

# **“RISK ASSESEMENT OF BOT PROJECT”**

*Project Report Submitted In Partial Fulfillment of Requirements for the Degree*

*Of*

**Masters of Technology**

**IN**

**CIVIL ENGINEERING**

**With specialization in**

**Construction Management and Technology**

Under the Guidance of

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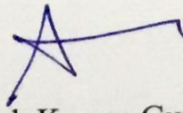
**June, 2016**

## CERTIFICATE

This is to certify that the work which is being presented in the project title **“RISK ASSESSEMENT OF BOT PROJECT”** in partial fulfillment of the requirements for the award of the degree of Bachelor of technology and submitted in Civil Engineering Department with specialization in **“Construction Management and Technology”** and submitted to the Department of Civil Engineering, Jaypee University of Information Technology, Waknaghat is an authentic record of work carried out by **Chander Kumar Modgil (142603)** during a period from July 2015 to June 2016 under the supervision of **Dr. Ashok Kumar Gupta** Professor and Head Of Civil Departement, Assistant Professor, Civil Engineering Department, Jaypee University of Information Technology, Waknaghat.

The above statement made is correct to the best of my knowledge.

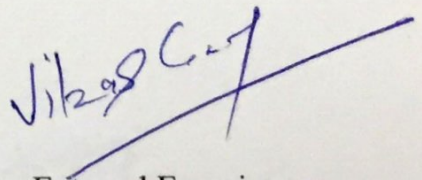
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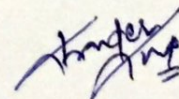
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# ACKNOWLEDGEMENT

First of all, I would like to express our deep gratitude to our project guide **Dr. Ashok Kumar Gupta**, (Professor and Head of Civil Engineering Department) for providing us an opportunity to work under his supervision and guidance. He has always been our motivation for carrying out the project. Their constant encouragement at every step was a precious asset to us during our work.

I am thankful to the faculty of Department of Civil Engineering, Jaypee University of Information Technology for providing us all facilities required for the project work.

I would like to thank my parents for their continuous support and motivation. Finally we would like to thank to all who directly or indirectly helped me in completing this project. My Classmates were always very helpful to me. They were always there for me whenever I needed their support.



**Chander Kumar Modgil**

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## **ABSTRACT**

The rising demand of infrastructure and meagre funds available with the government has allowed the BOT approach to be followed as the best possible option to resolve the transportation queries. Although, undertaking infrastructure work in India includes many risks and problems that are prevalent mainly because of differences in legal systems, market conditions, political scenario, culture. It is crucial for investors to identify and assess the critical risks expected to occur with investments in India's BOT infrastructure projects.

In order to make sure that BOT project to be successful it is necessary to identify , access and manage the risks involved in the BOT project. It provides encouraging prospects to the foreign investor. The most common element of a BOT projects is that the concerned Govt. Authority of infrastructure projects gets the private sector engaged to a greater extent in the performance of certain operations previously handled by the public sector. This could range from design finance , construct , operate and maintain before finally transferring the facility to the concerned authority like PWD, NHAI in case of India .

Based on the survey the risk associated with the BOT projects is recognized in different stages of the project .Depending upon the score the risks are ranked in decreasing order of their criticality ,the risk is allocated to various parties which are likely to be affected and mitigation measures are proposed . The answer to creation of a successful BOT project is the active participation of the government in risk sharing is necessary, for which a flexible approach is required from governments perspective to attract investors by providing relaxation in norms. This report does so through a series of case studies of actual BOT projects in highway sector which have long involved the private sector through various forms of PPPs. The objective of this thesis is to assess the critical risks associated with Build Operate Transfer projects across India.

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# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 General**

In the recent years there has been a rising trend to place the major public investments , particularly , particularly for the infrastructure projects into the private sector . A lot of countries have adopted the BUILD OPERATE TRANSFER or the BOT approach . The reason being the private sector will finance , construct , operate the project facility and then will transfer the ownership right to government after the completion of specified construction period .Therefore the BOT scheme is a limited project financing technique for implementing infrastructure project by using private funding .

India is a developing country and transportation forms the backbone of the Indian economy. Rail transport is the most used system for long range and large quantity commodity transport. However, it has some limitations. Road transport is therefore an essential assistance system which is extremely well designed, due to which transport closest to the drop point is possible. Road transport efficiency depends on several factors like availability of fuel point locations, vicinity etc. but the most important of all these is the quality and subsequent services. Road construction forms an integral part of infrastructure development. Most of the times, the large-scale projects like road development were taken up by the Government solely, however, this increased the financial as well as labour stress on the Government bodies. Therefore, an alternative arrangement in the form of Private Participation Projects (Public Private Participation) under the headings like Build – Operate – Transfer (BOT) is available.

Even though there are numerous ways to make investment in infrastructure sector in our country, it's obvious for such projects to face risk . The process for allocation of risk which are available in various countries, is not suitable in India because of differences in law systems, market environment and culture prevalent. For successful execution of BOT schemes in India, the financiers should identify and find methods to mitigate the critical risks .The objective is to identify and evaluate the common risks involved in these

BOT Highway projects and figure out the critical risks and prepare a framework to mitigate these risks which all the parties involved in the project can refer to .

## **1.2 IMPORTANCE OF THE STUDY**

The Build-Operate-Transfer (BOT) mechanism has technique of limited recourse financing. This approach serves as an alternate to conventional public financing method for development of infrastructure projects. It assess the type of equity and debt in financing of the project. As an addition, it identifies the type of financial instruments adopted in projects financing. Due to limited funds, government had to make decision to start the project of National Highways across various states along with bypass routes outside the city by BOT.

The BOT was completely based upon the concession period .The tender has specified clause which does change the rate of interest due to variation in prime lending rates issued by the State bank of India. Due to wide range of fluctuation in PLR from inception of project & till date therefore the concession period is changed with respect to that .

Risk assessment can provide greater certainty in carrying out construction by identifying risks that otherwise might escape from notice and result in complex problem. Study of risks, Risk Analysis and Risk Management necessitates a sensible and practical approach, aided by a variety of tools and techniques. It must be done by those who have prior experience and knowledge of BOT projects.

The project aims to assess various kinds of risks in BOT projects and manage the so identified risks so as to avoid the time and cost overruns.

## **1.3 OBJECTIVES OF THE STUDY**

The objective of the study is

- To conduct study of the Built Operate Transfer (BOT) Model.
- To assess and mitigate the risk involved in Build Operate Transfer Project & then form a rating system.

#### **1.4 SCOPE OF THE STUDY**

- The scope of the study is limited to the BOT Highway project (Expressway , National Highway & State Highway )
- To have a better preview of these risks involved in BOT projects by carrying out a case study on highway sector which has been executed under BOT basis. The case study would essentially be in the form of the questionnaire survey.

#### **1.5 NEED OF THE STUDY**

The critical reason for below par condition of our Highway sector is the insufficient flow of funds in this sector. The investment in highway sector as proportion of the country's national income has also shown declining of funds. The financially constrained situation of the road sector has risen largely because of the difficult financial position of the central and state governments. The gap between existing infrastructure support and the minimum expected infrastructure required for the vibrant economy causes the participation of private entrepreneurs. As the BOT is an important concept of the Construction Industry. This study will help in attaining the knowledge of conceiving and executing of a BOT project to study its performance and risks involved.

This study will form a base for analyzing any BOT project's performance. It will provide better understanding of BOT concept to public and private organization and help in formulation of strategy for a successful BOT project.

#### **1.6 METHODOLOGY**

- Study of BOT project
- Identification of risks involved
- Questionnaire survey
- Data interpretation and analysis
- Risk Mitigation response
- Conclusion

## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 DEFINITION OF RISK**

The environment in which decision making is takes place can be divided into three types:

- 1) Certainty
- 2) Risk
- 3) Uncertainty

Certainty exists only when one can exactly specify what could happen in the period of time which is covered by the decision. In other words, certainty means where every action has been known to lead invariably to a definite outcome. This does not, of course, happen in construction industry.

It can be sure that certainty has a major difference between the other two types. There's is much ambiguity among the concept of risk and uncertainty. Based on general consensus, it is believed that each action in a risky situation leads to several known outcomes, each of which occurs with a specific probability. For example, flipping a fair coin gives an analogous illustration of risk. A person knows what the outcomes are, as well as the probabilities, though he cannot be certain about what the exactly the outcome is.

Uncertainty, by contrast, might be described as a situation in which there is no information or historic data relating to the situation. In other words, no one has idea about the probability of each outcome. Buying a particular stock in NYSE can be exemplified as a case of uncertainty. Someone knows that the stock price may either go up or down in coming days, however, he cannot be certain about the probability of any of these outcomes.

A company has to operate in an environment where there are many uncertainties. This aim is to identify, analyse, evaluate and operate on risks. Accordingly the company is

converting uncertainties into the risks. Furthermore, as we think more about uncertainty and risk is a more relevant term in construction project.

Risk is described by three components which are as (1) *the risk event*: what could happen to the obstruction or in expedition of project (2) *the probability of occurrence*: chance of the occurrence of the event (3) *the potential loss/gain*: outcome of the happening of event that can be mentioned as a loss or gain. From these mentioned characteristics, the impact of risk could be measured by the multiplication of the probability of occurrence and the consequence. Gray and Larson (2006) take into notice the ease of identification of risk and represent the risk value like the product of probability of the occurrence, its impact and the ease in detection.

Various researchers who have given definition of risk based on their research and studies. Akintoye and Macleod in 1997 had defined risk as likelihood of the unforeseen events occurring, that can *substantially* affect the planned completion of project in terms of time, cost and quality . Niwa,Chicken and Posner (1998), also believe only in the dark-side of the risk. Al-Bahar in 1989 had added the essence of the risk and uncertainty and also defined risk in terms of the project management as an “exposure to the probability of occurrence of events which can have an adverse or favourable impact on the project objective as the consequence of uncertainty”. Al-Bahar (1990), Raftery (1994), Chapman (1997), Vaughan (1997), and PMI (2000) consider positive as well as negative impacts of risk. . Risk management effectively helps in improving the project performance on the basis of assessment of both threat and opportunities. Therefore risk can be recognized as an uncertain condition that, if occurs, will have a positive or negative impact on the project outcome (PMBOK Guide 2003).

