

# Risk Management in BOT PNG Toll Plaza

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**Abstract** - An abstract Risk management is the process of identifying potential risk in Advance, analyzing them and tacking precautionary steps. BOT (Built, Operate, and Transfer) means the government transfer the concession to Privet Company and the company is responsible for building, operating the project, and then transfer the project back to the government when the concession period expires. The main purpose of this paper is to investigate financial risk, technical risk, original and maintenance risk, foreign exchange risk, commercial risk in BOT projects. Risk identification and classification based on risk factors has been studied from the past research work. They concluded that BOT project is subjected to many risks and finally it is converted into financial risk. To overcome the risks in BOT projects various tasks have to be undertaken such as recruiting strong management team, powerful controlling team, strong support and assistance needed by the government, etc. Identifying risk in order of importance: delay in approval, change in law, construction schedule, land acquisition and competition, enforceability of contract has been made in this paper. Identification of risk affecting Time and cost overrun in BOT project are also presented.

**Key Words:** BOT Projects, Risk Management, Risk Mitigation

## 1. INTRODUCTION

Since 1948 In East Asian countries the build –operate transfer (BOT) project have become popular and evolving vigorously this is aligning with the need of basic infrastructure to develop the countries and lack of huge fund has urged the host government to utilize BOT type of procurement. The BOT is a type of infrastructure project which is based on granting of concession by a principal, usually a government, to a promoter, sometimes known as concessionaire, who is responsible; construction, financing, operation and maintenance of a facility over the period of the concessions before finally transferring the facility at no cost to the principal, in a fully operational condition.

The term BOT (Built –Operate –Transfer) can be characterized as a primary start up business venture wherever personal organizations provide to create and operate a project, which might ordinarily be initiated by the government when a hard and fast concession amount. The Built –Operate-Transfer method is an alternative for the government to source public project to the privet quarter. Beside BOT, the privet sector designs, finance, constructs and manages the ability and eventually, once a detailed

concession amount, the possession is shifted to the government.

### 1.1 Definition of BOT

The term BOT can be defined as major start up business venture where private organization undertake to build and operate a project, which would normally be undertaken by the government after fixed concession period.

Some or even all of the following different parties could be involved in any BOT project

1. Government
2. Project Sponsor
3. Contractor
4. Lender
5. Purchasers
6. Operator
7. Insurance
8. Supplier

Contractual structure for a toll-road project

The contractual structure for a toll road project can be diagrammatically constructed by the following chart.

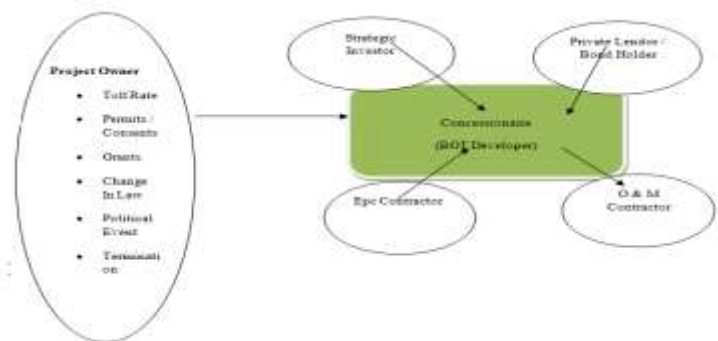


Fig no. 1.1

### 1.2 Types of Risk in Bot Project

1. Technical risks
2. Financial risk
3. Political risk

1. Technical risks- Technical risks always present in engineering project, at the end which is transformed in

financial risk Among the technical and management category, open and honest communications among stakeholders and cost overrun were found to be most critical risks. It is classified into two types

- Construction Risk-

The most critical risk in construction are project delay due to many reasons such as poor interface coordination, late design changes, late delivery of raw materials, changes in project schedule versus estimated project delivery schedule, bad weather condition, difficult ground condition etc.

- Operational risk and maintenance risk

Inefficient team would lead to unnecessary high cost of operating and resulting lesser revenue to the consortium so the operation and maintenance team requires specialized technical skills and abilities in operating the facility.

