



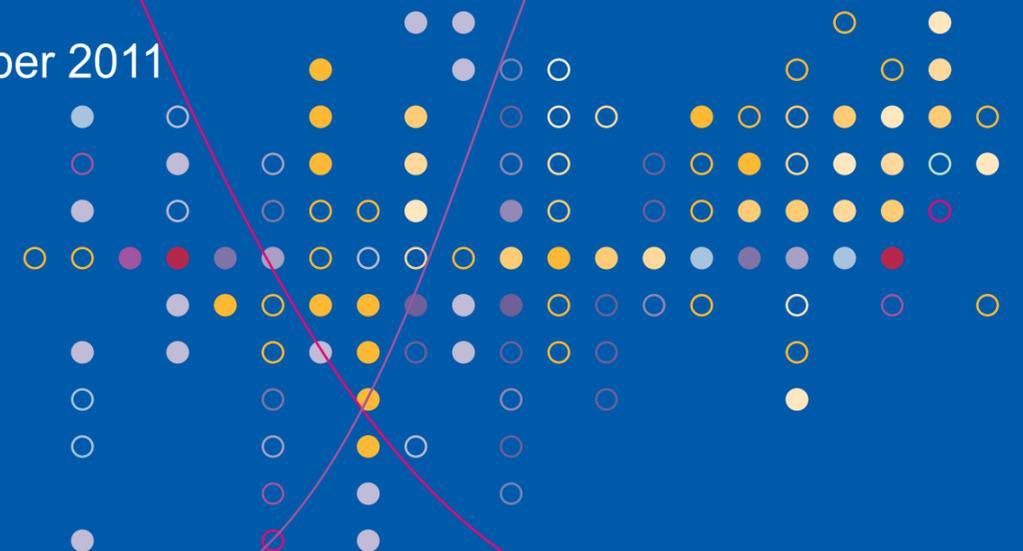
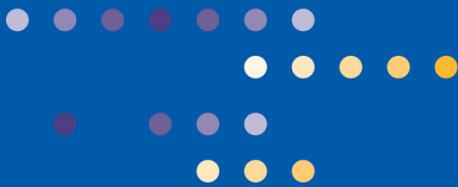
Seeking Efficiency and Excellence in the Implementation of Infrastructure Projects in India

# Seeking Efficiency and Excellence in the Implementation of Infrastructure Projects in India

Study Sponsored by

**Holcim Ltd**

December 2011



**NATIONAL COUNCIL OF APPLIED ECONOMIC RESEARCH**  
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## About NCAER

The National Council of Applied Economic Research (NCAER) is an independent policy research institute that supports India's economic development through empirical economic and sociological research. It is India's oldest and largest policy think-tank. NCAER was inaugurated by the President of India, Dr Rajendra Prasad, on December 18, 1956. NCAER's original Governing Body included leading post-Independence figures from both the public and private sectors: John Mathai, C.D. Deshmukh, T.T. Krishnamachari, V.T. Krishnamachari, Ashoka Mehta, J.R.D. Tata, John F. Sinclair, and N.R. Pillai. The Ford Foundation provided much of the initial financial support, including for NCAER's campus for which Prime Minister Jawaharlal Nehru laid the foundation stone. The bulk of NCAER's revenues today come from research studies done for the government and the private sector. This is supplemented by internal resources from NCAER's endowment income and from donor grants. NCAER's work programme is currently divided into four areas:

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**December 2011**

**National Council of Applied Economic Research  
'Parisila Bhawan', 11, Indraprastha Estate  
New Delhi (INDIA)**



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## Study Team

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The study team has been led by Dr. Geethanjali Nataraj at NCAER. Dr. Shashanka Bhide led the study in its initial stages. Mr. SKN Nair, Senior Consultant on the project has made immense contributions in all stages of the work. Ms. Payal Malik has been a Consultant to NCAER and has contributed to the case studies on Power and National Highways. Mr. Afaq Hussian from Bureau of Economic Research, New Delhi contributed the case studies on Rural Roads and Krishnapatnam port. Dr. Bornali Bhandari, Fellow at NCAER has contributed the case studies on State highways. Ms. Triveni Chouhan has contributed the case studies on Railways and Dr. Geethanjali Nataraj has contributed the case studies on Airports and Dahej Port.

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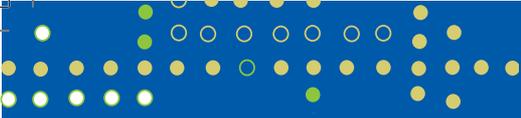
This study would have not been possible without the cooperation and support extended by the project promoters of various projects studied. We would like to express our gratitude and sincere thanks to all of them. We place on record our sincere thanks to Mr. V J Kurian, MD, Cochin International Airport; Mr. Hari Marar, President, Bengaluru International Airport; Prof. Bakul Dholakia, Mr. Harsh Mehta and Capt. Jasbir Singh, Adani Group; Mr. M. Soans, Brindavan Infrastructure Company Ltd; Mr. K Ramchand, Managing Director, IL & FS and Mr. Rajiv Dubey, Senior Manager, IL&FS Transport Networks Ltd; Mr. Dinesh Kumar, Sharma Constructions Pvt. Ltd; Mr. Alok Kanagat, Executive Director, Coastal Gujarat Power Ltd; Mr. P V Prasanna Reddy, President and CEO, GVK Jaipur Expressway Pvt. Ltd; and Mr. JL Bajaj and Mr. Ashwin Kumar, Reliance Energy. We also thank Krishnapatnam Port Company Ltd, Mr. N Sivasailam, MD, BMCRL, Bengaluru; Mr. Vishnu Kumar, Director, Monorail, MMRDA; Mr. Atul Jain, Project Director, L&T, Mumbai; Mr. Mangu Singh, Director Works, DMRC; and Mr. KP Maheshwari, CEO, DAMEPL, Reliance Ltd.

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Further, we wish to thank our Director-General, Dr Shekhar Shah for his encouragement and support during the course of the study. He also chaired the workshop proceedings on July 8, 2011.

The study team would also like to acknowledge the contribution of editors in making this report more readable. We wish to thank Mr. J S Punia and Mr. P P Joshi for their support in the production of this report. The team however, remains responsible for any errors.

**Disclaimer:** The findings, interpretations and conclusions expressed are those of the authors and do not necessarily imply endorsement by NCAER or its Governing Body.



Seeking Efficiency and Excellence in the Implementation of Infrastructure Projects in India

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## Foreword

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Estimates suggest that India's deep infrastructure deficit pulls down its GDP growth by 1-2 per cent a year. India's Planning Commission estimates the infrastructure investment needed at US\$ 1 trillion in the 12th Five-Year plan. About 40 per cent of this is expected from the private sector. But as a previous NCAER November 2010 study on "Accelerating Infrastructure Building in India" points out, there are immense problems in infrastructure implementation and the institutional arrangements needed to resolve the often conflicting interests of a wide range of stakeholders. Both the government and the private sector need to vastly improve their project execution to improve on-time and within budget performance in order to provide affordable, sustainable, high-quality services to the citizens. This remains a massive challenge.

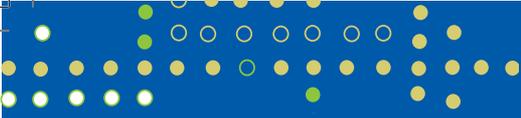
The present study seeks to address this challenge and examines a sample of 16 relatively successful projects spread across five different sectors—roads, power, ports, airports, and electricity, across different Indian States, public and private ownership, and rural and urban areas. Eleven of the 16 projects are PPP. The main objective of the study is to understand (1) the extent of success as measured by performance indicators such as time and cost efficiency and the quality of assets created; (2) factors that led to success at different stages of project execution; and (3) the constraints that had to be overcome to achieve success. The study emphasises the lessons of success and how these can be replicated and scaled up.

The study was commissioned by Holcim Ltd. We would like to thank Paul Hugentobler and Samuel Poletti at Holcim for their steady support to the study team. Their inputs and participation in the discussions of the study proved invaluable. The study would not have been possible without the generosity of time and information and the opportunity for intense discussions that was provided by officials and other observers involved in the case study projects.

This study has provided an opportunity to NCAER to continue and deepen its engagement with infrastructure development policies and programmes in India. I sincerely hope that the study will contribute to a better understanding of what leads to success in accelerating high-quality implementation of infrastructure projects in India.

New Delhi  
December 7, 2011

**Shekhar Shah**  
*Director-General*  
NCAER



Seeking Efficiency and Excellence in the Implementation of Infrastructure Projects in India

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## List of Acronyms

AAI	Airports Authority of India
ADB	Asian Development Bank
AGM	Annual General Body Meeting
AAI	Airports Authority of India
AMTRL	Ahmedabad Mehsana Toll Road Company Limited
APEDA	Agricultural and Food Promotion Export Development Authority
APRDC	Andhra Pradesh Road Development Corporation
ATMs	Air Traffic Movements
AVLS	Automatic Vehicle Location System
BBMP	Bharath Bengaluru Mahanagar Palike
BESCOM	Bangalore Electrical Supply Company
BIAAPA	Bangalore International Airport Area Planning Authority
BIAL	Bangalore International Airport Limited
BICL	Brindavan Infrastructure Company Limited
BMC	Bombay Metropolitan Corporation
BMTC	Bangalore Metropolitan Transport Corporation
BOOT	Build Own Operate Transfer
BOQ	Bill of Quantities
BOST	Build Operate Share Transfer
BOT	Build Operate Transfer
BPCL	Bharat Petroleum Corporation Limited
BSCPL	B. Seenaihand Company (Projects) Limited
BSNL	Bharat Sanchar Nigam Limited
BWSSB	Bangalore Water Supply & Sewage Board
CAR	Contractors all Risk
CD	Cost Drainage
CDC	Centre for Dry Cargo
CEO	Chief Executive Officer
CGPL	Coastal Gujarat Power Limited
CIAL	Cochin International Airport Limited
CIASHA	Cochin International Airport Share Holders Association
COD	Commercial Operations Date
CPC	Centre for Perishable Cargo
CRMB	Crumb Rubber Modified Bitumen

