A STUDY ON THE RATE OF RETURN
OF PRIVATE INFRASTRUSTURE INVESTMENT PROJECT

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ABSTRACT: Present PII(Private Infrastructure Investment) in Korea has increased up to 11% compared to the year 2003 and is expected to increase in the future. In spite of its rapid increase, we don't have any definite standard or system which distinctly presents the rate of return for domestic PII yet, and practical and scientific research is not sufficient compared to its necessity and importance.

Hence, in this study we suggests methods to estimate the rate of return of PII to promote SOC PII to last successfully and present the proper level of rate of return of PII which is appropriate for domestic situations through diverse analysis.

Therefore, to present reasonable rate of return, we have used 5 methods: previous research analysis, case study, financial index analysis, analysis of investor's rate of return, and analysis of rate of return in a real estate market. After comparing and analyzing these methods, at the end, we have presented the appropriate level of rate of return of PII, which can be applied in the domestic market.

Key word : SOC, Private Infrastructure Investment, Rate of Return

1. INTRODUCTION

1.1 Background and Objective

It is sure that investment on SOC is an essential nation wide task to build infrastructures for developing international competitiveness. As it requires a lot of capital resources for investing on SOC, taking all responsibilities to support all capital resources is barely possible. Therefore, government has been encouraging private infrastructure investment(PII). With this effort, PII has increased up to 11% compared to year 2003, and it appears potentials to keep increasing the portion of private part. Even though, rapid increase of private infrastructure shows several sides of problems like increasing financial burden to the government or misunderstanding demand, and these problems eventually become barriers for success of private infrastructure projects.

Especially, the problem seen in the structure of infrastructure investment has caused a lot of burden for bolstering PII when it comes to investment sources that are the root of PII. In 2003, among the investors, 80% of investors were construction companies that intend to return the financial support by the means of construction profit. Practically, the pure investors who are actual financial investors were only 10%.

The reason why the rate of pure investor is relatively low is the lack of confidence that conservative financial investors such as banks, fund companies, insurance companies have about PII. Also, there are other additional reasons that make investors reluctant to invest like lack of systematic governmental support, ambiguousness in the stages of planning, and technical and political problems. So it is expected that government have developed continuously related policies and technical supports in order to bolster infrastructure investment in terms of standard developing of validity analysis and inviting CM system.

Most of all, to diverse the resources of investment, it is urgently needed to establish validity and reliability standards with equipping tools for decision making. To do this, socially accepted rate of return should be suggested.

However, there are no obvious standards or systems in terms of PII at previous stages for the rate of return. Even though investing earning rates can be a crucial or an essential factor to decide invest, there are few scientific researches about investing earning rates.

Therefore, we would like to suggest appropriate rate of return in order to foster successful PII and continual development in PII by establishing related theories and utilizing various analysis in accordance with domestic situation.

1.2 Scope and Methodology

The aim of this study suggests appropriate investing earning rates in terms of PII. To accomplish this aim, this study has set the scope as follows:

First, after observing current situation of PII, structural problems that financial resources have are analyzed. Second, previous researches are reviewed, and based on this review, a new theory is established in order to suggest appropriate rate of return for PII. Third, suggesting appropriate earning rates of PII. In this study we have tried to encourage PII in various ways to reflect domestic market situation.

In order to reflect vivid domestic situation of Korean economy, this study have used documents issued since 1998 when Korean economy was under IMF.

2．PII AND ITS DRAWBACKS

2.1 Current situation and Future of PII

The portion of PII has been increased up to 11% which used to be 1～5% in 1990s, and this tendency seems to be continuing.

PII can be named in two different ways in terms of management subjects as: national government utility and local government utility. In case of national government utility, whose investing scope was more than 200,000 million won in current situation of December 2003. There are 29 national government utilities whose operating contracts are completed, and total 24.7 trillion won is invested. Besides, when it includes ongoing utilities and in case of recruiting enterprisers, there are 37 utility costs more than 35 trillion won. In parts, there are 17 roads utilities, and six port utilities and its parts are quite various.

Also, local government utilities are total of 97 utilities, and its parts are various like roads, tunnels, ports, parking lots, and environment. They are vividly in progress. Especially, in case of environmental utilities, there are 37 utilities out of total 97 utilities. 40hours a week working system leads to increase tour utilities. Current status shows that previous transportation utility centered in central government utility turned into various local government utility that has various proposals of PII.

