

# Global Experiences of Public Private Partnership for Highway Development

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## Introduction

Faced with massive infrastructure needs, the private finance initiative (PFI) has gained renewed attention from the development community. Between 1990 and 2005 alone, US\$71 billion were invested by the private sector in 392 projects in 26 developing countries. A notable trend in this development is that PFIs are more prevalent in developing countries than in developed countries. This is due in part to the more severe budgetary constraints developing countries are facing, and also due to the fact that main cost elements such as labor, materials and land are still low in price in developing countries, while unit construction costs per km have already become prohibitively high in developed countries, as exemplified in Japan.<sup>1</sup>

However, strong skepticism still exists about the applicability of the PFI approach to developing countries, particularly in Asia. This is largely due to the following intrinsic difficulties associated with highway development:

- Risks associated with land acquisition and construction;
- Lumpy initial capital investments and the resultant long gestation period; and
- Difficulties in traffic forecast and associated uncertainties in future revenue flow.

These have led to another set of difficulties, i.e.:

- securing long term loans from financial institutions;
- delays in construction; and
- cash flow problems during the initial years of operation when debt service payments have started (after the end of the period of grace), but toll revenue has not yet picked up enough to service the debts.

Addressing these problems requires government intervention through the provision of: (i) subsidies to capital investments so as to lighten the initial burden of these investments to a level manageable by the investors; (ii) annuities to project companies; or (iii) minimum revenue guarantee to those companies. These government interventions in private finance initiatives have amounted to the emergence of a new form of public private partnership (PPP), a hybrid form of infrastructure finance which is primarily based on the PFI in the form of build-operate-transfer (BOT) or annuity concessions, but which is supported by

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<sup>1</sup> An earlier version of this report was prepared for the Workshop on PPP in India when the author worked for the Asian Development Bank as a Principal Transport Specialist. The material was distributed to the workshop participants, but it was not published. The original paper was primarily based on the findings of research which the author conducted in Washington DC in March 2005, but it has been substantially updated to include more recent developments.

the public sector through subsidies, annuities, or guarantees.

As its name implies, PPPs encompass various types of cooperation between the public and private sectors. One well-known type of PPP involves the so-called “third sector,” which in the context of Japan means joint corporations in which both the public and private sectors invest. The third sector approach has been mostly applied to public services (such as local railway services) which were not viable financially, but still needed socially. While the third sector involves the participation of the private sector in the provision of managerial capacity and financial resources, the management of third sector initiatives has often been inefficient due to the need for agreement between their public and private shareholders, which may take time to achieve due to conflicts of views between government institutions and private sector companies. The third sector approach has often ended up combining the inefficiencies of both worlds, i.e. the bureaucracy of the public sector and the higher financing costs of the private sector.

In contrast, the new form of PPP referred to above is entirely managed by the private sector, while public sector intervention is limited to the provision of the necessary financial assistance. In other words, while the third sector approach is based on the public sector provision of services supplemented by the private sector, the BOT-based PPP is basically a private sector initiative, supported by the public sector through the provision of subsidies or guarantees to project companies. The discussion in this paper focuses entirely on this latter form of PPP, namely the BOT-based PPP.

### **Comparison of Performance Between Public and Private Sector-Led Schemes**

Infrastructure has traditionally been developed and operated by the public sector. For those governments considering a shift from the conventional public sector financing scheme to a BOT-PPP scheme, the first question to be asked by the public (whether in the national Parliament or municipal general assembly) is whether the BOT-PPP scheme would provide better performance than the traditional public sector finance. This question is particularly relevant since the public authorities can mobilize funds in a less costly manner than the private sector. In addition, the current competitive bidding-scheme for the engagement of contractors works relatively well in securing low cost construction. If the disadvantage of the public procurement system is the non-inclusion of a budget for operation and maintenance (O&M), this can be put out to tender separately by competitive bidding. It can be further argued that the combination of these two contracts may provide a superior alternative to a BOT scheme since it would provide a simpler form of contract and thus take less time for negotiations.

These arguments against BOT schemes may be valid in many cases, and one should be aware that shifting to a PPP or BOT scheme will not always be the best choice among the various policy options available to the public authorities. However, it should also be noted that a BOT-PPP scheme has several major advantages over a public sector financing scheme. As often noted a major advantage of the BOT scheme is that the combined provision of construction and later O&M enables BOT operators to design the facilities in such a manner as to minimize the life cycle costs of the construction and operation of the infrastructure, and thus enhance the operational efficiency of the project. Other benefits would include the efficiency of intervention of the financiers once a problem happens. Usually the private sector financiers have a “step in” clause which enables them to intervene quickly in the management of a company managing a failed project so as

to prevent a default. This may prevent disruption of BOT service provision in a more effective manner than intervention by the public sector, which is often slow in decision making and less capable in dealing with managerial issues in the project companies. The strongest benefit of the BOT scheme (if structured correctly as indicated in a “viability gap funding” or VGF scheme) lies in closing a hidden loophole in public sector procurement. A major problem with public sector procurement derives from the fact that the contract will usually be won by the lowest bidder. Tactics that experienced bidders often employ is to bid low (often lower than cost price) and win the contract, and then claim for the higher costs incurred later, by requesting compensation for “variations to contracts.”

As seen above, both public procurement and BOT-PPP systems have advantages and disadvantages, and thus there is no way to resolve the question of which is superior. The only way to conclude this discussion is to compare the real world performance of these two systems on the basis of specific cases. In this regard, an analysis was conducted in 2007 by PricewaterhouseCoopers of India (PwC) following a request from the Highway Authority of India (NHAI)<sup>2</sup>. The key findings of the survey are summarized in the following paragraphs.