CRZ	Coastal regulation zone
CSR	Corporate social responsibility
CUTE	Common Use Terminal Equipment
DAME	Delhi Airport Metro Express
DEA	Department of Economic Affairs
DMRC	Delhi Metro Rail Corporation
DPR	Detailed Project Report
DRB	Dispute Resolution Board
ECC	Engineering Construction and Contracts
EFYP	Eleventh Five Year Plan
EIA	Environment Impact Assessment
EPC	Engineering, Procurement & Construction
EPMS	Enterprise Port Management System
FCs	Forest Clearances
FIs	Financial Institutions
FRBM	Fiscal Responsibility and Budgetary Management Act
FSI	Floor Space Index
GCC	General Conditions of Contract
GCF	Gross Capital Formation
GCPTCL	Gujarat Chemical Port Terminal Company Limited
GDP	Gross Domestic Product
GIC	General Insurance Corporation
GMB	Gujarat Maritime Board
GMC	Saint Gadge Maharaja Chowk
GoG	Government of Gujarat
GoI	Government of India
GoK	Government of Karnataka
GQ	Golden Quadrilateral
GRICL	Gujarat Road and Infrastructure Company Limited
GSIDC	Goa State Infrastructure Development Corporation Limited
GAIL	GMR Tuni Anakapalli Expressways Private Limited
GVKPIL	GVK Power & Infrastructure Limited
HDFC	Housing Development Finance Corporation
IDBI	Industrial Development Bank of India
IDFC	Infrastructure Development Finance Company
IDPL	Infrastructure Development Projects Limited
IIT	Indian Institute of Technology
IL&FS	Infrastructure Leasing & Finance Limited
IPCL	Indian Petro-Chemicals Company Limited
IRC	Indian Road Congress
ISRO	Indian Space Research Organisation
ITB	Indian Testing Board

ITNL	IL&FS Transport Networks Limited
JNPT	Jawaharlal Nehru Port Trust
JV	Joint Venture
KPCL	Krishnapatnam Port Company Limited
KPTCL	Karnataka Power Transmission Company Limited
KRCL	Krishnapatnam Rail Company Limited
KRDCL	Karnataka Road Development Corporation Limited
L&T	Larsen and Toubro
LARR	Land Acquisition and Rehabilitation & Resettlement
LIC	Life Insurance Corporation
LOA	Letter of Award
LOI	Letter of Intent
MBs	Maritime Boards
MCA	Model Concession Agreement
MCGM	Municipal Corporation of Greater Mumbai
MDRs	Major District Roads
MMRDA	Mumbai Metropolitan Regional Development Authority
MoP	Ministry of Power
MoRTH	Ministry of Road Transport and Highways
MoSRTTH	Ministry of Shipping, Road Transport and Highways
MoU	Memorandum of Understanding
MPRDCL	Madhya Pradesh Road Development Corporation Limited
MPRRA	Major Ports Regulatory Authority Act
MPSEZL	Mundra Port and Special Economic Zone Limited
MRTS	Mass Rapid Transit System
MSDSC	Maritime States Development Council
MUTP	Mumbai Urban Transport Project
MW	MEGA WATT
NDC	National Development Council
NCAER	National Council of Applied Economic Research
NECL	Navayuga Engineering Company Limited
NGOs	Non Governmental Organisations
NH	National Highway
NHAI	National Highways Authority of India
NHDP	National Highway Development Programme
NMDP	National Maritime Development Programme
NOC	No Objection Certificate
NRI	Non Resident Indian
O&M	Operations & Maintenance
ODP	Outline Development Plan

ODRs	Other District Roads
PAP	Project Affected Persons
PM	Project Management
PMGSY	Pradhan Mantri Gram Sadak Yojana
PMI	Project Management Institute
PPA	Power Purchase Agreement
PPHPD	Passenger Per Hour Per Direction
PPI	Payment Protection Insurance
PPP	Public Private Partnership
PWD	Public Works Department
RBDCK	Roads and Bridges Development Corporation of Kerala
RFID	Radio Frequency Identification
RFP	Requirements for Proposal
RFQ	Request for Qualification
RIDCOR	Road Infrastructure Development Corporation Limited
RSRDC	Rajasthan State Road Development and Construction Corporation Limited
RTS	Rapid Transport Systems
RUB	Road Under Bridge
SBT	State Bank of Travancore
SCC	Special Conditions of Contract
SDM	Security Device Manager
SEZ	Special Economic Zone
SH	State Highway
SMB	State Maritime Board
SPV	Special Purpose Vehicle
TAMP	Tariff Authority for Major Ports
TPC	Tata Power Company
UDF	User Development Fee
UEM	United Engineers, Malaysia
UMPP	Ultra Mega Power Plant
UTI	Unit Trust of India
UTs	Union Territories
UZA	Zurich Airport
VGf	Viability Gap Funding
VHTRL	Vadodara Halol Toll Road Company Limited
VR	Village Roads
VTMS	Vessel Traffic Management System
WB	World Bank
WPI	Wholesale Price Index

## Executive Summary

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India is the fourth largest economy in the world. However, one factor which is a drag on its development is the lack of adequate infrastructure. Infact, there are estimates suggesting that the lack of proper infrastructure pulls down India's GDP growth by 1-2 per cent every year. Physical infrastructure has a direct impact on the growth and overall development of an economy. While strategies to accelerate economic growth did anticipate the need for faster development of infrastructure as well, the fast growth of the Indian economy in recent years has placed increasing stress on physical infrastructure. Sectors such as electricity, railways, roads, ports, airports, irrigation, and urban and rural water supply and sanitation, continue to experience the pressure of rising demand for services even as they suffer from a substantial initial deficit. The goals of inclusive and high level of economic growth can be achieved only if this infrastructure deficit is overcome. Infrastructure development would also help in creating a better investment climate in India. To develop infrastructure, there is a continuing need to revisit the issues of budgetary allocation, tariff policy, fiscal incentives, private sector participation and public-private partnerships to ensure that required infrastructure development takes place.

The public sector is expected to continue to play an important role in building transport infrastructure. However, the resources needed are much larger than the public sector can provide and public investment will therefore have to be supplemented by private sector investments, in Public Private Partnership (PPP) mode. This strategy was followed in the Eleventh Plan and it has begun to show results in both the Centre and the State sectors.

India's estimated infrastructure investment is pegged at US\$ 1 trillion in the 12th five year plan of which approximately 40 per cent is expected from the private sector. While this implies large potential opportunities for private sector investment, both the government and the private sector need to address the issues of achieving efficiency in the execution of projects on-time and within budget and provide affordable services to the population.

The present study has been carried out with precisely the objective of assessing the problems and constraints in the successful implementation of infrastructure projects in India. It has examined several successful projects across sectors which have not experienced any time and cost overruns. These successful cases have helped us to identify a few best practices in infrastructure building which other projects being implemented can follow leading to fast execution of infrastructure projects in India.

### Objectives and Organisation of the Study

The present study took up a sample of projects in different infrastructure sectors, states, in the public and private sectors, in rural and urban areas to understand (1) what was the extent of success of the projects with respect to some measures of performance such as time and cost efficiency, quality of assets created; (2) what were the factors that led to the success in different stages of the project; (3) what were the constraints that needed to be overcome to achieve success. The study also focuses on what needs to be done to replicate the

positive performance of the projects in the other projects in the infrastructure sector and whether these learning can be transferred to the other projects.

The study has looked at all stages of project execution (including planning and contracting) as also post-execution sustainability issues, covering 16 projects in five major infrastructure sectors. The number of projects/cases that have been studied in each sector is as follows:

**Roads:** 3 projects in National Highways, 2 in State Highways and 2 rural road projects : Total 7 Projects

**Railways (Metro projects):** 3 Projects

**Airports (One Greenfield and one Brownfield project):** 2 Projects

**Ports:** 2 Private Port projects

**Power:** 2 Thermal Generation projects

Eleven of the 16 projects studied fall in the PPP category. The non-PPP projects are two rural road projects, two metro projects and one airport project which was piloted by the State government although it was partly financed by investments from NRIs.

Reports of the 16 Case Studies are provided separately in this Report. We have also supplemented these cases with information on additional projects from other available data.

The study also carried out consultations with other stake holders on their perceptions of the constraints. For this purpose, we held consultations with (a) government officials and agencies involved in the pre-execution activities; (b) government agencies involved in the approval of fiscal support to the projects; (c) government agencies who monitor the progress of projects; (d) financing agencies such as banks and investors; (e) construction contractors and other vendors; (f) professional service providers (engineering services); and (g) experts who have examined the issues relating to the impact of the project. In some cases the concerned stake holders were not specific to the selected projects but provided general inputs.

To hold meetings with the various project promoters and stake holders, detailed questionnaires were prepared for both the project promoters and the stake holders to elicit correct responses to get the facts of the case right and also to understand the actual process of implementation of a project.

### **Synthesis and Findings of the Study**

Judging from the Case Studies of 16 projects and responses from select stakeholders, the main conclusion is that often cited hurdles causing delays and cost overruns are surmountable. Factors contributing to delays in execution and cost overruns in public sector infrastructure projects have been well documented; chief among these factors are:

- Inadequate financial and other resources,
- Poor planning including poorly drawn Detailed Project Reports,
- Delays in securing environmental and other clearances,
- Delays in land acquisition,
- Inadequate coordination with other agencies involved,

- Delays by suppliers and contractors for civil works, and
- Poor project monitoring.

Additional factors that cause delays in PPP projects are identified as:

- Poorly drafted contracts;
- Lack of understanding of complexity, context and dependencies of contract;
- Lack of experience of private partner in working with the public sector and vice versa;
- Failure to adopt partnership approach and personality clashes;
- Unclear identification of authority and responsibility in relation to commercial decisions;
- Focus on existing arrangements rather than emphasis on potential improvements; and
- Inadequate evaluation of statutory, political and commercial risk.

Majority of the cases taken up through this study are examples of projects implemented successfully without major overruns in cost and time. Most of the factors that cause delays and cost overruns have been avoided or overcome in these projects. Overall, the success of these projects was largely attributable to the projects being well conceived and their implementation properly planned. The funding was imaginative but cost-effective and a strong leadership also contributed to the success in several projects. The cases also reveal a clear dedication to the basic commercial objectives.

As per the experience of the 16 projects studied, summary of the factors contributing to the success of the cases included – Incentives and how these are applied/ exploited, Project design, Inputs, Quality of planning and leadership, Specific context and circumstances of the project, Experience of Promoters, Strength of Consortium, Positive political and public perception, etc.

**Other important additional findings from the Study are the following:**

Successful projects often involve higher costs – owing to superior inputs – so a cost effective approach is crucial to timely implementation of especially large infrastructure projects.