According to the mid-long term plan of PII(2002～2011), approximately 20～40 trillion won is required to operate PII. And this assumes that developing rate of GDP is annually 4 ～6%. It also considers annual investment scope that costs about 1,500 million won, and it takes 2.4% of GDP. This will be measured for utilizing to complete the first plan for investing transportation facilities, and network between government complex, and the fourth plan of national land planning.

2.2 Problems that current domestic PII

Currently arising problems are as follows:

Firstly, more than 50% of capital comes from borrowed capital. Those organizations like banks try to join decision making process. From this situation, the enterprisers are forced to have excessive guarantee. Eventually, this burden can be a basic obstacle to keep the enterprisers from joining in PII.

Secondly, more than 80% investors are construction companies which simply participate in the investment only for the construction profits. This causes disqualification in PII due to rising expenses of construction, inappropriate project contracts and unreasonable business proposal.

Thirdly, lack of participations in PII causes lack of creativity and variety which are huge advantages for applying PII. Therefore, it can't fully utilize managing PII. It causes lack of confidence from citizen.

Besides, conservative characteristics of banking sector or stubborn policies can be another obstacle to encourage PII.

Therefore, diversifying both investors and capital resources is essential in order to bolster and settle successful PII.

3. THE STUDY ABOUT RETURN ON INVESTMENT (ROI)

3.1 The standard of return of private investment

Economic Feasibility is to decide whether or not it is feasible by measuring the profits and expenses of public works in the view of government, and then by calculating the economical return under the measurement. On the other hand, financial feasibility is to estimate the current financial profits and expenses in the view of individual investors, not the whole society, and then examine the feasibility of the target work by calculating the financial return under the examination. Current investment and cash flow is critical in the examination of financial feasibility.

Consequently, to figure out the return on investment, financial feasibility should be carried out. Utilizing the result, we can calculate the proper return. However, when operating feasibility, it is not clear whether return is set first rather than other factors like interest rates, or operating period and vice versa.

3.2 Risk Premium

When private investors decide return on investment, the first consideration should be who takes a risk expected in target work. The amount of return from target works depends on who takes a charge. For example, if government takes a lot of risk, stable investment withdrawal will be possible so investors have to set lower return, on the contrary. If investors take a lot of risk, they can expect more return. Therefore how to share risk is the most important factor in the decision of return on investment on private investment.

The discussion about the risk and its countermeasure to occur on private investment has been existing for a long time. However, there has been no exact solution. Maybe, there is not accurate solution because each project has different situation, purpose and period.

The description and solution of risks can be various by the person, and period, and we can't say that one of them is absolutely right.

4. ESTIMATING FAIR ROI (RATE OF RETURN ON INVESTMENT)

In this chapter, five ways are used to estimate fair ROI are mentioned which is the aim of this study. Based on all five ways of estimating ROI, finally this study suggests fair rate of return on investment. It is different from traditional ROI based on previous economical analysis and various approaches to estimate ROI can estimate realistic return on investment.

4.1 Estimating ROI with analysis of previous study

When PII in SOC is operating, estimating fair ROI is always controversial. So, Government-run research institutions and banking sectors have been struggling to estimate fair ROI.

There are many studies to suggest fair ROI; they show various ROI in accordance with researching methods and

periods. In most of cases, they suggested ROI with dividing social discount rate and ROI separately.

With reviewing of previous researches, they suggested about 9～12% for ROI, and 7～9% for Social discount rate.

4.2 Estimating ROI with case analysis

In this study, business returns are observed, according to the annual report from Korea Development Institute, from private investment utilities that are ongoing or be completed between 2001 and 2002.

In case study, the portion of private investment takes 72% of total capital and its average return is 8.5%. When the case is observed, return of each part of projects as: Port 9.09%, Highway 9.05%, but in case of Railroad is 9.77% which is the highest, and in the case of environment is 6.99% which is the lowest.

However, as the target of analysis is not enough, this result can't be generalized.

Table 1. Average return of the case

Division	Cases	Average expenses (100 million won)	Average rate of Private investment (%)	Average return (%)
Port	4	5,052	63.77	9.09
Highway	11	7,792	83.17	9.05
Environment	5	474	53.02	6.99
Railroads	2	27,048	70.00	9.77
Others	1	406	100.00	5.90
Total	23	7,078	72.83	8.53

Return from projects is generally decided by risk of the projects, scope of the project, the rate of private investment, and government subsidies. Limited case analysis is not enough to prove correlation between factors. However, the return tends to be high with the high risk, private investment, equity capital, and low government subsides.