The risk management in project process has a defined focus. They restrict it to manage the uncertainty associated with the projects related to down-side of the event occurrence. Hence most studies include references to ‘risks’ as term such as threat, with explanation such as ‘impact severity’, ‘ease in detection’ and the application of probability-impact matrices to estimate whether a risk can be rated as low, moderate or high.

The basic fundamental for risk management is pretty well known. It explains many risks associated to be identified, impact determined and mitigated at economical cost. Risks could be efficiently managed by agencies from outside of the project are transferred to these agencies, thereby cutting the residual risk carried by the project. The process of this transfer of risks typically includes cost, which is included in the user charge applied by the sponsors. By any means if risks has been efficiently given to those who can manage them the best, the expenditure of risk management is reduced and the tariff will be minimum-cost tariff. Few risks are widespread in most of the infrastructure projects. They have a very critical impact on these projects.

## CHAPTER 3

### CONCEPT OF BOT PROJECT

#### 3.1 BOT

On the other side, the viability of any project for the local government depends a lot on its efficiency to make the financing of the project possible public funds. Even though the government can borrow the amount on economical rates than a private company would, various factors will offset this specific advantage. For example, the efficiency in technical expertise and technical standards that the private party is expected to display as well as risk transfer. Hence the private entity is liable for substantial part of the associated **Build–operate–transfer (BOT)** is a type of project financing, in which a private entity gets a concession by the private/ public sector for the finance, design, construct, and operate the facility mentioned in the concession agreement or contract. It allows the project promoters to receive their investment, operation and maintenance expenditure from the project.

Due to the long gestation period, the fund are usually raised at the time of concession period. The increase in rate is often associated to a combination of factors both internal as well as external, allowing the stakeholders to reach a promising internal rate of return from their investment.

Example of countries in which BOT model has successfully been implemented in the past are Israel, China , Saudi Arabia , USA ,Vietnam , Philippines , Malaysia , Egypt . In countries such as Nepal , New Zealand , Canada , Australia the term often used is build-own – operate- transfer (BOOT). Conventially , these projects ensures that infrastructure to be handed back over to the government in end of concession period. In Australia , due to the borrowing power of its states, the transfer duties can be omitted. In case of Alice Springs – Darwin section in Adelaide–Darwin railway line the lease period allowed is 50 years.

BOT has numerous applications in infrastructure sector and in public–private partnership model. In BOT model a third party, say for example the government administration, issues to the private sector party to design and construct infrastructure as well as to

operate and maintain that facility for a certain period. In this period the private entity has the responsibility to arrange finance for project and is allowed to retain all revenues which is generated from project and is the sole owner of the concerned facility. The facility is then handed back to the concerned department in the end of the concession agreement. Some different parties may be involved in any type of BOT project:

- Host government: The government is the originator of the infrastructure project and will decide if any BOT model is appropriate to meet its requirement. The political and economic condition are main reasons for this decision. The government provides support for such projects in some form.
- Concessionaire: The project sponsors (concessionaire) create a special purpose vehicle which is managed by their financial assistance.
- Lending bank : Almost all the BOT projects are funded to large extent by the commercial debt. The banks are expected to finance these projects on “non-recourse” mechanism meaning it will expedite the formation of special purpose vehicle and all assets for reimbursement of debt.
- Other lenders: The special purpose vehicle may have different lenders such as local or national banks which provides loan for infrastructure purpose.
- Parties in project contracts: Because of the fact that special purpose entity has limited person, it will involve the third party for performance of its obligations as per the concession agreement. In addition, it would have to assure that there are adequate vendors for the supply of raw material and various other resources essential for the project

A BOT Project is specifically used to create a discrete asset in place of whole network and is often entirely green field in nature (even though refurbishment can be involved). In any BOT Project the operator or the project company generally obtains its revenues by levying charged to the facility created rather than tariffs imposed on consumers .Variety of project are known as concessions, such as road projects, which are newly built and have got a number of similarities with the BOTs.



In general, any project is viable financially for the private party if the revenues generated from the project would be able to cover its cost and provide sufficient return over investment. These are various types of common risks involved:

- Political risk: Commonly prevalent in the developing countries due to the possibility of unstable political scenario which can lead to dramatic overnight change of the government.
- Technical risk: Construction difficulties, such as unforeseen soil conditions, unskilled labour, breakdown of equipment
- Financing risk: Foreign exchange rate and fluctuations in the interest rate, market risk (escalation in the prices of the raw material), income risk (over-optimistic estimation of cash-flow), risk of cost over run .

### **3.2 NATURE OF BOT PROJECTS**

There have been numerous major construction projects in the past five years in India. In the 1980's infrastructure construction was performed mostly in the conventional tendering style. In the previous five years, however, the private entity has been mostly involved in the construction and financing of the public infrastructure work.

BOT (Build/Own/Transfer) project is public infrastructure project which involves a particular type of structured financing.

The involvement of the private entity in the development of infrastructure work in India as part of BOO (build-own-operate) or BOT (build-own-operate-transfer) is proving to be a challenging task. The lead time for such projects is very long, and the initial up-front costs are significant. In addition, there are a number of complicated hassles which have to be resolved with respect to any infrastructure projects settled to date.

These projects are complex due to the number of parties involved and their respective number of contracts, which should all interlock. Additionally, each party is depends upon the performance all parties to the project not only its counterpart. Moreover the execution of BOT project are generally based on a project basis requiring all parties to share among them the risks of the project. Risk sharing of project is necessary because the sponsor, a

joint venture of one sort or another, will have a limited worth being substantially less than the aggregate net worth of the equity parties.

In a BOT agreement, the private sector designs and construct the infrastructure, finances its construction as well as operation and maintenance for over a period, often as long as 20 or 30 years. This period is commonly referred to as the "concession" period.

Traditionally, these projects require for the infrastructure to be transferred to the government body in the end of the concession period. (In India ,due to reasons related to the borrowing powers of its states, the transfer duty is omitted).

BOT is a type of project financing. The trade mark of project financing are:

(i) The lenders of the project look mainly upon the earnings of the project as the source from which repayment of loan will be made. Their credit assessment would be based on the project, not just on the credit worthiness of the its borrowing entity.

(ii) The security from the lender is largely restricted to the project assets. As a result, project financing is commonly referred to as "limited recourse" financing due to the fact that lenders are allowed only a limited recourse compared to the borrower.

Most of project finance structures are complex. The risks involved in the project are spread across various parties; each risk is normally assumed by the party which can be most efficiently and cost-effectively controlled or handled.

Once the project's risks are known, the likelihood of their occurrence identified and their impact on the project assessed, the sponsor should allocate those risks. Briefly, its options available are to absorb the risk or lay off the risk with some third parties, such as insurers, or allocate theses risk among contractors and lenders. The sponsor will be working, more often than not, on behalf of a client at a time when the equity providers are not known. Nevertheless, each of these stakeholders in the project must be content with the risk allocated, the creditworthiness of the risk bearers and the reward that follows to the party which is taking the risk. In this respect, each party normally takes a quasi equity risk involved the project.

### **3.3 PARTIES TO BOT PROJECTS**

There are a numerous parties to any BOT project, all of whom have their particular cause to be involved in the project. The contract agreements between such parties, and the allocation of risks, could be complex.

The major parties to a BOT project will usually include:

#### **3.3.1 Government Agency**

A government authority or statutory authority is a crucial party.

It would provide grant to the sponsor the "concession", which is the right to build, own and operate the facility ,allow a long term lease of or sell the site to the sponsor, and often acquire majority of all the service provided by the facility.

The government's contribution is critical in large and complex projects. It may be necessary to assist in obtaining the concerned approvals, authorisations and permissions for the construction and operation of the facility. It may also be required to provide assurance that the agency acquiring services from the facility would be able to honour its financial obligations under the contract

The government authority is usually the primary party .It will start the proceeding of the project, carry out the tendering process and do the evaluation of tenders, and will provide the sponsor the concession, and where ever necessary, to off take the agreement. The authority of a government agency to enter into the documentation involved with an infrastructure project and carry out its obligations there under, and the manner in which that body enters the documentation (agent of the Crown or otherwise) is a vital issue. This is examined in detail below.

The concept of ultra virus is largely not relevant to companies, as the Corporations Law considers that they have the powers of any natural person, which can be subject to the expressed exclusion from the company's constituent documents. However, this does not hold for statutory authorities.

It is settled law which statutory authority framed under legislation only have the powers for which its constituent legislation has provided. Therefore, the statutory powers and function must, without doubt, be sufficient enough to empower it to be able to enter into each of the project documents for which it is a party and bind its obligations there under. If the authority has not been empowered with the requisite powers, its actions are declared void.

Examples of power required by any authority in a particular BOT project are:

- To enter into contract with another person for that person to be able to carry out one or more of the assigned functions (for eg. the construction and operation of the particular infrastructure);
- In order to make payments in time to that person according to consideration of the services provided;
- To continue land and then make that land "available" for that person;
- To sell or lease land to that person along with providing easement and rights of way for the purpose of access
- For the issue of undertakings, guarantee, indemnities bond or to financiers and involved entity in relation to its or any other persons' liabilities.

### **3.3.2 Sponsor**

The sponsors are the party, normally a consortium of interested group (specifically including a contractor group, an operator, a financial institution, and various other groups) which, in response to the tender floated by the Government Department, frames the proposal for construction, operation, and financing of that particular project.

The sponsor commonly form a company, a limited partnership , unincorporated joint venture ,or a unit trust . These investors in the sponsor group are often called as the "equity providers" or "equity investors". It is not uncommon for equity investment to be nearly about 20% of cost of the project. Equity fund is, however, costly compared to that cost of debt. Any equity investor might require return on investment of 20% to 25% in today's global market to adjust for compensation by assuming the major risks associated

in any infrastructure sector. As a result it would be cost-efficient for the equity to fall short of 20% of the total project cost.

The sponsors can be a company, consortium, a limited liability partnership, unit trust, a joint venture or any combination of more than one.

### **3.3.3 Contractor**

One of the sponsor can be the construction company. It will handle execution and completion risks, which is, the risk of finishing the project in time, within budget and as per the specifications. These risks are considerable and the lenders will hope to see a construction firm with sufficient size of balance sheet and access to capital that provide real substance for the completion guarantee.

Often these general design of the BOT projects is governed by the experienced utility. Contracting company takes the construction risk. Further, on the basis of type of infrastructure project handing over risk is allocated to the contractor company. The sponsor would try to make the contractor firm to enter in a fixed time fixed term construction contract. This is however rarely achieved in the project as there time and cost issues which emerge out due to negligence of construction company which can cause the fluctuations in price or timing.