2. Financial Risk - From past study most critical risk in BOT project is financial risk. It occurs due to change in availability of fund and change in cost of project. It is classified into following types

- Currency risks
- Interest risks
- Equity Risks
- Foreign exchange risks
- Commercial risks
- Liquidity risks
- Counterparty risk
- Economic risks

3. Political Risk –

- Sovereign Risk-

Sovereign risk is related to the provision of loan to foreign government and commonly used in banking world. Sovereign risk occurs when the political environment is unstable and will affect the investor of the project

- Country Risk-

Country risk is totally different from the sovereign risk. Before any BOT project implementation, the promoter should necessarily conduct a thorough country risk profile.

**3.1 Project Startup phase** - during this phase, equipment is tested, raw material inputs are ordered, project staffing is completed, and marketing starts. Loan exposure may rise slightly during this phase due to working capital requirements and final payments to contractors and equipment suppliers. Initial sales from project start up enable loan payoff to commence. Over instances point towards the necessity of having a proper understanding of how the BOT projects operate and how the possible risks arise. Only then can proper risk assessment be done.

**Operation Phase** - Inadequacy of revenue is the most significant risk during this phase, especially from the perspective of debt servicing and acceptable return to project investors. Over a period of time, as the project cash flows stabilize and the exposure of the lenders investors gets reduced, the risk perception also reduces.

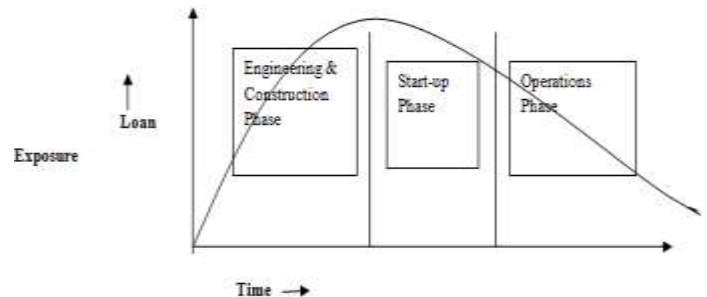


Fig. no.3.1 Project Risk Phases

**2. NEED OF THE STUDY -**

Risk management in BOT PNG toll plaza and risk associated in general construction project are analysed by using questionnaire survey. Give the solution of those risk and apply to another project.

**3. OBJECTIVE OF STUDY**

- I. To study the different types of risks in BOT projects.
- II. To study financial risk analysis of BOT projects.
- III. To identify the risk associated in PNG BOT project.
- IV. To review the impact of the risk associated with PNG BOT project.

**4. LITERATURE REVIEW**

**Amol Prabhakar Garole and Ganesh P. Jarad (2016) [1]**

In this research, the critical risks associated with India's BOT project were investigated. Main conclusion are to identify critical risk 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.

**Syed Kamarul Bakri. et.al (2010) [2]**

In these research identify to multiple risk in every BOT project is subjected to multiple risks. Thus it has become the responsibility and liability of the promoter to mitigate the risk to ensure the success of a BOT project.

**Mrs. Savita Achyut Jangale and prof. Mr.A.A.Suryawanshi (2014) [3]**

In this research studied that every BOT project is subjected to multiple Risk. Finally all risk converted into financial Risk.

**Maniyar Javed Basha and Harish Naik (2012)[4]** In this research studied that risk include every stage of project.to identify risk category, phase of predominance, risk identification and risk mitigation of every stage like that: land acquisitions ,project completion risk, technology risk, operation and maintenance risk, financial risk,intrest rate risk and force majeure risk.

**Engineer Rinaj Pathan And Prof.S.Pimplikar (2013) [5]** In these research studied that risk management is important process to archive the successful project financing.in these paper risk involved in each phase the method to limit the risks, the problem encountered.

### 5. PROBLEM STATEMENT

Out of every 33 BOT project, 30 project are suffering from Time Overrun due to various delays. Which means around 90% projects are facing various Risks due to various delays causing Time overruns and cost overruns associated with them. Due to which stake holders are suffering from major losses. And to find various solutions to reduce and eliminate such risks.