In this study, it is shown that the higher the rate of private investment and equity capital, higher the return on investment

4.3 Estimating ROI with economic indicators analysis

After IMF, domestic interest rate is steadily declining and stabilizing. In this situation, investors are trying to find other investing places. In order to expect high ROI, it must meet high risk. It is hard to decide how high risk would be met, or how high rate of return can be expected. In this case, two factors can primarily be examined. They are risk free ROI and market risk coverage ratio. The sum of risk free ROI and market risk coverage ratio is fair ROI.

(1) Risk Free ROI

Generally risk free ROI is considered as current interest rate. Risk free ROI is changeable but it is gradually falling and stabilizing.

It is reasonable to set risk free ROI in the level of 4.5～5%, even though current interest rate is below 4.5%. This interest rate is influenced by contemporary social and political issues. Most of economist are estimating fair interest rate in domestic market is 4.5～5.5%.

(2) Market Risk Coverage ratio

Market risk coverage ratio is same as risk premium, it is compensation to meet risk when investing. In case of PII in SOC, private investor doesn't take responsibility by itself. However, it is reasonable to consider PII to have a lot of risk, because PII requires long time period of investing and a lot of money. Even so, to estimate market risk coverage ratio is hard. Therefore, with estimating other enterprises' ROI, market risk coverage ratio is measured in this study.

As comparable businesses, they are chosen relevantly similar to construction companies which take 80% of investors and have similar interest rate, and the range is limited in projects since 1998. The interest rate of construction industry is 8.49% as shown in table 8. This is understandable rate with other industry, but it is higher than that of manufacturing industry.

Comparison analysis is operated within 7 industries. The comparison subject is return of equity capital and it is calculated from net income $\times$ equity capital / 100, and it means return of company's pure investment.

When it comes to comparing with constructing industry with other industry group, net incomes from equity capital of constructing industry is 14%, because it was booming of reconstructing in 2002 since 1998's abrupt declining of construction. This tendency doesn't seem to continue. Therefore, it may not be appropriate to generalize with this result.

In case of other industries, industrial profit ratio fell down drastically from IMF, but it has recuperated rapidly. In 2002, most industries showed about 10% of net incomes. This tendency seems to continue but the rate of growth will be slowing down. With the standard of 2002, benefit ratio doesn't seem to change unless we have abrupt economical crisis like IMF. Therefore, it is reasonable to set 2002 as a standard for estimating risk coverage ratio.

With synthesizing current situations, estimated risk coverage ratio is 6～7% from considering average benefit ratio of industry's 10.25% and 4.5～5.5% of current interest rate.

Benefit ratio of PII is estimated as about 11～12% based on average interest rate was 4.7% and risk coverage ratio was 6～7% in the standard of 2003. This is higher than the results of case analysis.

However, this estimation has several drawbacks. For example, first of all, these calculated ROI are ex post factor calculation. So, it may not be proper to apply for predicting future estimation. Second, there is no consideration of future risk. This means there is no consideration of political or economical issues. So, this theory can be valid when the situation is stable. Therefore, this estimation method can be used, when all the situations are stable. However, it will be partially valid with consideration of domestic interest rate of 2002 to 2004. Without further abrupt changes, benefit ratio will be declining and be stabilizing as like interest rate.

4.4 ROI estimation from financial investors' return analysis

Fair ROI of PII is estimated based on expected return of financial investors. This comes from truly capitalism point of view; it is fully meaningful that fair ROI can be estimated by only principles of market without any influence from government.

It is not reasonable to generalize because expected return of financial investors can be extremely different in accordance with their business plans and capital utilizing principles. Also, it is not appropriate considering all financial investors as all investors of PII. However, conservative investors who want stable benefits rather than risky benefits with characteristics of PII will possibly participate in PII.

Therefore, this study assumes that potential investors are conservative investors who prefer stable and safe investment. With this assumption, this study estimates fair ROI of PII with analysis of investment accomplishment from two conservative pension and funds institute and one insurance company.

Concluding average ROI as expected ROI of financial investors is not appropriate. With considering risk scope and investing terms of PII, it is appropriate to compare with cash trust fund, beneficiary certificate, stocks which are relatively risky financial instruments. However, it is not easy to calculate risk scope, so average investment of all financial instruments, 16.07%, is estimated as expected ROI in this study. This result is only limited with financial derivatives which is not including investment portion of companies. It is different from ROI of total investment, but it is reasonable to use as average expected ROI of pension and funds institute.