This makes it all the more important that the selection process for project implementers is fully transparent and adequate competition is generated.

International tie-ups could be beneficial in various ways even where new technology is not involved. One example is of Tuni–Anakapalle NH project where a foreign agency could bring in strengths both in regard to reduced financing cost and timely implementation through a subsidiary company. Another example is the BIAL where the involvement of the Zurich airport made technical know-how an advantage in the implementation of the project.

The Namma Metro project is a collaboration between the central and State governments and is thus a public sector project. However, association of foreign lenders has contributed to improved monitoring and reviewing systems and to successful implementation.

This observation could apply also to the association of a renowned indigenous agency like DMRC which helped both the Delhi Airport Metro and Namma Metro.

The Krishnapatnam Port project was implemented in record time partly because of the turn-key construction by an in-house agency with adequate experience.

Likewise knowledge of working in local environment can be an advantage for successful implementation. Examples of Tuni–Anakapalle Highway, Krishnapatnam Port and rural road schemes serve to illustrate this.

Recent experience of Mundra UMPP and Krishnapatnam UMPP – the latter not a Case study project – illustrates that even a successful design for the award of the project could lead to unanticipated problems. In the instant cases, the price of imported fuel was not within the ambit of force majeure and there is uncertainty in regard to project operation and possibility of disputes. This underlines the need for constant review of the arrangements for various input links in the projects.

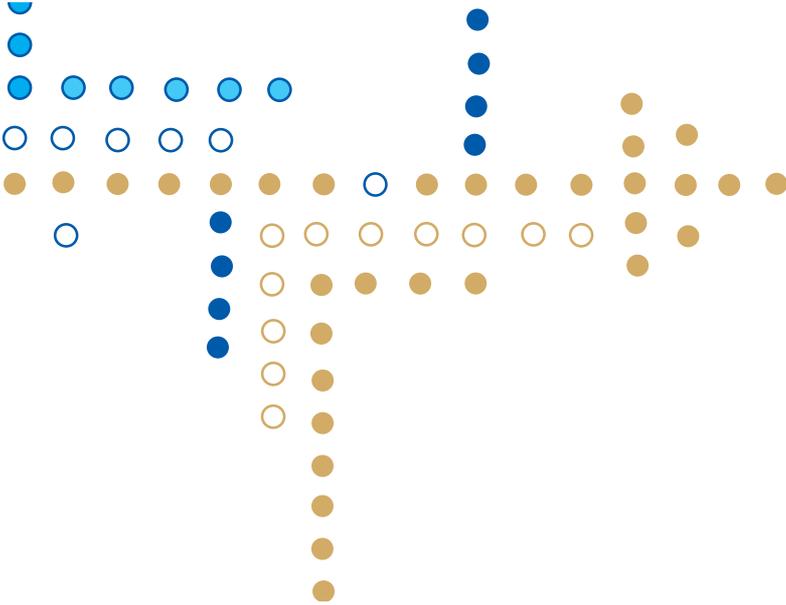
Geographical location also plays a key role in the successful implementation of the projects. Most of the port and airport projects are on the outskirts of a city giving them ample space to execution the project without any disturbance to the city's environment and traffic. BIAL, Krishnapatnam port and all the NH and SH highway projects along with the rural roads projects, one of the factors for their success was their ideal location.

This highlights the need for extra efforts to anticipate problems and be ready with solutions in the case of projects not so favourably located.

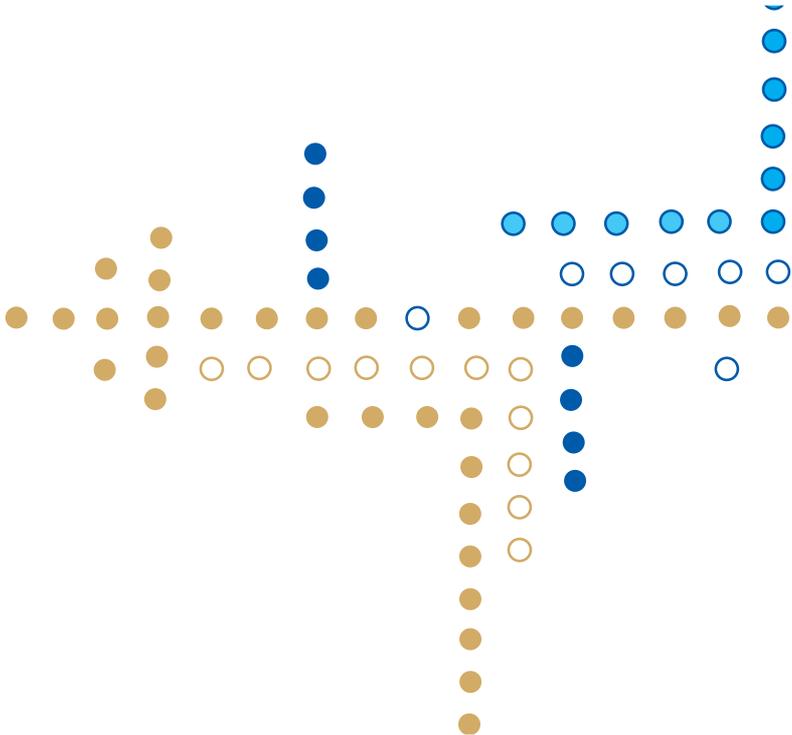
## Conclusion

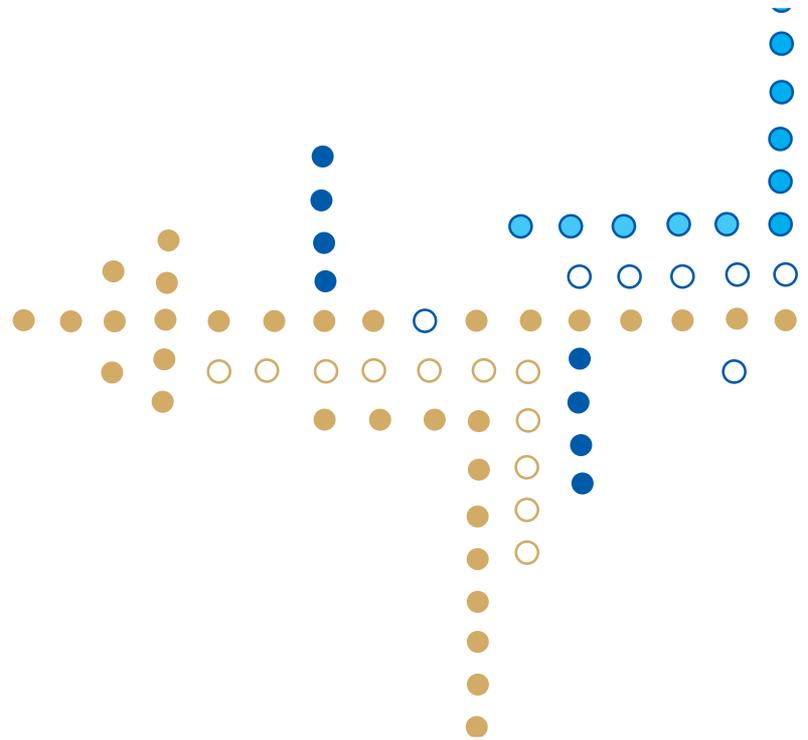
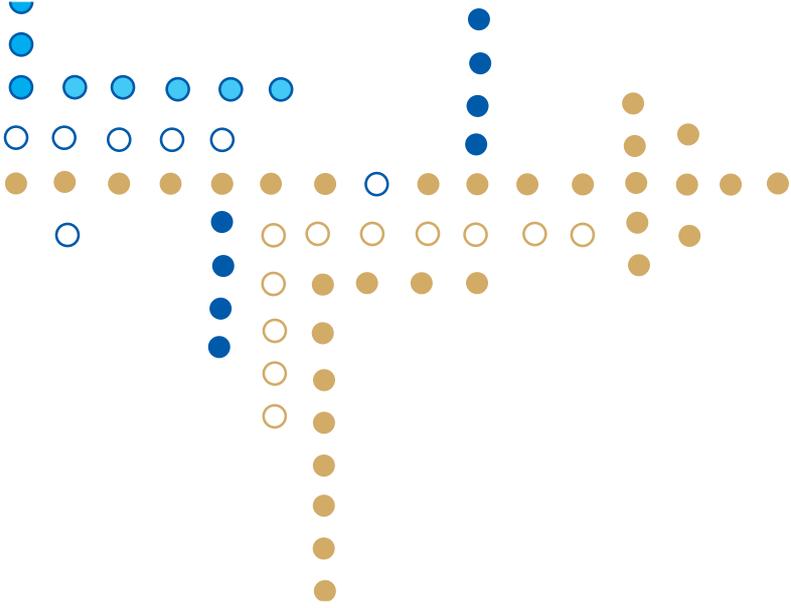
PPPs are still a relatively new phenomenon in India and in a nascent stage compared to the experience in a number of other countries. However, PPPs have compensated for the budgetary and borrowing constraints of the governments. They also imply efficiency gains, efficient use of resources, availability of modern technology and better project design. They have also led to faster implementation, reduced lifecycle costs and more optimal risk allocation. The private sector has responded to the government's attempts to encourage private sector-led growth and investment for meeting infrastructure deficit. Projects in the roads sector now attract far more bidders than they did five years ago. Apart from the projects surveyed in the study, some of the projects such as Coimbatore Bypass, Mumbai-Pune Expressway, Pipavav and Mundra ports, Delhi and Hyderabad airports, Mundra and Sasan UMPP demonstrate the efficacy of the PPP model in India. The Economic Survey (2008–09) noted six key hurdles faced by PPPs: policy and regulatory gaps; inadequate availability of long-term finance; inadequate capacity in public institutions and public officials to manage PPP processes; inadequate capacity in the private sector—both developer/investor and technical manpower; inadequate shelf of bankable infrastructure projects that can be bid out to the private sector; and inadequate advocacy to create greater acceptance of PPPs by the stakeholders.

India has to proceed with caution with respect to PPPs, ensuring necessary checks and balances because the benefits of private-sector efficiencies will come at a price. In this context, the suggestion for independent regulatory bodies in core infrastructure sectors such as the transport sector – comprising highways, railways, ports and airports – is a welcome suggestion for future reforms. Measures also need to be taken to make existing regulatory agencies in the power sector more effective. To make PPPs a success, state governments need to establish full-fledged PPP departments mandated with developing the core competencies, policy framework and public discourse. Rigorous assessment of the costs and benefits of the large projects would also be critical for achieving broader public support for the completion of projects.



