

## Risk Assessment of Bot Projects

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### ABSTRACT

The growth of the infrastructure sector in India has been relatively slow compared with the industrial and manufacturing sectors. The energy shortage, an inadequate transportation network, and an insufficient water supply system have caused a bottleneck in the country's economic growth. The Build-Operate-Transfer (BOT) scheme is now becoming one of the prevailing ways for infrastructure development in India to meet the needs of India's future economic growth and development. There are tremendous opportunities for foreign investors. However, undertaking infrastructure business in India involves many risks and problems that are due mainly to differences in legal systems, market conditions and culture. It is crucial for foreign investors to identify and manage the critical risks associated with investments in India's BOT infrastructure projects. Based on the survey, the following critical risks are identified: delay in approval, change in law, cost overrun, dispatch constraint, land acquisition and compensation, enforceability of contracts, construction schedule, financial closing, tariff adjustment, and environmental risk. The measures for mitigating each of these risks are also discussed. Finally a risk management framework for India's BOT infrastructure projects is developed. Main purpose of this paper is to investigate critical risks associated with Build Operate Transfer projects in India.

**KEYWORDS:** Risk management, BOT, Infrastructure projects, Mitigating measures, equity risks

### I. SCOPE OF RISK ANALYSIS ON BOT PROJECTS

The long lasting implementation of project risk management in India can best be evidenced by the construction project procedure that has been in use for over 4 decades in India. The feasibility study was formally introduced into the procedure in 1992. A capital project (including infrastructure projects) must follow the procedure. When an organization has identified its need for a new facility, it must submit a project proposal defining the purpose, requirements and general aspects of the project, such as location, performance criteria, scope, layout, equipment, services and other requirements. The definition and planning of the project shall be carried out in coordination with agencies in charge such as provincial, municipal, autonomous region governments, central ministries or commissions. The project proposals of a medium or large sized project must be submitted to the agencies in charge for review and comments. The priority projects are subject to review and approval by the State Council.

The review and approval procedure makes sure that the project complies with the national economic and social development programs and there are sufficient resources available to the project. Once the proposal is approved site selection and feasibility study shall follow. The feasibility study involves the process of risk identification and analysis. Various matters should be considered when selecting the site for the proposed project and feasibility study is made, such as climate, topographical and geological conditions, resources, transportation, potential natural calamities, environment conservation, available services, and utilities and so on. Usually, several alternative sites and proposals should be considered and compared with each other in terms of the various factors influencing the project.

### II. OBJECTIVES OF RISK ASSESMENT

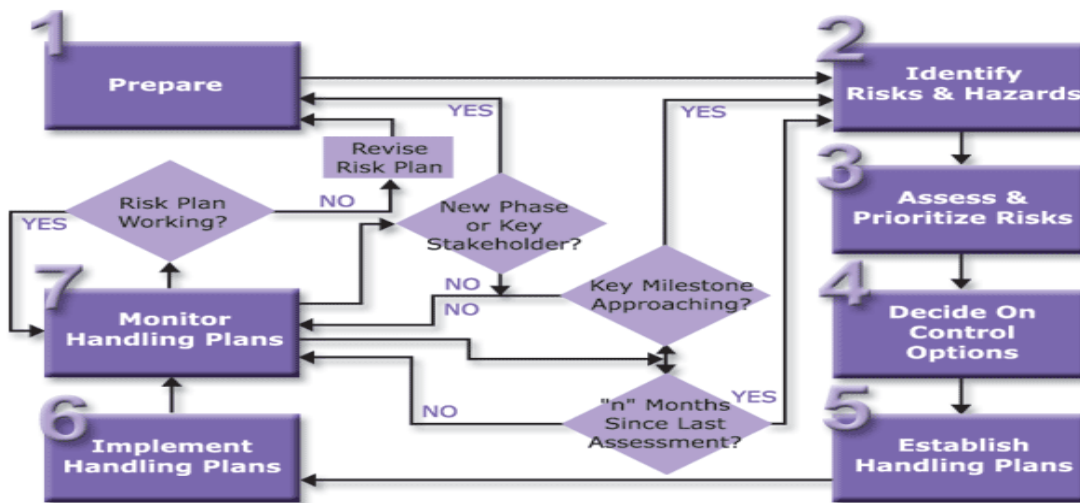
The experience of private investment in infrastructure in India over past years indicates that risks and pitfalls go together with opportunities. Proper identification, therefore, of the risks associated with investment in infrastructure in India and planning for effective responses thereto are essential for the private investors to be successful. In general, in order to be successful all capital projects shall meet the criteria and have the characteristics as listed below.