Also, insurance companies are the major financial investors except for banking sectors; they have invested in PII about 80,000,000,000 won including Life insurance companies and property insurance companies, and its investment scope is gradually increasing.

ROI can be used as expected rate of return to insurance company. Only the ROI of Korea Life Insurance Association used in this study can be different from investing preference of other Insurance Association or investors, and every investor have its own operating and investing standard. So ROI suggested in this study can't be fully substituted by the representative ROI of all insurance companies.

On the basis of this analysis, this study estimates fair ROI of PII in SOC. It is expected that expected ROI of pension and fund institutes is 16%, and insurance companies is 13% which is similar to average expected ROI of insurance companies. However, 13% of ROI is relatively low from the standard of other investing instruments in2004, based on ROI of stable investing instruments of invest and trust companies, 16.74%, in 2004.

Therefore, fair ROI of financial investors who participate in PII is estimated 13～16% which is higher than ROI from case analysis. This is relatively higher than current ROI, 8.5%, but ROI of pure financial investors should be higher than construction companies. As pure investor can't expect other resources of ROI unlikely to construction companies which can have construction merits. Therefore, suggested fair ROI, 13～16%, can be reasonable figure to be a fair ROI.

4.5 Estimating ROI with analysis of Real estimate return

Generally real estate is called property asset like lands and buildings. In Korea, Civil Law 99-1 says that "Lands and their fixtures are real estates." in a narrow definition of real estates. Besides, in a broad definition, real estate can include living space with land, resources and environment. This means that PII in SOC whose subjects of investing are facilities and their fixtures may be seen as investment on real estates. However, there is a difference. As general investment on real estates is limited with achieving Rental income and Capital income where as PII is for achieving management ROI. Even though with different characteristic, they share similar characteristics in terms of investing features like return, liquidity, and risk. Therefore, under assumption that real estate investment is similar to PII. ROI of real estate investment is researched and analyzed and on the basis of this analysis, fair ROI of PII in SOC is estimated.

(1) ROI of Offices and business section

Recently domestic real estate market has applied REITs and opened its market. As increasing foreign capital in the market, it is required to develop authorized and precise analysis and information for safe and successful investment. To this, Korea Real Estate Research Institute annually announces ROI of offices in 7 major cities. In this study, on the basis of 2003 annual research, fair ROI of PII is estimated.

ROI of Offices is dividing asset price of real estate with return from real estate investment during prescribed term. ROI of Offices has income gain and capital gain. The sum of income gain and capital gain is composite return. ROI of major 7 cities for ROI of office is 11.81%, and for business section is 14.09%.

By cities, Seoul shows the highest ROI of office building i.e.14.51%, and Gwangju shows the lowest of ROI i.e. 2.55%. In case of business sectors, Seoul shows much higher ROI i.e. 18.39%, and other cities show average 8～9% ROI.

So it seems reasonable to set ROI of offices and business sectors as more than 12%. Based on this assumption, in case of PII in SOC, ROI of PII in SOC should include more than 2 % of risk premium with consideration of investment scope and term. Current interest rate of lease industry of real estate in 2004 has shown 2～3% lower than constructing industry. This situation can support above formula to set ROI of offices and business sectors.

Like this, on the basis of ROI of offices and business sectors, ROI of PII in SOC is estimated 14～15%. This level of ROI can encourage not only domestic investors but also foreign investors to participate in PII in SOC.

(2) ROI of Apartment

In this section, ROI of PII in SOC is estimated with researching ROI of apartment investment. In Current situation, investing in apartment is a vivid way to invest. Therefore considering ROI of apartment can help to observe common investors' expected ROI.

Recently, Apartment investment market has been affected, especially in Seoul and Gyeongi area. This has been caused by low interest rate. With low interest rates, investors are seeking proper investment. Also, Gangnam area in Seoul has been booming to reconstruct, it fosters gathering a lot of investors that is much more than actual demand, so average market price has raised 2 - 10 folds. However, this seems to be a contemporary phenomenon, and government has struggled to stabilize affected real estate investment. It is expected that overly heated real estate investment will come down.

In this part, increasing rate of tax standard value annually announced by Korea National Tax Service is observed in order to estimate ROI of apartment. As current overly heated real estate investment seems to be temporary and analysis of tax standard value helps can help support objectiveness of ROI of apartment.

Tax standard value is annually estimated in National Tax Service, to assess vale of real estate such as apartment, tenement houses for taxation purposes like Gift, Inheritance, Concession taxes. The president of National Tax Service announces value of real estate based on price of land and fixtures that costs 70～80% of market price. Also, to guarantee equity and objectivity, when tax standard value is set, it is committed by professional research institute to reflect real market price.