# 1 Background and Study Objectives





# Background and Study Objectives

## 1.1 Introduction

India is the fourth largest economy in the world. However, one factor which is a drag on its development is the lack of world class infrastructure. Infact, estimates suggest that the lack of proper infrastructure pulls down India's GDP growth by 1-2 per cent every year. Physical infrastructure has a direct impact on the growth and overall development of an economy. But, the fast growth of the Indian economy in recent years has placed increasing stress on physical infrastructure, such as electricity, railways, roads, ports, airports, irrigation, urban and rural water supply, and sanitation, all of which already suffer from a substantial deficit. The goals of inclusive growth and a 9 per cent growth in GDP can be achieved only if this infrastructure deficit is overcome.

Infrastructure development will help in creating a better investment climate in India. To develop infrastructure in the country, the government is expected to revisit issues of budgetary allocation, tariff policy, fiscal incentives, private sector participation, and public-private partnerships (PPPs) with resolve.

There are many issues that need to be addressed in different infrastructural fields. To begin with, the gap between electricity production and demand is affecting both manufacturing and overall growth. Then though road transport is the backbone of the Indian transport infrastructure, it is inadequate in terms of quality, quantity, and connectivity. Also in the overall transport sector, civil aviation and ports desperately need modernisation.

It is expected that the public sector will continue to play an important role in building transport infrastructure. However, the resources needed are much larger than what the public sector can provide.

Public investment will, therefore, have to be supplemented by private sector investment in the PPP mode. This strategy was followed in the Eleventh Five Year Plan and has started showing results in both the central and the state sectors. A brief description of each of the transport infrastructure sectors is now presented.

### 1.1.1 Roads

India has the second largest road network in the world, totaling 4.2 million km, but most of it is of poor quality. Half the network is not paved and the National Highways (NHs) account for only 2 per cent of the total length of roads in the country. An initial push to investment in roads was given in the Eleventh Five Year Plan. NHDP-I (Golden Quadrilateral) and NHDP-II (North-South, East-West links) were started before the Eleventh Plan but were effectively pushed ahead during the Plan period.

In order to ensure inter-connectivity among districts, work in NHDP phases III, IV, and V will be progressively expanded. In addition, a new programme for constructing roads in the North-East was started in the Eleventh Plan. This also includes the proposed Trans-Arunachal Highway.

### 1.1.2 Railways

Railways are an important part of any transport network for both passenger and freight movement. Indian Railways is one of the largest railways networks in the world carrying 22 million passengers every day and 923 million tonnes of freight a year. The railway network has to be significantly augmented to increase

its freight carrying capacity. The rolling stock has to be modernized and new, higher capacity locomotives inducted. Average speeds too must be significantly increased and special attention paid to augmenting the carrying capacity of the trunk routes, which account for only 16 per cent of the network but carry 50 per cent of the traffic. Dedicated western and eastern freight corridors are iconic projects which will greatly upgrade the capacity of the system.

### 1.1.3 Ocean Ports

The capacity of India's ocean ports to deal effectively with growing international trade volumes increased in the Eleventh Plan partly on account of private investment in the so-called minor ports, as well as in container terminals and dry-bulk and liquid handling facilities in the major ports. As a result, both berthing and turn-around times have fallen. However, in terms of planned capacity addition, ports will meet only 50 per cent of the Eleventh Plan target. It is imperative that the pace of expansion of the port sector be accelerated building on the successful experience of the past few years.

The capacity for dredging of ports in the private sector needs to be further augmented and full operational flexibility given to the ports to use it. While capital dredging of ports will lead to further deepening and larger sized ships will be able to use the ports, maintenance dredging will ensure a continued efficient operation of current port capacity.

Another constraint that has emerged is the lack of capacity/availability of rail and road networks linking ports, especially the new ports coming up in the private sector. These connectivity projects should be identified on a priority basis and implemented using private participation wherever possible. In such cases the projects will need to be facilitated, including in the matter of land acquisition.

### 1.1.4 Inland Waterways

Inland waterways provide a clean and efficient mechanism for transporting goods across regions where quite often road movement may not be feasible or would in any case be more expensive. Investments need to be promoted in this sector so that it can be developed, particularly in the North Eastern Region and in a number of other major rivers. There is also a need to bring about legislative changes to make the creation of new waterways faster after technical assessments are made.

### 1.1.5 Civil Aviation

The Eleventh Plan saw extensive modernisation of airport infrastructure through a combination of public and private investment. Chennai and Kolkata airports are being modernised by the public sector along with 35 non-metro airports across the country. The two major metro airports – Delhi and Mumbai – have been successfully modernised in the PPP mode. The new Mumbai airport is also expected to be bid out for development by the private sector. In addition, the Hyderabad, Bangalore, and Cochin airports offer good examples of the success of the PPP mode. There is scope for utilising this model to upgrade other airports.

The expansion of the airport network has increased the basis for air connectivity enormously. Air connectivity is vitally important for bringing mid-sized towns into the business network, thereby enabling wider distribution of manufacturing and commercial services across the country. There are large requirements of this connectivity in the North East and in the Left Wing extremism affected districts. In addition to the mid-sized airports that have been modernised by the Airports Authority of India (AAI), further expansion of the airport network should be pursued in the Twelfth Plan to meet these needs.

In order to include a large number of potential towns for air connectivity 'daylight landing strips' offer one solution which is cost effective insofar as it does not require expensive night landing equipment. This can help bring many more mid-sized towns into the air connectivity network and facilitate transactions of industrial and commercial business across the country.

Special efforts are needed for the modernisation of navigation control with the aim of bringing greater precision and enhancing the safety of passengers and cargo as well as greater efficiency in air traffic control. AAI has launched the Gagan project in collaboration with ISRO. This envisages a global navigation satellite system which will include better ground surveillance

capability for surface movement control and guidance; this will be especially useful in poor visibility conditions. This is likely to be operationalised by June 2013. The implementation of this programme is presently continuing at various airports.

## 1.2 Investment Trends

1.2.1 The experience of many other emerging developing countries suggests that GCF in infrastructure may need to be accelerated to an even higher level—around 11 per cent—by the terminal year of the Eleventh Plan. However, the target of 9 per cent by the end of the Eleventh Plan seems reasonable (see Table 1.1).

**Table 1.1: GCF in Infrastructure Based on Growth Targets (at 2006–07 prices)**

Year	2006–07	2007–08	2008–09	2009–10	2010–11	2011–12
Eleventh Plan period						
GDP at market price (Rs in crore)	41,45,810	45,18,933	49,25,637	53,68,944	58,52,149	63,78,843
<b>Rate of growth of GDP</b>	<b>9.00</b>	<b>9.00</b>	<b>9.00</b>	<b>9.00</b>	<b>9.00</b>	<b>9.00</b>
GCF in infrastructure as a % of GDP	5.00	5.75	6.50	7.25	8.00	9.00
GCF in infrastructure (Rs in crore)	2,07,291	2,59,839	3,20,166	3,89,248	4,68,172	5,74,096
GCF in infrastructure (US\$ billion)	51.82	64.96	80.04	97.31	117.04	143.52
Total GCF in 11th Plan	<b>Rs 20,11,521 crore or US\$ 502.88 billion</b>					

Source: CSO and Planning Commission.

The aggregate investment target derived in Table 1.1 is broadly consistent with estimates of sector specific requirements that emerge from reports of the working groups constituted by the Planning Commission and by inter-ministerial committees under the aegis of

the Committee on Infrastructure. Total investment in infrastructure on this basis during the Eleventh Plan is projected at Rs 2,056,150 crore (or US\$ 514.04 billion at Rs 40 to a dollar) (see Table 1.2).

**Table 1.2: Sector-wise Investments Projected for the Eleventh Plan**

Sectors	Rs (in crore)	US \$ billion	Share (%)
Electricity (incl. NCE)	666,525	166.63	32.42
Roads and Bridges	314,152	78.54	15.28
Telecommunication	258,439	64.61	12.57
Railways (incl. MRTS)	261,808	65.45	12.73
Ports	87,995	22.00	4.28
Airports	30,968	7.74	1.51
Total	2,056,150	514.04	100

Source: Annual Plan and other Planning Commission documents and CSO.

Infrastructure development had also been accorded key priority in the Eleventh Five Year Plan (2007–12) and the Twelfth Plan period (2012–17), with projected investment requirements of \$500 billion and \$1.5 trillion, respectively, by the Prime Minister’s Committee on Infrastructure. These initiatives pale when compared to China that spends about 11 per cent of its GDP on infrastructure development. This is also indicative of the scope and extent of scaling up that is required in India.

### 1.3 Implementation Issues

Quick implementation of infrastructure projects in India is a rarity; there are several obstacles to their speedy rollouts. For instance, there is hardly any progress on the Delhi-Mumbai industrial corridor project. Progress has been slow because of delays in decision-making and problems with land acquisition; environmental clearances have added layers of complexity for investors trying to navigate India’s bureaucratic by-lanes. NGOs add to the delay by holding up projects by filing writ petitions.

To improve India’s poor roads, narrow bridges, and dilapidated airports that choke the flow of goods and people, a large injection of capital into the system is required. A lot depends on the central and state

governments which must remove policy, regulatory, and institutional bottlenecks for speedy implementation of projects.

### 1.4 Infrastructure Development in the Twelfth Five Year Plan

Inadequate infrastructure was recognised in the Eleventh Plan as a major constraint for rapid growth. The Plan had, therefore, emphasised on the need for massive expansion on investment in infrastructure based on a combination of public and private investment, the latter through various forms of PPPs. Substantial progress has been made in this respect. The total investment in infrastructure, which includes roads, railways, ports, airports, electricity, telecommunication, oil gas pipelines, and irrigation is estimated to have increased from 5.7 per cent of GDP in the base year of the Eleventh Plan to around 8 per cent in the last year of the Plan. The pace of investment has been particularly buoyant in some sectors, notably telecommunication and oil and gas pipelines, while falling short of targets in electricity, railways, roads, and ports. Efforts to attract private investment in infrastructure through the PPP route have met with considerable success, not only at the level of the central government, but also at the level

of individual states. A large number of PPPs have taken off, and many of them are currently operational at both the centre and in the states.

