# VIABILITY OF PRIVATE SECTOR INVOLVEMENT IN INFRASTRUCTURE PROJECT DEVELOPMENT IN DEVELOPING COUNTRY

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***ABSTRACT***

*Since public infrastructures underpin economic and social development, infrastructure project development is essential for the sustainable growth of a country. In many developing countries, large scale infrastructure projects are undertaken through conventional public procurement, using bilateral and/or multilateral funding. On the other hand, the financial capacity and practical project management know-how of the private sector is an attractive option for the government for the sustainable construction of new infrastructures from the macro aspect. For example an infrastructure development financed by the private sector is off-balance sheet, enabling the government to invest more public funds for social projects.*

*The more popular index used for evaluating the economic feasibility is the Economic Internal Rate of Return (EIRR). The calculation of the EIRR does not capture the feasibility or viability of a project when the private sector is involved in its development because the realistic financial and other risks are not sufficiently assessed and incorporated into the analysis. This paper aims to present a framework to assess the viability of public infrastructure projects reflecting the various risks involved in a project by quantifying and incorporating them to the cash flows and the financial analysis.*

***Keywords:*** *Private Sector Involvement; Risk Analysis; Viability.*

## 1. PRIVATE SECTOR INVOLVEMENT IN INFRASTRUCTURE PROJECT

Continuous development of public infrastructures is essential for the sustainable growth of a country. The provision of public service and infrastructure in developing countries has traditionally been the undertaking of the government. However, with increasing population pressures, urbanization and other development requirements, the government's ability to adequately address public needs through the traditional ways has been heavily constrained. This situation led governments worldwide to increasingly look at the private sector to supplement infrastructure investments and provide public services.

The financial capacity and the practical project management know-how of the private sector are now an attractive option for the government for the construction of new infrastructures, which are needed to achieve the national target for the growth of a country. A public sector involved project can be generally identified as a project which is formulated based on a contract between a government/public sector utility on the one side and a private sector company on the other side, for delivering an infrastructure service on payment of user charges. This project scheme is generally expected to give a win-win solution for all stakeholders. According to the Asian Development Bank (ADB) (2009), the rationale for private sector involvement in infrastructure project is mentioned is as follows.

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For the Public Sector (ADB, 2009) - It allows the public sector to derive benefits from the efficiency and effectiveness of the private sector. This is possible because of the following impacts:

**Innovation -**Private sector involvement allows the government to tap the private sector's capacity to innovate. The government will spell out the services it needs, and the desired outcomes/outputs while the private sector can then introduce solution to meet all of the government's objectives.

**Sharing of responsibilities -** The government and the private sector share the responsibility of delivering a service depending on each party's expertise.

**Finance -**Access to private capital frees government capital to be used in projects with higher public policy objectives.

**For the Private Sector** (ADB, 2009)

**Business opportunities -**Private sector can have access to business opportunities which were traditionally accessible only to the public sector.

**Design and delivering innovative solutions -**Allows the private sector to move from just constructing assets according to specified designs, to designing and delivering innovative solutions. There is more room to innovate and offers efficient solutions for the public services.

**For the General Public** (ADB, 2009)

**Combining expertise of public and private entities**- Would deliver public services that can better meet the needs of the public without compromising public policy goals and needs.

**Protection of public interest -**The government would ensure that public interest is protected in projects involving the private sector and that service delivery would meet public needs at the best value for money. The government's focus shifts from providing the service to managing the service provider.

## 2. KEY TO SUCCESS OF PRIVATE SECTOR INVOLVEMENT

While involving the private sector can be an important option for sustainable economic growth of a country, various types of risks exist in implementing the infrastructure projects. The features and the magnitude of the risks identified for a project are different depending on the project. It is, therefore, necessary to formulate and assess a project from various aspects (World Bank, 2012; Venkata and Mahalingam, 2012; NCPPP, 2012;Puentas, 2012; European PPP Centre, 2013; ADB, 2009; RF&RIS, 2009; WE, 2008; Li *et al.*, 2005; Ranasinghe, 1996a, 1998, 1999, 2000).