### **3.3.4 Financiers**

In any infrastructure project there is likely the association of financial institutions making the fund available. It will first be requiring the security first for creation of that infrastructure facility. The stand by loan will quite often be provided by the different or the same bank with regard to the facility for any overruns which are not covered in contract agreement.

As we know that the funding of the BOT project is a particular type of finance mechanism, debt financiers will carefully examine the main project documents to review the allocation of risk and how does that impact in approval of their credit. There had been some problems in arranging debt financiers for infrastructure projects, because of the long term gestation period of these large and complex project, which may have a payback

period of up to 15 years, and there are numerous infrastructure projects in the market place at present.

Due to the fact that long term debt in India is very less the Debt financiers have conventionally viewed themselves like a short term financiers, as evidenced from the past. Accordingly they are comfortable in financing construction phase of the project, given that the return period for such project is 15 years. The amount of debt will limit the number of financiers for this infrastructure project. tax exemption and the bonds are floated for a limited number of infrastructure projects. For eg , these bonds are unavailable for health and water sector but available for transportation project like road, rail and airport.

### **3.3.5 Equity Investors**

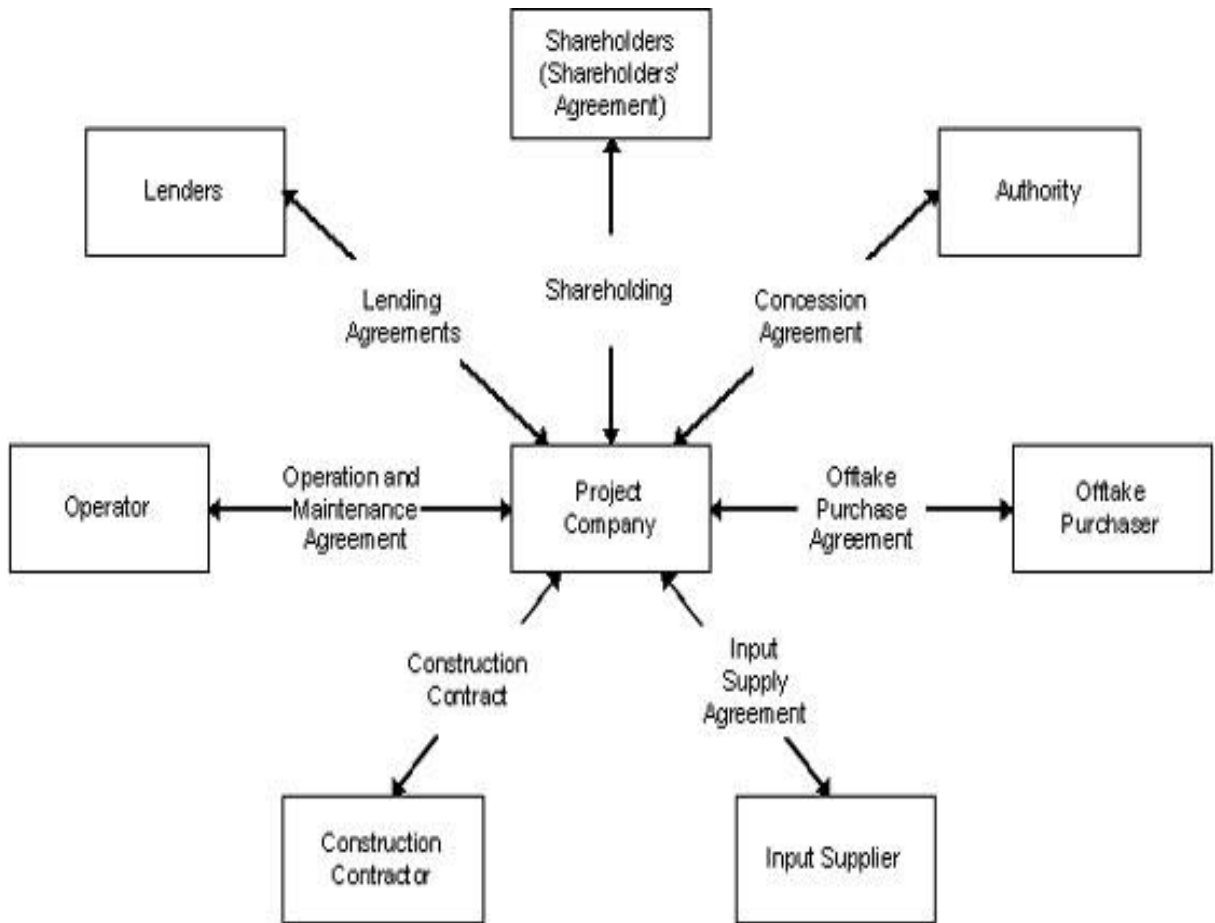
The willing investors should have sufficient rights to enter the contract and perform its necessary obligations as per the terms of contract .The example where power should be carefully understood is in insurance and superannuation capital.

### **3.3.6 Other Parties**

Other parties like insurers, suppliers of equipment and engineering design professionals will also be involved. Many of the parties will include their lawyers and financial and tax advisers .

Various parties are associated in an infrastructure project. These include equity providers, equipment suppliers, raw material suppliers, insurers and, of course, consultants.

### 3.4 BOT MODEL



**FIGURE 1 BOT MODEL**

### 3.5 SALIENT FEATURES OF A BOT PROJECT

- In any BOT project, the statutory body grants to a private entity the right to develop and operate any facility or system for specified period of time (the "Concession Period"), in what could conventionally be a public sector project
- Commonly its a discrete green field newly built project.

- The Operator finances, constructs and owns the facility or system and maintains it for the concession period commercially, after which the facility is handed back to the authority.
- BOT is latest tool for financing of the project. Since it relates to new project, there is no stream of benefit from the outset. Lenders have therefore growing concern to ensure that project assets are already ring-fenced within the operating company and all such risks associated with the project are accurately assumed and passed upon the appropriate entity. Hence the operator forms a special purpose vehicle
- The revenues generated from a particular "off take purchaser" such as the government, who buys project output from the contractor firm (It is different from concession where the project output is sold directly to consumers and users). In the power sector, it could take form of Power Purchase Agreement. For more, see Power Purchase Agreements.
- Contractor firm obtains funding for the project, and obtains the design and execution of the works and operation and maintenance of the with proper input supply and sufficient off take purchase potential. It is also necessary to include parties with experience in the handling of the appropriate type of work, such as working with multicultural and multilingual partners ,which can be given the particular risks in relation to these aspects of a BOT projects. The off take purchaser will be concerned to ensure that the main shareholders remain in the special purpose vehicle for a period of time as the project is certain to be awarded to it on basis of their technical expertise and financial stability.
- Project firm will communicate the construction and operation of the work as per the requirements of the concession agreement. The off-taker would like to know the detail of the construction sub-contractor and concerned operator.



- The project firm (also the lenders) in a such project will be certain to ensure it has a secure affordable source of procurement. It will regularly enter into the bulk supply agreement for raw material, and the supplier may be the same entity as the reliable supplier who is registered with the concerned authority.
- The revenues collected from the operation phase is intended to include operation costs, maintenance cost, repayment of debt principal (that reflects a significant part of development and execution costs), financing costs (involving interest and fees), and sufficient proportion of return for the shareholders of the special purpose vehicle.
- Lenders grant limited recourse or the non recourse financing and will henceforth, carry any residual risk with both the project company and its stakeholders.
- The special purpose vehicle is assuming numerous types of risk. It is concerned to make sure that those risks retained by the grantor are protected. It is usual for a project company to need some kind of assistance from the govt. authority such as NHAI and/ or, particularly in the case of highway projects, commitments from the government which involved into the Contract Agreements such as land acquisition.
- In order to mitigate residual risk (because lenders will only wish to bear a limited portion of the commercial risk in the project) they will insist on transferring the project company risk to various other participants through contracts, such as construction contract, and operation and maintenance contract where such work could be given to other party .
- Facility during the concession period .
- The Project company is a Joint Venture (special purpose vehicle), its stakeholders will often involve the companies with execution and/or operation experience.

### **3.6 QUALITIES OF BOT PROJECT :**

Basic qualities of BOT Project includes:-

- **High priority, government:** The project should have been initiated from a government-led planning and its prioritization steps. The project can such that, regardless of capital(private or public), the government would still wish to expedite the project quickly.
- **Genuine risk allocation:** The shared risk allocation is a prime feature of any BOT project. The private entity must genuinely assume critical risk
- **Mutually valuable:** It applies to both sides, which means authority should genuinely accept few risks and not transfer the complete risk to private sector, and the vice versa.

### **3.7KEY CONSIDERATIONS IN BOT**

BOT usually involves complex planning and sustained effort. Infrastructure projects such as highway and bridges, sewerage and drainage require large investment, very long gestation period, less cost recovery, and various construction, social, and environmental risk. When any infrastructure project is developed as BOT then the process often involves detailed risk and cost assessment, complex and lengthy bidding procedures, difficult shareholder management, and long negotiations for the financial closure. It means that BOTS projects are critically relying on sustained and explicit support from the sponsoring government. To manage these procedural complexities and possible pitfalls of BOT, governments need to be clear, focussed, and technically able to handle the legal regulatory, policy, and other issues like ownership.

### **3.8 NEED FOR BUILD OPERATE TRANSFER**

The Needs for the Build Operate and Transfer Projects are listed below:-

- Economic growth relying on Infrastructure
- Limited Budgetary assistance available
- Demand surpasses Budgetary support

- People's wish to pay for services
- Success of BOT in other countries

### **3.9 AREAS OF BUILD OPERATE TRANSFER**

- Roads/Highways
- Harbour
- Airports – Brownfield and Greenfield
- Railways and Cargo Services
- Power Projects
- Water Supply and Drainage
- Rural Infrastructure
- Urban Infrastructure
- Tourism
- Oil & Gas Pipelines
- Hospitals and Hygiene

These are different sectors where privatization has been observed. Our work is concerned with the road projects & especially the Highway sector.

### **3.10 POTENTIAL BENEFITS FROM BOT**

The **potential benefits** which could be expected from BOT is mentioned as below:

- **Cost-effectiveness-** Since choice of the developer/ service provider relies upon competition or benchmarking done in the past, the project is generally economical than before.
- **Higher Productivity-** By associating payments to performance, the productivity gains are likely to occur within the project.
- **Accelerated Delivery-** Since these contracts mostly have incentive and penalty clauses in relation to implementation of BOT projects this leads to faster delivery of projects.

