin Channel	18,429
Kwangju Metropolitan City	Kwangju 2nd Bypass Road	3,349
MOMAF	Incheon Port Terminal	2,500
MOMAF	Mokpo New Outer Port	2,492
Seoul Metropolitan City	Woomyun Mountain Tunnel	1,182

(in 100 million won)

Also, future trends of the private investment in infrastructure facilities and the demand of infrastructure are expected to increase at the faster rate than currently. Therefore, more aggressive PFI incentives are needed to go along with these trends.

[25] Source: Ministry of Planning & Budget, Korea
[26] MOMAF: Ministry of Maritime Affairs and Fisheries
[27] KNR: Korean National Railroad
[28] MOCT: Ministry of Construction and Transportation

3.3 Detail process of PFI in Korea

In this chapter, detail process of PFI in Korea will be explained. There are two types of PFI project in terms of initial proposal entity. One type is the projects solicited by the government and the other type is the projects proposed by private sectors. Therefore, the process and guidelines of the two types of projects are different. Each process will be examined in the following subchapters.

3.3.1 Solicited projects by the government

The PFI process for the solicited projects by the government is illustrated in the Figure 3-4 below. At the beginning, the government decides what kind of project is suitable for the PFI projects. If total cost of applicant projects is over 200 billion won, the Ministry of Planning and Budget generally examines and designates the prospective projects by preliminary feasibility studies. Otherwise, other ministries can decide upon the prospective PFI projects. Even if other ministries decide on the projects whose cost is over 50 billion won, the preliminary feasibility studies should be done by the Ministry of Planning and Budget.

After designation of the PFI project, the ministry concerning the project gives notification to the public for bidding. Basic project data such as total costs, construction period, intended region, project scale, anticipated level of fee, types of concession, and amount and method of financial subsidy are supposed to be provided in the public

notification. The qualification of applicants and the criteria of project selection are the contents of the notification as well.

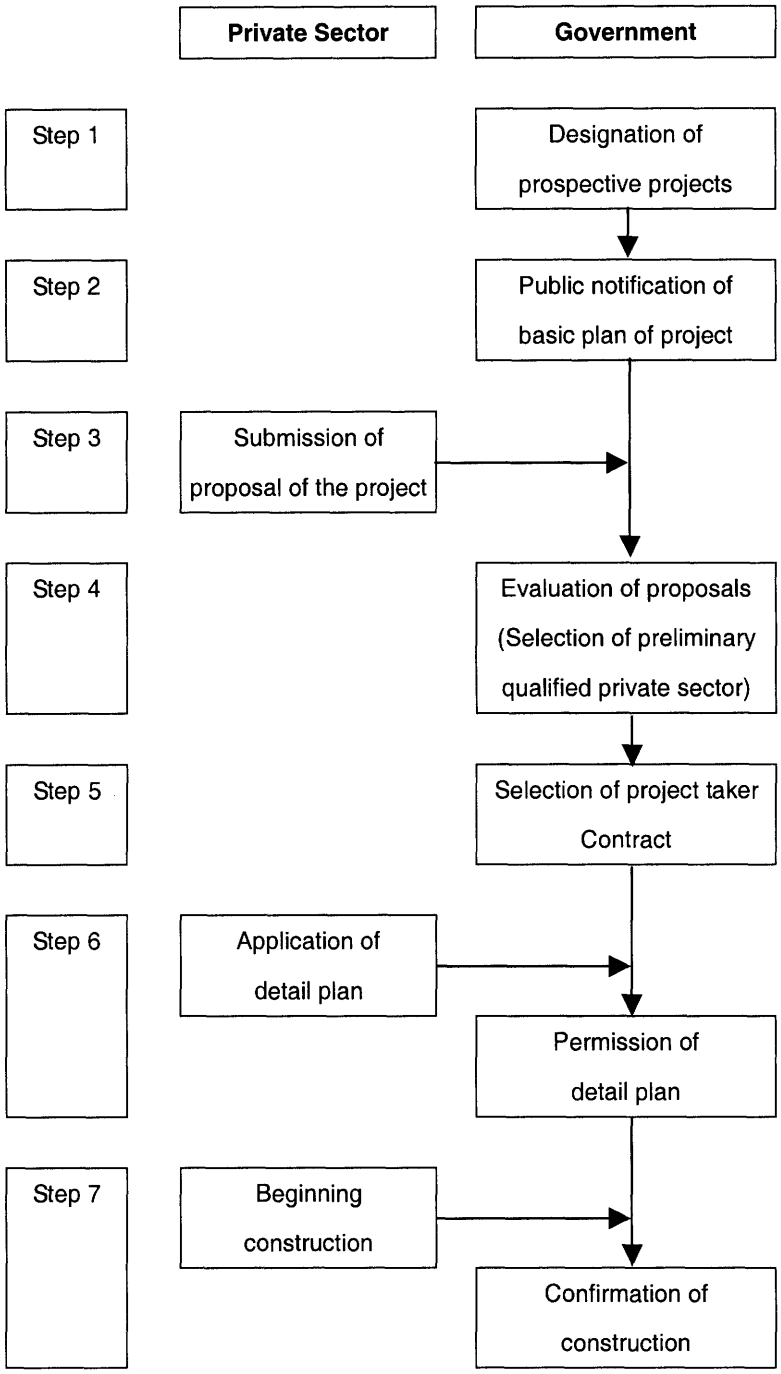


Figure 3-4 Process for solicited projects by the government in Korea[29]

[29] Source: The Ministry of Planning and Budget, Korea (2002): Long-term Plan of PFI in Korea

With the proposals submitted by the public sectors, the Evaluation Committee for the PFI project, which consists of the concerned ministry and related experts, examine and select the project taker. In this process, the committee selects the preliminary applicants first, and compares and evaluates selected applicants. Through this selection period, the private sector submitting the best proposal will be chosen. Then, the committee contracts with the finally selected applicant.

The winning concessionaire submits the detail project plan for acceptance by the committee as a next step. With the approved detail plan, the project taker will launch the project starting construction with supervision by the government during the construction period. Finally the government will confirm the completion of the project after constructing the project and the operation of the project will be started.

3.3.2 Proposed projects by the private sector

The process for projects proposed by the private sector is little different from the process for projects solicited by the government. Generally, the scale of the projects of this kind is relatively smaller than the projects proposed by the government because the blueprints of the big infrastructure projects are planned and examined in terms of long-term development plan of the country, ahead of the private sector. This suggestion by the private sector can stimulate it to find out or plan the proper PFI projects using its creativity and efficiency, which is the main characteristic of the private sector.