The Twelfth Plan intends to continue its thrust on accelerating the pace of investment in infrastructure as this is critical for sustaining and accelerating growth. Public investment in infrastructure is expected to bear a large part of the infrastructure needs in backward and remote areas for improving connectivity and expanding much-needed public services. Since resource constraints will continue to limit public investment in infrastructure in other areas, PPP-based development needs to be encouraged wherever feasible. It would be necessary to review the factors which may be constraining private investment, and steps may be needed to rectify them. PPPs, with appropriate regulation and concern for equity, need to be encouraged in social sectors, such as health and education. Several state governments are already taking steps in this direction.

### 1.5 Financing Infrastructure

According to the approach paper of the Twelfth Five Year Plan since more than two-third of the investment in the economy is by the private sector (households and corporate). It will be necessary to ensure that the financial system is able to translate the otherwise favourable macroeconomic investment-savings balances into effective financing of private sector investment needed for 9 per cent GDP growth. For this, a financial system capable of mobilising household savings and allocating them efficiently to meet the equity and debt needs of the fast expanding private corporate sector is a must. This depends on the efficiency of the financial system as a whole, which at present consists of a large number of financial institutions, such as banks, non-bank finance companies, mutual funds, insurance companies, pension funds, private equity firms, venture capital funds, angel investors, and micro-finance institutions. Special attention is required for the financing needs

of private sector investment in infrastructure. Infrastructure investment (defined as electricity, roads and bridges, telecommunication, railways, irrigation, water supply and sanitation, ports, airports, storage, and oil gas pipelines) will need to increase from about 8 per cent of GDP in the base year (2011–12) of the Plan to about 10 per cent of GDP in 2016–17. According to the Twelfth Five Year Plan, the total investment in infrastructure will have to be over Rs 45 lakh crore or US\$ 1 trillion. Financing this level of investment will require larger outlays from the public sector, but these will have to be coupled with a more than proportional rise in private investment. Private and PPP investment is estimated to have accounted for a little over 30 per cent of the total investment on infrastructure in the Eleventh Plan. Their share may have to rise to 50 per cent in the Twelfth Plan.

### 1.6 Public-Private Partnerships in India

In the last one decade, the government has been faced with a huge resource crunch. The combined deficit of the central and state governments is roughly 10 per cent of GDP. Government borrowing has been capped through the Fiscal Responsibility and Budgetary Management Act. This necessarily limits state participation in infrastructure financing, thus opening the door to innovative approaches, such as PPPs.

The Government of India has been encouraging private sector investment and participation in all infrastructure sectors. As the National Development Council has made clear: 'Increased private participation has now become a necessity to mobilise the resources needed for infrastructure expansion and upgrading.' The PPP model has been fairly successful in many advanced countries and it is a robust model. PPPs in India are in a nascent stage, but are gaining popularity and support given the dire need to improve infrastructure in the country.

A review of international best practice in PPPs suggests a number of core issues that public authorities must address when considering their use for procuring public infrastructure projects. These include:

- Whether PPP arrangements will result in better value for money than conventional procurement methods;
- Whether the project is affordable in the long term, given overall budgetary constraints;
- How willing is the private sector to be involved in the provision of public services; and

- What type of PPP arrangement is most appropriate for a particular project.

In recent years, the PPP model in India has been fairly successful with several projects being implemented across sectors. However, one of the main problems confronting infrastructure and PPPs in India is the delay in implementing and executing large-scale projects resulting in time and cost overruns. Efficiency in implementing infrastructure projects in India is a rarity. The PPP model is a complex one leading to problems at various stages of implementation and execution of the project. Box 1.1 gives the broad reasons why PPPs fail in some cases.

#### Box 1.1: Why do some PPPs fail?

If a contract is inadequately managed, one or more of the following problems may occur and potentially render the project unworkable:

- The provider may assume control, leading to unbalanced decisions that do not reflect the interest of the public sector;
- Decisions are taken at inappropriate times;
- New business processes are unsuccessfully integrated with existing ones, and fail;
- People within either sector may fail to understand their roles and responsibilities;
- Disputes and misunderstandings may arise, some of which might be inappropriately escalated;
- Progress may be slow or there might be an inability to move forward;
- The desired benefits may not be achieved; and
- Possibilities for improved performance or value for money might be lost.

There are a number of reasons why the public sector may fail to manage a PPP project successfully, including:

- Poorly drafted contracts;
- Contract managers assigned insufficient resources;
- Lack of experience in either the public sector or the provider teams;
- A failure to adopt an attitude towards partnership;
- Personality clashes between project team personnel;
- Lack of understanding of the complexity, context, and dependencies of the contract;
- Unclear identification of authority and responsibility in relation to commercial decisions;
- Lack of measurement of performance;
- Focus on existing arrangements rather than emphasis on potential improvements; and
- Inadequate monitoring and management of statutory, political, and commercial risks.

Source: Ministry of Finance, Singapore (2004).

Undoubtedly, PPPs in India have gathered significant traction in recent years but it is said that India lacks the overall sophistication of the market in terms of innovative and diverse application of PPPs. According to a 2011 survey by the Royal Institution of Chartered Surveyors, over 240 projects with a value of US\$14.5 billion have been delivered over the last 15 years which show that this model has been operational in India, with a majority of \$9.4 billion having been delivered during 2005–10 alone.

Over the years, adoption of standardised documents, such as model concession agreements and bidding documents for award of PPP projects have been streamlined and there has also been accelerated decision-making by agencies in a manner that is fair, transparent, and competitive. This approach has contributed significantly to the recent strides in rolling out a large number of PPPs in different sectors. According to the Private Participation in Infrastructure database of the World Bank (India), with 1,017 PPPs accounting for an investment of Rs 486,603 crore, India is second only to China in terms of the number of PPPs; in terms of investment it is second to Brazil. Transport is the dominant PPP sector in India both by the number of projects and investment, mainly due to the large number of road sector projects. Further efforts are needed to mainstream PPPs in several areas, such as power transmission and distribution, water supply and sewerage, and railways where there are significant resource shortfalls and also a need for efficient delivery of services. Similar efforts will also have to be initiated in social sectors. The government has also been emphasising the need to explore the scope of PPPs in the development of social sectors like health and education.

Some of the major PPPs undertaken so far are:

- Delhi, Mumbai, Hyderabad and Bengaluru airports.
- 4 ultra-mega power projects at Sasan (Madhya Pradesh), Mundra (Gujarat), Krishnapatnam (Andhra Pradesh), and Tilaiya (Jharkhand).
- Container terminals at Mumbai, Chennai, and Tuticorin ports.
- 15 concessions for operations of container trains.
- Jhajjar power transmission project in Haryana.
- 298 national and state highway projects.

India's estimated overall infrastructure investment is pegged at US\$ 1 trillion in the Twelfth Five Year Plan of which approximately 40 per cent is expected from the private sector. While this ensures tremendous potential opportunities for private sector investment, it is imperative that both the government and the private sector address the issues of achieving efficiency in the tendering process, execution of projects on-time and within budgets, and streamlining structural financing problems, etc.

### 1.7 About this Study

The present study was carried out with the objective of studying the problems and constraints in the successful implementation of infrastructure projects in India. It examined several successful projects across sectors which have not experienced any time and cost overruns. These successful cases helped us in identifying a few best practices in infrastructure building which other projects that are being implemented can follow. This will lead to fast execution of infrastructure projects in India.

### 1.7.1 Background, approach, and objectives of the study

In a recently completed NCAER study (2010) on 'Accelerating Infrastructure Building in India', attention was drawn to the significant time and cost inefficiencies in the implementation of infrastructure development plans in the country. With the country poised to double its spending on infrastructure development over the Twelfth Five Year Plan (2012–17), it is important that projects are implemented efficiently and they deliver services to meet the demands of various sectors and regions in India's fast growing economy. This study was financially supported by a grant from Holcim Limited.

This study reviewed a series of policy measures initiated by central and state governments, especially over the last decade, which were aimed at removing persisting bottlenecks in the implementation of infrastructure projects. A workshop was held on 1 December, 2010 to discuss the issues highlighted in the study. Some of the key issues across the sectors that were highlighted in this workshop attended by high-level official participants, were:

- High level of complexity in infrastructure projects which requires efficient processes and procedures in the government at different levels to facilitate execution. This requires institutions and capacity building, especially in the government. The government has made efforts to improve the scenario in terms of giving attention to issues at the highest levels, model agreements, fiscal support, and so on. But more needs to be done as the performance has been very different across sectors and across states.
- There is a need for building pipelines for projects quickly, otherwise the contracting process will become distorted as builders chase very few projects.
- Very clear, transparent, and efficient processes for land acquisition, shifting of encumbrances at the project site, and environmental and forest

clearances which require government support are needed.

- Improved governance and dispute settlement processes need to be in place.
- Monitoring of progress in a manner that leads to corrective actions. Need for enhanced accountability for the delivery of projects.
- Finance may emerge as a constraint as India builds its infrastructure development momentum.
- Need for building a responsive supply chain of inputs and services: contractors, materials, and labour. There is a need for significant initiatives to bridge the emerging gap in the requirement and availability of skilled labour.

Phase I of the study highlighted the issues and provided illustrations of the processes. There was a general agreement in the discussion that these were significant issues that needed to be addressed to achieve the goals set for creating infrastructure that enables India's sustained economic growth. This led to Phase II of the study, the objectives and scope of which are now briefly described.

### 1.7.2 Study methodology

The present study took up a sample of projects in different infrastructure sectors and in different states, in the public and private sectors, and in rural and urban areas to understand:

- 1) What was the extent of success of the projects with respect to some measures of performance, such as time and cost efficiency and the quality of assets created;
- 2) What were the factors that led to success in different stages of the projects; and
- 3) What were the constraints that needed to be overcome to achieve success.

The study also focused on what needs to be done to replicate the positive performance of these projects in other projects in the infrastructure sector and

whether we can translate the learning to other projects.

The study looked at all stages of project execution (including planning and contracting) as also post-execution sustainability issues, covering 16 projects in five major infrastructure sectors. The number of projects/cases that were studied in each sector are:  
Roads: Three National Highway projects, 2 State Highways, and 2 rural road projects – 7 projects in all.

**Railways (metro projects): 3.**

**Airports (One greenfield and one brownfield project): 2.**

**Ports: Two private port projects.**

**Power: Two thermal generation projects.**

Eleven of the 16 projects studied are in the PPP category. The exceptions are two rural road projects, two metro projects, and one airport project which was piloted by the state government (it was part financed by private investment from NRIs).