1. A credit risk rather than an equity risk is involved.
2. A satisfactory feasibility study and financial plan have been prepared.
3. The cost of product or raw material to be used by the project is assured.
4. A supply of energy at reasonable cost has been assured.
5. A market exists for the product, commodity or service to be produced.
6. The best way to appreciate the concerns of investors in infrastructure in India is to review and consider some of the common causes for their failures as shown below :

- Delay in completion, with consequential increase in the interest expense on construction financing and delay in the contemplated revenue flow.
- Capital cost overrun.
- Technical failure.
- Financial failure of the contractor.
- Government interference, inactions.
- Uninsured casualty losses.
- Increased price or shortages of raw materials.
- Technical obsolescence of the plant.
- Loss of competitive position in the market place.
- Expropriation.
- Poor management
- Financial insolvency of the host government.

In particular, for private investors to be successful in their infrastructure projects, these risks must be properly considered, monitored and avoided throughout the life of the projects

### III. PICTORIAL REPRESENTATION OF RISK MANAGEMENT



### IV. TYPES OF RISKS IN BOT PROJECT

The followings are the main findings through the literature review:

- a) The BOT scheme to financing infrastructure projects has many potential advantages and is a viable alternative to the traditional approach using sovereign borrowings or budgetary resources.
- b) BOT projects involve a number of elements, such as host government, the Project Company, lenders, contractors, suppliers, purchasers and so on. All of which must come together for a successful project.
- c) The application of the BOT scheme in Indian infrastructure development is being carried out stage by stage.
- d) There are two broad categories of risk for BOT projects: country risks and specific project risks. The former associated with the political, economic and legal environment and over which the project sponsors have little or no control. The later to some extent could be controllable by the project sponsors.
- e) A few researches of risk management associated with India's BOT projects focused on a particular sector. Different researchers appear to have different points of view on risk identification because they have approached the topic from different angles.

- f) A particular risk should be borne by the party most suited to deal with it, in terms of control or influence and costs, but it has never been easy to obtain an optimal allocation of risks. Risk management is a critical success factor of BOT projects.

Above points are as per KPMG report on India Infrastructure sector dated 22nd July 2010.

## **V. TYPES OF RISKS IN BOT PROJECT**

Progress of a project is corresponding with the occurrence of risks. Risks have been categorized into three major captions; financing, political and technical risks. The successes of a project are measured by the overall project cost, duration and quality of the final product or services delivered. Usually the risks are corresponding with these three parameters

### **A. Financial Risk**

#### **1) Currency Risk**

The investor or lenders is aware the existence of currency risk in any BOT projects and it does occur due to funding from international banks or foreign companies; creates volatility of the exchange rates. Bing et al. have stated that fluctuations in currency considered as an austere problem in international transactions.

#### **2) Interest Rate Risk**

In contrast, interest rate will affect the project in terms of borrowing and debt payments. Any fluctuation in the interest rate will definitely affect the lenders. An appropriate interest rate should be agreed upon the project. The lenders have to pay extra cost if the interest rate is far high or benefit them if the interest rate is low. More foreign investors or private sector could be attracted by providing interest rate guarantee by the host government in a BOT project. This approach has been adopted in Indonesian BOT toll road whereby the government has guaranteed on maximum interest rate, minimum revenue guarantee, debt guarantee, tariff guarantee and minimum tariff guarantee.

#### **3) Equity Risk**

Performance of the concessionaire is crucial in seeking for fund to implement a BOT project. Usually, equity risk is related with the performance of the company which is measured by the share price of the company. The higher the share price goes, in definite, benefit the shareholder but the lesser it goes will affect the prestige of the concessionaire. Capability of the company in raising capital for the BOT project is reflected on the share price. It has been believed that, the equity investors and other long term investors will only agree to provide the amount of funding for BOT project upon the promoter has proven their financial capability of the project over its entire lifespan. It is very difficult to attract domestic capital of debt and equity especially in East Asia when it is involving huge amount of investment in an infrastructure project. Nevertheless, the competence in carrying out detailed and comprehensive feasibility study, economic and risk assessment study, ensure the promoter to be in better position in obtaining domestic equity finance for funding the BOT project.