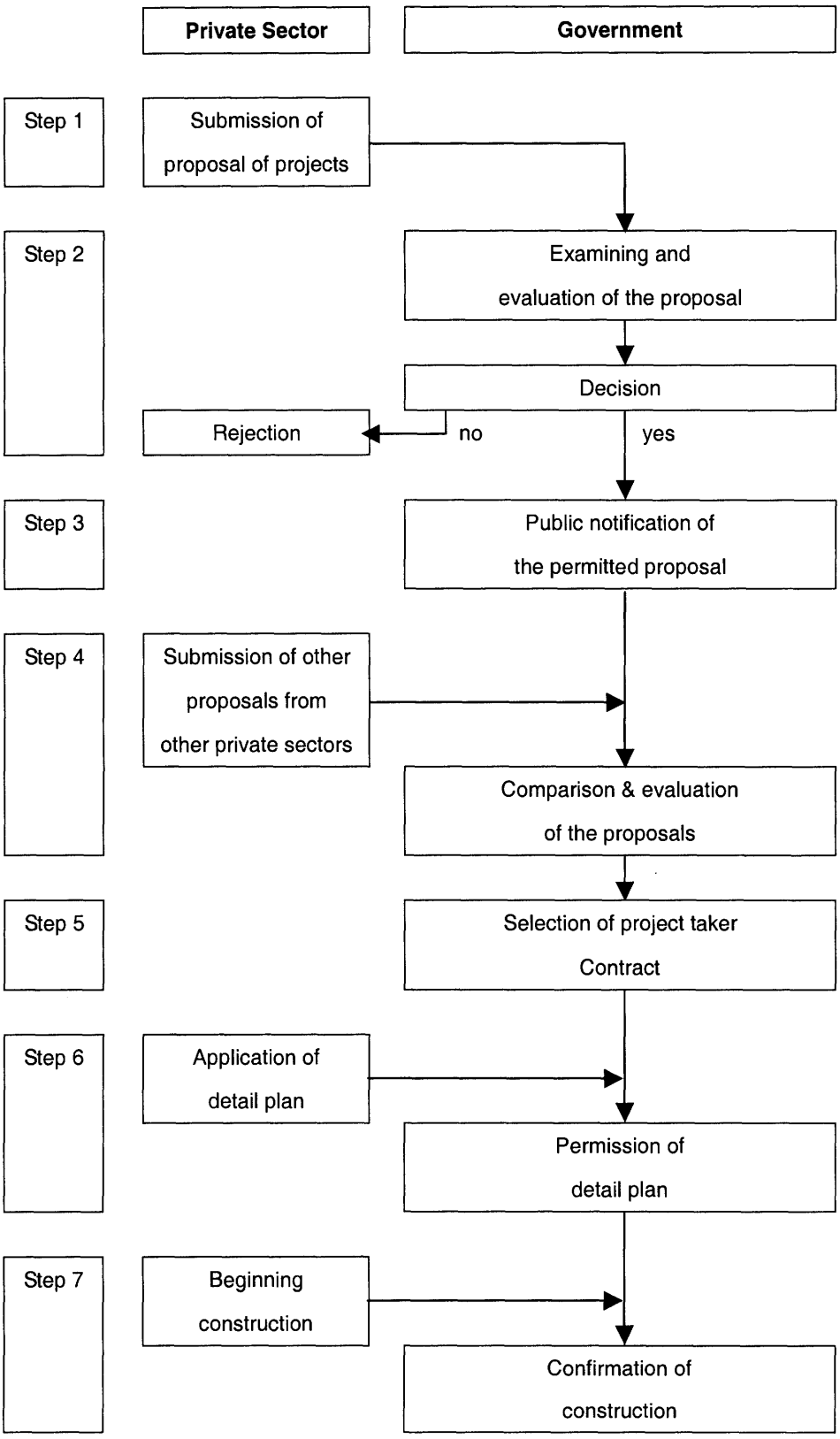


Figure 3-5 Process for the projects proposed by the private sector in Korea[30]

[30] The Korean Ministry of Planning and Budget (2002): Long-term Plan of PFI in Korea

As shown in the Figure 3-5 above, except the initial process in which the private sectors propose the project with PFI, these entire processes are similar to the process dealt with in the above subchapter. In the first step, the private sector submitted the new proposal for the project with PFI method. The concerned ministry and the PFI committee examine and evaluate the proposals submitted. If the project is suitable for the PFI, the concerned ministry notifies the public of the bidding plan. The proposal will be abandoned if it is inappropriate by the evaluation. After the public notice, the committee evaluates and compares the other proposals by other parties during the bidding process. When the final project taker is decided upon, the project will be proceeded with the same following process for the projects solicited by the government.

Chapter 4. Case in Korea

- Incheon International Airport Railroad Project (IIAR)