- **Clear Customer Focus-** The shift in focus from service inputs to outputs create the scope for innovation in service delivery and enhance customer satisfaction.
- **Recovery of User Charges-** Innovative decisions may be taken with greater flexibility in case there is decentralization. Whenever there is possibility of recovering user charges, they can be levied in harmony with local prevailing conditions.
- **Construction Cost Savings:** By the association of design and construction component within one private entity can lead to saving through the ‘phased in’ or ‘fast-tracked’ delivery schedule, quick procurement, lower interim funding, and a reduction in time and cost overrun risk.
- **Operational Savings:** In few cases, private partners are capable to lessen operating costs by the operation of various facilities, latest technology, sharing skilled labour, more flexible funds arrangements, bulk purchasing of raw material, and centralization of the administrative staff. The savings are often increased when the private entity is involved at the initial or infrastructure design stages.
- **Faster Implementation:** By coordinating with less number of service providers, addition of the design and execution, shortening procurement time, and increasing capital financing, services in demand and infrastructure facility may be introduced quickly, and thus, cheap.
- **Preserved or Improved Levels of Service:** Road swill get access to specialized expertise and facility that, for various reasons, was not available in-house. The economies of scale and arrival of new techniques may open the path for the same or improved service at a lesser cost. Few private partners, such as firms working in water utilities, have presence throughout the world. It allows them to achieve various economy of scale and gain knowledge and technology which was not available for a single municipality.
- **Risk Sharing:** Under conventional practices, governments considers all risk involved with service delivery. BOT model allow the turning over of some of these risk to the private entity, such as that involving with liabilities, market fluctuation, cost overruns ,ongoing maintenance, regulatory compliance mechanism etc.

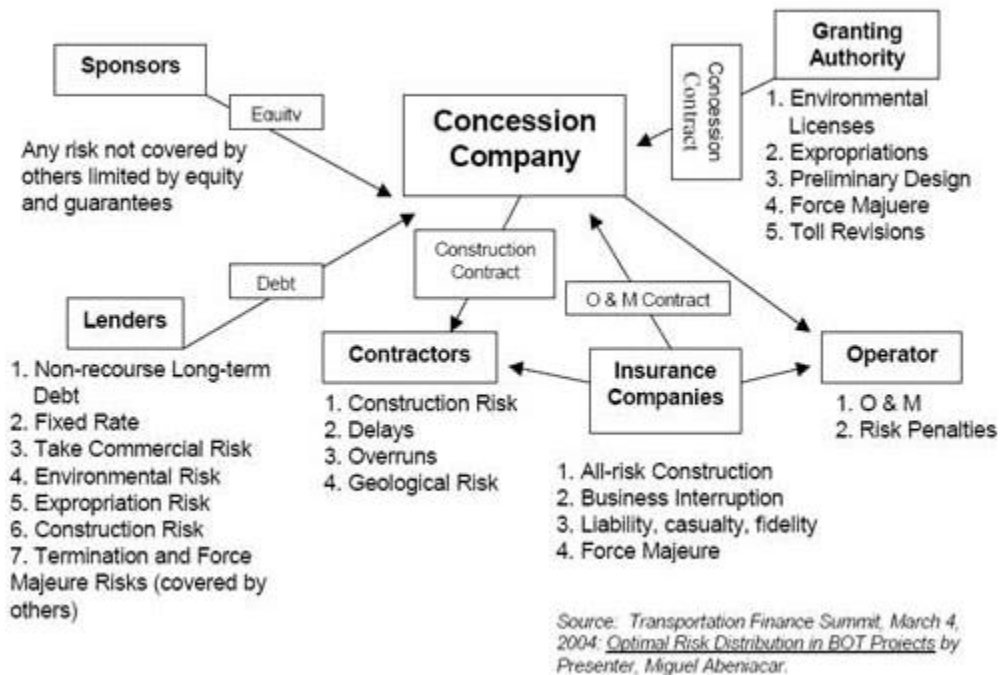
- **Avoidance of Capital Debt:** While BOT could be means of funding capital for projects ‘off-balance sheet’, this should be understood that any capital costs to the private entity will be collected in the service levied ultimately on the road user.
- **Enhanced Public Management:** For enabling a bigger role for the private entity in the aspect of infrastructure project, managers are able to give additional time for planning and monitoring work as opposed to handling the resources needed to provide a service.
- **Enhanced Economic Development:** BOTs brings opportunities to allotting road facilities to other jurisdictions, bring foreign investment from outside the country where permitted, give expanded channels of business to small entrepreneurs, increase the quality and expertise of the work force, create a modern business climate in the sector as well as a strike rapport with the government and the private sector, and improve technical standard for local industry.
- **Innovative Solutions:** Competition invites potential private party to search for innovative ways to provide a particular facility more efficiently than their rivals.
- **Enhanced Facility Maintenance:** Relying upon the structure of the agreement, private entity are motivated to safeguard the value of its assets, extend their life, and make further invest in modern equipment and machinery which lead to better efficiency.
- **True Costing and True Value:** The charging of road services, as part of the user charges or the general tax rate, hardly reflects the total cost of the facility (e.g. depreciation, overhead).
- **Arms-Length Independence:** It may arrange the efficient and necessity-based delivery of certain facility by removing political interferences from daily operations.

### **3.11BOT Contract Structure**

The major responsibilities for toll road development involves the designing, construction, maintaining, toll collection, arranging fund, and transferring the legal ownership. The build operate transfer (BOT) is the most usual approach used for

assigning duties for toll road projects. BOT is in a wide term defined as the process involving build-own-operate-transfer (BOOT), build-lease-transfer (BLT), rehabilitate-operate-transfer (ROT), lease-rehabilitate-operate (LRO), and similar arrangements that are used to develop new facilities or improve existing ones. BOT structure includes the grant of a concession (sometimes also called a license or authority) by a fairly empowered statutory authority (the grantor) for a special purpose company or vehicle (the concessionaire).

Under the concession agreement, the concessionaire would accept to fund, build, control and operate the facility for a specific time period, typically 15 to 25 years in Asia, after which responsibility for the service is handed to the government, normally free of charge. The concessionaire typically considers primary responsibility for executing the project, arranging funding, performing maintenance and operation, and collecting tolls, while the government sector retains legal title. In most projects design work is jointly done, with the public sector leading from the front in the preliminary design (including number of lanes, interchanges, route alignment ,and other high-level specifications) and the private entity completing the detailed design, after getting the approval nod from government.



**Figure 2 BOT ROAD MODEL**

The concessionaire would involve a contractor company (the contractor) to carry out the construction works as per terms and conditions mentioned in a construction contract. The party would also commonly involve an independent party (the operator) for operation and maintain the project as per terms and conditions specified in the operation and maintenance contract.

The motive would be that the concessionaire will receive sufficient amount during the operational phase: to payback the debt that would be available by the banks and lending institutions (the project lenders) to the design, development and building of the toll road; to complete the concessionaire's capital and maintenance costs; to payback the investment of the party who are originating the project (the sponsors), also the other investors who would engage in the project later; and, hopefully, to provide a sufficient profit for the investors and sponsors.

### **3.12 CRITICAL ELEMENTS FOR BOT PROJECT EVALUATION**

In order to bring private fund, a toll road project should have strong project potential and contract structure which comes from a combination of these following elements. The **Figure 3** shows the critical element of BOT project evaluation which is made of below elements.

- country environment
- public-private risk sharing
- sponsors' ability
- concession environment
- project economics/project structure
- financial market environment
- financing structure

A country with concession and a favourable environment can be critical to attracting funding and limiting the necessity for government consideration of risk, while an

unfavourable environment may cause decreasing financing without sufficient government support.

In principle, project risks in BOT toll road development should be given to the public or private party that is best able to handle them. The private party is generally better at handling Commercial risks and responsibilities, like those involved with construction, operation, and financing. But for a project to get financing, public participation would be required in those areas such as acquisition of right-of-way, traffic and revenue risk , political risk .

Sponsors' capability to successfully build and operate a facility is very critical to attract financing. In the same way, the sponsors' ability to assess necessary project risk will be considered critical since it is very uncommon for a toll road project be financed on a complete non-recourse basis. Funding structure of any project is a outcome of all the above elements, but is usually composed of the capital of sponsors and other party with debt financing of these sources, which can include that of the governments. The financing structure can also get affected by the scenario of financial market environment during the time of financial closing.

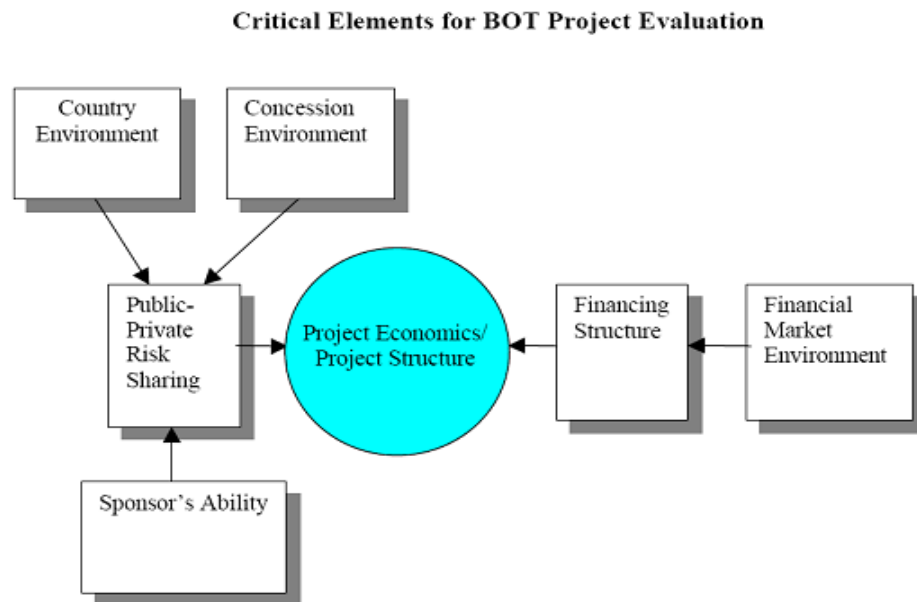
Public-Private Risk Sharing the private entity is normally responsible for construction ,operation and toll collection, while public body retain legal right of the facility. Design work is generally shared. The prime risks affecting toll road projects include pre-construction, construction, post construction ,traffic, currency ,and revenue force majeure, political ,tort liability and financial. These risk should be addressed in a way satisfactory to equity debt investors before they can commit to project finance. Financing structure in most of the private toll roads are done on a project finance basis, wherein investors depend on the performance of the work for payment instead than the credit of the sponsor. This mechanism is also called as limited recourse financing, which shows that lenders have limited recourse for sponsors for making payment if the project fails to generate sufficient returns.