Ranasinghe (1998) states that while private-sector participation in infrastructure projects offers substantial benefits, it is also a complex and difficult undertaking that requires a clear understanding of the concepts, and trust between the public and private sectors. The private sector and the public sector often have conflicting objectives. For example (Ranasinghe, 1998):

- While the private investor aims to maximise revenue and maintain positive cash flows, the utility will aim to control revenues to prevent excessive charging and pay only according to results;
- While the private investor aims to minimise operating costs and use project assets to maximise profits, the utility will require that project assets are properly maintained to provide good quality service and are used in ways to maximise economic benefit to the country;
- While the private investor aims to transfer project risks to the utility, the utility will try to transfer project risks to the private investor, and
- While the private investor would like a stable legal environment, the government would like project companies to comply with all present and future laws and policy changes.

The keys to success of a project involving the private sector is as follows (ADB, 2009):

- How the private sector and the public sector can reasonably share the risks,
- How a government (or utility) can prepare a request for project (RFP) in which the private sector is interested, and
- How the final contract between private sector and public sector can be honoured on the long term.

Focusing on the keys to success, this paper will outline a framework to assess the viability of public infrastructure projects, taking into account of the risks associated with the implementation of the project. As highlighted above, as the objectives which are pursued through the implementation of an infrastructure project by the public sector and the private sector are often conflicting, an index or method which assesses project viability and is acceptable to both sectors, would contribute to the success of private sector involvement in public infrastructure project development.

## 3. RISK ALLOCATION

A component critical to success of any private sector involvement project is the allocation of risks involved in the development of the project. Before allocation of the risks to the party best able to handle them, all risks should be identified.

An illustrative list of risks associated with a project and its consequences as suggested by the ADB (2009) are shown below.

Table 1: Generic Risk Categories (ADB, 2009)

| No. | Risk Category | Description of Risk | Direct Consequence |
|---|---|---|---|
| 1 | Commissioning risk | The risk that the infrastructure will not receive all approvals to satisfy an output specification, such as expected changes in legislation which allows for a specific output specification not materializing | Additional ramp-up costs, cost of maintaining existing infrastructure or providing a temporary alternative solution where this ideas to delay in the provision of the service |
| 2 | Construction risk | The risk that the construction of the assets required for the project will not be completed on time, within the budget or to specification | Additional raw materials and labor costs, cost of maintaining existing infrastructure or providing a temporary alternative solution where this ideas to delay in the provision of the service |
| 3 | Demand risk | The risk that the actual demand for a service is lower than planned | Reduced revenue |
| 4 | Design risk | The risks that the proposed design will be unable to meet the performance and service requirements in the output specifications | Cost of modification, redesign costs |
| 5 | Environmental risk | The risks that the project could have an adverse environmental impact which affects project costs not foreseen in the environmental impact assessment | Additional costs incurred to rectify an adverse environmental impact on the project, incurred from the construction or operation of the project or pre-existing environmental contamination |
| 6 | Financial risk | The risk that the private sector over-stresses a project through inappropriate financial structuring | Additional funding costs for increased margins or unexpected refinancing costs |
| 7 | Force majeure risk | An act occasioned by an unanticipated, unnatural or natural disaster such as war, earthquake or flood of such | Additional costs to rectify |

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| | | magnitude that it delays or destroys the project and cannot be mitigated | |
| 8 | Industrial relations risk | The risk that industrial relations issues will adversely affect construction costs, timetable and service delivery | Increased employee costs, lost revenue or additional expenditure during delay in construction or services provision (post-construction) |
| 9 | Latent defect risk | The risk that an inherent defect exists in the structure being built or equipment used, which is not identified upfront and which will inhibit provision of the required service | Cost of new equipment or modification to existing infrastructure |
| 10 | Operating risk (service under performance) | The risks associated with the daily operation of the project, including an unexpected change in operating costs over budget | Increased operating costs or reduced revenue over the project term |
| 11 | Performance risk | The risk that the operator will not perform to the specified service level, such as the government authority permitting off-take of less than required demand | Cost of failing to comply with performance standards |
| 12 | Change in law risk | The risk that the current regulatory regime will change materially over the project or produce unexpected results | Cost of complying with new regulations |
| 13 | Residual value risk | The risk relating to differences from the expected realisable value of the underlying assets at the end of the project | Lower realisable value for underlying assets at the end of the project term |
| 14 | Technology obsolescence risk | The risk that the technology used will be unexpectedly superseded during the term of the project and will not be able to satisfy the requirements in the output specification | Cost of replacement technology |
| 15 | Upgrade risk | The risks associated with the need for upgrading the assets over the term of the project to meet performance requirements | Additional capital costs required to maintain specified service |