4.1 Background and Outline

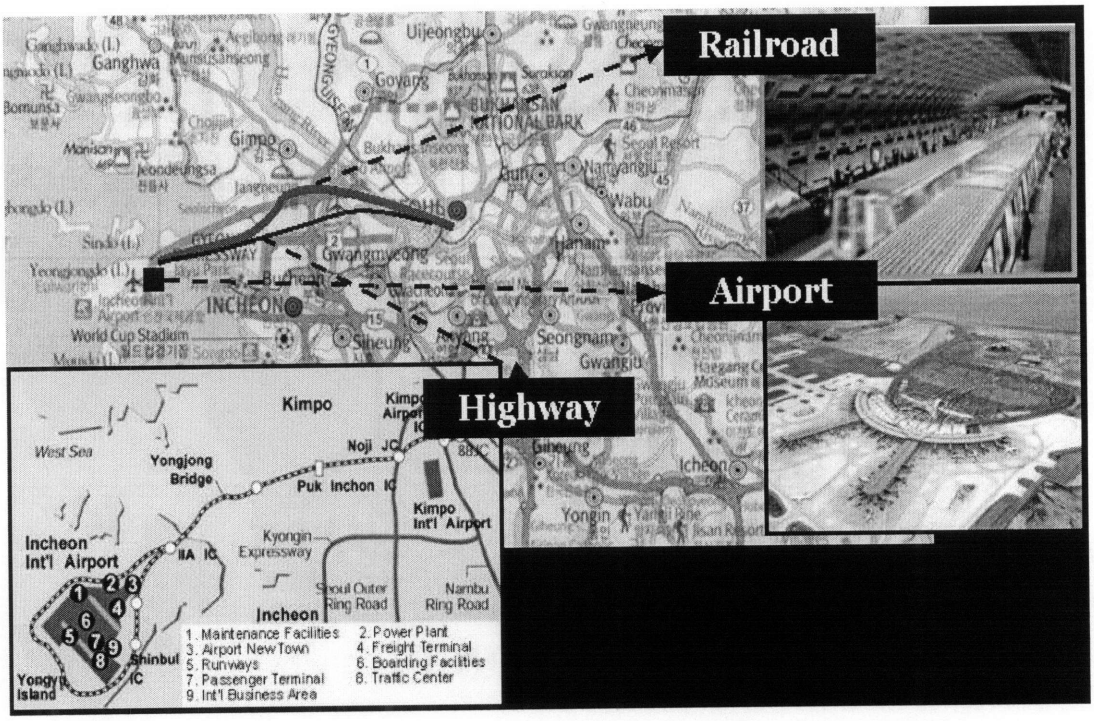


Figure 4-1 Location of the railroad and related entities

Incheon International Airport Railroad Company (IIARC) was established in March 2001 as a privately financed company for the purpose of constructing and operating a High-speed railroad for thirty years from Incheon International Airport to Seoul with a distance of 61.5 km. This project is part of a big plan of Incheon International Airport

along with the Korean government's strategy for a new era in which Korea will be the hub of Asia. However, the fact that the highway, Incheon International Airport Highway, is the only road connecting Incheon national airport and Seoul is one of the big problems of activating the strategy, Hub of Asia for Korea. Moreover, it is important that this project be completed as soon as possible in terms of developing Custom Free Zone and tourist area in the airport's outskirts. This railroad will be an alternative way from the Incheon Airport to Seoul because the highway system does not sufficiently support the volume of passengers and freights.

Date	Schedule
1997. 04	Authorizing the project as PFI by the Korean government
1997. 07	Forming the project preparation entity
1998. 06	Notice of basic plan of the project
1998. 11	Submitting the basic project plan
1998. 12	Designating preferred negotiating applicants
1999. 04	Activating PFI Act
1999. 09	Submission of updated plan of the project
2001. 03. 23	Forming the project company (IIARC)
2001. 03. 31	Approval of execution plan by the government for the 1st phase
2001. 04. 30	Beginning construction for the1st phase
2002. 11. 30	Submission of execution plan for 2nd phase
2003	Beginning construction for the 2nd phase
2005. 12. 31	Completion of construction for 1st phase
2006. 01. 01	Beginning operation for the 1st phase
2008	Completion of construction for 2nd phase (75 months after approval)
2038	End of concessionaire period

Table 4-1 Project schedule[31]

[31] Source: http://www.iiarc.com/02business/01_1_pass.htm

The project has been under construction with the aim of opening the 1st phase by 2006. The significance of this project is that first privatization railroad project and the biggest privatization project with total costs of 4.6 trillion won (3.8 billion dollars) in Korea. A general outline of the project is as follows in the Table 4-2 below.

Table 4-2 Outline of the IIAR project[32]

Route	Seoul~Incheon
Authority	The Korea Government
Structure	Railroad and Railroad Stops
Scale	61.5km
Maximum Speed	120 km/h
Project Company	Incheon International Airport Railroad Company (The private company)
Delivery System	Design-Build-Finance-Operate
Project Cost	5.5 trillion won (4.7 billion dollars)
Project Period	75 months (56 months for 1st Phase)
Concession Period	30 years from 2008
Estimated Fare	Normal (Incheon~Seoul): 3,850 won(3 dollars)
	Express (Incheon~Seoul): 9,600won(6 dollars)
Progress Plan	
1st Phase	From Incheon Airport to Kimpo Airport with 6 stops Distance: 41.5 km Construction Period: March 2001~December 2005 (57 months)
2nd Phase	From Kimpo Airport to Seoul with 4 stops Distance: 20 km Construction Period: 2003~2008 (75 months)
Financing Plan	Debt: 4.1 trillion won (3.1 billion dollars) Equity: 1.3 trillion won (1.0 billion dollars)

[32] Source: http://www.irex.or.kr/01company/01_0_company.htm

As a critical factor of the project, the capital will be raised by 25% equity from the sponsor companies for initial construction and 75% debt from the syndicated banks. The portion of debt and capital is illustrated in the Figure 4-2 below and the detail-financing plan will be explained in the subchapter 4.3 Financing Plan.

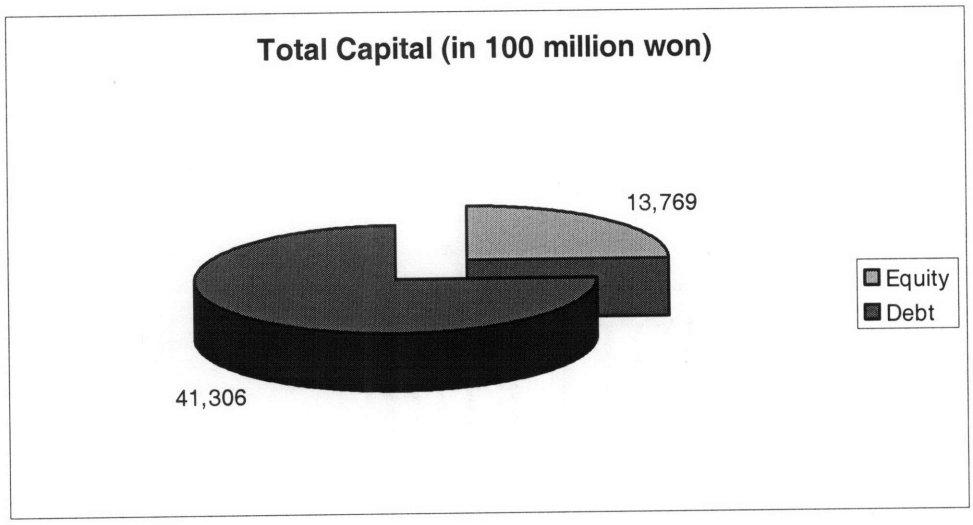


Figure 4-2 Financing plan[33]

[33] Source: Incheon International Airport Railroad Company (2001): Incheon International Airport Railroad Project

4.2 Project Structure

The project company (IIARC) consists of sponsor companies that have purchased stock of IIARC. Sponsor companies as shareholders are usually major construction companies, engineering firms and investment companies. The IIARC uses loans from the commercial bank and the financial institutions as well as equity of the company. The sponsor companies are responsible for cost overruns of the project by the ratio of the equity of the initial invest exceeding anticipated contingency costs during the construction and operation period.

In the project company, the Integrated Project Management Organization (IPMO) has been installed for successful accomplishment of the project by introducing advanced project management. IMPO consists of local experts from Korean Railroad Company and Seoul Subway Corporation and foreign experts from Bechtel, one of the biggest global construction companies, who have sufficient experiences in global railroad projects.

