

APPROVAL RISKS IN TRANSPORTATION INFRASTRUCTURE PROJECTS IN INDIA

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ABSTRACT

With the growth in Indian economy, major infrastructure development initiatives have been undertaken by the Governments at the central, state and local body levels. Transportation infrastructure projects recently undertaken in India have experienced large cost and time overruns. The development, construction and operation of the infrastructure facilities need a number of permits and approvals. These projects are more vulnerable to approval delays because they require various statutory and non statutory approvals and clearances during the development phase and project specific approvals during the implementation phase. This paper discusses the preliminary phase of the research to investigate and evaluate the impact of the various approval risks on the outcome of transportation infrastructure projects. Critical approval risks and risk sources have been identified through literature review and interviews with key experts in the various transportation sectors such as airports, metro rail and roads. The approval risks are structured in three levels through a risk breakdown structure (RBS). Approval risks are classified into development approval risks and implementation approval risks. Development approval risks are further broken down into statutory and non statutory approval risks. The identified approval risks will benefit the developers and project managers of the infrastructure projects to better plan infrastructure projects taking into account impact of these risks.

INTRODUCTION

Good transport infrastructure is part of the enabling environment for rapid, efficient, and sustainable economic growth. India has an extensive and diversified transport system, comprising of 3.71 million kilometres (km) of roads, 63,465 km of rail, 13 major and 199 minor ports, 15 major international airports, 113 domestic airports, and 14,500 km of navigable inland waterways (World Bank Statistics, 2011). In the 12th 5-year plan (2012-2017), the Government of India envisages an investment of US\$1 trillion for infrastructure projects, of which transportation projects account for a major component. (The Economic Times, 2011)

Every infrastructure project has to undergo several stages: planning of the project, approval, awarding of contracts, construction/procurement, and operation and maintenance. During the development phase, the project sponsoring department

prepares the designs and estimates of the project and these designs and estimates are approved by the appropriate authority in the department. In addition a project generally requires approvals from several other departments. The approvals process is often neither streamlined nor expeditious. A major challenge that infrastructure project developers have faced in India is immense delays in the commencement of the project owing to regulatory and administrative delays in clearing all requisite aspects of the projects (World Bank Report, 2006). Over 65% of 441 road projects taken up by the National Highway Authority of India (NHAI) have suffered cost and time overruns. As many as 137 projects involving over 5000 km of highways were delayed due to problems in land acquisition and environmental clearances (Infranews, 2010). Obtaining approvals for a project from a complex web of government agencies and departments, from municipal to state to central government levels, can be an extremely time-consuming process, delaying entire projects and hurting their financial viability (Wang et al, 2000). In the beginning of the implementation phase a contract is signed between the sponsoring department and a contractor. The timely completion of the project requires active cooperation from the sponsoring authority, the contractor(s) and several other departments. Projects experience cost overrun and time overrun due to the delay in approvals at every stage of the project.

This paper focuses on identification of approval risks in the development and implementation phase of the transportation infrastructure projects in India. Identification of approval risks of the transportation infrastructure projects will help the developers and the project managers to plan ahead in order to minimize the impact of these risks.

RISK MANAGEMENT APPROACH

Since approval risks can arise throughout the project life cycle, effective risk management is an iterative process and not limited to a one-time analysis (Govt. of Western Australia Report, 2009). Risk management is the art and science of identifying, analysing, and responding to risk throughout the life of a project and in the best interests of meeting project objectives. Its objective is to develop an organized framework to assist decision makers to manage the risks, especially the critical ones, effectively and efficiently. A systematic approach to risk management in construction industry consists of three main stages: a) risk identification; b) risk analysis and evaluation; and c) risk response. The risk management process begins with the initial identification of the relevant and potential risks associated with the construction project (Perry and Hayes, 1985).