Sponsor's Ability :The project company is normally a consortium of parties with various specialty required to develop the toll road project. The sponsor of the overall project must



have adequate track records for executing a number of common projects in the previous years and should be able to assign proper team of people during various stages of project work to coordinate the complex process of these private financed toll road project.

Such team at the early stage is required to have an expertise not just in the technical aspect of project but also in the financial and legal aspects for constructing financial model and to draft required contracts using foreign experts in the areas.



**Figure 3: Critical Element for BOT Project Evaluation**

### **3.13.CASE STUDY**

#### **3.13.1 NOIDA TOLL BRIDGE**

##### **DESCRIPTION :**

The **DND Flyway (Delhi Noida Road)** is the 8 laned 9.2 km (5.7 mi) and access controlled expressway that has joined Delhi to Noida, an industrial hub area. It was constructed and is administered by The Noida Toll Bridge Company Ltd. The acronym DND means for "Delhi-Noida Direct".

<b>NAME</b>	<b>DND FLYOVER</b>
LENGTH	10.2 KM
DEVELOPER	NTBCL
COST	Rs 4051430000



**Figure 4: Delhi Noida Toll Bridge**

**Issues :**

- 1) Contract was awarded by the direct negotiation.
- 2) It had an improperly structured CA.

The most important fault is that the stated facility provides guaranteed returns of over 20% annually on total project cost (TPC), and any shortfalls in the collection of returns are adjusted to TPC over which guaranteed return would be paid in future years. This Inclusion of shortfall in revenue in Total Project Cost considerably wipes out revenue risk from the concessionaire, and it gets very expensive for the authority to provide service

- 3) Delay in getting necessary administrative approvals

There were two states and a local authority involved .Different laws and regulations were the prime reason.

#### 4) Flawed revenue projection

DND Flyway, has a length of 6 km and a capacity of 2,22,000 vehicles per day of which the present utilisation is 1,02,000 vehicles per day. The revenue shortfall in 2011-12 was 440 crore, taking the TPC to 2,869 crore in end-March 2012. Projections suggest that the TPC would increase to 83,237 crore (200 times the original TPC) by the end of the concession period due to shortfall in guaranteed returns. Thus, the project suffers from a vicious circle of low actual returns, leading to shortfall in guaranteed returns and raising TPC, entailing a higher servicing liability in the future.

#### 5) User unacceptability for payment of toll.

The toll rate was 380 for single trip which the LCV users found high and they preferred to use the old highway of Mayur Vihar Extension.

#### 6) Toll hike

Concessionaire given the right to determine toll. Toll rates for the 22-km Delhi-Noida Direct (DND) flyway were increased from 1<sup>st</sup> April by the Noida Toll Bridge Company Limited (NTBCL). Two wheelers toll rates have been increased from Rs 11 to Rs 12, for cars from Rs 22 to Rs 25, LCVs from Rs 45 to Rs 55, bus and truck will now shell out Rs 70 from earlier Rs 55. Large vehicles will pay Rs 100 from existing Rs 75 and extra-large vehicles from Rs 95 to Rs 135. This is not the first time toll rates have been increased.

### **SUPREME COURT DECISION**

- There was an annual revision of toll rates.
- The rights of development for land allowed to the developer.
- The CA allowed for extension of the concession period on a regular basis till the pre-determined return and project cost on investment was recouped.

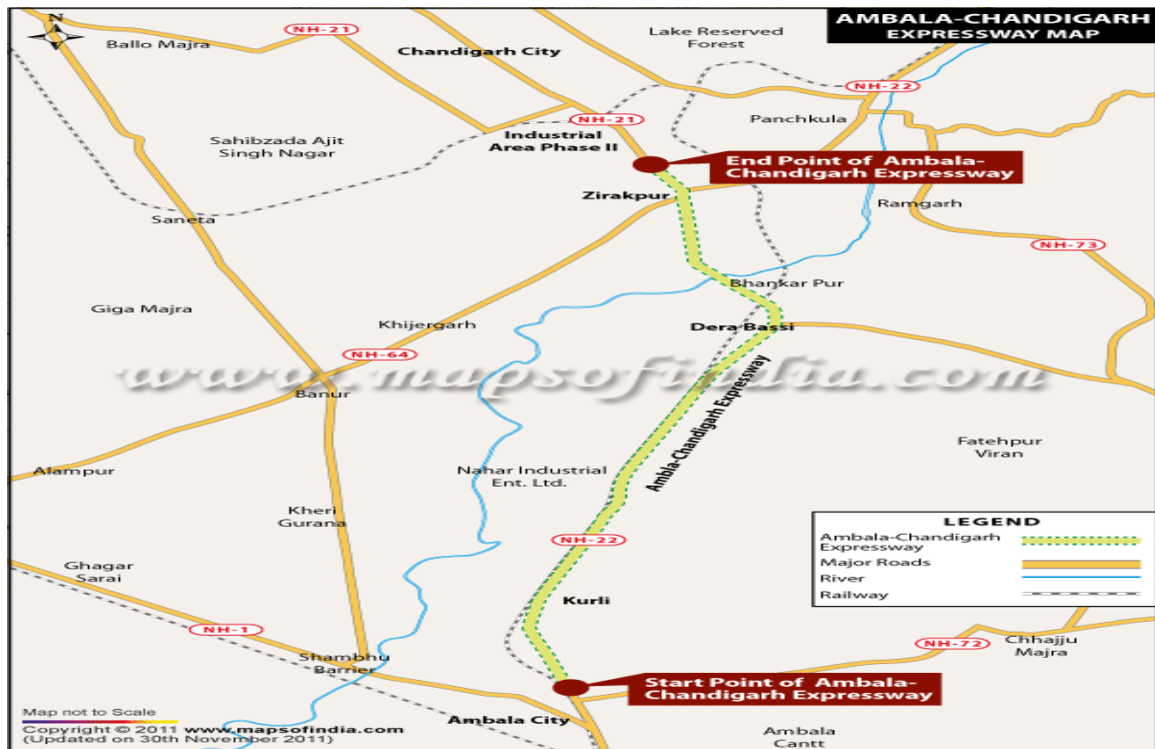
### **3.13.2 AMBALA CHANDIGARH HIGHWAY**

#### **DESCRIPTION :**

**Ambala Chandigarh Expressway** is 39 km long four lane expressway, huge traffic density along the corridor of Ambala-Chandigarh stretch (km 5.775 to km 39.960 on NH-22 and from 0 km to 0.872 kms on NH 21) on BOT mechanism, was completed in

32months at a cost of 2.95 billion(US\$46 million) .This expressway was put into operational from December 2009 and was developed by the GMR Group with impetus from the World Bank.

<b>NAME</b>	<b>NH 21</b>
<b>LENGTH</b>	35 KM
<b>DEVELOPER</b>	GMR
<b>COST</b>	Rs2970600000



**Figure 5: Ambala Chandigarh Highway**

**ISSUES:**

- 1) The CA did not levy any charges on the Project Assets including receivables/revenues ,rights as per project agreements to the Lenders
- 2) Variation in the Total Project Cost of DPR and Concessionaire’s analysis
- 3) Lack of secondary bond and active loan market restrict churning of loan portfolio

- 4) Non-availability of dependable historical records and traffic information to base financial projections on Funding
- 5) Delay in ROW/ Land Acquisition affect announcement of Appointed Date & COD
- 6) Cost over run because of change in hyper-Inflation and scope during execution.
- 7) Consistent framework of the long-term policy in terms of CA, guidelines for(RFP/RFQ), the tax treatment and toll collection
- 8) No mention of Dispute Resolution Board

Need for an independent regulatory statutory body for monitoring the progress and dispute resolution.

### **3.13.3 YAMUNA EXPRESSWAY**

#### **DESCRIPTION :**

**Yamuna Expressway** is the 165 km long 6 lane which can be extendable to 8 lanes, access controlled expressway, connecting Agra with Greater Noida in the state of Uttar Pradesh. This is India's largest six-lane access controlled expressway highway. The total project cost was 127.36 billion (US\$1.7 billion).

This expressway project concept was put forward by the honourable Chief Minister of Uttar Pradesh Behen Mayawati, its construction work began in November ending 2007, completed in two years before its original target date, and was started on 9 August 2012 by Chief Minister Shri Akhilesh Yadav.

The expressway begins from Delhi NCR region of Greater Noida and ends at Kuberpurat NH 2 near Kanpur and Agra. Overall, a total of 14 service roads of about 165 kms have been constructed for local commuters to access the highway.

<b>NAME</b>	<b>YAMUNA EXPRESSWAY</b>
<b>LENGTH</b>	165 KM
<b>DEVELOPER</b>	JAYPEE GROUP
<b>COST</b>	Rs126409900000



**Figure 6: Yamuna Expressway**

**Issues :**

1) Project disappointed by fainting to attract enough number of equity providers.

Enough interest could not be shown by the investors due to lack of incentives in form of VGF and UP govt. was unstable and under the heavy debt.

2) Delay in land acquisition took about 5years.

The project was awarded to the company in early January 2003 . The Concessionaire was unable to commence the execution work of the Expressway immediately following announcement of the project as a result of the delay in land acquisition. YEA thereafter

started transferring the land to the Project Company in 2006 and the contractor initiated the construction of the Expressway from January 2008 onwards.

3) Private promote was unduly favoured? – There was surplus land provided

Undue favouritism was displayed by handing over the contract to Jaypee group through a closed bidding .

4) Damage to Taj Mahal –Resulting in the breach of Taj Trapezium Zone rules

5) Usage of land for non-essential purposes

The land across the expressway was bought in huge amount by the promoters who used it for setting up of township and other commercial plazas.