The structure and equity portion of the project is shown in the Figure 4-3 and 4-4 below.

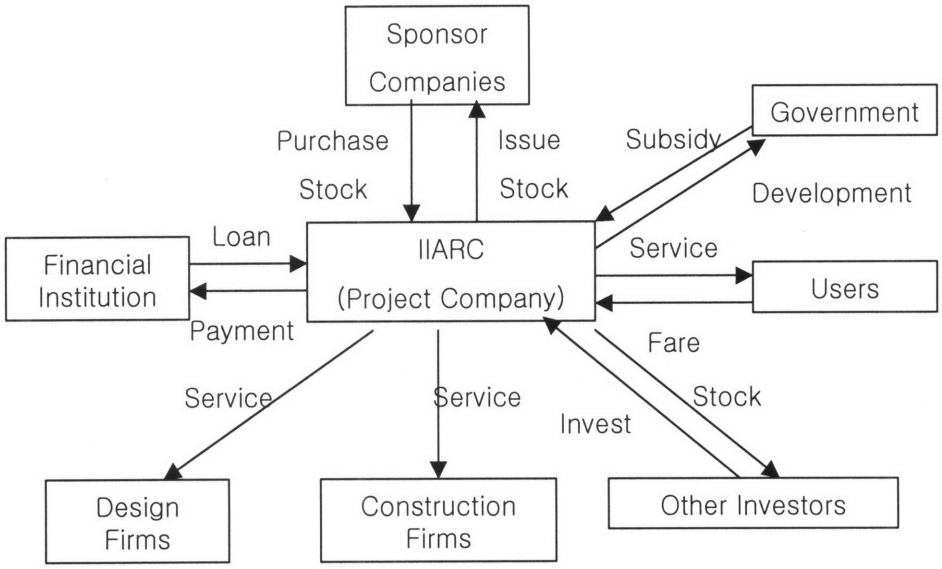


Figure 4-3 Structure of the IIAR project

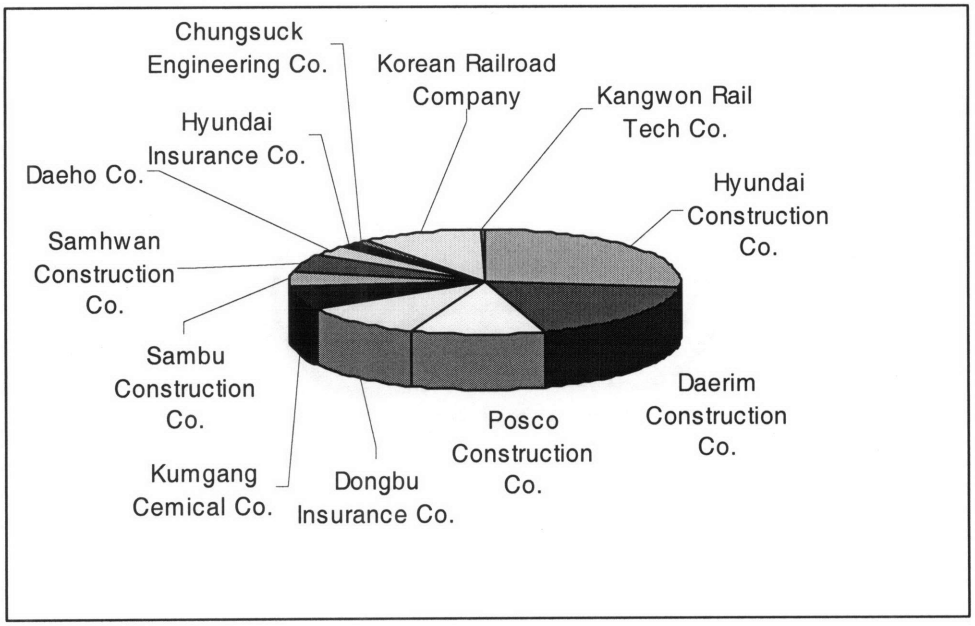


Figure 4-4 Sponsor Companies of the IIAR project[34]

[34] Source: http://www.iiarc.com/01company/03_2_sketch.htm

Most sponsor companies are major construction companies in Korea with healthy financial status and sufficient experience in various infrastructure projects, which might guarantee the probability of the success of the project as planned. There have been changes in the composition of the sponsor companies compared with the early planning stage of this project. Daewoo Construction Company, for example, former one of the biggest construction companies in Korea, was involved in this project at the beginning of the project, however, due to financial crisis in that company, Daewoo was forced to quit.

Alstom S.A is a France based global company specialized in energy and transport infrastructure. Alstom serves the energy market through its activities in power generation, transmission, and distribution through its activities in rail and marine industry. In this project, Alstom contracted with the project company, IIARC, about providing engineering and mechanical expertise of railroad and trains.

The participation of the Korean Railroad Company in this project reflects the close relationship of the project with the national government for smooth cooperation as well as the characteristic as an example of public project with private financing.

A Balance sheet and income statement of the main sponsor companies is provided in the Table 4-3 and 4-4 below.

Table 4-3 Income statement of the major sponsor companies[35]

Companies	1995		1996		1997	
	Revenue	Net Income	Revenue	Net Income	Revenue	Net Income
Total	382,213	8,019	445,099	7,584	514,751	4,958
Hyundai Construction Co.	38,473	230	47,321	211	56,074	141
Alstom S.A.	135,122	5,098	138,809	4,820	141,968	3,672
Daerim Co.	22,170	208	24,774	229	29,203	28
Posco Co.	21,964	1,733	28,023	1,507	30,070	453
Kumho Construction Co.	10,176	92	11,508	43	12,054	47
Samhwan Co.	4,061	55	4,541	44	5,290	78

(in 100 million won)

(1 dollar = 1,300 won)

Table 4-4 Balance sheet of the major sponsor companies[36]

Companies	1995			1996			1997		
	Assets	Liabilities	Equities	Assets	Liabilities	Equities	Assets	Liabilites	Equities
Total	475,091	404,209	74,913	506,131	420,812	85,319	592,024	493,830	98,193
Hyundai Construction Co.	59,483	51,029	8,454	70,948	61,114	9,834	94,568	82,039	12,529
Alstom S.A.	247,157	217,933	29,255	249,039	217,976	31,063	249,567	217,579	31,988
Daerim Co.	34,006	26,016	7,990	38,196	29,966	8,230	40,631	32,430	8,201
Posco Co.	26,788	18,193	8,595	28,442	18,368	10,074	33,875	23,275	10,600
Kumho Construction Co.	17,206	12,872	4,334	19,967	14,403	5,564	22,840	17,422	5,418
Samhwan Co.	7,025	5,356	1,669	7,026	5,052	1,974	8,320	6,377	1,942

(in 100 million won)

(1 dollar = 1,300 won)

[35] Source: Financial Supervisory Service, Korea
[36] Source: Financial Supervisory Service, Korea

4.3 Financial Scheme

4.3.1 Projected cash flow

Total anticipated project cost is 5.7 trillion won, including 20% contingency; 1st phase: 2.5 trillion won and 2nd phase: 2.9 trillion won. Total construction cost is 2.5 trillion won. Total cost of the project also considers 5% of Consumer Price Index (CPI) increases each year and the currency rate 1300 won/US dollar is applied. The balance is filled in with the interest to be earned during construction and parent companies' letter of credit for the contingency. Detail project costs projection is as follows in Table 4-5.