Risk identification and application of risk breakdown structure

“Risk identification involves the identification of risk sources, events, their causes and their potential consequences” (ISO 31000:2009). Chapman and Ward (1997) noted that risk identification is both important and difficult. Clark et al. (1990) suggested that an identified risk is not a risk unless it is a management problem. Risk identification process is considered as a base for subsequent risk analysis and response management process. There are various techniques for identifying the risks associated with projects like documentation reviews, brainstorming, checklist analysis, diagramming techniques, delphi technique, surveys, root cause

identification, force field analysis, nominal group technique and risk breakdown structure. Risk breakdown structure is the tool used for this study as it has some specific advantages than other tools like ensuring coverage of all types of risk, indicating areas of dependency or correlation between risks and focusing risk response development on high-risk areas.

Risk breakdown structure

The Risk Breakdown Structure (RBS) is similar to the Work Breakdown Structure (WBS) commonly used in estimating the work required to get a project done. It's a top-down breakdown of the risks faced by a project. Each descending level represents an increasingly detailed definition of sources of risk to the project (Hillson and David, 2002).

Very little research has been done about approval issues for infrastructure projects in India. This paper fills the gap by analyzing approval risks that can impact projects. Risk analysis involves consideration of the causes and sources of risk, their positive and negative consequences, and the likelihood that those consequences can occur. In this paper the critical approval risks and the sources of approval risks are identified. Risk analysis can then be performed considering the sources of the identified approval risks. Such a work would form the initial step in developing risk mitigation framework for approval risks in transportation infrastructure projects.

METHODOLOGY

The methodology used to structure the RBS comprised a comprehensive literature review. Semi structured interviews with key experts in the various transportation sectors such as airports, metro rail and roads were conducted to identify the critical risks and the sources of risks. The interviewees were selected through theoretical sampling. The theoretical sampling procedure dictates that the researcher chooses participants who have experienced or are experiencing the phenomena under study. By doing so the researcher has chosen 'experts' in the phenomenon and thus able to provide the best data (Strauss & Corbin, 1998; Glaser and Strauss, 1967). The interviewees from each sector were from top management and middle management. The persons who are well versed in the field i.e. experts were selected so that they can share their experiences in obtaining various approvals/clearances from various agencies. A specially designed interview questionnaire was used comprising of open ended questions. The questions were framed in such a way that the approval issues in both development and implementation phases were captured. The issues such as the time taken for each approval, delays in approvals, and causes of these delays were discussed. The open ended questions allowed the interviewees to share their experiences and opinions without constrained alternatives. The face to face interview technique was adopted as this allowed for extensive discussion and immediate clarification of the questions as well as responses. A total of 20 interviews have been conducted so far. Further interviews are being conducted. The interviewees were Project Directors and Engineers from National Highways and Tamil Nadu Road Sector Project; General Managers, District Revenue Officers and Engineers from Chennai Metro Rail; General Manager from Airport Authority of India; Engineers, Planning Managers

and Managers from leading contracting companies. Secondary data in the form of archival reports, newspaper reports and other publicly available data were also collected. The documents used for the identification of the various approvals/clearances required for the projects were:

- Works Manual of National Highways, Airport Authority of India and Metro Rail.
- Concession Agreements in case of BOT (Build Operate Transfer) road projects.

Analysis of interviews

The steps involved in analyzing data from the semi structured interviews are:

- The interviews (tape recordings) were first transcribed.
- Next the themes i.e. the approval risks/sources of risks were identified and coded from the transcribed interviews.
- The coded approval risks/ sources of risks were then classified based on the topic.
- The findings were then validated among the respondents.

APPROVAL RISKS

The Risk breakdown structure given in Figure 1 shows the hierarchy of the identified approval risks at different levels in the development phase and implementation phase of the transportation infrastructure projects. The identified approval risks are discussed below.

Development Approval Risks

The project development process is strategically important for infrastructure projects. It aims to assure that the right project is selected and adequately planned for the subsequent project phases. The project development process requires careful and detailed coordination among all elements involved in the project. The development approval risks are further broken down into statutory approval risks and non-statutory approval risks which are in the level 2 of the risk breakdown structure.