Balanced allocation of all the identified risks plays a critical role in the successful implementation of any private sector involved project. The general principle governing risk transfer is that each risk should be allocated to whoever is best able to manage it at the least cost, taking into account public interest considerations. Therefore, optimal rather than maximum transfer of risk needs to be undertaken (ADB, 2009). The important factors to be considered during risk allocation include (ADB, 2009):

- The nature of the project
- The respective strengths and ability of each sector to manage a risk (this may change over time as each sector's risk mitigation skills improve)
- Flexibility of the output specification (whether any constraints exist which influence the method for managing risk)
- Previous levels of risk transfer (this indicates the historical success of each sector in managing particular risks and the potential ability to manage risks in the future)
- Prevailing market attitudes towards risk
- Public interest factor

- Other policy considerations
- External environment, economic scenario, risk appetite of foreign institutions

## 4. ASSESSMENT OF PROJECT VIABILITY

After identification of risks/formulation of the projects, the next important activity is assessing their financial viability. The financial analysis would determine the viability of the project given the cash flows of the costs involved and the expected revenues.

### *4.1. PROJECT COST*

The key input for the financial feasibility analysis is the project cost and it is the variable that is best defined at this stage of the project. Three broad categories of costs are considered, that is, capital costs for project development and operation and maintenance costs which arise during the operation and maintenance of the constructed infrastructure or asset. ADB (2009) defines them as follows.

#### *CAPITAL COSTS*

Capital costs for the development of projects would include basic capital costs on buildings required for the project, including any fit-out costs required to convert an existing property to the required use. Land acquisition cost would include specific costs on assets across the value chain, which needs to be created. Cost estimates should reflect the full resource costs of the project (ADB, 2009).

It is to be noted here that the estimation of capital costs should also include the opportunity cost of assets already owned by the institution and which are to be used in the project. If the asset could be sold or used for another purpose, then the use of that asset in the project has an opportunity cost. The main heads of capital costs for a typical project is given below (ADB, 2009).

- Land acquisition cost
- Construction costs
- Installation of electro-mechanical equipments
- Contingency reserve
- Preliminary and pre-operative expenses
- Interest during construction
- Operation and maintenance to be capitalized

#### *OPERATING COSTS*

In addition to consideration of the capital costs to be incurred for the creation of an asset, the project cost estimation should also include the costs on operation of the assets created, such as:

- Raw material purchase charges
- Power consumption charges
- Input costs of consumables for assets operation
- Cost of employees directly involved in service delivery includes wages and salaries, employee entitlements, superannuation, training and development, etc.
- Administration expenses
- Insurance costs

The operating costs would be identified on the basis of the demand projections and the rates of operating costs identified on the basis of current market rates or rates paid in recent similar projects (ADB, 2009).

#### *MAINTENANCE COSTS*

In addition to considering the operational costs of the assets, it is equally important to take into account the expenses relating to the maintenance of the assets created. These costs largely relate to the regular civil works which need to be undertaken for maintaining the life of the asset. These civil works therefore include repair works and minor replacements. These maintenance costs are recurring in nature and will be linked to maintaining the capacity and quality of the asset rather than upgrading or improving assets. Maintenance cost typically includes raw materials (spares), tools and equipment and employee costs associated with maintenance work (ADB, 2009).

A combination of the capital costs and the operation and maintenance expenses on the identified project would indicate the total investment costs on the project in constant value terms.

#### *DUE DILIGENCE OF PROJECT COSTS*

This activity involves reviewing the definition of project costs, both capital and operational/ maintenance, to ensure that they conform to some minimum tests of reliability, credibility and consistency so as to be acceptable to the prospective bidders. A description of some of the important parameters for the review of project costs is as follows (ADB, 2009).