Table 4-5 Total Project Costs[37]

Costs	Total	1999	2000	2001	2002	2003	2004	2005	2006	2007
Inspection	34	11	23							
Design	518	116	306	96						
Construction	24,593	157	1,193	3,819	6,655	6,226	3,515	2,105	925	
Overhead	2,160	367	222	292	552	282	180	147	93	27
Facilities	2,735	68	203	68	419	251	750	645	333	
Tax	3,305							1,573		1,732
Others	470	10	55	82	81	53	60	130		
Reserve	11,294	64	292	959	2,137	2,328	1,810	2,051	716	937
for CPI change	1,230	8	60	191	333	311	176	105	46	
for quantity change	10,064	56	232	768	1,805	2,107	1,634	1,945	670	
Interests	9,965				103	1,183	2,524	3,218	2,277	659
Total	55,075	792	2,294	5,314	9,946	10,323	8,839	9,867	4,343	3,355

(in 100 million won)

[37] Source: Incheon International Airport Railroad Company (2001): Incheon International Airport Railroad Project

Also, the anticipated project cash flow is as seen in the Table 4-6 below. The discount rate for calculating NPV is 12.38%, which will be described in detail in chapter 4.3.3. In order to propose the exact rate of internal return (IRR), total NPV of the projected cash flow is assumed to be zero. The first year of producing revenue is 2004 and the concessionaire period will last until 2037 for 30 years after completion date.

Table 4-6 Anticipated cash flow of the project[38]

	Total	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Expense	139686		729	2001	4356	7706	6812	4539	4836	1939	2669	890	974	1443	1661
NPV	26860		648	1585	3069	4831	3800	2254	2136	762	933	277	270	356	364
Revenue	313102							29	653	2689	4953	6087	6494	6944	7173
NPV	26860							14	289	1057	1733	1895	1799	1711	1573

		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Expense		2112	2300	2402	3053	2974	3544	3433	3703	4333	3938	4259	3918	3899	4713
NPV		412	399	371	420	364	386	333	319	332	271	259	212	188	202
Revenue		7412	7664	7929	9573	9964	10379	10817	11282	11774	11774	11774	11774	11774	11774
NPV		1446	1311	1225	1316	1219	1130	1048	973	903	804	715	636	566	504

		2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
Expense		3911	4706	4154	4664	4463	4189	4174	3932	3889	4860	4733	3847
NPV		149	159	125	125	107	89	79	66	58	65	44	41
Revenue		11774	11774	11774	11774	11774	11774	11774	11774	11774	11774	11774	2903
NPV		448	399	355	316	281	250	223	198	176	157	140	31

(in 100 million won)

[38] To meet NPV of the project being zero, the fare is applied as basic fare 2,747 won (until 10Km) + additional fare 65 won/Km.

As similar to most infrastructure projects, a huge initial expense is required for the construction. Revenue from 30 years of the concessionaire period will cover the initial deficit of the company. Trends of cash flow of this project is depicted in Figure 4-5 during the concessionaire period.

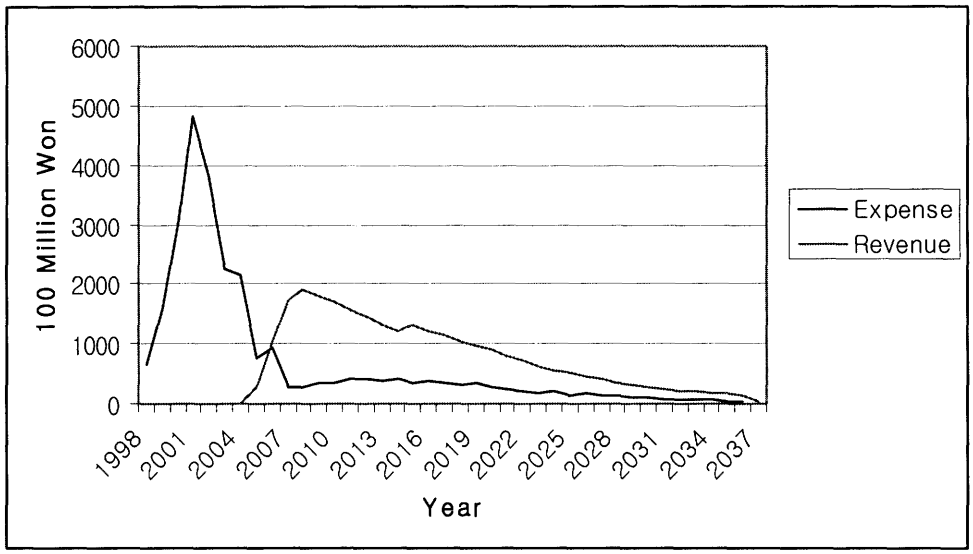


Figure 4-5 Trends of Cash Flow[39]

4.3.2 Fund raising plan

Sources of funds of the project consist of, as Table 4-7 shows, 25% equity and 75% debt. IIARC uses the project financing, which is non-recourse financing. Therefore, equity from the sponsored companies should be used for initial project construction because the loan of the project is provided with the condition that the project itself

[39] Source: Incheon International Airport Railroad Company (2001): Incheon International Airport Railroad Project

progress at a certain level pace. Sponsored companies pay the project costs as an equity, 1.3 trillion won, 25% of total costs, according to the progress of construction.

Table 4-7 General outline of debt financing[40]

Total debt amount	4.1 trillion won (3.4 billion dollars)
Borrowing period	16 years (5 unredeemed years)
Repayment method	Principle: 40% in first 5 years. 60% in next 6 years. Interest: pay 3 month later.
Interest rate	IRR of commercial bond with 3 years of maturity + Spread[41]
Syndicated Banks	Korean Development Bank and so on.