Statutory Approval Risks

Statutory approvals are issued under the Acts/Rules/Regulations. The different statutory approval risks are discussed below:

a) Technical and finance approval from different ministries

Pre-tendering approval process is centralised and slow. The multitude of approvals required (e.g., from the External Finance Committee, Public Investment Board or by the Cabinet Committee for Economic Affairs) can add almost up to one year to the pre-tendering process. Several processes, such as ministerial approvals, do not have defined timelines. Furthermore, the individuals involved are not always held accountable for delays in approvals. Despite several plans to introduce single window clearance mechanisms, there have not been visible improvements (Prashant et al., 2009).

b) Delays in land acquisition

Approval for acquisition of land has to be obtained from the district collector/state

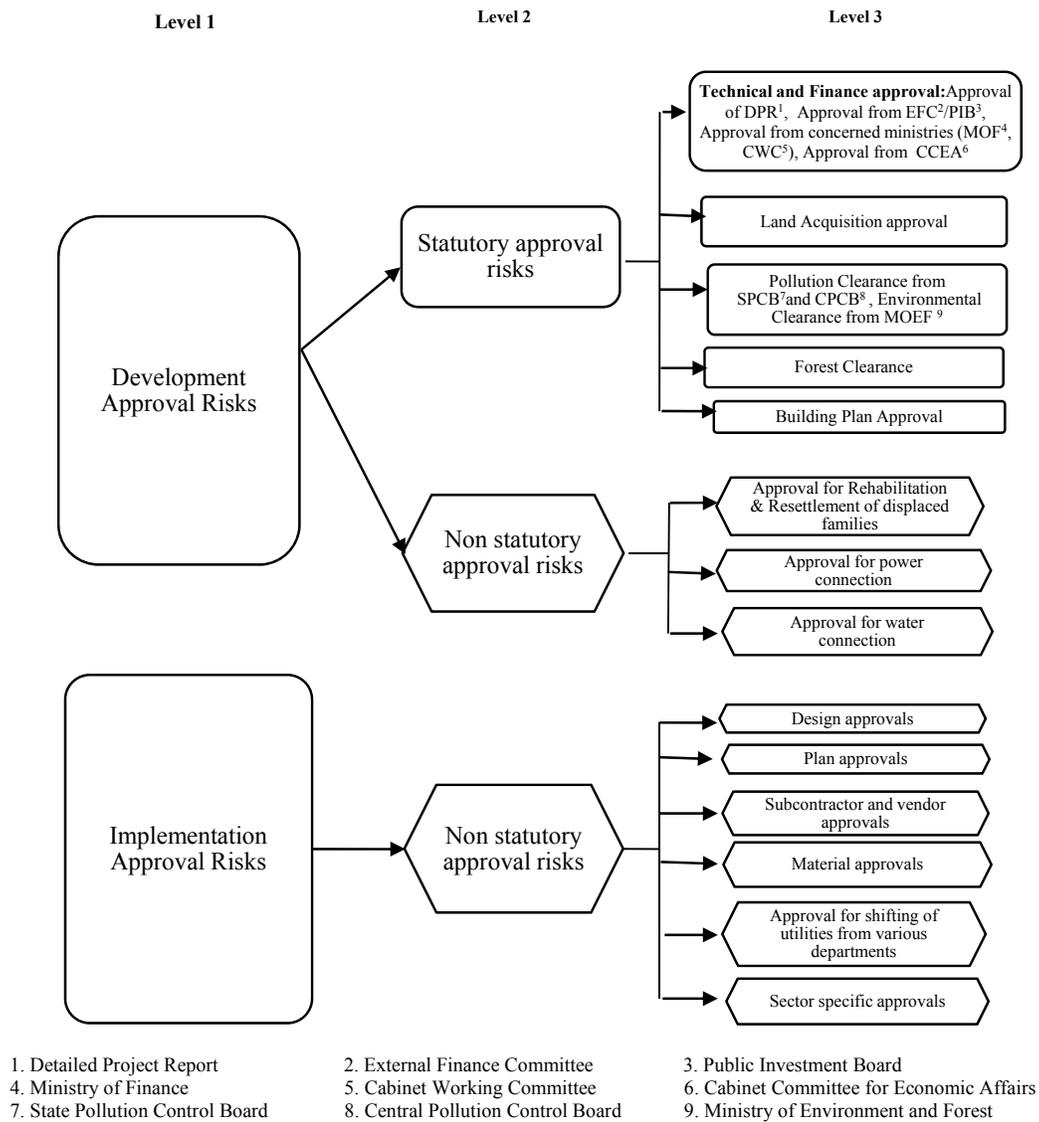


Figure 1. Risk Breakdown Structure for Approval Risks

government according to the Land Acquisition Act, 1894. Land acquisition requires clearances from multiple agencies at centre, state and local levels. In India, nodal agencies often award projects with only part of the land acquired, sometimes as low as 30 per cent. This is contrary to the global best practice of completing the land acquisition before tendering projects. Delays in subsequent land acquisition are possibly the single largest factor causing project delays. "There is an urgent need to streamline the land acquisition and environment clearance for infrastructure projects," said the pre-Budget survey, which depicts the health of the economy (Business Standard, 2011).

c) Approval of building plans

Approval of building plan by local authorities is another area where considerable delays are experienced highlighting the need to streamline the process.

d) Environmental clearance

Depending upon the nature of the project, environmental and pollution control clearances are required from Central/State Government/agencies. While a time limit of 90 days is stipulated for completing appraisal, various studies/reports have shown that environmental clearance perhaps takes the longest and causes maximum delay in implementation of projects (Govt. of India Report, 2002). Some of the main causes behind delays in environmental clearances are cumbersome procedures, submission of incomplete information, reopening of technical issues at every stage and delays in site visits.

e) Forest clearance

Clearances from forest authorities are required for projects requiring diversion of forest land for non-forestry purposes. The Ministry of Environment and Forests (MoEF) gives clearance for diversion of forest land. Proposal for diversion of forestland has to be submitted to the forest department in the district. After departmental approval, this proposal requires approval of the state government before being sent to the MoEF. Recommendations of the Expert Committee are processed by the MoEF for according the forest clearance. The entire process of forest clearance may take up to 13 months (Prashant et al., 2009).