#### **4) Foreign Exchange Risk**

Fluctuations in foreign exchange are considered another major risk which might affect the BOT project during the construction and operation. Foreign companies who are interested to invest in another country should aware of the opportunities and threats associated with international currency transactions before they proceed. The Malaysian government has managed to reduce the foreign exchange risk by providing guarantees. The said guarantees was to absorb the shortfall when (1) the adverse exchange rate movements exceeds 15 percent on its offshore debt (2) adverse interest rate movements exceeds 20 percent on its floating rate offshore debt [2,7]. This approach was adopted in North-South Highway project and it benefited the promoter.

#### **5) Commercial Risk**

Commercial risk is described as a risk that can jeopardize the financial performance to the project. In spite of that, commercial risk in BOT project is characterized differently; Merna and Njiru have classified into three categories, risks related to the completion, during operation and risks related to input or output of the project [2]. Supply and off-take agreement between the supplier and the government is very crucial in mitigating the risk. In the agreement, the related parties will agree upon the required amount of input for instance coal in power plant project and the output generation is the electricity. This will allow the supplier to stock the materials upfront at lower price and the promoter able to generate the required output within the stipulated cost, not burdening the public by increasing the tariff. Apart from that, it will secure long term revenue for the promoter by selling the output to the client.

## **6) Liquidity Risk**

Most of the BOT project, the revenues are generated from the operation. To ensure the success of the BOT project, it should be able to generate sufficient amount of revenue to settle the debt within the stipulated time frame. An amount of profit that can be generated from the operating facility is determined by conducting analysis on the projected revenue during operational phase. The failure to generate the required revenue will cause to liquidity risk.

## **7) Counterparty Risk**

Inadequate support in terms of financial from the lender at specific time is defined as counterparty risk. It also can be interpreted as a credit risk. According to Lam and Chow, credit risk as the risk that the counterparty (partner of the joint venture) to any financial transaction is not being able to fulfill its commitment on the due date [16]. The debt capacity of the promoter will reduce when the credit risk arises. In a concession contract, transactions between two or more parties contain a risk that one party will default on an obligation of the commitment. Failure in financing the required cash flow for the BOT project is the most common issue that arises.

## **8) Economic Risk**

This risk mostly related to the facility's operation which consist of materials supply, labour supply, equipment availability, inflations, tariffs, fiscal policies and exchange rates [17]. Project cash flow is affected by any financial aspects that relate to the economic parameters. Increment in supplier to stock the materials upfront at lower price and the promoter able to generate the required output within the stipulated cost, not burdening the public by increasing the tariff. Apart from that, it will secure long term revenue for the promoter by selling the output to the client

## **B. Political Risk**

### **1) Sovereign Risk**

Sovereign risk is a risks related to the provision of loans to foreign government and commonly used in banking world [3]. The risk is governed by the political environment of the country where the investment will take place, specifically, the location of BOT project commence. Sovereign risk occurs when the political environment is unstable and will affect the investor or promoter of the project. For instance in East Asia, some of the BOT project faced difficulties due to political instability such as in Thailand due to frequent change in political leaders. Apart from that, countries which are governed by different ideologies such as Libya and Saudi Arabia are also facing sovereign risk. A BOT project might face serious risk when there are changes in government's policy and regulations due to changes in ruling government as can be learned from past experience. The changes in bureaucracy level due to reshuffling might posses impact on the decision making process in a concession contract. By providing some kind of guarantee by the host government, the risk shall be prevented. In addition to that, the concession contract agreement should be based on the international order systems to safeguard the promoter.

### **2) Country Risk**

Country risk is totally different from the sovereign risk. It related to overall investment climate in a specific country. The aspects that can contribute to country risk are socio-economic condition, internal or external conflicts that inflicting the country corruptions, ethnic tensions, policy and legal aspects. Before any BOT project implementation, the promoter should necessary conduct a thorough country risk profile and budgetary practices by a reliable third party (reputable management consultant or a good political analyst or both) to minimize the risk. Decision could be made based on the study and they should also seek assistance by referring to World Bank or Asian Development Bank. Nowadays, in East Asia, consortiums are established to undertake most of the BOT project. These consortiums consist of Engineering Procurement and Construction, (EPC) Contractors, Operation and Maintenance, (O&M) contractors and will be responsible for the feasibility study till implementation of the whole project and operation for a stipulated period of time. Every foreign investment is subjected to country risk due to unstable government and its component, and inadequate foreign reserves.