In 2004 Tax standard value, it shows in metropolitan area, Tax standard value increasing rate as 12.2%, which is much higher than other investment.

Table 2. The increase rate of tax standard value

Announce date		2000. 7.1	2001. 7.1	2002. 4.4	2003. 4.30	2004. 4.30
Increase Rate (%)	National wide	12.2	3.8	9.7	15.1	6.7
	Metropolitan area	14.3	6.9	16.5	19.3	12.2

Source: National tax service, Regular announcement of Tax standard value, 2004

Based on above analysis, fair ROI of PII is estimated within 15% like expected ROI of apartment. To support this, first, as investing characteristics of apartment and PII is similar, so risk of both investments will be almost same. Second, in terms of liquidity, PII is inconvenient, so it needs to provide higher ROI. However, current ROI of real estate tends to be over estimated because of booming of real estate investment. Over estimated current market price of real estate suggests ROI to be down fall.

Therefore, it is reasonable enough to set a fair ROI of infrastructure investments on SOC as 15% which is the level of apartment ROI.

5. THE SUGGESTION OF PROPER RETURN ON INVESTMENT

In this study, the concepts related to return on investment are listed to suggest proper ROI private investment, and the proper ROI on private investment is estimated in various ways. As we have mentioned above, this study is aimed at estimating proper ROI on the view of investors to participate in private works, not that of government or local self-governing body.

To do this, proper ROI was analyzed in 5 ways, and the result of the analysis is revealed on the following table 3.

Table 3. Standard of Estimated ROI

Estimating methods for ROI	Standard of Estimated ROI		
	lowest	highest	mean
by previous study	7.5%	13.4%	10.5%
by example analysis	6.4%	10.4%	8.5%
by analysis on economic indicators	11.0%	12.0%	11.5%
by financial investors' analysis of ROI	13.0%	16.0%	14.5%
by analysis of ROI from investment on real estate	15.0%	15.0%	15.0%

According to the analysis, the standard of estimated ROI is estimated in the wide range from 6.4 %(example analysis) to 16 %(financial investors' analysis of ROI). It is because of the different criteria among the analyzing methods. Also, we should consider that it may well be much lower than of ROI on overall private works because the example analysis (6.4%) is the return on the environmental work that has the least risk in all private works. In addition, in case of previous study and example analysis, price increase and current economic situation should be considered since there may be a big difference between the analyzing points. Now, we can see the current trade of real state overaffecting, and current rate of interest is very low, which also are the causes of extensively estimated result.

Accordingly, this study suggests that proper ROI on SOC private investment is 12～13%, summing up all analysis. This is much higher standard than existing ROI, 8.5%, but is lower than expected return of financial investors and return from investment on real estate. Therefore, when considering both public aspect and profitable aspect of private investment, we can decide that it is the most suitable standard of ROI to persuade both government and private investors.

6. CONCLUSION

This study establishes the theories on ROI for private investment and proposed proper ROI level in 5 ways.

ROI on private investment is estimated through example analysis and etc., and in result, 12～13% ROI is suggested. It is 3～4% higher than existing ROI on private investment, and differs from the previous levels of ROI.

The reason why the return suggested in this study differs from the existing return can be summed up in two ways. First, previous participants of private investment were usually Construction Company, so they considered construction profits more important than business profits. So, business profits tend to be set low. Second, activating participation of financial investors is required to successive investment. To do this, ROI on private investment should be increased because investors can expect ROI on private investment like other investment. Therefore, 12∼13% ROI suggested in this study is fully reasonable.

In case of business profits increase, in this study, we can expect 3 kinds of effects. First, competition among participants can introduce civil creativity, like our original intention. Second, risk that government used to take. The burden of government will be transferred to investors, so national burden will be reduced. Next, investors will examine target work thoroughly because risks of investors are increased. However, it does not always bring positive effects. Increase of return can cause the burden to investors followed by increasing cost and the enlargement of financial supply of government. Therefore, return on private investment should be decided carefully, considering all these conditions.

The discussion about proper ROI on private investment will be continuing, and bring a lot of controversy. However, there are not decision-making instruments or methods in Korea, and the development of this kind of method may not be easy. It is because each work has different conditions and circumstances. Measuring risks of each work has a limitation. Notwithstanding, suggesting proper ROI is necessary to successful business. So systematic study is required to draw the proper ROI to persuade government, investors and users.

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