The Government of India (GOI) decided in 1998 to upgrade three major arterial highways to four-lane standard, totaling 13,000 km. The principal mechanism employed by NHAI in the construction of these highways was engineering procurement construction (EPC)<sup>3</sup> under a public sector financing scheme. A smaller number of projects were implemented using two forms of private sector financing scheme, namely BOT and annuity concession schemes. From these arterial highways, completed sections amounting to 5,000kms of road from 150 projects were selected for the survey. Thus, the size of the sample in the survey by PricewaterhouseCooper was 150, including 135 EPC contracts, 8 BOT contracts and 7 annuity concessions. The average length of the highways covered by each EPC contract was 31km, half of that covered by each BOT or annuity contract (both with an average length of 60km). The major findings can be summarized as follows (see Table 1):

- The performance of BOT is far superior to other forms of contract in terms of cost effectiveness and delivery time. At the time of the completion, construction costs were 30% lower than EPC and 57% lower than annuity schemes. BOT construction was completed one month earlier than the original schedule, in sharp contrast to the average 16-month delays in EPC contract and 3-month delays in annuity contracts.
- Annuity contracts were less impressive but still performed better than the EPC contracts, being completed 13 months faster on average. Construction costs were 18% higher than with EPC finance, but this was due to the inclusion of O&M costs, which often exceed 20% of the construction costs if a concession period of 12 years is taken into consideration.

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<sup>2</sup> The author obtained the results of the analysis from the NHAI in the course of discussions on a proposed Public Private Partnership Project for the National Highway Development Program to be financed the by Asian Development Bank in which the author served as a task manager. The key findings of the analysis were discussed by the NHAI and the ADB mission, and it was agreed to include them in the Project Appraisal Document (PAD) for the Project. Unfortunately, while the project was ready for presentation, the ADB Board decided to delay submission, and the PAD has not yet been made available to the public.

<sup>3</sup> While NHAI often refers this contract as an EPC, it is more exactly termed an “item rate contract”.

- EPC contracts exhibited the poorest performance. Particularly problematic was the delay in delivery time, of 16 months on average from the original schedule. Furthermore, the contractors charged NHAI 20% more than the original contract prices through changes to the original contracts. This figure coincides with the UK government finding that contractors generally charge 20% more than the original contract prices.

The above findings provide a clear justification for the GOI to move to BOT-PPP schemes, away from the traditional item rate contracts using public sector financing. The GOI has also indicated the clear preference for BOT schemes over annuity concessions because of their relative performance indicated above.

**Table 1. Comparison of time and cost performance between EPC, BOT and Annuity Arrangements**

Types of contracts	Average length of project (km)	Average size of project (awarded contract price)	% variation or % changes from awarded contract prices	Coconstruction cost per km at completion	Weighted average delays	No. of completed projects analyzed
EPC	31.0	\$24m	20%	\$0.9m/km	16.0 months	135
BOT	60.0	\$71m	-44%*	\$0.7m/km	-1.1 months*	8
Annuity	59.5	\$65m	3%	\$1.1m/km**	3.3 months	7

Sources: NHAI, PricewaterhouseCooper

\*After adjusting for one extreme case

\*\* Per km construction costs include O&M costs

Exchange rate \$1=Rp45

## Review of Key Elements of the BOT/PPP Operations

### *(1) Comparison between public and private procurement process*

Procurement process for publicly financed projects: While PFIs cover a wide spectrum of private sector participation, including: (i) service contracts; (ii) management contracts; (iii) leasing; (iv) concessions; and (v) privatization, the second generation PPPs primarily focus on concessions, particularly BOT schemes. The process of selection of BOT contractors and the subsequent process are significantly different from those of the traditional public sector finance schemes. Under traditional schemes, a contractor is selected through competitive bidding, either national or international. Design requirements are specified in a detailed design (DD) by the government, the executing agency. Bidders compete with each other in the rates for each item indicated in Bills of Quantity to be specified in the bidding documents (“item rate contract”). The typical process is illustrated in Table 2.

**Table 2. Typical process for public sector projects financed by a multilateral aid agency (e.g. ADB)**

Stage no	Stage	Agent
1	Project identification	Listed in Country Partnership Strategy
2	Formulation of a project	Executing agency (EA)
3	Appraisal & decision to finance	ADB
4	Detailed design & bidding documentary preparation	EA with assistance of consultants
5	Competitive bidding (procurement)	Selection of a winning contractor by EA
6	Construction (disbursement of loan)	The contractor
7	Operation & Maintenance (O&M)	The EA

Procurement process of BOT concession: The typical process of BOT selection, together with the subsequent processes, usually runs as follows. Since the concessionaire is responsible for both construction and O&M of the facilities, the concessionaire develops the facility taking into account the minimum life cycle cost elements. Because of this factor, the government usually does not specify detailed design requirements, letting the private sector design the facilities by themselves so as to let them to have flexibility for innovation. The bidding process starts with preliminary selection of bidders, followed by the usual process of competitive bidding. Depending on the size of the BOT project, a bidder usually forms a consortium of participating companies (called *sponsors*) in its preparation of the bid.

Once the bid is awarded, the consortium will form a *special purpose company* (SPC) with the intention to “ring-fence” the assets of sponsors from possible seizure in case of default. With the establishment of the SPC, the sponsors become the SPC shareholders so that their liabilities are limited to the amount of shares they have invested in it. The SPC is a legal entity which assumes all responsibilities and obligations associated with the delivery and implementation of the project. Construction and O&M are carried out by subcontractors, who are often shareholders in the SPC.