## **C. Technical Risk**

Technical risk could be classified into construction risk and O&M risk. Essentially, technical risk is the most common and well understood form of risk. Technical risk is the subject of close surveillance. To minimize the technical risk, the concessionaire is responsible to evaluate the risk in detail to ensure the project will be constructed accordance to the design specification and host government's requirements and functioning well. Thus, well reputed and established consultant together with an experience contractor should be hired to implement the BOT project without any tolerance to the standard codes and practice.

### **1) Construction Risk**

Unknown ground conditions, delay in procuring of construction materials, and price escalation of raw materials for construction such as an increase in the price of steel, copper or aluminum are the problems related to construction risk which occur during construction phase. In addition to that, poor design report, prolong construction schedule and changes in factor of production also contribute to construction risk. In the North-South Highway project in Malaysia has caused the promoter to bear the increment in the project cost. The initial estimated cost was US\$1.2 billion but due to hassles encountered during construction phase such as land acquisition problem and poor road design, the cost escalated to US\$1.8 billion [2,7,18]. The increment was almost fifty percent higher than estimated cost, this scenario was not unusual in East Asia since the local contractors are still learning and relying on the expertise of foreign based contractors which can be costly in terms of consulting fees. It is essential to make available the design report and to be vetted by the owner and consultant before any BOT project commences. Preferably, to have a third independent party to audit and comment the design and construction methodology which would help to minimize the construction risk.

### **2) Operational and Maintenance Risk**

During this phase there are several associated risks. One of them is when the performance of facility is not to the required level due to technical problems. Selection of inefficient machineries and equipments during the implementation phase and poor workmanship during installation phase could cause the poor performance. The spare parts for the selected machinery and equipments for the facility are to be ensured that they are easily available at affordable cost. Throughout the concession period, the machinery and equipments will undergo some routine service due to wear and tear process, to optimize the performance. New available technology should be incorporated to ease the operation phase. Sometimes, initial cost is very high but in long run it will benefit the consortium. The operation and maintenance team requires specialized technical skills and abilities in operating the facility. Inefficient team would lead to unnecessarily high cost of operating and resulting lesser revenue to the consortium. It is very important that a proper agreement should be established to ensure the interest of the operator is secured. The efficiency of the facility's operation could be increased by providing maintenance manual and update it on a regular basis together with standard operating procedure.

## **1. RISK RESPONSE STRATEGIES**

India's government officials and project managers use the risk response strategies that are available to them.

### **➤ Avoidance :**

Risk avoidance is changing the project plan to eliminate the risk or condition or to protect the project objectives from its impact. Some risk events that arise early in the project can be dealt with by clarifying requirements, obtaining information, improving communication, or acquiring expertise. Reducing scope to avoid high-risk activities, adding resources or time, adopting a familiar approach instead of an innovative one, or avoiding an unfamiliar subcontractor may be examples of avoidance.

### **➤ Transference :**

Risk transfer is seeking to shift the consequence of a risk to a third party together with ownership of the response. Transferring the risk simply gives another party responsibility for its management; it does not eliminate it. Transferring liability for risk is most effective in dealing with financial risk exposure. Risk transfer nearly always involves payment of a risk premium to the party taking on the risk. It includes the use of insurance, performance bonds, warranties, and guarantees. Contracts may be used to transfer liability for specified risks to another party. Use of a fixed-price contract may transfer risk to the seller if the project's design is stable. Although a cost-reimbursable contract leaves more of the risk with the customer or sponsor, it may help reduce cost if there are mid-project changes.

### **➤ Mitigation :**

Mitigation seeks to reduce the probability and/or consequences of an adverse risk event to an acceptable threshold. Taking early action to reduce the probability of a risk's occurring or its impact on the project is more effective than trying to repair the consequences after it has occurred. Mitigation costs should be appropriate, given the likely probability of the risk and its consequences. Risk mitigation may take the form of implementing a new course of action that will reduce the problem—e.g., adopting less complex processes, conducting more seismic or engineering tests, or choosing a more stable seller. It may involve changing conditions so that the probability of the risk occurring is reduced—e.g., adding resources or time to the schedule. It may require prototype development to reduce the risk of scaling up from a bench-scale model. Where it is not possible to reduce probability, a mitigation response might address the risk impact by targeting linkages that determine the severity. For example, designing redundancy into a subsystem may reduce the impact that results from a failure of the original component.