#### **DECISION OF SUPREME COURT**

- Supreme Court instructed the Uttar Pradesh govt and promoter to submit documents relating to environmental approvals.
- 
- SC abruptly cancelled the petition of the aggrieved farmers in favour of larger public purpose
- New R&R policy was started – according to that the land to be acquired by developer

## **CHAPTER 4**

### **QUESTIONNAIRE SURVEY**

#### **4.1 THE SURVEY**

Based on the above study case studies a questionnaire was prepared and floated .Following risks were covered in the survey :

- 1) Bidding Risk
- 2) Delay in land acquisition
- 3) Financial Closure
- 4) Administrative Approval
- 5) Environmental Risk
- 6) Design Risk
- 7) Non availability of material on time
- 8) Construction Risk
- 9) Operation and Maintenance Risk
- 10) Revenue Risk
- 11) Political Risk
- 12) Force Majeure

The risk were allotted a score on a scale from 1 to 5 based on their magnitude from low to extreme. Here 1 being the lowest and 5 being the highest. The party to whom risk was allocated was also mentioned in the questionnaire survey.



#### 4.2 DATA GATHERING :

There were 40 people, who gave ratings to these risks and then the mean score of these risks are calculated. The responses are taken from site engineers, junior engineer, manager and senior management team.

On the basis of score the average was calculated for each risk . Then these risk were ranked to find out the critical and non critical risk involved in the project execution .

#### 4.3 RESPONSE :

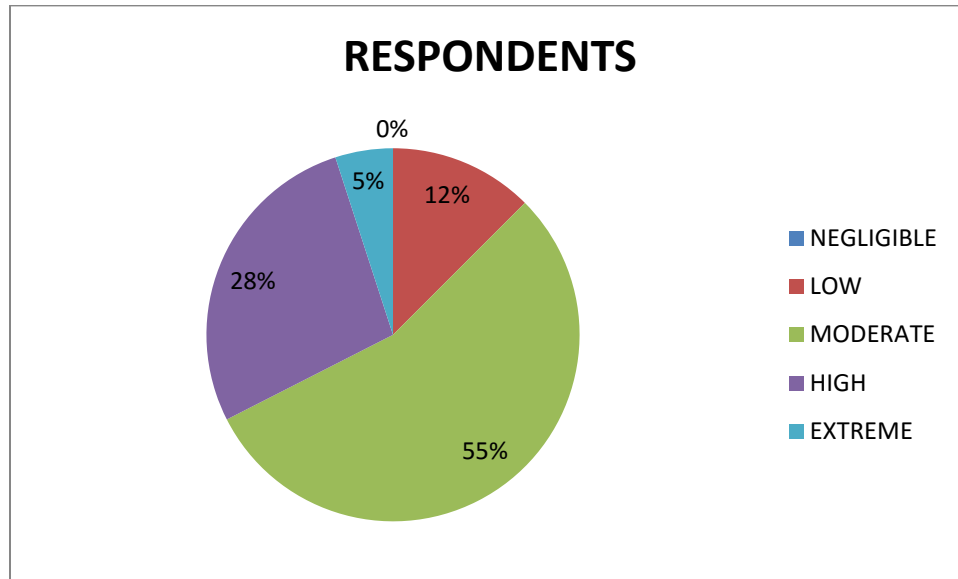
**TABLE 1 – ALLOCATION OF RISK**

TYPE OF RISK	No of Respondents					RISK ALLOCATION
	1	2	3	4	5	
BIDDING RISK	0	5	22	11	2	CONTRACTOR
DELAY IN LAND ACQUISITION	0	5	10	15	10	CLIENT
FINANCIAL CLOSURE	0	4	18	11	7	CONTRACTOR
ADMINISTRATIVE APPROVALS	0	3	15	17	5	CONTRACTOR
ENVIRONMENTAL RISK	0	8	14	14	4	CLIENT
DESIGN RISK	1	8	13	15	3	CONTRACTOR
NON AVAILABILITY OF MATERIAL ON TIME	0	9	12	18	1	CONTRACTOR
CONSTRUCTION RISK	0	4	19	10	7	CONTRACTOR
OPERATION & MAINTAINENCE	1	12	16	11	0	CONTRACTOR
REVENUE RISK	0	13	8	11	8	CONTRACTOR
POLITICAL RISK	0	11	16	9	4	CLIENT
FORCE MAJEURE	5	16	11	8	0	CLIENT/CONTRACTOR

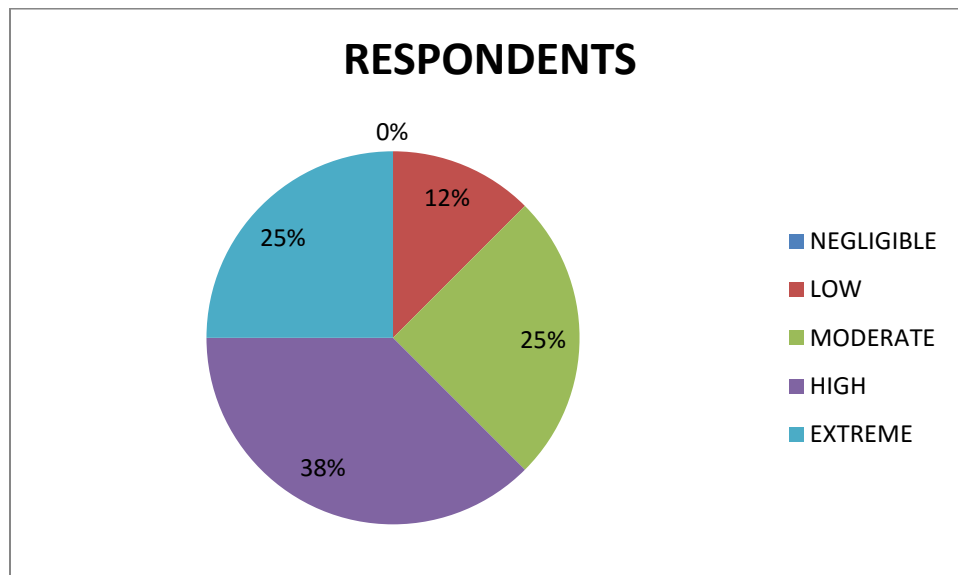
# CHAPTER 5

## 5.1 GRAPHICAL INTERPRETATION :

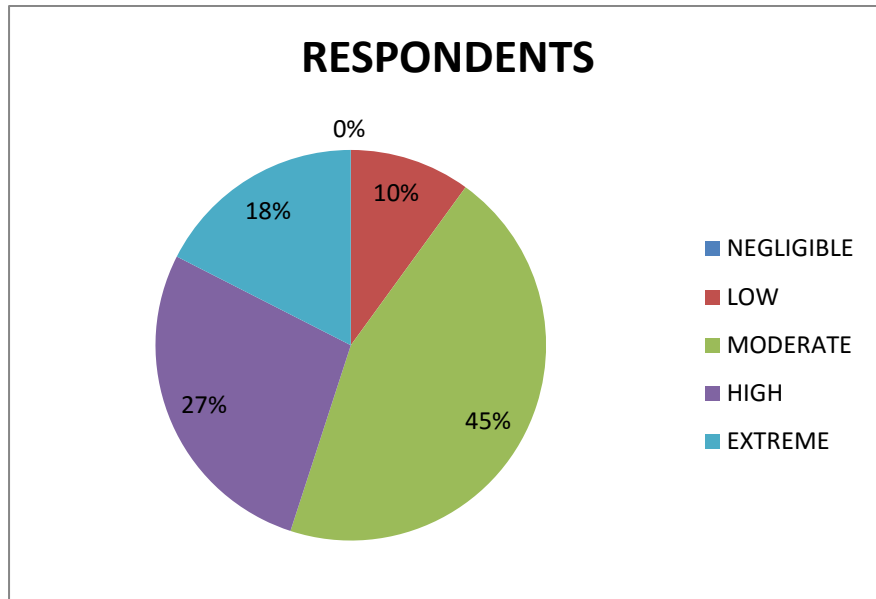
### 5.1 BIDDING RISK :



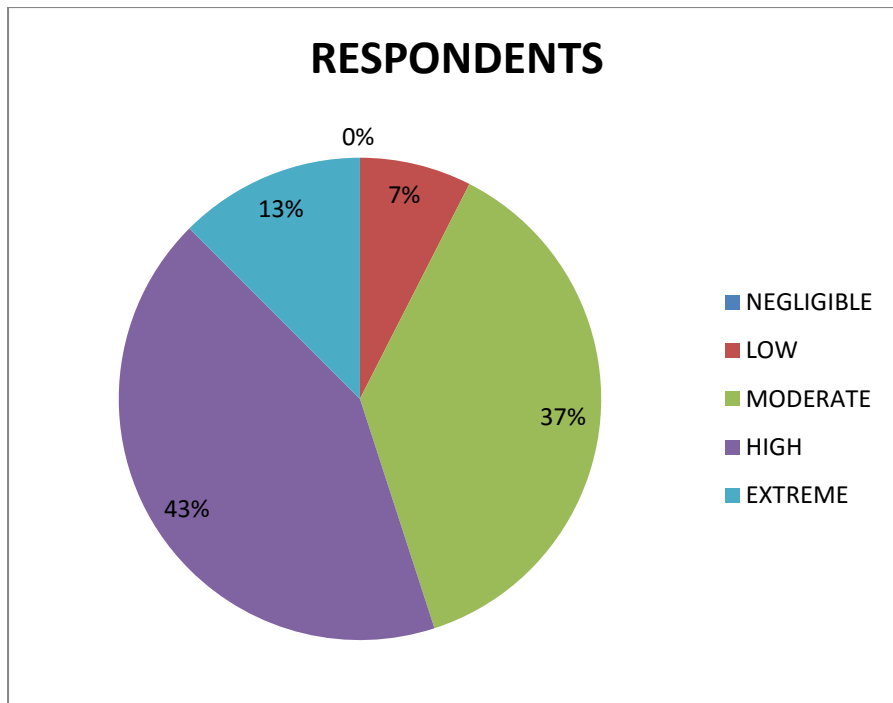
### 5.2 DELAY IN LAND ACQUISITION :