Core functions of the SPC are: (i) securing finance, (ii) collecting tolls; and (iii) paying debts. If the project makes money, the SPC will pay dividends to shareholders on an after-tax basis. This means that shareholders will be paid only after all debts are served and taxes are paid, but profit still remains. While sponsors are often required to cover 30- 40% of the project cost, it is not unusual to cover only 10% in case of a large project. The deal debt-equity ratio is determined in consideration of a trade-off between the cost of finance and the yield to investment. If the equity portion is higher, the cost of finance will be lower.

## *(2) Solicited versus unsolicited bids*

As indicated above, private sector projects are usually selected through competitive bidding. However there are some cases in which they are selected through a different system. This occasionally happens in case where private sector companies come up with a completely new project concept which can bring major benefits to the communities through innovation. The project concept can be truly innovative, or it can be a mere trial to sell the companies' products. In the latter case, the government should look into the proposal very carefully, but some governments may not have the necessary institutional capacity to evaluate the benefits of the projects. Even if the project seems an excellent one, the government may not be able to award a contract to the proposers of the project, either due to the lack of transparency in the selection process, or because it lacks the basis to judge whether the estimated cost of the project is appropriate or not.

In order to deal with those cases, a specific procedure has been devised called "Swiss Challenge." Under this scheme, potential bidders are given an opportunity to bid and submit their estimates in relation to the original proposal. If these potential bidders come up with a bid offering a lower price, the original proposers will be given another chance to rebid to match the lowest price bid. If they come up with the same price or a price which can beat the lowest bidder, they win the contract. After this process, the government can award a contract to the original proposer as a reward for its innovative ideas. There are a few examples of this type of award in the Philippines.

## *(3) Project finance*

As stated earlier, the new form of PPP is primarily based on BOT or annuity concession schemes. Under these schemes, the project company has to mobilize the necessary funds through borrowing from banks or issuing bonds. Since these are critical elements of the success of the BOT-PPP scheme, a significant portions of this section is allocated to a discussion of the project finance issue based on the experience in India, where the author has been closely involved in the process as a task manager, from the initial stage of PPP conceptualization to its operational stage.

Corporate finance vs project finance: A traditional way of financing investment is "corporate finance" under which sponsors will borrow the money from banks by: (i) offering the creditworthiness of the sponsoring companies as a security for the payment of the entire debt; (ii) pledging their net assets as collateral for the payback of loans to creditors (often called "balance sheet finance"); or (iii) offering specific assets as a recourse for the payback of the loan ("asset backed finance"). However, if the size of the investment is large and associated risks of defaulting are high, sponsoring companies generally prefer "project finance," in which the project company (which is generally formed by sponsors) mobilizes necessary funds by pledging to lenders the future revenue flow to be generated by the assets created by the project. This is often referred to as "non recourse finance," since no assets are pledged as a recourse for the payback.

Experience with the NHDP program in India indicates that, if the size of projects is less than \$50 million, the project companies often mobilize the necessary funds under a corporate finance scheme. If the project is larger than \$50 million, the project companies appear to prefer project finance.

High transaction costs: Due to the complexity associated with project finance and associated risk mitigation measures, transaction costs tend to be very high. This is further compounded by the complexity of BOT contracts combining two different sorts of activities in one package, e.g. (i) short term construction activities and (ii) long-term O&M. Negotiations between the government authorities and the project company often take more than a year, as exemplified by BOT negotiations for urban transport projects in Bangkok in the 1990s. Given this tendency towards long negotiations, the GOI has developed a model BOT contract for the national highway subsector. While the model contract is a little too complicated in structure for sector-wide application (particularly with regard to fee structure), it has contributed significantly to the reduction of time for negotiations. Actually no modifications are allowed except for areas clearly identified in the model contracts. An important thing to be noted is that in spite of the rigidity of model contract provisions, many private sector contractors have participated in the bidding. The truth is that, if there is no possibility of amendment, private sector companies simply give up and do not try to spend or waste their time on modification of the model clauses.

#### *(4) Credit Enhancement Measures*

As stated earlier, the BOT and annuity concession schemes mobilize funds through borrowing from financial institutions, and through other financing methods including issuance of bonds. This often requires a variety of credit enhancement measures or risk mitigation measures so as to alleviate the concerns of financiers. Some of the major credit enhancement mechanisms often applied to highway projects are listed below.

Minimum revenue guarantee: Whatever efforts are made, demand forecasts can be potentially wrong for any project, but this risk appears to be particularly great for highway projects as stated in the 1989 report of the Federal Highway Administration, US Department of Transportation. The FHA report pointed out that the traffic forecasts had been consistently overstated, while the cost estimates had been consistently understated. This tendency was called “optimism bias” by the World Bank.<sup>4</sup> This intrinsic difficulty associated with traffic forecasts constitutes a major risk with highway projects, which has made financiers hesitant to lend money to these projects. Since this has been a major deterrent to BOT-based highway projects, several countries such as Chile, Korea, South Africa, and Argentina have introduced a minimum revenue guarantee system for qualified highway projects/programs with the aim of facilitating project finance by the project companies.

Under this scheme, the Government first sets its traffic projections, or revenue projections for each year of operation. If the level of traffic or revenue is less than a certain threshold (for example, 80%) of the traffic/revenue projected, the government will pay the shortfall between the level realized and the threshold. This minimum risk guarantee is usually combined with a revenue sharing scheme as a counterbalance in the case of a higher-than-projected traffic level. If the level exceeds a corresponding upward threshold (for example, 120% of the traffic/revenue), the additional revenues will be shared equally

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<sup>4</sup> Because of this, international financiers accept only those traffic forecasts carried out by a dozen internationally recognized consulting firms as a basis for the revenue projection for the highway projects in question.

between the government and the project company. This minimum revenue guarantee system has enormously facilitated financing by the project companies, but there are still many governments reluctant to adopt this system because of their wish to avoid assuming contingent liability.