➤ **Acceptance :**

This technique indicates that the project team has decided not to change the project plan to deal with a risk or is unable to identify any other suitable response strategy. Active acceptance may include developing a contingency plan to execute, should a risk occur. Passive acceptance requires no action, leaving the project team to deal with the risks as they occur. A *contingency plan* is applied to identified risks that arise during the project. Developing a contingency plan in advance can greatly reduce the cost of an action should the risk occur. Risk triggers, such as missing intermediate milestones, should be defined and tracked. A *fallback plan* is developed if the risk has a high impact, or if the selected strategy may not be fully effective. This might include allocation of a contingency amount, development of alternative options, or changing project scope. The most usual risk acceptance response is to establish a *contingency allowance*, or reserve, including amounts of time, money, or resources to account for known risks. The allowance should be determined by the impacts, computed at an acceptable level of risk exposure, for the risks that have been accepted.

## VI. METHODOLOGY OF STUDY

**Procedure :**

This research study employed a combination of methods for an integrated qualitative and quantitative research methodology . The first stage was a comprehensive literature review together with lessons learned from the practice of BOT projects in developing countries, especially in India, to develop a initial list of risks associated with India's BOT infrastructure projects. In the second stage of instrument development, only the critical risks associated with India's BOT Infrastructure projects were chosen for study.

### **RISK MANAGEMENT FRAMEWORK FOR BOT INFRASTRUCTURE PROJECT**

Based on the survey results and analysis as well as case studies, a risk management framework for investing in India's future BOT infrastructure projects can be proposed as follows.

**Step 1:** List all risks associated with the proposed BOT infrastructure project and then analyze these risks in order of importance. The more critical the risk, the more attention should be paid to it.

**Step 2:** For each risk, list corresponding mitigation measures as more as possible, and then examine the availability of mitigating measures in sequence based on their effectiveness. The more effective the measure, the higher the priority for adoption. Sometimes, a combination of several mitigating measures is needed to be adopted.

**Step 3:** For each risk and its mitigating measures, negotiate with Indian government and related entities to incorporate the risk mitigation measures, and fine tune the concession agreement and other agreements as much as possible to ensure that all of these risks are adequately covered.

**Step 4:** Allocate risks to related parties according to the principle that risk should be borne by the party most capable of controlling it. An optimal allocation of risks depends on the relative bargaining power of the parties and the potentiality of reward for taking the risks

**Step 5:** Adopt the risk allocation and security structure and enter into financing process for the project.

## VII. CONCLUSION

In this research, the critical risks associated with India's BOT projects were investigated. The main conclusions are as follows:

- The identified critical risks in order of importance are: delay in approval, change in law, cost overrun, dispatch constraint, land acquisition and compensation, enforceability of contracts, construction schedule, financial closing, tariff adjustment, and environmental risk.
- The measures for mitigating each of these risks have been evaluated by respondents. Most of the measures were regarded as effective to some degree, however the most effective measures to mitigate each risk are:

- 1) For delay in approval, maintaining a good relationship with government authorities, especially officers at the state or provincial level;
- 2) For change in law, obtaining government's guarantees via adjusting either the tariff or extending concession period;
- 3) For cost overrun, entering into contracts with the project participants so that all share the responsibility and the incentive;
- 4) For dispatch constraint, entering into take-or-pay contracts with other parties;
- 5) For land acquisition and compensation, obtain government's guarantees to achieve timely acquisition of land;
- 6) For enforceability of contracts, making a credit judgment on the financial ability and Integrity of the contracting party to live up to its contractual obligation;
- 7) For construction schedule, choosing quality, trust-worthy Indian partners with knowledge of how to handle everyday construction issues;
- 8) For financial closing, equity financing and cooperation with government partners;
- 9) For tariff adjustment, negotiating to separate and redefine the tariff burden so that while some portions of the total tariff burden remained fixed other portions were either adjusted, re-scheduled or paid in foreign currency; and
- 10) For environmental risk, creating appropriate lines of communication and contacts with government authorities and agencies.

The risk management framework proposed by this research project will be easier to apply than others. It incorporates the findings from this research and provides step-by-step guidelines for foreign companies who intend to invest in India's infrastructure projects in the future. It also has the potential to help national, provincial, and city government to examine their approach to and services in support of BOT infrastructure projects. It suggests that mechanisms be reviewed to improve the communication and coordination links between different levels of government, that thought be given to developing mechanisms to coordinate actions by different government agencies and that the lessons learned from individual BOT projects be shared among government servants so that unintended barriers to BOT are dismantled.

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