**Inflation:** The costs of individual items considered for arriving at the final cost should reflect current market prices. The implications of unrealistic assumptions on inflation/omission of inflation are that the cost estimates would be lower and would not reflect the current level of prices.

**Opportunity Cost:** In case the sponsor is deploying its own resources - men, machinery or funds-in the project, then the opportunity cost (the return foregone by the sponsor by not deploying these resources profitably elsewhere, including its own operations) will need to be considered as the cost of the resource. The implications of omitting opportunity costs in the cost estimates are that the cost estimates would be under reported, inflating the feasibility of the project. However, the project will then not be comparable with the private sector reference.

**Total Project Cost:** The basis or assumptions for the estimation of the project costs needs to be verified. According to Ranasinghe (1996b), the items considered for arriving at the total project cost are:

- Base costs (capital, operating and maintenance) in constant value terms;
- Escalation During Construction (EDC) to reflect the impact of inflation as current market prices;
- Interest During Construction (IDC) to account for the borrowed funds.

### *4.2. PROJECT REVENUES*

Project revenues represent the income that is generated from the provision of service supply to the user. It should be noted that inflows of a revenue nature will be considered as project revenues. Any inflow of a capital nature would be added to the project funding or reduced from the gross cost of the project, depending on its accounting nature (ADB, 2009).

The revenues may be bifurcated into two broad categories-direct revenues and indirect revenues. Direct revenue is single, largest and the most important component of revenue generated from the provisioning of services to the users. In addition to the direct sources of revenue, the public sector may also explore the indirect revenue sources such as Real Estate Revenues, that is, possibility of increase of the real estate value of the municipalland within its possession due to development of the project (ADB, 2009).

The sum total of the above revenue streams would be projected in the financial analysis for the project.

### *4.3. FINANCIAL MODEL*

The financial viability of any capital-intensive project is defined by the returns on investment. Therefore, one of the key objectives behind the preparation of a financial model is to estimate the returns that the project can generate in the future. These returns are calculated on the basis of project cash flows, which are available to both equity and debt investors who have invested in the project (Ranasinghe, 1998, 1999).

The financial model includes:

- Calculation of project cash flows;
- Calculation of project net present value (NPV) at minimum acceptable rate of return (MARR)
- Calculation of project internal rate of return (IRR)

For the financial model, some basic assumptions and inputs need to be considered. The inputs and assumptions are listed below (ADB, 2009).

- Project cost including capital costs, preoperative expenses (to be capitalized), fees of the transaction advisor (if any),cost of legal approvals, etc. In addition, the phasing of the capital expenditure also needs to be defined.
- Project revenues including the revenues which have been identified from all the sources
- Operations and maintenance costs as per the demand projections and the estimated operating expenses
- Certain assumptions for projecting the cash flows in the future, for instance, long-term inflation rates, long-term interest rates, income tax rates in the future, etc.

For the calculation of the project cash flows, the following key statements would have to be prepared (ADB, 2009):

- Projected Profit and Loss Account
- Projected Balance Sheet
- Projected Cash Flow statement (showing calculations of the project cash flows)
- A statement of the assumptions used across the financial statements
- Total capital expenditure and its phasing

These five financial statements will constitute the basic financial model of the project. Generally, the financial statements listed above are projected to cover the economic life of the created asset so as to consider the costs of the complete project life cycle (ADB, 2009).

### *4.4. ASSESSMENT OF PROJECT VIABILITY*

The private sector investor would invest capital in a project contract as a business investment. This means that there is an expectation of attractive returns from the investment that the private investor has made. The key question therefore to assess the commercial viability is to determine whether the returns available from the project are attractive enough for a private investor.