Foreign exchange risk guarantee: Another major deterrent for foreign investments in the highway sector is the currency mismatch between toll revenue and foreign investments. Since this has constituted a factor discouraging foreign investors, a limited number of governments of developing countries have introduced foreign exchange risk guarantees, including the Chilean government. In the case of India, since many of the BOT projects have been implemented by domestic companies and there is less need to resort to foreign investors, the Indian government has not been enthusiastic to date about promoting foreign direct investment in highway project by offering this guarantee.

Partial credit guarantee: Because of the perceived commercial risks of infrastructure projects, the financiers may not be willing to provide a loan on the terms required to ensure the financial viability of the project. The partial credit guarantee (PCG) provides comprehensive coverage for all commercial risks for a specified portion of the borrowing through the payment of fees to PCG providers. The PCG typically covers debt service portions accruing during later maturities for which lenders are not willing to provide such long cover. PCGs are provided by multilateral aid agencies such as the Asian Development Bank (ADB) and International Finance Corporation (IFC). In the case of the ADB, the guarantee fee is 0.4% (40 basis points) for a public sector financed project, together with a front-end fee.

Political risk guarantee: Political Risk Guarantees (PRGs) cover payback of all or part of the project debt in relation to specific political risks. The guarantee is activated if any of the following events (or any combination of them) takes place:

- currency inconvertibility and/or non-transfer;
- confiscation, expropriation, nationalization, or deprivation of project assets;
- political violence, such as strikes or civil disturbances, terrorism, and sabotage that negatively affects the project; and
- breach of contract, such as non-delivery by state-owned entities of inputs, or nonpayment for outputs (e.g., power or water)

PRGs are well suited to cases in which financiers are willing to take on the commercial risks of a project, but which require assistance from a multilateral aid agency in mitigating the above political risks. PRGs will be provided by multilateral aid agencies such as the ADB and the Multilateral Investment Guarantee Agency (MIGA). In the case of the ADB, the PRG fee is 0.4% (40 basis point) together with the front-end fee and the stand-by fee.

Monoline services: For large infrastructure projects such as those over \$500 million, bonds are the most efficient way of mobilizing the necessary funds for investment. However, if the project is BOT-based, the cost of the bond would be very high because of the difficulties of recourse and resultant low credit rating. However, if all the risks

are covered by a reputable guarantor, the credit rating will be upgraded and the cost of issuing the bond will be immensely reduced. An innovative mechanism which has recently emerged is a guarantee by financial insurance companies. Since this insurance is applied only to the bond, this insurance service is often called a “monoline service” as opposed to “multiline” insurance services which cover a variety of business activities. This service is the commitment of financial insurance companies to pay automatically both principal and interest of the bonds to their subscribers in the event of the failure of the issuer to do so. The effect of this is an immediate jump in the credit rating of the bond from whatever rating was originally given to it by the financial insurance companies. For instance, if a non-investment graded bond (say a BB+ rated bond) is guaranteed by an AAA rated financial insurance company (such as MBIA or XL Capital), the bond would also be upgraded to AAA. Of course, this insurance service is costly (several percent), and thus the financial insurers recommend the bond issuers to get PCG and PRG from multilateral aid agencies such as the MIGA, IFC, or ADB. This would significantly lower the premiums to be paid by the bond issuers to the financial insurance companies. Once covered by these guarantees, they are willing to insure the possible default on the payback of debt services. The whole process of structuring this product is described in Table 3 below. This table is also useful in illustrating the process of project formulation and the resultant higher credit rating of the project.

**Table 3. Measures to improve credit ratings of infrastructure projects**

Initial rating of project	Steps to be taken to enhance the rating
Non-investment grade	Improvement of ways to package or structure the project, based on the advisory services to be provided with regard to financing structure, risk allocation/mitigation, safeguards for environmental and social development issues, legal structure, and implementation arrangements
Close to, but not yet, investment grade (“BB+”)	“Partial credit guarantee” and/or “political risk guarantee” to be provided by multilaterals
Investment grade (“BBB-”)	Guarantee to be provided by a AAA rated financial insurer for the possible default by the project company to pay interest and/or principle
Insured bond (Global AAA)	

### Major Types of BOT Concession

Over the last three decades, the PPP schemes have evolved from a simple BOT model to a highly sophisticated structured model. While various categorizations would be possible, the classification based on the selection criteria for BOT operators provides the most straightforward explanation. In this section, this will be discussed in relation to highway projects.

Tolls: The most frequent competition parameter applied in BOT concessions is the least amount of tolls to be charged to users. This arrangement enables the government to select the most cost efficient service provider and let them to provide the general public with the services delegated to the private sector. Since the operation would entail service provision over a period of time (often more than 20 years), the concession agreement usually includes a safeguard provision against potential inflation by linking the level of tolls to either the consumer price index or the wholesale price index. To provide a better service, an increasing number of BOT operators have introduced electronic tolling systems, but tolling systems should be a combination of manual and electronic tolling, since the latter requires all vehicles to carry tags, which should not be imposed on a facility which should be open to all types of users. This toll-based method sometimes results in a situation in which the tolls are too high for the public to pay. If this happens, the government has to set a ceiling for the maximum level of tolls to be charged to the users. If the ceiling is too low to recover the cost of toll road operation, the government has to provide a subsidy. In that case, the amount of subsidy will become a selection criterion in the selection of BOT operators.

Capital grant: A major problem of the PFI based highway development is high initial capital costs to be incurred for the development of toll roads. To reduce the size of the investment to a level manageable by the private sector, the government often provides a grant to the project company so that the operator can set the toll at a level affordable for users. The private company requiring the lowest grant from the Government wins the bid. The grant could all be paid at the time of commencement of the contract, or it can be paid as the construction progresses. Alternatively, the grant could be paid in phases, say 60% during the construction and 40% during the O&M stage, so that the client maintains the necessary control over both construction and maintenance periods.