Non Statutory Approval Risks

Non statutory approvals are required for the project but are not issued under Acts/Rules/ Regulations. Non statutory approvals such as release of power connection, release of water connection and Rehabilitation & Resettlement of displaced families are to be obtained. Release of power connection is sought from the state electricity board and the release of water connection from the state or municipal water supply department. Delay in release of electricity and water connection also delays implementation of projects. The process for release of these connections, particularly for electricity, is cumbersome and the applicant is required to visit a large number of offices. Approval for Rehabilitation and Resettlement of displaced families should be got from the state government/MoEF. There is no clear cut policy on Relief & Rehabilitation leading to problems being faced at the time of implementation of R&R plan with project-affected persons insisting on employment.

Implementation Approval Risks

Once a project reaches the implementation phase, a project team and the necessary resources should be in place to perform the project tasks. The approval process ensures that each project phase and associated deliverables are successfully completed before beginning the subsequent phases. Implementation approvals are non statutory approvals that are to be obtained as per the contractual agreement.

a) Design approvals

In case of design-build contracts basic designs, detailed designs, and shop drawings are to be approved by the consultant/client. The reasons for delay due to design documents are; mistakes and discrepancies in design documents, delays in producing documents after subsequent revisions, unclear and inadequate details in

drawings, complexity in project design, inadequate design team experience, and misunderstanding of owner's requirements by design engineer. Delay in reviewing and approving design documents by consultant is one the reasons for delay in design approvals.

b) Plan Approvals

The contractor has to obtain prior permission and specific approval of the owner for the documents mentioned in the contract and also before taking appropriate decisions. The commonly listed deliverables for plan approval are master schedule, cash flow statement, working methodologies, quality plan, procurement plan, project management plan, and safety & environment procedures. Delays due to the approvals are often not incorporated in the planned schedule.

c) Subcontractor and vendor approvals

Conflicts in sub-contractors schedule in execution of work, delays in sub-contractor's work, frequent change of sub-contractors because of their inefficient work and delay in material delivery are the issues related to the subcontractor and vendor approvals.

d) Material approvals

Approval for the materials to be used and approval for the quality of materials are to be obtained by the contractor from the client. Slow decision-making by the client has been found to be a major cause of delay. Consultant related factors include quality assurance/control and long waiting time for approval of tests and specifications.