#### *NET PRESENT VALUE (NPV)*

Net present value (*NPV*) is used to determine the difference in present value of cash flows of future project revenues and costs in today's value, usually represented as time zero in a cash flow diagram. In other words, it is the value obtained by discounting the annual cash outflows and inflows accruing throughout the life of an infrastructure project at a constant minimum acceptable rate of return (*MARR*). Then, the fundamental relationship to determine the *NPV* of an alternative is given by,

$$NPV = \sum_{i=0}^{n} \frac{B_i - C_i}{(1+r)^i} \quad (1)$$

Where $B_i$ and $C_i$ are the benefits (revenues) and costs of the $i^{th}$ year and $r$ is the discount rate respectively.

In choosing between alternatives, the criterion is to select the one that maximises NPV. For instance, a NPV of $ z means that the PV of the alternative is $ z greater than on an investment of similar size that produces a rate of return equal to the MARR. A negative PV means that the alternative does not satisfy the rate of return requirement, as MARR reflects the opportunity cost of capital. In other words, the possible returns an investor would obtain on the same amount of capital if invested elsewhere, assuming that the risks are similar for both investment alternatives is higher.

#### *INTERNAL RATE OF RETURN (IRR)*

The IRR calculates the return on the investment in a project as a non-dimensional measure. Present value formulations are the foundations for IRR calculation which is calculated by equating NPV of cash flows to zero and solving for the discount rate that allows the equality. Therefore, IRR is defined as the rate at which NPV is equal to zero. The IRR estimated would therefore have to be compared against a benchmark to assess whether the project is commercially viable. The possible benchmarks, MARR, could be returns that are generated through similar projects or returns that are assumed to be reasonable by a private investor. In order to identify whether a project is commercially viable or not, the following index called Weighted Average Cost of Capital(WACC) is suggested in ADB (2009). The WACC is a minimum return that a project must earn on its asset base to satisfy its creditors, owners, and other providers of capital.

## 5. RECOMMENDATION

The keys to success of a project involving the private sector was identified previously as to how, the private and public sectors can reasonably share the risks, a RFP in which the private sector is interested can be prepared, and how the final contract between the two sectors can be honoured on the long term.

While NPV and IRR are indices which are utilized for economic or financial evaluation of capital investment projects, this study will attempt to understand the concept of these indices and to research how more adequate/realistic cash flows for the cost and the revenue can be estimated taking into account of the risks associated in respective infrastructure projects.

High return or profitability is not necessarily expected from or required for infrastructure projects which are undertaken by a government because of their public nature. Therefore, reasonable assumptions in the cash flows for the economic/viability evaluation, for example, the benefit amount expected from a project after the completion of the asset can be assumed up to the end of the project life. Other uncertain factors (risks) from the long term aspect, such as variation of inflation and interest rate based on the local and international economic trends, deterioration of asset value, adequacy of demand projection, may not be incorporated into the cash flow analysis.

When the project returns are not found to be attractive for a RFP, the possibility of obtaining an additional grant to fund the costs of the project may be explored. Typically, if the returns on a project are found to be unattractive, the viability of the project may be enhanced by considering the option of a subsidy (viability gap fund) by the public sector. Ranasinghe (1999) developed a spreadsheet-based model that can be used for viability analysis of an infrastructure project.

The key factor to be considered in the viability analysis is how the various risks identified in Table 1 are quantified and incorporated into the cash flow calculations. Some concepts for quantification of risks and incorporation into the financial model suggested by the ADB (2009) are given below.

- Risk is a possibility/potential but is equivalent to cost if it is materialized.
- Conversion of the extent of risks to cost value, considering the direct consequence and type of risk.
- Risk converted to cost value is presented as an expected value assuming the probability of

occurrence

- In parallel with assumption of risk, if risk mitigation measure available will be considered, the net cost for risk will be the difference between the whole cost for risk and the cost required for the mitigation measure

Hence, project viability analysis would include correcting the estimated cash flows (revenue and costs) by incorporating various risks and estimating the subsidy ratio necessary to make the public infrastructure projects viable to provide the service to the consumers at a reasonable cost. Type and weight of risks to be considered in evaluating a public infrastructure under PPP scheme will be different by the nature of the project and the implementation mode. The future of this study will eventually propose a methodology to identify/select the specific risks to be considered for evaluation of a project, to quantify them and to incorporate into the economic evaluation, to formulate the viability of water supply projects to be implemented applying PPP method.

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