Annuities: Following the technical evaluation, the winning bidder is selected on the basis of the financial proposal requiring the lowest annuity payments from the government. The unique element of this scheme is that the government payment of annuities will start only after the completion of construction, i.e. once the asset has been constructed to specified standards, so as to provide an incentive for the early completion of construction. A common form of the annuity scheme is that, while the project company physically collects tolls, they cannot be retained as its own revenue, but have to be transferred to the government. This means that, although the annuity scheme is often described as a form of PFI, the project company does not assume any traffic risk, but only the construction risk. Furthermore, all the estimated construction and O&M costs will be paid by the government, but in the form of installments. This facilitates borrowing from lenders. This annuity concept was primarily developed in India. In the current version of the model contract for the annuity scheme, the NHAI can choose another option which allows the project company to retain tolls as its own revenue. This acts to lower the amount of annuity to be paid by the client, and also lets the contractors assume a part of the commercial risks. The Chilean Government adopted a scheme similar to the latter variant, four concessions for the development of southern sections of Route 5.

Financial viability gap fund: In contrast to the above schemes in which cost recovery is the main thrust, the financial viability gap fund was primarily designed for securing the

necessary funds for servicing debts. In terms of a cash flow perspective, the project will be sustainable as long as it can generate the amount of the money to cover debt services. The essential element of the financial viability gap fund is that, if the revenue falls short of generating the funds to cover debt services, the gap between the toll revenue and debt services would be paid by the government in the form of an annuity.

While this was the original form of viability gap fund (VGF) scheme devised by the Ministry of Roads, Transport, and Highways (MoRTH) in 2003, the current form of VGF has changed to one similar to the capital grant approach. Under the current form, the government would pay the VGF in several payments but only after the equity of the project company has been used up. In addition, the amount of the VGF the government would pay is limited to the amount the financiers would disburse for each period of time. If the amount of VGF exceeds 20% of capital expenditure, that portion would be paid only during the O&M period. Under the current rule, the maximum amount of VGF to be paid is limited to 40%. This can be further increased if special permission from the MoRTH is obtained, but this is still rare until now.

Length of the concession period and “least present value of revenue”: Many of the above concession schemes presume a fixed concession period. Establishing a fixed concession period entails both two kinds of risks. If the traffic is lower than projected, the length of concession may not be sufficient for the project company to recover capital costs. If the traffic is higher than estimated, the project company might earn excess profits. To address this problem, a “least present value of revenue” (LPVR) system was developed. Under this scheme, the winner is the project company which claims the lowest value of toll revenue to be received throughout the concession period. The concession ends when the value of the toll revenue (discounted at a predetermined rate set in the contract) equals the concessionaire’s bid. Under this scheme, the concessionaire cannot claim that it cannot recover the costs, since the period of concession is extended until the concessionaire is able to earn LPVR. This scheme can substantially reduce the possible chances of default, which in turn, reduces the cost of borrowing from financiers. A possible disadvantage of this scheme is that its risk reduction features can make the concessionaire indifferent to demand enhancement measures. This scheme was applied by the Chilean Government for a BOT project, the Santiago-Valparaiso highway with an estimated cost of \$400 million in 1998.

Shadow toll: This terminology is somewhat misleading, as the concept does not involve any actual levy of toll to road users. This concept was developed based on the fact that the project companies would be paid in accordance with the number of vehicles passing through the project roads at an agreed rate per vehicle km (“shadow toll”). The competition parameter which the bidders use to compete is the lowest amount of shadow toll. This scheme was introduced first in the UK to provide incentives to the project companies to provide user oriented infrastructure services for non-tollable roads. However, few projects have adopted this scheme because of the high transaction costs coupled with a relatively small benefit.

### **Global PPP/PFI Experiences**

PPP/PFIs have been applied globally since the 1970s. But, the experience to date is

mixed; some are successful and some are total failures. This section reviews selected cases in various countries and highlights key elements to provide a quick overview of world experience in the highway sector.

### *(1) The Mexican experience*

In 1989, the Mexican government announced a major development program of 6,000 km of toll roads, with an estimated cost of \$16 billion. In the five years from 1990 to 1994, the government granted 52 BOT concessions, covering 5,500 km of the network. Thirty of these contracts were directly awarded to private concessionaires, while the remaining 22 contracts were delegated to state governments for further private sector concessioning.

In order to create an immediate and visible impact on the ever-worsening traffic congestion, the government adopted a rather unusual selection criterion, the shortest concession period instead of the conventional lowest toll criterion. The construction industry preferred the shortest concession period criterion since they were primarily interested in construction, but not O&M. The result was, as expected, very short concession periods, ranging from 8 years to 15 years. This led to enormously high tolls that would allow the project companies to recover the project costs in a very short period of time. This, however, resulted in the situation that some of the newly built tollroads were almost empty, while the parallel untolled roads remain heavily congested, providing no solution to the original problem.

Another problem of this program was huge cost overrun, averaging 50% higher than the original estimates. All concessions were renegotiated later with agreement being reached to lengthen the concession period from the contractual 8-14 years to 30 years. This was, however, found insufficient to rescue the project companies. In late 1997, the government was forced to devise another rescue plan by assuming all bank liabilities and temporary ownership of 23 private sector concessions. This second round of the rescue plan cost the government \$7.8 billion. The major cost overrun was partly due to peso devaluation in 1994, but it was also reported to be due to the fact that the construction companies (sponsors for the special purpose company) allegedly inflated the costs to recover the cost of construction, thus allowing the special purpose company to fail (World Bank, "Toolkit for Private sector development for toll roads."). In this program, tax payers were major losers, while the construction and banking companies were able to recoup most of the costs.