Debt financing will be raised through syndicated bank loans, funding mainly from the Korean Development Bank, and the proceeds of bond issues in the amount of 75% of total costs, 4.1 trillion won. As shown in the Figure 4-6 below, the repayment period of the debt is 16 years and interest rate is Internal Rate of Return (IRR) of a commercial bond with 3 years of maturity plus spread of 2%. For the first 5 years, 40% will be repaid and rest of the loan, 60%, will be retired for the

[40] Source: Incheon International Airport Railroad Company (2001): Incheon International Airport Railroad Project

[41] Originally the interest rate was the IRR of the commercial bond with 3 years of maturity in Korea, 16% plus 2% of spread. However, considering the trends of commercial interest rate declining these days, 14%, which comes from 12%, IRR of commercial bond plus 2% of spread is applied as an interest rate.

next 6 years.

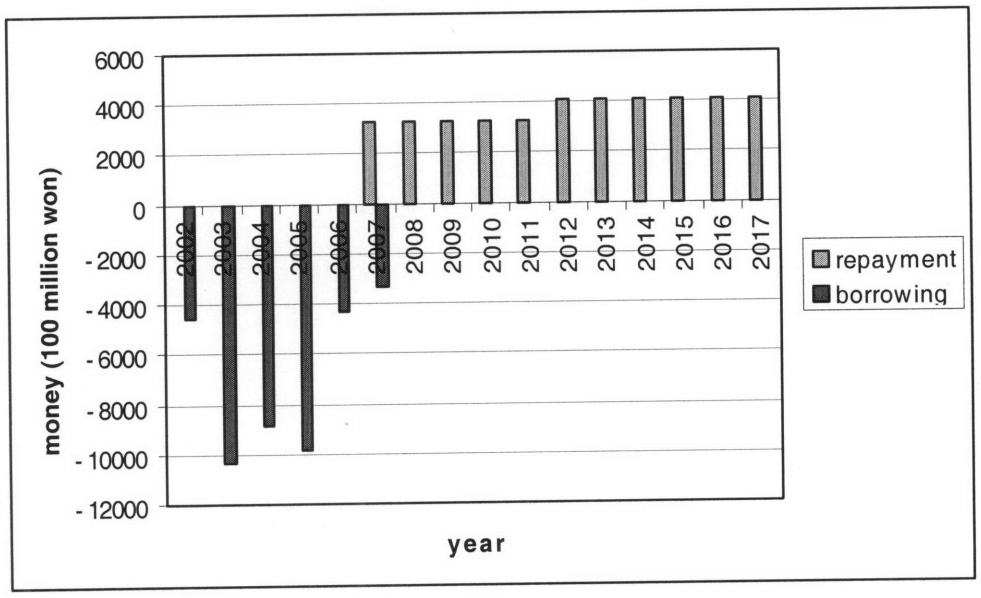


Figure 4-6 Debt repayment plan[42]

The debt financing of this project is based on the principles of the portion of capital required, the currencies and the provenance of the loans and the necessity to allow a refinancing. As it is the case in most project financing packages, the amount of capital requested is 25%. The bank involved in the financing would not be willing to participate with a lower rate, as the bank would bear too much risk and the investors not enough. The amount of money required can be raised on the Korean domestic market and foreign market. In return for bearing high risks, the banks can take advantage of relatively high rate of return, 18%.

To ensure the reliability of the financing package, special attention must be

[42] Source: Incheon International Airport Railroad Company (2001): Incheon International Airport Railroad Project

provided to the risks and methods in which they are shared, the internal rate of return, and the rate of return on the capital.

If necessary, the project can be refinanced. In this case, the length of the repayment of the loans could be longer. New lenders could replace the initial ones and the project company could pay higher dividends and the interest payments could be lowered. As new lenders would enter, there would be fewer risks involved in the project than during the first financing and the interest rates could be lower. This would minimize interest expenses.

The whole negotiation between the banks and IIARC is still in the process because there are still conflicts associated with credibility of demand forecasting of the railroad and the expected rate of return of the project. The participants of the financial institutions are also not confirmed due to delayed negotiation. The Korean government should have reconciled the two parties. This is the biggest problem of current situation, which delays the construction.

Foreign investment is in negotiating process. The fund-raising plan in terms of years is as follows in Table 4-8.

Table 4-8 Fund-raising plan[43]

	Total	1999	2000	2001	2002	2003	2004	2005	2006	2007
Equity	13,769	792	2,294	5,314	5,368					
Debt	41,306				4,578	10,323	8,839	9,867	4,343	3,355
Total Capital	55,075	792	2,294	5,314	9,946	10,323	8,839	9,867	4,343	3,355
Equity Ratio	25%	100%	100%	100%	54%	0%	0%	0%	0%	0%

(in 100 million won)

(1 dollar = 1,300 won)

Equity investment from the sponsored companies has been done with several ways of fund raising as shown in Table 4-9 for initial construction of the project.

Table 4-9 Equity Investment plan[44]

	Total	1999	2000	2001	2003
Own capital	6,484	594	1,658	2,113	2,119
Issuing bond	2,103		63	1,013	1,027
Loan	1,740			860	880
Others	3,442	198	573	1,329	1,342
Total	13,769	792	2,294	5,315	5,368

(In 100 million won)

(1 dollar = 1,300 won)

[43] Source: Incheon International Airport Railroad Company (2001): Incheon International Airport Railroad Project

[44] Source: Incheon International Airport Railroad Company (2001): Incheon International Airport Railroad Project

4.3.3 Discount rate and proper fare

To determine proper fare rate, detail anticipated project costs, discount rate, and anticipated transportation demand are used. In the costs, contingency and interest are excluded for calculating proper fare. The following formula in Figure 4-7 is used for the proper fare, which is listed in the Korean PFI Act.

$$\sum_{t=1}^{n} CCt + CR = \sum_{t=n}^{N} (ORt - OCt) + \sum_{t=n}^{N} ANRt$$

n: Beginning date of facility operation

N: Ending date of operation concessionaire

CC_t: NPV of construction costs at each year

CR: Profit listed on Korean PFI act

OR_t: NPV of operation revenue at each year

OC_t: NPV of operation costs at each year

ANR_t: NPV of terminal value of the facility

Figure 4-7 Formula for determining of fare in Korean PFI[45]

Discount rate is also a very important factor for calculating the proper fare. Because this project requires high risks to the project participants, discount rate increase according to high risk. Furthermore, in order to attract foreign investment,

[45] The Private Finance Initiative Act on Infrastructure Projects, Korea (2000)

reasonable level of return should be guaranteed, as well as transparency of the project and consistency of the government's policy. Therefore, an IRR (Internal Rate of Return) of 18% is used reflecting expectation rate of return with the viewpoint of foreign capital. An actual discount rate comes out as 12.38% according to the formula in the Figure 4-8 below.