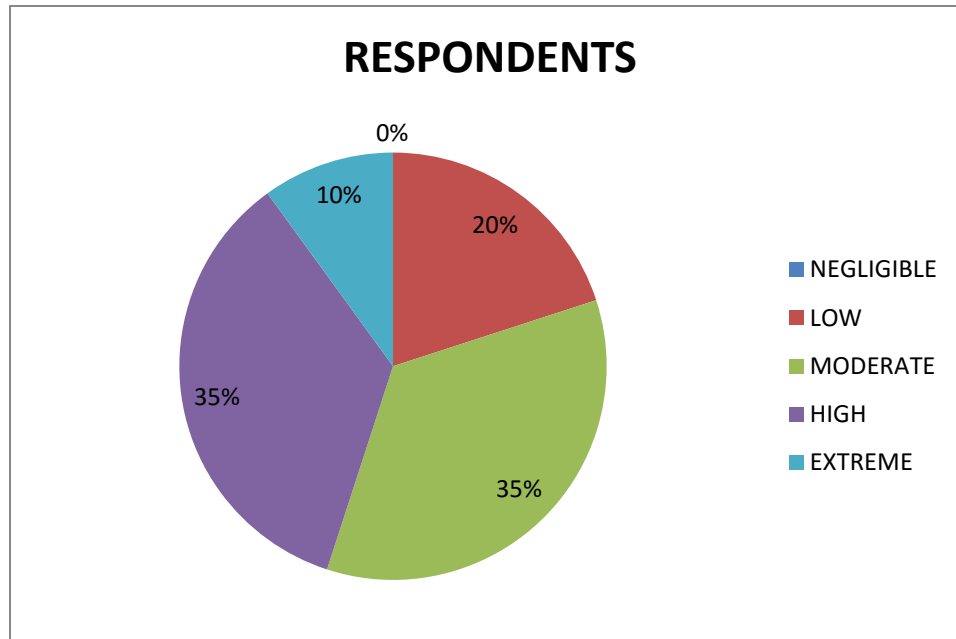
### 5.3 FINANCIAL CLOSURE :



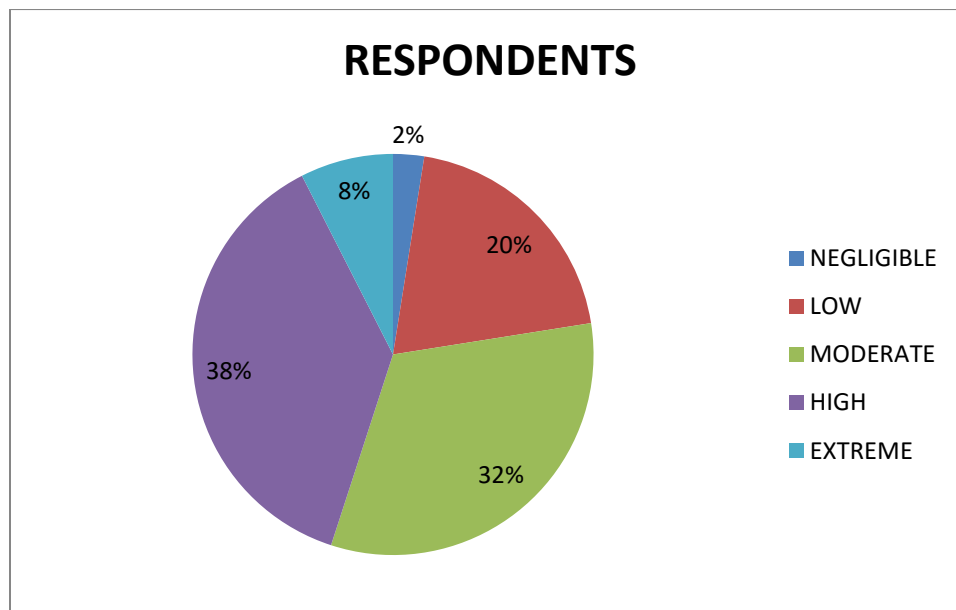
### 5.4 ADMINISTRATIVE APPROVAL :



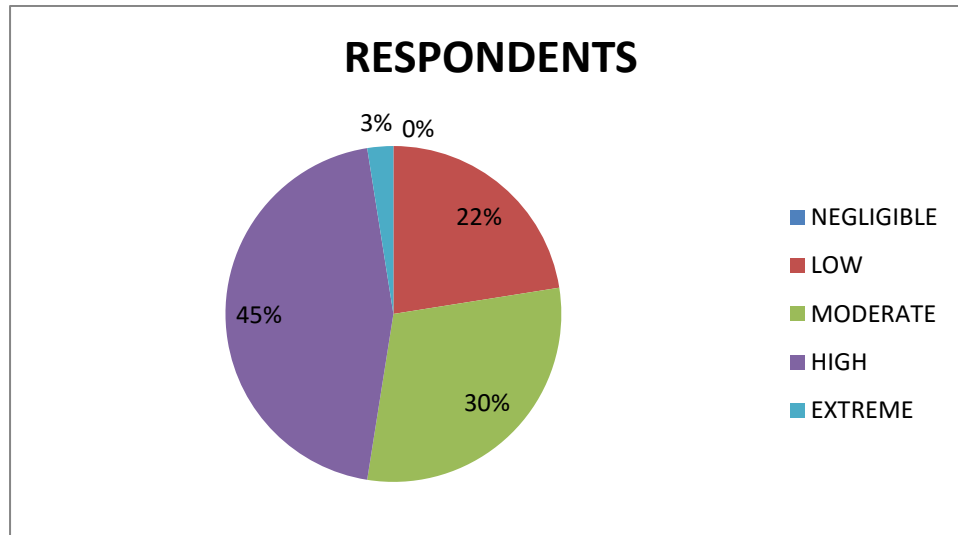
### 5.5 ENVIRONMENTAL RISK :



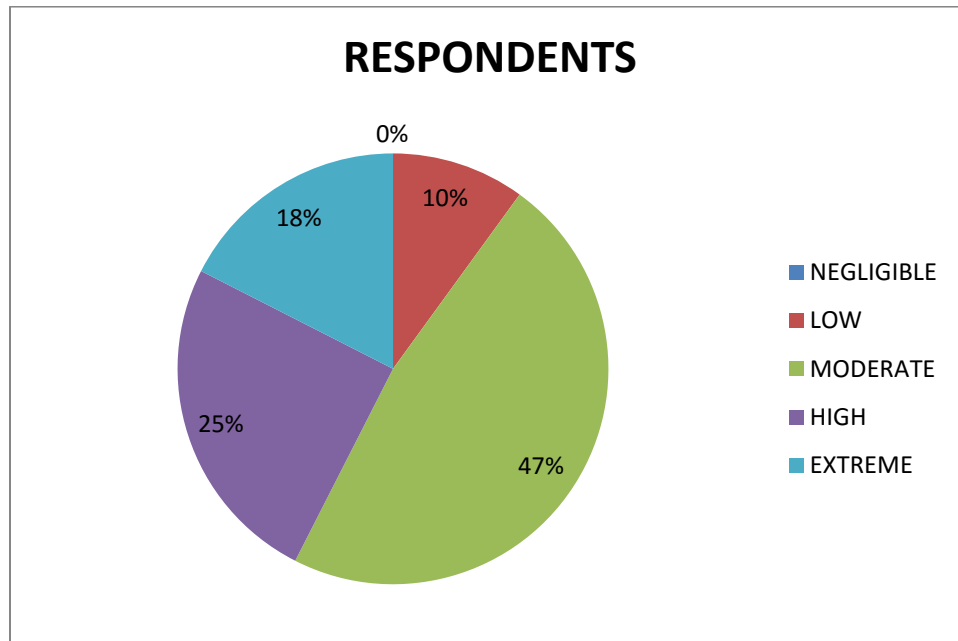
### 5.6 DESIGN RISK :



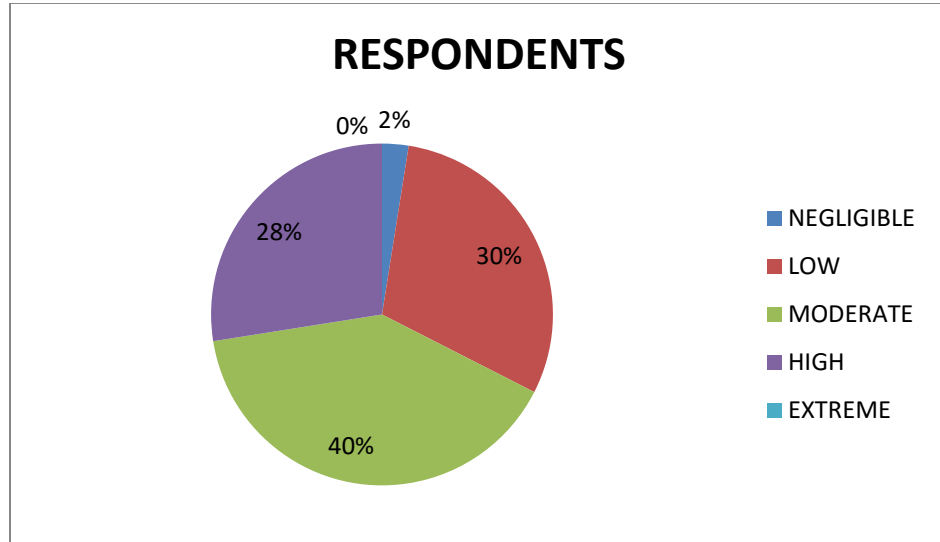
### 5.7 NON AVAILABILITY OF MATERIAL IN TIME :



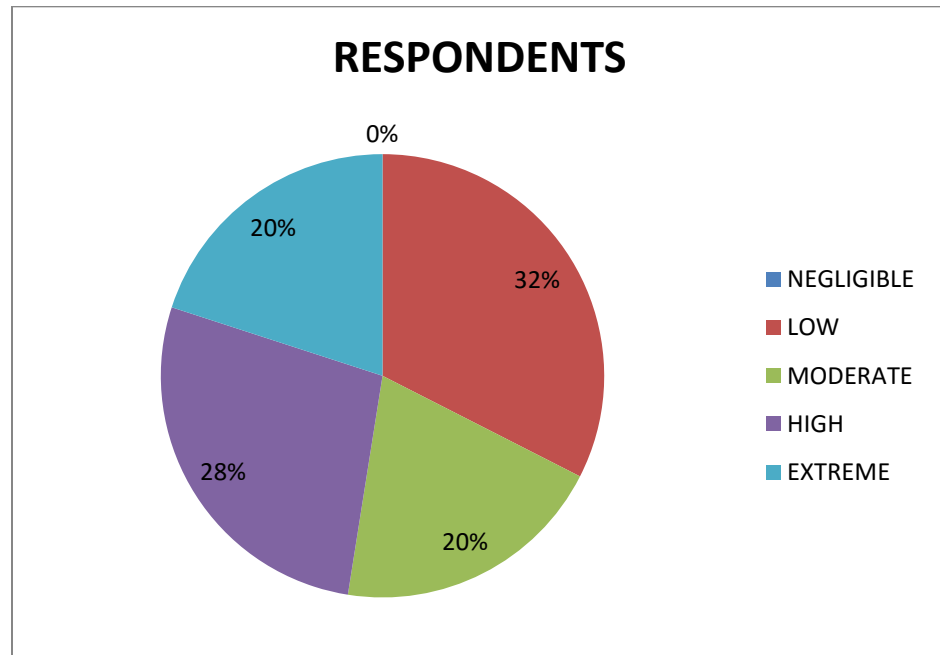
### 5.8 CONSTRUCTION RISK :