Reports of the 16 case studies are appended to this report. We have also supplemented these cases with information on additional projects from other available data.

The study also carried out consultations with other stakeholders on their perceptions of the constraints. For this purpose, we held consultations with: (a) government officials and agencies involved in the pre-execution activities, (b) government agencies involved

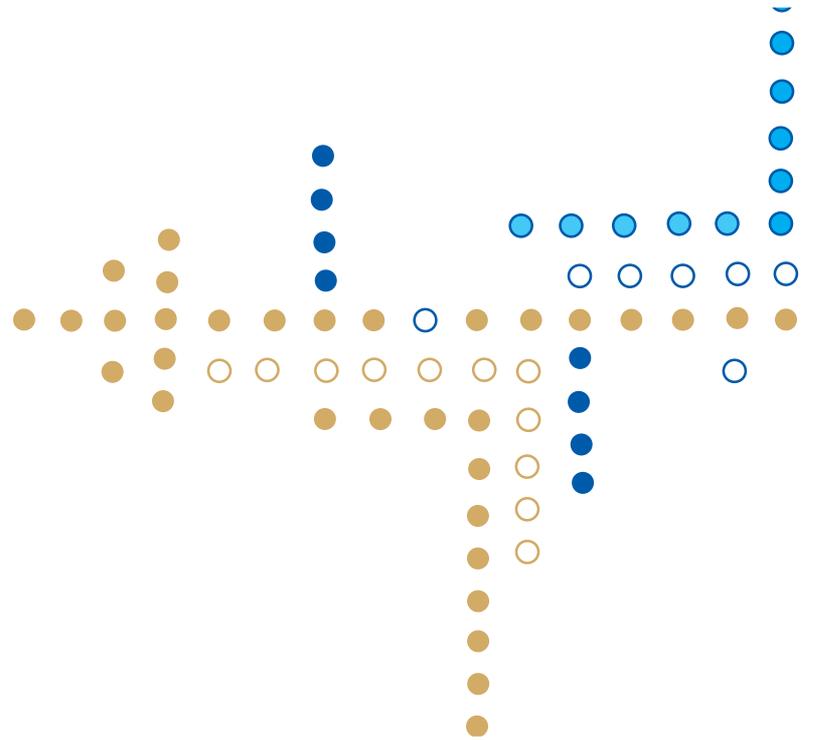
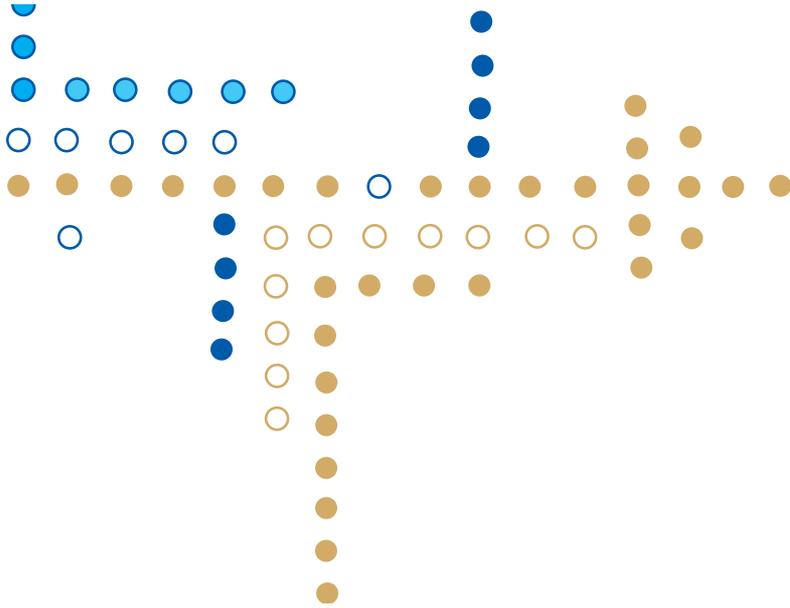
in the approval of fiscal support to the projects, (c) government agencies which monitor the progress of projects, (d) financing agencies, such as banks and investors, (e) construction contractors and other vendors, (f) professional service providers (engineering services), and (g) experts who have examined issues relating to the impact of the projects. In some cases the concerned stakeholders were not specific to the selected projects but provided general inputs.

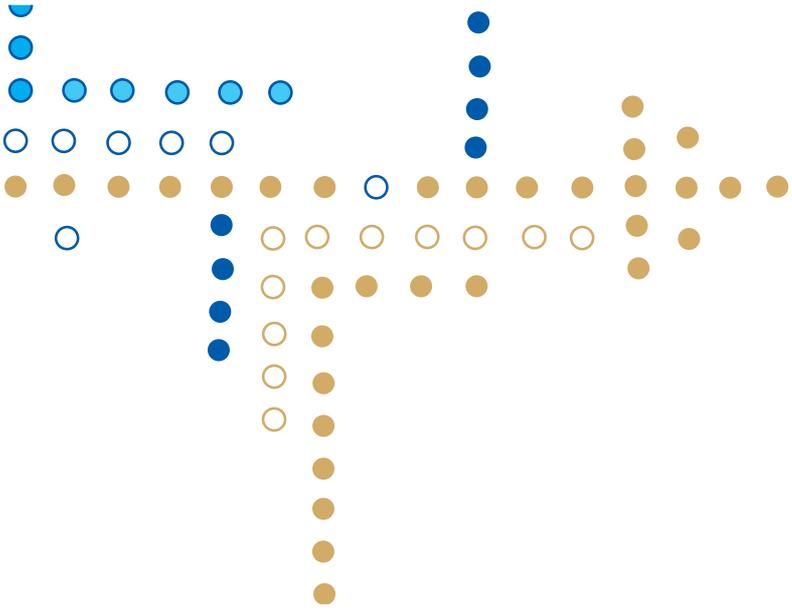
To hold meetings with various project promoters and stakeholders, detailed questionnaires were prepared for both of them to elicit correct responses so that the facts of the case could be ascertained and also to understand the actual process of implementation of a project.

## 1.8 Interim Workshop

After the initial survey of projects, an interim workshop was held on 8 July, 2011 to get feedback on the interim findings. The interim workshop provided useful insights from experts in the field on how to carry the case studies forward and focus on various aspects of project implementation, including issues related to DPRs, model concession agreements, land acquisition problems, environmental clearances, red tapism, and trust deficit between the government and the private sector.

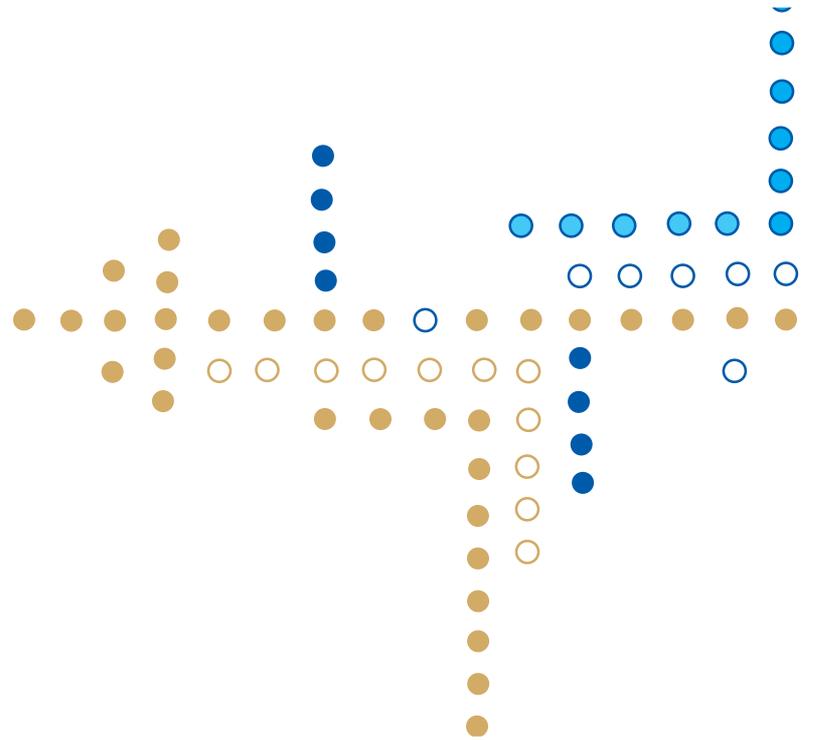
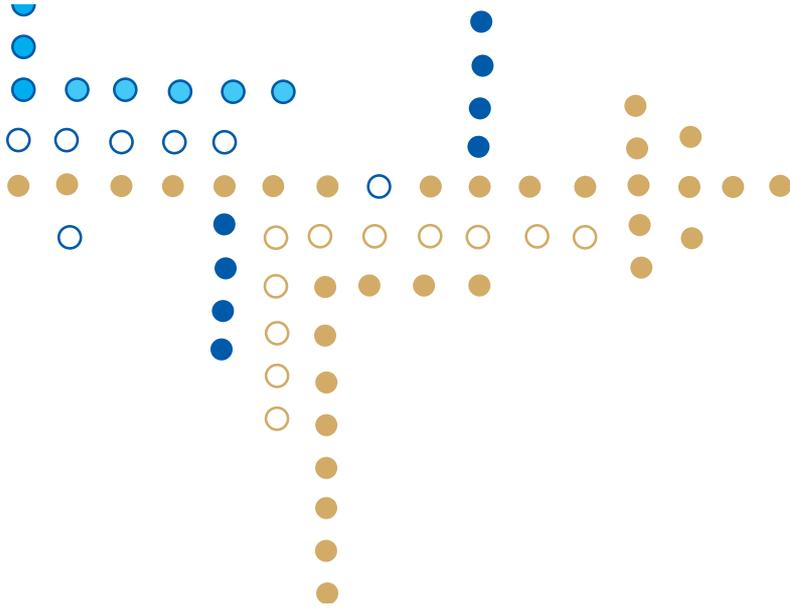
Based on all secondary sources of information and detailed meetings with the project promoters of the various cases and stake holders, a report has been prepared based on the objectives of the study- including the findings of the previous Phase 1. The findings of the present study are presented in the following chapter 2 of this report.