Actual discount rate = {(1+IRR)/(1+CPI)}-1

Figure 4-8 Formula for discount rate[46]

Anticipated transportation demand is based on government's survey and research on the development plan of Incheon International Airport, the urban development plan of main influencing areas such as Seoul, Incheon, and Kyungki, and the traffic survey of total volume of the passengers, trip length, and trip goal. Also, demanding change factors, shown in Table 4-10, are reflected in an anticipated demand.

[46] The Private Finance Initiative Act on Infrastructure Projects, Korea (2000)
CPI: Consumer Price Index

Table 4-10 Demand changing factors[47]

Contents of the plan	Completion date
Custom Free Zone in the Airport	2005
3rd phase subway in Seoul	2005
Subway system of Kyungui railroad	2005
Expansion of Kyungin railroad	2005
Incheon subway 1st phase	2005
Incheon subway 2nd phase	2014
Local way to Incheon Airport	2010

In 2005, Custom Free Zone will be open in the Incheon International Airport. The airport plan is aimed at not only making Incheon and the vicinity be logistic hub of East Asia but also developing suburbs of Seoul metro area. Huge volume of freight and passengers from Incheon International Airport will use this railroad to access other areas in Korea. If the Custom Free Zone project does not proceed as planned, the profitability of this project will be hurt seriously.

This railroad will be not only as an advanced approach to Incheon International Airport but also one of the common modes of commuter transportation around the Seoul metro area. Upon completion of this railroad in 2005, other related transportation methods described in the Table 4-11 below will be open simultaneously. Therefore, the

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volume of commuters will not occupy a large portion of predicted passenger volume.

Table 4-11 Anticipated transportation demand[48]

Year	**Demand** (number of people)
2005	164,485
2007	393,488
2010	462,711
2015	630,086
2020	760,846

For exact anticipating of transportation demand, the company used the proper fare recommended by the Korean government. The proper fare is based on 750 won until 10km plus additional 65won/km. This process is very critical for the financial plan for both the project company and syndicated institutions.

To make the Net Present Value (NPV) of the project equal zero, the fare should be 2,747 won as basic fare plus 65 won/km as additional fare. However, this level of the fare is too high for the prospective customers because this infrastructure facility, Incheon International Airport Railroad, has the character of public transportation of both the Metropolitan area around Seoul as well as a means of accessing transportation to the Incheon International Airport. The fare from the NPV calculation has no reality because the current the fare of metropolitan subway is 450 won as a basic fare plus 66

[48] Source: Incheon International Airport Railroad Company (2001): Incheon International Airport Railroad Project

won/ 5 km.

As a result, the final proper fare is 750 won as basic fare, which comes from 1.5 times of Seoul metropolitan subway fare, and 65 won/km as additional fare in order to enhance the profitability of the project from the project company's point of view.

4.4 Supports from the Korean government

4.4.1 Financial support

(1) Revenue guarantee

The Korean government guarantees 90% of the prospect revenue. If the prospect revenue will be lower than 90% of anticipated, the Korean government will directly subsidize for the amount of deficit. Also in case of surplus over 110% of anticipated revenue, the company will reimburse the amount over 110%.

(2) Currency

In order to perform this project successfully, it is unavoidable that the company attracts foreign investment and uses advanced foreign equipment, whose costs are absolutely depending on the currency rate. But the currency rate is hard to forecast as shown in the Asian economic crisis at the end of 1990s. Therefore, the company can be reimbursed the currency deficit from the Korean government during the construction period upon completion and during the operation period at the end of each year. Furthermore, the project company will be subsidized by the Korean government given the trouble in proceeding with the project due to increase of the project costs incurred from abrupt change of currency rate.

(3) Buyout option

This project includes high risks as a typical railroad project, which requires high initial investment and high cost of goods sold during the operation period. Thus, it is very unsure whether the investors, including the lenders, as well as the project company can collect the investment capital or not. The Korean government can execute the buyout option of this project in case of emergencies due to construction suspension incurred from majuer force and difficulty of operation incurred from wide discrepancy between real and forecasted transportation demand.

(4) Guarantee for foreign investment

Foreign capital might be necessary with lower interest because this project requires huge amount of capital for which only domestic capital might be insufficient to be raised. Given this situation, the government will cosign the loan from abroad.

(5) Custom exemption

The Korean government provides the custom exemption for the equipment from the foreign companies. This not only reduces the project costs but also improves profitability.

(6) Tax benefit

Although this project will be owned and operated by the private company (IIARC) during the concessionaire period for 30 years, the company will get the tax benefit without paying the property tax for this infrastructure. The reasons are that the government is to cut down the project company's financial burden, to set the fare at the proper level, and to attract the private sectors to join the following PFI projects as well.

4.4.2 Administration support

(1) PFI Act

The Korean government is currently revising the PFI Act simultaneously with this project, which might bring the change and the extra cost to this project. Therefore, this project will be applied by the retroactive PFI Act even after amendment of the PFI Act.

(2) Subsidiary enterprises

When the company (IIARC) would like to create subsidiary enterprises of this project, the national and local governments are supposed to help them out.

4.5 Risk Management

4.5.1 Pre-construction Risk

Both the Korean government and IIARC share responsibilities for land compensation, environmental compliance, regulatory permissions, and other project requirements before the construction period. The character of this project as a pioneer PFI project with huge amount of costs in Korea makes the both parties be cautious in their preparation.

4.5.2 Construction and Completion Risk

The construction and completion risk is huge because the project is very sensitive for the length of the construction and the estimated costs reliable figures. In this project, the project company, IIARC assumes for the cost overrun, delay of completion, inadequacy of the performance, as most contractors are the participants of the project company. Because mostly the contractors should carry the risks associated with these delays or over cost by the means of careful contracts, the project company will take most those risks by itself. For deficit due to each contractor's fault, each contractor will charge for the deficit. Of course, the company shares the risk with performance bond from the insurance company.

4.5.3 Market Risk

Because fare revenue is the only source of the cash flow of the project company, except the revenue guarantee from the Korean government, demand forecast for the volume of anticipated users is the most crucial factor of this project. To prevent the participants from not joining this project at the beginning, the Korean government conservatively forecasted future customer volumes using a consultant and guarantees 90% of anticipated revenue. Also, any surplus revenues over 110% will go to the Korean government.

The fact that project is a pioneer PFI project in Korea requires the Korean government to choose to guarantee and support definitely. With limited government budget, it is hard to proceed with the projects associated with Incheon International Airport at the same time, which targets Korea to be a hub of Asia. By introducing upfront private capital, the Korean government can save the big burden at the beginning phase. The private parties feel secure for the upfront investment in this project with this revenue guarantee during the operation period.