### 6 RESEARCH GAP

Risk management in BOT PNG Toll plaza has been studied that risk management in various factors such as technical risk,fianacial risk, political risk.at start up to end of those project. And to find out the problem arise in start to end of those project. And give the solution of arising problem. With the help of qestionary survey on case study and real project. And those solution apply on real construction work and to overcome those risk.at start up to end of project.

### 7. METHODOLOGY

This Chapter includes the Methodology that has been used to carry out the dissertation work. The General data for the dissertation was first collected and then Literature Review was done by studying the Research work of other authors. The study is performed by preparing questionnaire survey and also by studying the case study of a residential project. The Research methodology for present study has adopted is questionnaire survey to identify significant factors influencing Time overrun in BOT Pimpalgaon-Nashik-Gonde Toll Plaza.

- 1) Break-even point analysis
- 2) Decision tree analysis
- 3) Sensitivity analysis
- 4) Scenario analysis

#### 1) Break-even point analysis

Analysis of the level of break-even allows you to indirectly take into account the uncertainty of the market situation and serve as a risk indicator of production. The basic idea

behind break-even point is to calculate the point at which revenues begin to exceed costs. ... Examples of Fixed cost include rent, insurance premiums, or loan payments. Variable costs are costs that change with the quantity of output.

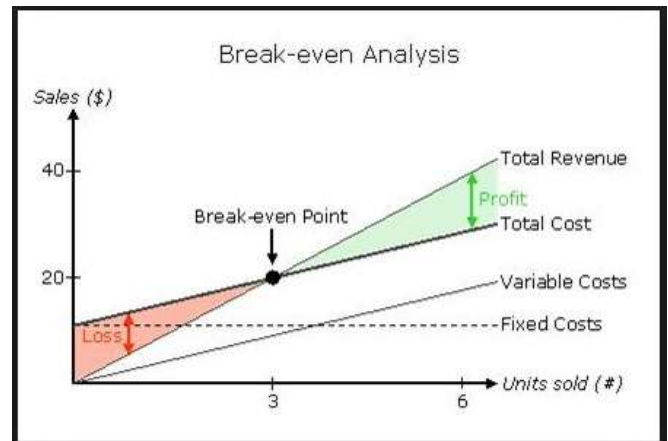


Fig no. 7.1

**2) Decision tree analysis** - To use Decision Tree Analysis in Project Risk Management, you need to:

1. Document a decision in a decision tree.
2. Assign a probability of occurrence for the risk pertaining to that decision.
3. Assign monetary value of the impact of the risk when it occurs.
4. Compute the Expected Monetary Value for each decision path

#### 3) Sensitivity analysis

Measurement of sensitivity analysis below are mentioned the steps used to conduct sensitivity analysis:

- 1) Firstly the base case output is defined; say the NPV at a particular base case input value (V1) for which the sensitivity is to be measured. All the other inputs of the model are kept constant.
- 2) Then the value of the output at a new value of the input (V2) while keeping other inputs constant is calculated.
- 3) Find the percentage change in the output and the percentage change in the input

#### 4) Scenario analysis

Scenario analysis means a systematic process of obtaining expert opinions from business managers and risk management experts to derive reasoned assessments of the likelihood and loss impact of plausible high-severity

operational losses. Scenario analysis may include the well-reasoned evaluation and use of external operational loss event data, adjusted as appropriate to ensure relevance to a [bank]'s operational risk profile and control structure.

**7.1 METHODOLOGY FLOW CHART**



Fig. 7.1 Methodology flow chart

**8. DATA COLLECTION**

This chapter includes all the Data collected, required for the dissertation work. It includes both the questionnaires Survey and case study to work out the Analysis part of the dissertation work.