A key lesson of the program is that the government has to be wary of the contractor driven nature of the BOT program. It should be noted that the BOT concept was originally devised by the construction industry at the time when excess capacity of the construction industry existed. The government should design the BOT scheme in such a manner to ensure that the assets created by BOT contractors are properly operated and maintained.

### **(2) The Chilean experience**

In the early 1990s, the Government of Chile decided to develop 2,000 km of intercity expressway networks under a BOT scheme at a total estimated cost of \$3.3 billion. The program was divided into 12 concession packages, which were put out to tender over a five year period, two in 1994, one in 1995, six in 1996, two in 1997 and one in 1998. During this period, the evaluation criteria for the concession had been evolved

with several modifications being added. Initially the criterion was a weighted average of several parameters including tolls, subsidies, payment to the state for the operating right of the existing infrastructure, and the period of concession. But, due to the complexity associated with the simultaneous application of these criteria, they were soon simplified to the lowest toll criterion. Meanwhile, for less profitable projects, the minimum present value of revenue criterion was introduced. To enhance the creditworthiness of projects, the government introduced a minimum revenue guarantee and also an exchange rate guarantee. As the competition becomes intense, the tolls proposed by bidders were becoming lower and lower, to such an extent that the government worried about the long term financial viability of the concessions. This led to the introduction of another criterion: a floor for the level of tolls so as to prevent below-cost bids.

All of these 12 toll road concessions were put in operation one by one over the period 1998-2002. Average lapse time between the time of the tender and the start of the operation was 4.5 years – eight months from the date the bid was advertised to the publication of the award in the government gazette; another eight months for setting up the project company and getting construction started; and 33-45 months to complete construction and commence full scale operations. In consideration of the comprehensive nature of BOT contracts (covering detailed design, construction and O&M stages), this represents a fairly efficient operation.

Most of the project companies had experienced difficulties in arranging long-term financing during the construction period. Due to the intrinsic risk associated with construction, the financiers were reluctant to offer a long-term loan to project companies. The companies had no choice but to use bridge financing during the construction period, in spite of the fact that it exposed them to uncertainty before the business base was firmly established. Because of this difficulty, the government decided to introduce minimum revenue guarantee as discussed earlier.

While this measure has provided extra comfort to local financiers, the project companies still encountered another problem: limits on the amount loaned by local banks and in access to institutional financing on local capital markets. These limitations led the government to encourage foreign financing by providing a hedge against foreign exchange risks. With this instrument, a significant amount of money was mobilized through the issuance of well-wrapped divestures in foreign capital markets.

The Chilean program represents a successful case of the PPP scheme. A particularly interesting aspect of this experience is the dynamics the process created over the years. Before the program started, the private sector did not have full confidence in government sponsored PPP programs. However, as the early round of bids went well, the confidence of the private sector increased. The resulting higher level of competition among bidders allowed the government to shoulder less costs and risks compared with the concessionaires.

### *(3) The US experiences*

In 19th century, most of the US highways (16,000 km) were developed by the private sector, but entering the 20th century, the US highway systems were developed by the public sector with two notable exceptions in the 1990s.

Dulles Greenways in Virginia is one of these two exceptions. Since the end of 19th century, Virginia State laws had not allowed private parties to operate turnpikes or

highways. However, this ban was lifted by the Virginia Highway Corporation Act of 1988. Under this legal framework, a proposal to develop a 22 km toll road to connect Dulles International Airport to Loudon County in Virginia was approved. The total project cost was \$350 million, of which \$332 million was mobilized through the issue of bonds to institutional investors.

Originally the financing was expected to be completed by 1991, but long term financing was difficult to secure, largely due to the projected negative cash flow during the start-up period. These difficulties resulted in a delay in the commencement of the construction by 3 years (from 1991 to 1994). The financial prospects of the project were so weak that, at the ground breaking ceremony, Virginia's Lieutenant Governor told the 900 spectators that "this project has been pronounced dead more often than Elvis has been seen alive".

In spite of these difficulties, the finances were arranged, and the construction started in 1994 and was completed in 1995. However, as predicted, the project company encountered a financial problem due to the lower-than-expected traffic level. While the original estimate of the average traffic was 35,000 vehicles per day, the traffic level realized in 1996 was only 8,500 vehicles per day, with an average toll of \$1.77. Having seen this lower than expected traffic, the project company reduced the tolls to \$1.00. This triggered an immediate jump in ridership to 23,000 vehicles per day. However, since this level of traffic was still much lower than that originally anticipated, the project failed to generate adequate revenue. In 1996 the project company began to default, which eventually led to the renegotiation of the terms of bonds issued to finance the project. One of the reasons for this financial problem in the initial stages was an underestimate of the negative impact of an alternative route, Route 7, which runs almost parallel to the project road, around 6-7 km to the north.

However, more recently, the prospects have improved because Route 7 has again become congested. Traffic reached the originally anticipated level in late 1990s, and a large refinancing package was rearranged in 1999. Senior bonds received a stable rating from Moody's and Fitch Ratings. Furthermore, the first 6 kilometers of the road were widened from four lane to six lane standards in 2001. The project has now finally been regarded a success.

This experience clearly describes the type of problem that toll road projects are likely to encounter, i.e. financial difficulties during the initial period of operations. Once this problem is overcome, a project is likely to succeed since the traffic may pick up over a few years to the level necessary for profitable operations.