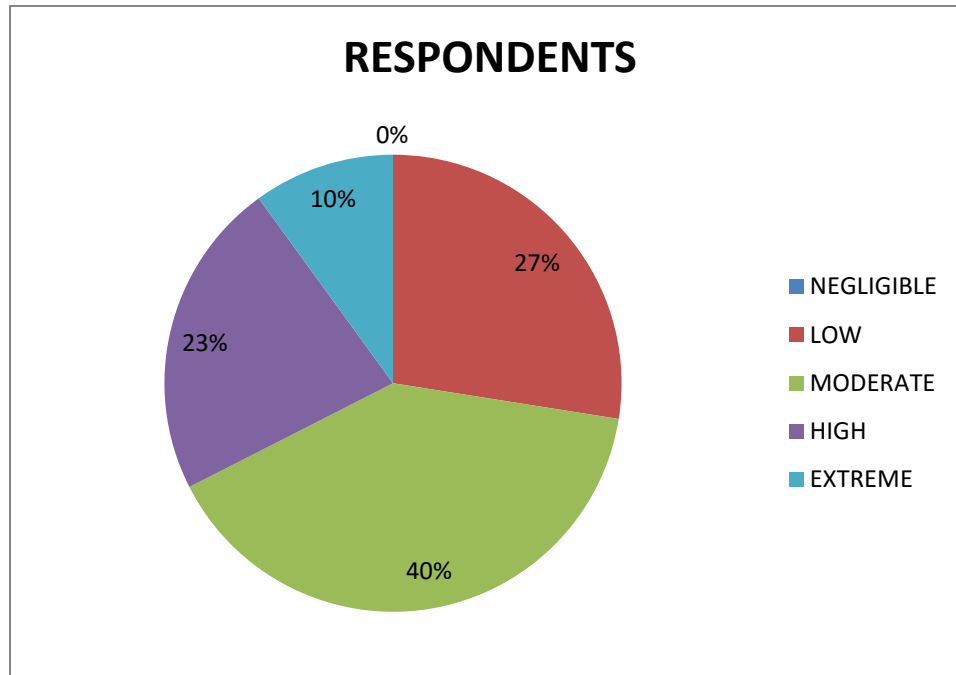
**5.9 OPERATION AND MAINTAINENCE RISK :**



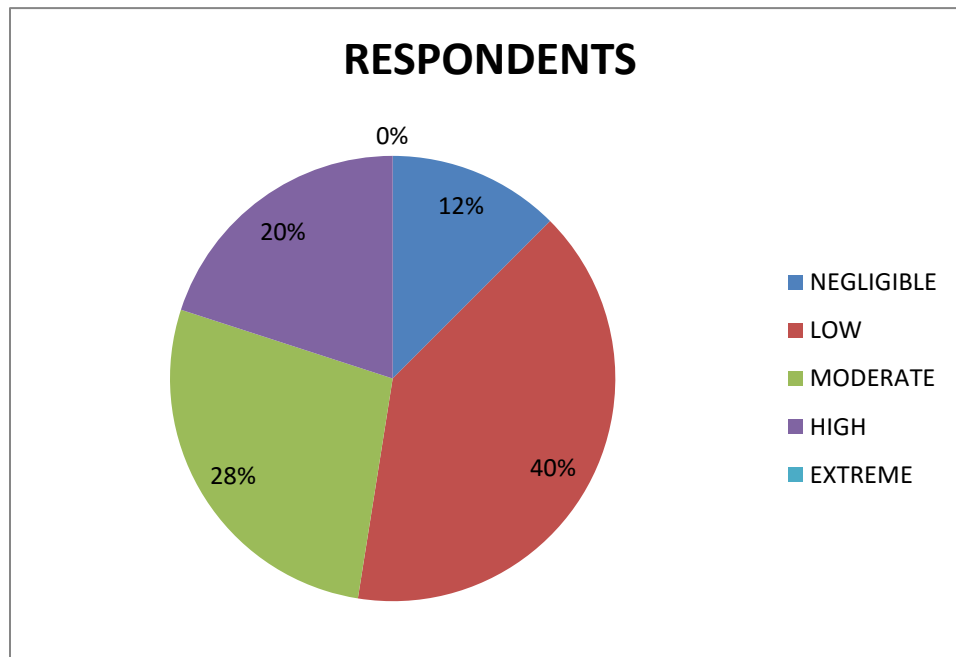
**5.10 REVENUE RISK :**



### 5.11 POLITICAL RISK :



### 5.12 FORCE MAJEURE :



## 5.2 RANKING OF RISK AND ITS MITIGATION MEASURES :

On the basis of weighted average score all the classified risks were ranked and their mitigation measures are provided to lessen the impact of these on the project progress.

**TABLE 2: Risk Mitigation Measures**

Sr .no	RISK	MITIGATION RISK
1	Delay in land acquisition	a) Compensation should be provided as per land acquisition act 2013 . b) Land acquiring process should be started just after the contract has been signed.
2	Administrative Approval	a) Establish JV( <i>Joint Venture</i> )with Indian government agencies or state-owned enterprises or local private partners ,or with foreign(international)company either already or not yet operating in India. b) Maintain good relationship with Central and State governments.
3	Financial Closure	a) Before bidding for any project , we should know sources off funds and return on investment. b) Equity financing and cooperation with government partners
4	Construction Risk	a) Method statement to be followed as mentioned. b) Adopt new technologies and do value engineering. c) Design should be approved by govt. authorities.
5	Revenue Risk	a) Their is an option for PDA for scuertization of toll revenue. b) Before entering into any project, we should look of similar kind of projects, which have been executed so that we will have idea of average PCU per day. c) Installation of CCTV cameras and smart card technology to prevent the toll theft
6	Environmental Risk	a) Compensatory plantation of trees. b) Recycling of waste products instead of dumping. c) Reducing the greenhouse emissions by using sustainable materials. d) Use of brown field instead of green field.
7	Non availability of material in time	a) Well qualified suppliers. b) Good inventory management .Eg- procurement of material before rainy season . c) Maintain proper contract documents with suppliers



8	Design Risk	<p>a) As far as possible , changes in drawing should be kept minimum.</p> <p>b) Detail drawings should be approved by head office.</p>
9	Bidding Risk	<p>a) Pre qualification of contractor which includes financial strength , past experience , projects in hand etc</p> <p>b) Qualified sub contractor should be employed on site.</p>
10	Political Risk	<p>a) Obtain government' sguarantees ,e.g.,adjust tariff or extend concession Period.</p> <p>b) Maintain good relationship with Central and State governments Authorities.</p>
11	Operation &Maintenance Risk	<p>a) Superior quality of materials should be use so that contractor has to bear less cost of O &amp;M in concession period.</p> <p>b) Proper designing of drainage system especially in road projects.</p>
12	Force Majuere	<p>a) This is beyond party's control so insurance is the best mitigation measure .</p> <p>b) Adequate mitigation of risk between both parties</p> <p>c) Suspension of performance obligations during the occurrence of FM event</p>

## **CHAPTER 6**

### **6.1 CONCLUSIONS**

The conventional role of government is recognized from a past experience and clearly demonstrated in the typical BOT contractual structure an inspector and a regulator. The dynamic role refers to government willing to take a more firm and dynamic role as a facilitator/guarantor, promoter and customer to support the execution of the project.

BOT projects in highway sector are protected from inherent risks which leads to the cost and time overrun on the part of the concessionaire. It is concluded that, there are at time political hassles and also the unstable government, difficult regulation for acquisitions of the land.

The common factor of any BOT model is that the government sponsor of an highway project involve the private entity to a greater role in the carrying out of certain functions previously handled by the government to achieve the benefits mentioned above. It will vary from maintenance services contract to total funding, development, operations and maintenance. Many of the countries have assertively turned the risks , rewards involved with carrying out these functions to private entity firm by long-term agreement or franchises, in which funding is established by tolls fees. BOT modeling project funding and delivering has provided yet another dimension into the policy of transportation infrastructure network in many countries, and list of interested countries is rapidly growing.

The case studies presented in this report explains how risks vary in project and appropriate need to be addressed on a case to case basis .The case studies presents both the opportunities and challenges of these BOT model projects and strategies formulated to address issues which occurred with respect to the context of national, legal, social ,regulatory, and institutional. A thorough review of the available cases demonstrates that the number of successful BOT Road projects is quite higher than the number of projects including the private entity which have suffered difficulties, especially for reasons unrelated to the increasing interest of the private party. In few cases the association of private party reduced the limit and consequences of these issues.

This approach may not be beneficial or appropriate in few cases whereas in other instances this BOT model can convert a troubled project into successful project. The necessity of a BOT approach is because of the fact that it is based upon true partnership, in which both the public entity and private player is included in ways that optimize their contributions for the project based upon their capabilities.

## **6.2 RECOMMENDATION**

On the basis of our analysis, it is always recommended to have

- An Independent Regulatory Monitoring Authority for the highway sector.
- Traffic projection are often tampered for allowing the project to become financially viable therefore realistic and precise estimation of the traffic from the traffic authority should be made to collect revenue by covering all the types of costs such as capital cost , construction cost , operation and maintenance cost. For land acquisition case, sufficient compensation should be granted through competent authority to acquire land. All legal hassles in this context to be relaxed to a practicable level.
- Policy for a distinct cell for encroachment and acquisition problems should be formulated and also be vested with enough powers to allow them come in immediate effect must be sought.
- The funding institution of the authority should grant necessary funds for the announced project at lower rate of interest and VGF concept that is viability gap funding may be positive or negative should be properly applied..
- The user perception shall be changed by giving improved facilities to them and at prices that are economical.
- Government must be familiar about the importance of the project its requirement and the legal hurdles for the project before commencement to deliver the facility in time

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