# 2 Synthesis of Study Findings





# Synthesis of Study Findings

## 2.1 Introduction

This chapter provides a summary of the findings from the case studies surveyed and presents the best practices and factors that emerge in the successful implementation of infrastructure projects in India across sectors. We first present briefly the profile of the projects studied. This is followed by a discussion of the identified success factors with Case Study illustrations (Section 2.2). Sustainability related issues are presented in section 2.3 followed by further learnings from the case studied. The last section 2.5 provides concluding remarks.

### 2.1.1 Main findings

Judging from the case studies of 16 projects and responses from select stakeholders, the main conclusion is that the cited reasons of hurdles causing delays and cost overruns are surmountable.

Factors contributing to delays in execution and cost overruns in public sector infrastructure projects have been well-documented; chief among these factors are:

- Inadequate financial and other resources;
- Poor planning, including poorly drawn Detailed Project Reports (DPRs);
- Delays in securing environmental and other clearances;
- Delays in land acquisition;
- Inadequate coordination with other agencies involved;
- Delays by suppliers and contractors for civil works; and
- Poor project monitoring.

Additional factors that cause delays in PPPs are identified as:

- Poorly drafted contracts;
- Lack of understanding of the complexity, context, and dependencies of the contract;
- Lack of experience of private partners in working with the public sector and vice versa;
- Failure to adopt a partnership approach and personality clashes;
- Unclear identification of authority and responsibility in relation to commercial decisions;
- Focus on existing arrangements rather than emphasis on potential improvements; and
- Inadequate evaluation of statutory, political, and commercial risks.

A majority of the cases taken up for this study are examples of projects implemented successfully without major cost and time overruns. Most of the factors that cause delays and cost overruns were avoided or overcome in these projects. Overall, the success of these projects can be largely attributed to the projects being well conceived and their implementation being properly planned. The funding was imaginative but cost-effective and a strong leadership also contributed to the success of several projects. The cases also reveal a clear dedication to basic commercial objectives.

### 2.1.2 Profile of projects studied

As noted in Chapter 1, a majority of the cases studied belong to the PPP category, involving ownership-sharing through JVs and long-term concession agreements. JV ownership patterns vary from majority

private shareholding to more equal public and private shares. The case studies also covered public sector projects and fully private ones.

In the case of PPPs involving concessions, the terms varied from 30 years (highways) to 50 years (ports). Some key features of the projects studied are given in Table 2.1.

**Table 2.1: Key features of the projects studied**

Features / Sectors>	Road	Power	Ports	Airports	Railways*	Total
Total Cases Studied	7**	2	2	2	3	16
Foreign Collaboration	1			1	2	4
Fully Private/Concession	3	2	2	1	1	9
New Technology		1			1	2
Equipment Import	1		1		3	5
Foreign Financing	1				1	2
Rewards for Performance		1				1
Selection through Bids	6	1	1	1	2	11
State-owned/JVs	3	-	-	1	1	5
Maintenance Obligations	6	2			3	11

Note: \* All 3 urban mass transit systems.

\*\* Comprising 3 National Highway projects, 2 State Highways, and 2 Rural Road schemes.

The two rural road schemes studied were of relatively small value. The costs of the rest of the projects varied across sectors, ranging from Rs 283 crore for the Cochin International Airport (which was completed in 1999) to Rs 5,750 crore for the Delhi Airport Metro, commissioned in early 2011. Eleven of the 16 projects have been fully completed. For the remaining five projects, at least their first phases have been completed more or less within estimated time and costs, while some later phases are under implementation. This applies to both the power generation projects studied (both multi-unit ones, one of them being an Ultra Mega Power Project of 4,000 MW). Similar is the case with two of the three metro rail schemes and one of the two port projects.

Further, the time period for completing the projects also varied. For instance, work on Bengaluru International Airport started in July 2004 and was completed in 2008, that is, in 48 months. The Jaipur Kishangarh Project took just half as much from April 2003 to 31 March, 2005. Overall, the projects studied covered a time-span of a little over a decade and a half: work on the Cochin International Airport started in 1994 and the first phase of the Bengaluru 'Namma Metro' was commissioned in October 2011.

## 2.2 Factors Contributing to Success

Table 2.2 gives a summary of the factors which contributed to the success of the cases studied.

**Table 2.2: Summary of Success Factors**

Factors contributing to success		Channels of impact
1.	Incentives and how these were applied/ exploited	<b>a. For government (sponsor)</b> <ul style="list-style-type: none"> <li>- Political benefits from direct consumption of the service</li> <li>- Political benefits from positive indirect impact, jobs, livelihoods, efficiencies</li> <li>- Long-term fiscal benefits from acceleration in economic activity</li> </ul>
		<b>b. For promoter/implementing agency</b> <ul style="list-style-type: none"> <li>- Financial benefits if there are rewards for delivery in time/ cost and quality</li> <li>- Benefits of future engagements</li> <li>- Benefits from learning</li> <li>- Commercial opportunity</li> </ul>
2.	Project design	<ul style="list-style-type: none"> <li>- Appropriate risk mitigation and risk sharing</li> <li>- Generating competition for projects</li> <li>- Selection of appropriate implementing agencies</li> <li>- Association of agencies that could enhance performance</li> <li>- Transparency of processes and decisions</li> </ul>
3.	Inputs	<ul style="list-style-type: none"> <li>- Technology</li> <li>- Managerial competence</li> <li>- Coordination with government departments</li> <li>- Equipment acquisition and employment</li> <li>- Institutional framework for monitoring and corrective actions</li> <li>- Network and contacts to speed up work</li> </ul>
4.	Quality of planning and leadership	<ul style="list-style-type: none"> <li>- Quality of DPRs</li> <li>- Motivation and guidance by top management</li> <li>- Resourcefulness, financial, and others</li> <li>- Flexible/responsive decision-making systems</li> <li>- Ability to overcome procedural hurdles</li> <li>- Vision that keeps future revenues and profits in view</li> <li>- Imaginative solutions to resolve local concerns, resettlement issues</li> </ul>
5.	Specific context and circumstances of the project	Political importance accorded to project Larger project eco-system Urgency owing to high project visibility Fortuitous circumstances, like previous work done

(Contd...)

6.	Experience of promoters, strength of consortium	Knowledge of the bidding process Awareness of the importance of a good DPR Ability to negotiate with the government Aware of local problems during land acquisition Good network of contacts to speed up the process of implementation in case of disputes and difficulties Trust of the financial institutions for finance Brand value of project promoter Collaboration between the international agency and a strong local partner International partner providing the latest technology and high end resource management skills Local partner providing bulk of the manpower from the local area strengthening the local economy
7.	Positive political and public perception	Political and public perceptions on the project's importance to state and region

The seven factors identified in Table 2 are now elaborated upon briefly, with examples drawn from the case studies.

### 2.2.1 Incentives

A well-designed project will allow incentives to be fully or largely exploited. While this was the case with most of the projects studied, the private port project being implemented at Krishnapatnam provides a striking illustration of how incentives helped in the execution of the project (see Box 2.1).

We now examine the various incentives for the main stakeholders. For the promoter (government on behalf of the citizens/users) these are:

*Political benefits from direct consumption of the service:* For example, the Namma Metro and relieving extreme road congestion in Bengaluru; a world class airport at Bengaluru adding brand

value to the IT capital of India and also catering to rising international passenger traffic.

The benefits will include expected economic ones from positive indirect impact, jobs, livelihoods, efficiencies, and social benefits relating to quality of life.

*Certain types of infrastructure projects will contribute to long-term fiscal benefits from acceleration in economic activity:* The two port projects at Krishnapatnam and Dahez, National Highway schemes, and the Cochin International Airport are typical examples. Recognition of long-term fiscal benefits from acceleration in economic activity by key decision-makers in government is the crucial element.

Successfully exploiting these incentives rests largely with the project promoter/ implementing agency and on coordination between the promoter and the sponsor/government agencies involved.

### Box 2.1: Krishnapatnam Port Project

**Key facts related to the project:** The Krishnapatnam Port Company Limited (KPCL), located in Krishnapatnam port town in the Nellore district of Andhra Pradesh was formed after it won the contract from the Government of Andhra Pradesh through a competitive bidding process to develop the existing minor port into a modern, deep water, and high productivity port, on a Build-Operate-Share-Transfer (BOST) concession basis for 50 years.

**Incentives given by the government and how they were reflected in the project design:** Land acquisition without conflict with project affected families. A major portion of the land required for the development of this project belonged to the Andhra Pradesh government which did not require any kind of acquisition proceedings. Displaced families were rehabilitated with a total rehabilitation package of Rs 19 crore approved by the collector. Employment was also generated for the youth.

**Long concession period:** As KPCL is being developed on a BOST concession basis, the developer is the Port Authority under the current mechanism and will share a portion of the revenue with the state government and continue to carry out port operations on a concession basis for 50 years starting from the date of concession mentioned in the agreement. Thereafter the port will be transferred to the state government or the lease may be extended as decided by the state government.

**Connectivity issues:** A new railway-cum-road-cum-pipeline link for hinterland connectivity is a distinguishing feature of the project: The Krishnapatnam Port has very good hinterland connectivity covering southern Andhra Pradesh, the districts of Rayalseema, North Tamil Nadu, and Eastern Karnataka. The Krishnapatnam Rail Company Limited (KRCL) was formed to provide rail connectivity to the port. This has been fully operational since 2010. This 114 km long rail line passes through Venkatachalam, which is 23 km from the port, on the existing broad gauge line connecting Chennai with Kolkata. There is a dedicated 26 km 4-lane road (earlier a 2-lane road existed that connected Nellore to the minor port that existed there) connecting the port to National Highway-5 (the Chennai-Kolkata Highway).

**Incentives for the project promoter and how they were exploited:** The Government of Andhra Pradesh has sanctioned 12,000 acres of land to Krishnapatnam-Infratech Private Limited for developing this special economic zone. Investors are free to fix their own tariffs for various port services without detriment to the development of the port in shorter/longer periods.

The concessionaire is declared as the port conservator as per the Indian Ports Act, 1908. Investors are given complete freedom to follow their own personnel and employment policies without being governed by the rules and practices of other Indian ports. The government assists in acquiring land on payment by investors. Wherever port land is available, it is provided to the parties at the rates prescribed by the government. Howe (India) was the key consultant for Phase I of the project that included the preparation of the DPR for Navayuga Construction Company Limited, a sister concern of KPCL that played a key role in designing and carrying out the construction of the port in a timely and efficient manner. The National Institute of Oceanography prepared a detailed and comprehensive Marine Environment Impact Assessment (Marine EIA) report for the Krishnapatnam Port. The Navayuga Construction Company was responsible for its construction. Therefore, no work was sub-contracted or done on a contractual basis.