e) Approval for shifting of utilities from various departments

Owner is responsible for coordination with other government agencies and getting clearances from them wherever mentioned in the contract. For example, for a road project, the project director has to get the necessary clearances with various departments for shifting of utilities so that the progress of work is not impeded. The various clearances are:

- Clearance from Forest Department for removal of trees, Telecommunication Department for re-locating telephone lines, Public Health Engineering Department and Local Authorities for re-locating the water supply and sewer pipe lines, State Electricity Boards for shifting or removing of electricity poles, Ministry of Petroleum for adjustment in the sites of petrol pumps and gas lines Community Leaders, for shifting of religious shrines and Archaeology Department for clearance in respect of interfering protected monuments

For a proposed subway project at a busy junction in a metro, for example, local authorities refused to divert traffic or even provide a map of utilities, leading to the project eventually being scrapped (Prashant et al., 2009). Shifting of utilities is a major challenge in the implementation of infrastructure projects.

f) Sector specific approvals

There are specific approvals which differ for the various transportation sectors such as roads, metro rails and airports. For example, for a road project environmental clearance for setting up a crusher unit has to be obtained and the contractor should obtain approval of the client for each quarry and borrow area to be used in the project prior to commencement of quarrying and/or borrow area excavation activities.

RISK SOURCE

The element which alone or in combination has the intrinsic potential to give rise to risk is termed as risk source (ISO 3100:2009). Risk sources are the outcome of the risk identification process (Duncan, 1996). Risk sources for approval risks in both development phase and implementation phase of the transportation infrastructure projects were identified through the analysis of interviews with experts. The identified approval risks are described in Table 1.

Table 1. Risk Sources

Risk Sources	Description
Development Approval Risk Sources	
No defined timelines	There are various stages and levels of review in the approval process. There are no defined time limits for each stage of processing, as well as the overall process.
Approval Process centralised and slow	Multiple approvals required from different ministries are sequential and thereby are time consuming.
Complex and unclear procedures	Procedures relating to approval for primary resources like land, electricity, water, building plans, etc., are complex.
Huge documentation procedures	Large amount of information is to be provided to many departments or agencies. This process consumes considerable time and effort.
Concerned officials not proactive	Real-time monitoring of each stage of the approval process by supervisory authorities is very important. If the officials are not proactive it causes delay in issuing the necessary clearances.
Corruption in approval of documents	Corruption occurs when the government's officials and representatives receive an unlawful consideration or commission or utilize any unlawful influence in connection with awarding and agreement to the project developer (Wang et al, 2000).
Lack of transparency in the administration of clearances and approvals	Lack of transparency in the system of grant of approvals and difficulties in obtaining necessary information on the procedural and documentary requirements for various approvals, latest orders and instructions cause delays.
Little communication & Information-sharing among related depts.	Examination of applications in different departments, in isolation of examination already carried out by other departments, leads to delays and, at times, conflict of opinion among departments.
Implementation Approval Risk Sources	
Lack of skilled persons	Consultants have to review the documents/ drawings within the stipulated time period. But due to lack of expertise in the concerned area, they take their own time to give approval.
Slow decision making by the client	The contractor has to often obtain the approval of the client in the project, and the client's slow decision making is the major cause of delay.
Improper planning	Adequate time is not been allotted for approvals while planning and scheduling. Further, the schedules are not updated on a regular basis.
Not adhering to timelines	The client/ consultant don't strictly adhere to the timeline given in schedule for approving the documents. Often the contractors also don't submit the documents in time.

Prescribing and enforcing time limits for approvals and empowering single window clearances would help reduce delays due to approvals. During implementation phase adequate time has to be incorporated for implementation approvals in the master schedule and tracked periodically. Appropriate trigger mechanisms would need to be developed to take the matter to the next higher level, whenever the prescribed time frames are not adhered to.