Another example of PFI in the United States is Orange Country's State Route 91 Express Lanes. In the early 1990s, the cash-strapped Orange County in California resorted to a PFI to provide a needed expansion of the Riverside Freeway. The county government agreed with a concessionaire for the development of a 16 km tollway in the middle of the congested Riverside Freeway, running from Anaheim to Riverside. Motorists could use the private lanes to get relief from the congestion by paying up to \$8 for a round trip. The construction was completed in the mid-1990s. Immediately after the service commenced, the Express Lanes reached a level close to congestion at peak times, but the users of the Riverside Freeway still continued to experience enormous congestion. The project was regarded as financially successful, but it was a failure in resolving the ever worsening traffic congestion of Riverside Freeway. Expansion of the Freeway was made more difficult due to the county government's acceptance of a clause that prevented any further

expansion of the Riverside Freeway until 2035. Too much enthusiasm in concluding this kind of deal sometimes leads to this type of misjudgment.

Over the last few years, there appears to be major resurgence of PFIs in US. There are reports of a number of highways being developed under BOT schemes.

#### *(4) The Chinese experience*

The Guangzhou-Shenzhen Superhighway Project was a green field project connecting two key cities in Guangzhou Province, Guangzhou and Shenzhen, by 123 km of six-lane expressway. The total cost of the project was originally estimated to be \$1.6 billion. While the project was a 50/50 joint venture between Guangzhou Provincial Highway Construction Company (a 100% state-owned construction company) and Hopewell China Development Company (a 100% privately-owned company), it was essentially a private venture initiated by Gordon Wu, a founder of Hopewell Group. The project was non-solicited. The concession was signed in February 1988; construction started in August 1988; financial closure followed in January 1991; and the project was completed in December 1993. A salient feature of this project is the accord of the right to develop real estate along the Superhighway as a part of the concession. The Guangzhou Government had allowed Hopewell China Development Company, a shareholder of the project company, to invest in real estate assets under certain conditions.

At the outset of the Project, the Guangzhou-Shenzhen-Zhuhai Superhighway Company was created as an SPC owned by the above two firms. The SPC estimated that the highway would become profitable immediately since the trip between these two cities could be made two hours shorter than on the existing National Highway 107. However, the traffic did not pick up as fast as anticipated. This was largely due to the underestimate of the potential impact of an alternative route, NH 107, whose level of toll was one third of that of the project road. The project also experienced a delay in construction (which meant the loss of an early construction bonus of \$129 million) due to the delay in acquiring land for real estate development. The cost overrun, which reached \$718, million, was another major problem. For these reasons, the project encountered major financial difficulties, but these were ultimately resolved by the intervention of the Hopewell Group. The traffic eventually reached 71,000 vehicles per day in 1997, which exceeded the original estimate of 30,000 vehicles per day.

A key lesson to be learned from this project is the need to estimate properly the negative impact of the competing roads. The project sponsors had underestimated this impact. Another lesson is the risk associated with the real estate business. This side business may increase the attractiveness of the project, but it enormously increases the risk factor of the project. Land acquisition for real estate development often fuels a speculative movement and results in a higher cost of land acquisition. The development of highways which are essentially public goods should not be mixed together with real estate development activities which are essentially of a commercial nature. The latter creates different kinds of risks for the highway development in question, though the development of public roadside rest areas and amenity facilities could be an exception to this principle.

## **Major Issues encountered in BOT development for highways**

BOT projects often encounter several types of problems including the following.

### *(1) Difficulty in securing the long term financing*

For banks, construction projects are a major risk factor. Until some tangible assets are created, there is nothing to secure the payback of their loans, and thus they are reluctant to offer long term financing to the project company. Even in the case of the Chilean program where the investment environment is relatively favorable in comparison with other developing countries, only three out of twelve concessions were able to obtain long term finance, and only under the sponsors' guarantee of payback (limited recourse financing). This has necessitated many project companies to arrange for some form of bridge financing. Bridge finance often requires an increase of the equity portion of the debt so as to provide lenders with extra comfort. This would again make the project more costly.

A problem of short term loans is the ability to refinance. The project company will be exposed to the scrutiny of banks at the time of the greatest financial difficulty, i.e. the initial operating period when the cash flow is much lower than required for debt service. As shown in Dulles Greenway Project, the project companies often start defaulting at the time of the commencement of operations, when the period of grace for medium term loans is finished and interest starts to be paid. A possible solution to this problem is the government provision of a minimum revenue guarantee. This would immensely facilitate refinancing. While India has not yet adopted this guarantee, many governments such as Chile and Korea have already done so. Serious consideration should be given to this possibility elsewhere.

There are two impediments to the adoption of the minimum revenue guarantee. One is the difficulty associated with traffic projections, which will be discussed in the next paragraph. Another is the government's reluctance to assume contingency liability, a practice generally discouraged by fiscal authorities.

### *(2) Tendency to overstate the future traffic*

Traffic projection presents the greatest risk for toll road projects. There is a clear tendency for traffic to be overstated. For instance, the Guangzhou-Shengzhen Superhighway Project projected twice as much traffic as the level actually realized. In the case of the Dulles Greenway Project, only a quarter of the estimated traffic was realized. Faced with this lower than expected traffic, the project company lowered the toll from \$1.77 to \$1.00. This resulted in an increase in traffic by 140%, but it was still one third lower than the original estimate. The most difficult part of the traffic projection is the estimation of the downward impact of tolls. While there are a few established techniques for estimating impact of tolls such as "stated and inferred preference surveys," these techniques alone will not be sufficient unless the possible impact of alternative routes on the project roads is fully taken into account. The business prospectus for a BOT project tends to understate the negative impact of these alternative roads on the project roads.

There are a couple of ways to deal with this traffic projection problem. One is to engage a reputable transport consultant to carry out the traffic projection on a network

basis, rather than on the project-by-project or section-by-section basis. Current practice in India and other developing countries is that the traffic forecast should be carried out by a design and engineering consultant as a part of the feasibility study, with minimum allocation of time and funds for this exercise. This obviously does not provide potential investors with any reliable basis for judgment of the viability of the project. What they need is a traffic forecast carried out by a specialized consultant with a high professional reputation. Another approach is the adoption of the “least present value of revenue” approach. This would be an effective way to deal with situations where reliable traffic projections are not available.