4.5.4 Political risk

The Korean government basically assumes political risk. Although it has been about ten years since the Korean government introduced PFI, the formation related to regulations and policies are still under revision. Therefore, political risks are the share

of the government.

4.5.5 Force Majeure

Similar to most PFI cases in other countries, the Korean government basically assumes force majeure risk with buyout option. The Korean government will take over the project by buying the project from the project company with the appropriate price in case of unexpected situation incurred from force majeure.

4.5.6 Operation risk

The project company is responsible for the operation of the railroad service, which includes collecting fare, maintaining facilities, and responding to emergencies, within the agreed operation budget. The Korean government and the project company agree upon the proper level of fare. The government monitors the operation. Should the project company provide inappropriate service, the government can ask for enhancement of the service quality.

4.5.7 Financial risk

IIARC's repayment obligation was secured by priority charges on certain project

assets and distribution of fare revenue, certain financing proceeds, and by parent guarantees, together with several insurance and bonds to mitigate risks. This was enabled by the Korean government's prospect revenue guarantee at least 90%. Also, the fact that most of the participants of this project is top tier construction companies in Korea reflects the reliability of the project company.

In case of currency loss, the Korean government will directly subsidize the amount of currency deficit during the construction period upon completion of construction. Also, the IIARC will be reimbursed for the loss due to currency changes during the operation period at the end of each year. The reason for these supports is that the Korean government has the main responsibility for the currency changes related to national economy.

4.6 Problems and Lessons

4.6.1 Insufficient preparation of the PFI Act

Without sufficient preparation, the Korean government has driven this railroad project of huge scale as a PFI project. The fact that initial establishment of the PFI Act was in 1995 and is still being revised at this time reflects that PFI system is not fully integrated in Korea. However, the government tried to launch the project regardless of this environment because the Incheon International Airport project was already started. When the Airport was planned, entire related projects were supposed to be done by the government. However, the Korean government's financial difficulties after the financial crisis in the late 1990s made the change of the initial plan unavoidable. Therefore, the government wanted to transfer this project to the private sector. Also, the major Korean construction companies, majority of the private participants of the project company, wanted to join the project because of their aggressive tendency to take as many project as possible without much consideration of the projects' profitability, in order to escape from the financial difficulties. As a result, this project has been easily launched without sufficient preparation, which resulted in other problems such as delay in contract negotiations, financial institutions' hesitations about this project, and delay of the construction.

To prevent the prospective PFI projects from the uncertain playground, the Korean government should fully form the PFI Act and related regulation by analyzing the PFI

acts of other countries such as the U.K. and Japan with successful PFI system. The formation of solid principle can stimulate the private parties to join the PFI playground, as the government's principles about the potential PFI projects are consistent in terms of financial and administrative supports.

4.6.2 Expensive cost

The cost of this project is relatively too expensive, which might result from insufficient preparations and misunderstandings of both the government and the project company. The characteristics of this project as a pioneer PFI infrastructure project with huge scale made the private participants plan the project conservatively in the financial aspects. Because the project company expected insufficient profitability of this project, it cannot help forecasting the low revenue and high costs with high discount rate. The participants deserve to ask the government for the proper rewards for bearing high risks of the project. However, the government did not approve the clear direct subsidy for this project. Although the government guarantees the project by some financial support such as revenue guarantee and buyout option, the cost of the project is not reduced as much as with initial direct subsidy. The reason is that the project company can rely on the revenue guarantee without making efforts to reduce cost during the planning period.

To avoid high costs of the huge PFI project, the government should clarify and enlarge the direct subsidies. Because the infrastructure projects are supposed to be

provided by the government for the public, the government has the responsibility for the infrastructure service, although the intention of the PFI is to share the government's burden for the infrastructures with the private sector. Therefore, the government's focus on PFI projects should be changed, from what the private sectors can provide the infrastructure service to the public, to what the government pays for the proper rewards to those who provide the public service instead of public sector.

4.6.3 Unskillful risk management

Risk management of this project is relatively unskilled. The Korea government takes most of the risks of this project because of the characteristics of this project, huge PFI project with high risks. Most of risk managements, financial risk allocation is the most unskillful. Revenue guarantee by the government can be the best incentives for the private participants to solve their concerns about uncertainty of the probability of this project. However, this risk allocation eventually results in rising cost and inefficiency of the PFI implementation process of this project. Although it is at the beginning period of the PFI application in Korea, the Korean government should have revised the unconditional revenue guarantee instead of initial direct government's subsidy.

Because this unskillful risk allocation problem comes from the inexperienced attitudes and knowledge of both private and public sectors for allocating huge risks, the PFI project application to Korea should start with the small scale projects, not with the

huge projects. After acquiring sufficient experience such as risk allocations and project financing regarding PFI projects, the private and public sector can implementation huge infrastructure projects more efficiently.

Chapter. 5 Conclusion

PFI is the best alternative way for the government's burden of providing infrastructure service, which has been traditionally the government's role, with the insufficient budget by bringing in private sectors' money in exchange for moderate and relatively secured high yield. To attract the private sector to public projects using project financing, which contains high risk bearing for the participants, the public sector provides proper rewards for risk taking to the private participants of the project. Proper risk management is the key success point of the project according to the best risk allocation process, which consists of risk recognition, rating risk influence, assumption of risk, calculation of financial influence, and risk allocation as described in Chapter two. In the U.K. and Japan, PFI has been well done with creative application adjusted to their unique environments using this basic principle.

In Korea, the PFI is not fully settled down so far although the Korean government has strived to stimulate the private sectors such as major construction companies, financial institutions, and foreign investors. In order to meet the increasing public needs for the infrastructure facilities, the proper risk management and related details of the PFI Act are needed as in the third chapter. For example, the Incheon International Airport Railroad Project, the pioneer PFI project in Korea, is described in Chapter four with the background, the structure, and the financial scheme of the project in detail. This project has some problems such as insufficient preparation, expensive cost, and unskillful risk management although most aspects seem positive for the innovative PFI applications to Korea.

In order to solve those problems, I recommend the following ways for the successful PFI application to Korea. First, the Korean government should integrate the PFI act and related regulation by analyzing the PFI acts of other countries with successful PFI system such as the U.K. and Japan to set the secured playground. Secondly, the government should clarify and enlarge the direct subsidies, which will help to reduce the costs of the project more than indirect subsidies. Finally, the PFI project application to Korea should start with the small scale projects, not with the huge projects because sufficient actual experience such as risk allocations and project financing regarding the PFI project will enable the private and public sector to implementation the huge infrastructure project more efficiently.

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