CONCLUSION

The risk identification process identifies and categorizes risks that could affect the project. Approval risks are major source of delay in the implementation of transportation infrastructure projects in India. This paper identified the critical approval risks for transportation infrastructure projects and they are structured through a risk breakdown structure. Approval risks are classified into development approval risks and implementation approval risks. Development approval risks are further broken down into statutory and non statutory approval risks. The multitude of statutory approvals from different ministries, environment clearance, forest clearance and land acquisition are the risks that pose a major threat for the development of an infrastructure facility. Implementation approval risks are further broken down into non statutory approval risks. Design approval and approval for shifting of utilities from various departments are the risks that hinder the implementation of the projects. Risk sources were identified for both development and implementation phase. Multiplicity of approvals, high levels of details sought with applications are among the major risk sources in the development of projects. Slow decision making by the client and not adhering to timelines in approving documents are the major risk sources in the implementation of projects. The results are based on the exploratory study conducted to identify the approval risks in transportation infrastructure projects and to refine this, further interviews are being conducted.

The delays due to these approval risks should be taken into account and should be properly incorporated in the schedule and planned well ahead in order to mitigate these delays. These identified approval risks would be helpful for the policy makers to streamline the approval processes. The strong level of economic growth achieved in India in recent years has led to increase in investment in infrastructure. The understanding of these risks is very essential for foreign investors interested in investing in Indian transport infrastructure.

Future work will focus on the analysis of identified approval risks. This requires the estimation of the probability of occurrence of risks identified and its level of impact on project objective in terms of time and cost.

REFERENCES

- Business Standard (2011), "Land Acquisition, Green Norms Affected Road Development." Oct 2011
- Chapman C and Ward S (1997), "Project risk management: processes, techniques and insights." 1st edition, England: Wiley

- Clark RC, Pledger M, Needler HM (1990), "Risk analysis in the evaluation of non-aerospace projects." *Int Interdisciplinary Appl- Orient J Knowledge-based Sys*, 8(1):17–24
- Duncan R William (1996), "A Guide to Project Management Body of Knowledge." http://www.unipi.gr/akad_tmhm/biom_dioik_tech/files/pmbok.pdf
- Glaser, B. G and Strauss, A (1967), "The discovery of grounded theory: strategies for qualitative research." Chicago, III: Aldine Pub. Co.
- Government of India (2002), "Reforming investment approval and implementation procedures." Ministry of Commerce and Industry, *Tech. Rep*, Part 2
- Govt. of Western Australia (2009), "Building a better planning system", *Tech. Rep*
- Hillson, David (2002), "Using a Risk Breakdown Structure (RBS) to Understand Your Risks." *Proceedings of the Project Management Institute, Annual Seminars & Symposium*, San Antonio, Texas, USA.
- Infranews (2010) "Nhai projects facing time, cost overruns." <<http://www.constructionupdate.com> > (Aug.5, 2010)
- ISO 31000:2009, "Risk Management – Principles and Guidelines."
- Ministry of Statistics and Program Implementation, (2003) <http://mospi.gov.in/login_correct1.htm?rept_id=esu01_2003&type=nss0> (Feb 13, 2010)
- Perry, J.G. and Hayes, R.W (1985), "Risk and its management in construction projects." *Proceedings of Institution of Civil Engineers*, Part 1, 78, 499–521,
- Prashant. G., Rajat G., and Thomas N. (2009), "McKinsey's Report Building India: Accelerating Infrastructure Projects." <http://www.mckinsey.com/locations/india/mckinseyonindia/pdf/Building_India_Executive_summary_media_120809.pdf> (Feb 13, 2010)
- Strauss, A. and Corbin, J. (1998), "Basics of Qualitative Research." 2nd Edition ed. Thousand Oaks, CA: Sage
- The Economic Times (2011), "India's infrastructure sector needs \$1 trillion investment in 12th Plan." <<http://articles.economictimes.indiatimes.com>> (Nov 27, 2011)
- Wang Q. S. B, Tiong K. L. R, Ting K.S, Ashley D (2000), "Evaluation and management of political risks in China's BOT projects." *Journal of Construction Engineering and Management*, 126 (3), 242-250
- World Bank Report (2006): "India - Financing Infrastructure: Addressing Constraints and Challenges." Finance and Private Sector Development Unit, South East Region.
- World Bank Statistics (2011), "India Transport Sector" <<http://go.worldbank.org/FUE8JM6E40> > (Nov 18, 2011)