However, the problem of the tendency to overstate traffic should not be overemphasized since the original projected traffic may eventually be realized after a time lag of a few years. Toll roads will become fully utilized sooner or later, but the difficulty is to predict when this will happen. In other words, toll road projects are often not viable from a short term perspective, but if looked at from a longer term perspective, they often become viable. If the initial financial difficulties resulting from the lower-than-projected traffic are overcome with the necessary support from the government, the project is likely to become profitable.

### **Lessons learned**

A number of lessons can be learned from the global experience, including the followings:

#### *(1) The need to tap the potential of foreign contractors*

Because of the currency mismatch between the toll revenue and capital costs incurred in a foreign currency, foreign contractors are generally not interested in participating in large-scale infrastructure projects in developing countries. However, the Chilean experience indicates the opposite. The government had originally expected that road concession projects would be led by Chilean financial institutions with technical support from domestic contractors. What happened in Chile was that many of the concession projects were constructed by foreign contractors. This indicates that foreign contractors will come if a conducive environment exists.

Another important factor in attracting foreign contractors is the size of the investment. Because of the high transaction costs associated with BOT projects in foreign countries, the size of the investment should be large enough to absorb high transaction costs. The current size of BOT investments in many developing countries ranges from \$50 million to \$200 million, which is too small to attract internationally reputable contractors. The usual size of internationally tendered BOT projects ranges from \$200 million to \$500 million, and it can be even greater than this. For instance, the size of Malaysia’s North South Corridor BOT Project was \$3.2 billion and that of the Guangzhou-Shenzhen Superhighway Project was \$2.1 billion. It is true that, as the size of the project increases, the complexity of the project also increases. However, if the size of the envisaged program is large, as seen in India, it is important for the government to consider substantially scaling up the size of individual investments. This would also enable the transfer of technologies in the concession market.

## *(2) Importance of standardization*

There are two approaches in designing a BOT project; (i) an innovation oriented approach; and (ii) a standardization oriented approach. Unlike the traditional “item-rate contract,” the BOT can encourage innovation by transferring the responsibilities for design and pricing schedule to the private sector. As an example, the US SR-91 Project took the first approach. The call for proposals did not include the preliminary design. Bidders were supposed to submit their own design proposals. They were also allowed to propose their own pricing schedule, including some innovative elements such as congestion pricing. This means that they could pursue a profit maximization strategy, as long as their return on investment did not exceed 17%, a ceiling set by the Federal Government. The disadvantage of this approach is the difficulty of comparing the various bids in an objective manner, since each bid is different in terms of design and pricing. Difficulty in comparison will not only make the selection process more complicated but also can potentially open up for a room for political intervention. Negotiations tend to take much longer because many contractual items need to be agreed in advance.

In contrast, in the case of Chile’s South Access to Concepcion Project, the government prepared the preliminary design of the roads. In addition, maximum limits were set for toll rates (indexed to inflation). All bidders were competing on the basis of identical design and operational specifications. This enabled the government to select bidders in a faster and more transparent manner. The time for the negotiations was very short. The project companies had, however, little chance for improvement of the government’s preliminary design, even if they could. As demonstrated above, a trade-off exists between the innovation oriented approach and the standardization oriented approach. While the former may be applied to complex “green-field” projects, the latter fits straightforward “brown-field” projects better. For India, the latter approach would definitely be better.

## *(3) Need to avoid renegotiation*

In the course of the BOT processing, granting agencies tend to pay little attention to the possible cases of renegotiation at a later stage. The real cost of a BOT concession cannot be measured until the BOT project has been transferred back to the government. Global experience indicates that BOT projects tend to entail a much higher incidence of renegotiations than expected. A study by J. Luis Guasch found that over 60% of 1,000 concession contracts awarded in the 1990s in Latin America were renegotiated within three years. In the case of high profile and lucrative projects, the competition is so tense that bidders are tempted to offer below-cost prices to win, in anticipation of later adjustments to the bid price through renegotiation. Politically well connected contractors often take this course of. If they fail to renegotiate, the project company will default. If the bidder succeeds in renegotiation, it is at a cost for the taxpayers. An effective way to prevent this from happening is the “least present value of revenue” (LPVR) scheme under which the concession period can be extended until the project company can recover the project cost plus a minimum profit. Other methods of minimizing the possibility of renegotiation include setting a minimum level of tolls or grant for bids so as to prevent below-cost bids. However, this requires thorough preparation of the bidding documents including accurate estimates of costs and future revenue. These are not easy tasks for any clients. A way that can be recommended to prevent the abuse of renegotiation is to detail the circumstances

which would trigger renegotiation.

(4) *The importance of careful planning and a phased approach for PPP program implementation*

As clearly demonstrated by the Mexican experience, lack of planning can result in major failure, costing the nation an enormous amount. However, if they is planned well, BOT schemes can bring major benefits to the country as demonstrated by Chilean experience. A key element of the Chilean success is its phased approach, with necessary modifications and improvements being added to the concession schemes over the years. If the Mexican government had adopted a similar approach, it might have been able to avoid such a major failure. However, because of the pressure to demonstrate a visible impact before the next election, the then administration had no choice other than concluding all contracts in a short period of time and getting construction started. This provides major lessons for India on the importance of a phased strategy which would allow the government to adjust its approach in mid-course, and achieve its objective at a minimum cost to the nation.

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Molotch, Harvey. 1976. "The city as a growth machine," *American Journal of Sociology*, 82 (9): 50-65.

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