**8.1 Case Study of BOT PNG Toll Plaza**

Summary of Contract:

**Client** : National Highway Authority of India

**Consultant** : Sheladia Associates Inc.in associations with THEME Engineering Services Pvt.Ltd.

**Concessionaire:** PNG tollway Ltd

**Construction Period:** 30 months from date of Appointment

**Concession Period** : 20 Years

		pimpalgaon – Nashik – Gonde Section of National Highway 3(NH 3) From Km 380.000 to Km 440.000 in the state of Maharashtra on Design, Build, Finance, Operate and Transfer Basis.
3.	Contract Length in Km	60 Km
4.	Appointed Date	4th January 2010
5.	Concession Period	20 Years
6.	Construction Period	30 Months
7.	Scheduled Completion Date	3rd July 2012
8.	Cost of work	940 Crore
9.	Progress Target on 31/12/2012(Financial)	100%
10.	Physical progress till now	95.95%
11.	Total time elapsed (month) from appointed date	56 Months

Table No 8.1

**PROJECT LAYOUT**



Fig. 8.1

Sr.No	Name of Contract	6 Laninig of Pimpalgaon – Nashik – Gonde section of NH-3
1.	Name of Concessionaire	PNG Tollway Ltd
2.	Contract Name	Improvement, Operation maintenance,Rehabilitation ,and strengthening of the existing 2 lane road and widening it to 6 lane divided highway of

9. DATA ANALYSIS

In data analysis phase to measure the risk by risk measurement method with the help of questionnaire survey in general organisation construction and case study.

Data analysis by using method of

- 1) Break-even point analysis
- 2) Decision tree analysis

1. What is the Impact and occurrence of the risk is occurred at the time of construction of Built Operate Transfer Project?

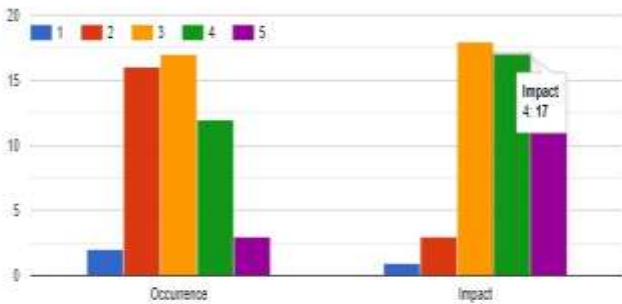


Fig. 9.1

3. What is the Impact and occurrence of the risk is occurred at the time of operation of Built Operate Transfer Project?

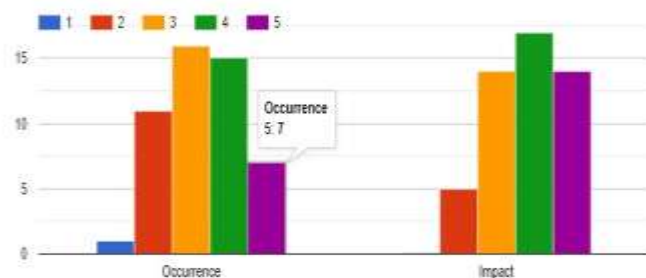


Fig. 9.2

Some of the ex. of solution of risk management fig 9.1 and fig.9.2 are given below. Out of 20 questions with the help of questionnaire survey responses on excel.

Fig. 9.3

In the above fig.9.3 show to given 20 questions responses of 50 responder in the general organization and result shown in excel. And to give the solutions of those results.

OCCURRENCE	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5
		1	2	3	4	5
		I M P A C T				

Fig. 9.4

In the above fig 9.4 shows that maximum risk occurrence factor is 15 to 25 same the minimum risk occurrence factor is 1 to 5 and medium risk occurrence factor is 8 to 10. to give the solution on maximum risk occurrence on project. Same as the impact of risk factor.

10. CONCLUSIONS

Every BOT Project has multiple risk, like as Construction, Operation & Maintenance, Risk occurs due to time overrun in construction and automatically it is converted into cost overrun, finally all risk converted into fanatical risk. In above 33 research has been concluded that high level of risk associated with BOT projects, the negotiators and Decision Makers, (DMs), for both the public and private. The critical risks associated with India’s BOT project were investigated. Main conclusion are to identify critical risk 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. it can also concluded that the

internal risks that gave the highest impact to BOT project were financial risks, operational problem, technical and design risks. The risk management strategies that were selected, and the results obtained. Two major categories of risk were identified, general risks and project-specific risks. .BOT project are targeting towards funding, designing, implementing and operational infrasture facility and service which were traditionally provided by the general public sector. In these research studied that risk management is important process to archive the successful project financing

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