In the case of Namma Metro, the study came across a unique incentive—a stipulation that decisions on claims for variations from the executing contractors were entertained only after the work was completed. This meant that disputes could be avoided mid-way through the project thus leading to its speedy implementation.

Additionally, there were specific incentives for the promoter/implementer. These would vary from project to project, but typically they include:

*Economic benefits like rewards for delivery in time/cost and quality:* For example, the first phase of the Rosa Power Project carried a stipulation that timely completion would mean that the firm would get the award of implementing the second phase of the project. In the case of the Bengaluru-Maddur Expressway, the reward for completion on time included retention by the promoter of one year's revenue normally payable to the government.

*Benefits of future engagements:* The Delhi Airport Metro is a typical example where the private firm is now well-positioned to take up similar projects that will be coming up in other metros and even in other developing countries. Similar is the case with the GVK Group which was involved in the Bengaluru airport. Given its association with Zurich Airport, the group intends to expand its operations and take up several other airport projects in other cities in and outside India.

*Benefits from learning:* Projects involving new technologies afford the opportunity to acquire expertise in the area that can be replicated in future projects. Tata's Mundra UMPP involved the adoption of super-critical boiler technology and larger turbine capacity (800 MW each), the first of this size in the country. Association of an international partner like Zurich Airport exposed Bengaluru International Airport to latest technology in airport construction.

*Commercial opportunity:* Certain types of infrastructure projects are so designed so as to generate significant revenue streams for the operators. The Krishnapatnam Port Project is a clear illustration where revenue streams were available for tapping as soon as the first phase of the project was commissioned. There could additionally be other commercial opportunities, for example, the Delhi Airport Metro which offers a commercial opportunity for the promoter (Reliance) which has interests in related areas like retailing. CIAL is an example of an international airport generating projected revenues and earning profits and helping in the development of infrastructure in adjacent areas and in the economy of the city served by it.

*Having good brand value and scope for strengthening it also acts as an incentive:* Successful completion of a project by adhering to cost and time stipulations in a particular sector gives credibility and enhances the brand value of the project promoter. This paves the way for the promoter bidding and bagging several other projects in the same or related infrastructure sectors. Going by the principle of learning by doing, the project promoter is able to learn from his past experiences and mistakes and move forward quickly in subsequent projects. These cases also act as best practice examples for other projects in the same and other sectors. For example, the GVK and GMR groups have established themselves not only in the airport sector but have diversified their businesses into several other areas. Another example is of the Adani Group which has proven technical expertise and skilled manpower to execute port (as well as power) projects across the country because of its established brand and trust factor with the government in different states, especially in Gujarat.

Some of these instances illustrate how incentives can be intelligently applied at the bid award stage. By including a provision which allows setting up of shopping malls at metro stations, the PPP model for

the Delhi Airport Metro Project was strengthened and made attractive. At the same time, the incentive should be one that is achievable. This was the case with the Rosa Power Project where the promoter was selected through an MoU. The promoter was offered the incentive of negotiated award of the second unit and could succeed in gaining it by good project management and the fortuitous advantage of clearances and spadework done by the previous owners who opted out of the project. The case studies thus establish the link between positive incentives and their exploitation and successful implementation.

### *Negative Incentives*

If there are no allowances for positive incentives in the project design, these create countervailing *negative incentives*, like, for instance, non-accountability for delays.

When the positive incentives are few and a number of negative incentives exist, the success of a project often depends on how the negative incentives are neutralized. Negative incentives typically apply to public sector projects where normally no penalties are incurred by the implementing agency for non-performance and foregoing of benefits through non-performance. This is a trickier area to handle but the case of Namma Metro shows that through a combination of measures like a fully empowered SPV for implementation, association of external agencies in financing and project consultancy/oversight, and good project management in areas like award of bids, a strong field of positive incentives can be created. Somewhat similar is the case of the Mumbai Monorail Project where a construction agency of standing with an experienced overseas associate was selected to implement the project.

These two cases also involved higher financial costs (through higher compensation for land /cost of new technology) but quite clearly the benefits through

timely completion will neutralize these additional costs.

Projects like rural road schemes which are awarded through selection of construction agencies are also prone to the negative incentive phenomenon because delays in commissioning do not have any short-term adverse impacts. A further factor is that such projects are sponsored generally through the PWD, an organizational model that is in need of revamp. The two cases figuring in the case studies show how such handicaps could be neutralized—in one case through good leadership and systems and in the other through association of agencies with local expertise.

A factor that complicates the case of such public sector as well as PPP schemes is that adverse impacts can be treated often as unforeseen and hence outside the field of accountability. Delays in acquiring land and in shifting of utilities etc. are common factors that lead to hold-ups of highway projects. Generally such delays are on account of the sponsoring department and hence do not have an adverse impact on the associated implementing agency. The case studies reveal that even this handicap can be pre-empted if a project is well-designed and the selection of the agency is transparent and ensures the award of the work to a well-motivated party. The two case studies relating to widening of NH stretches (Anakapalle-Tuni and Amritsar-Wagha) illustrate this. In one case, an experienced Indian agency associating with an overseas partner with good credentials was a key success factor. In the other, the bid was won by an experienced Indian firm that had a reputation to protect and to build on.

In both these cases, good proactive support by the sponsoring agency (NHAI) was another contributing factor. It also bears note that good agency selection helps overcome another typical negative incentive in such cases which is the *absence of significant spill-over benefits*. To illustrate, in the case of the Bengaluru

International Airport, there was a gap of nearly four years between the bidding and the signing of the Model Concession Agreement. It was a test of faith for the consortium partners who held themselves together for this time believing that the project was viable and important. Negative incentives in the form of indecisiveness on the part of the government, both central and state, was neutralized by the faith that the consortium partners had in the viability of the project.

*Commercial non-viability discovered along the way*

The projects studied by and large avoided this pitfall. However, in the case of the Ahmedabad -Mehsana Toll Road Project, it was discovered in the first years of operation that the traffic generated was below projections on which the project financing had been based. This was tackled by re-scheduling the debt repayment schedule. The inherent strength of the project and the credibility that the promoter enjoyed with financing institutions enabled this solution. The traffic has since picked up and is now at projected levels. (See later box)

### 2.2.2 Inputs

By inputs we mean both soft inputs and project hardware and its delivery. Raw material (like fuel linkage for power plants) and other inputs (skilled manpower, technology), and equipment supply comprise project hardware.

The case of the Mundra UMPP, which was executed by the Tata Power Company, exemplifies the contribution of both soft and hard inputs (Box 2.2).

In the area of 'soft' inputs, the quality of inputs from the sponsor as well as the implementing agency is of crucial importance. To illustrate the former category, in the Amritsar-Wagha NH widening project, NHAI could internalize the learnings of previous projects which helped to anticipate problems associated with environmental, forest, and other clearances and shifting of utilities and thereby avoiding delays on these accounts.

Large infrastructure projects in particular involve coordination of several agencies and efficient coordination becomes key to successful

### BOX 2.2: Mundra Ultra Mega Power Project (UMPP)

#### Key facts of Mundra UMPP

The Mundra UMPP was developed by Coastal Gujarat Power Limited (CGPL). The project covers an area of 1,254 hectares and is located in a coastal area of Mundra taluka in Kutch district of Gujarat. The project is a super-critical coal-fired power plant with a total capacity of 4,000 MW. The project has five units of 800 MW each and it is expected to be completed unit by unit. CGPL is expected to commission its first unit by September 2011. The remaining units are expected to be commissioned at regular 4-month intervals. The project is expected to achieve full commercial operations by March 2013 (17 months ahead of the schedule date). Coal requirements for the project will be about 11.7 million tonnes per annum. Given limited availability of domestic coal supply, imported coal will be used for the project. CGPL by taking advantage of TPC's global network will import coal from Indonesia, South Africa, Mozambique, and/or Australia. Mundra Port will be used to unload imported coal for the UMPP and it will be done as per the agreement signed between CGPL and the Mundra Port and Special Economic

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Zone Limited (MPSEZL). The total cost of the project is Rs 17,000 crore (\$4.2 billion) and it is funded through a debt equity ratio of 75:25. The entire equity is from Tata Power and the debt component is from both foreign exchange and domestic loans. Nearly, \$1.8 billion (approximately Rs 5,400 crore) foreign exchange loan is being provided by Korean Exim, Korean Insurance, Asian Development Bank, etc. The domestic loan of \$1.2 billion (approximately Rs 5,100 crore) was raised through a consortium of banks led by the State Bank of India. It is the first project to install 800 MW units based on super-critical technology in the country. Once the project is completed, it will be the largest coal based greenfield plant in the world. It is expected to release 23.4 million tonnes of CO<sub>2</sub> per year at the production level of 29,000 million units of electricity per annum, as compared to 27 million tonnes emitted by a conventional project of similar capacity (Power Line, 2011)<sup>1</sup>.

#### DATES OF IMPORTANT CLEARANCES

The Ministry of Power awarded the Mundra UMPP on a Build, Own, and Operate (BOT) basis through tariff-based competitive bidding in December 2006.

Name of Developer	CGPL of Tata Power Ltd
Date of LOI received from MOP	28.12.2006
Date of Transfer of SPV to developer	22.04.2007
Date of signing of PPA (Effective date)	23.04.2007
MOEF Clearance for Forest Land	Final Forest Clearance received on 10.6.2009
Financial Closure	Achieved on 24.04.2008

Mundra UMPP project, the only Ultra Mega Power Project (UMPP) that is running on track out of the four awarded so far.

#### PROMOTING AGENCY

A SPV, the CGPL, was incorporated on 10 February 2006 to implement the Mundra UMPP. After awarding the Mundra UMPP, Tata Power Company (TPC) acquired CGPL on 22 April 2007. TPC is the largest private power utility in India. It is involved in the business of power generation, transmission, supply, and distribution of electricity and coal mining. TPC sponsors CGPL and it owns 100 per cent of its shares. TPC has presence in all aspects of the power value chain. In the transmission business, TPC has a 51 per cent stake in Power Links, a joint venture with Power Grid. In the distribution business, it holds 49 per cent in North Delhi Power, a power distribution company. It also has a power distribution business in Mumbai. TPC has acquired 30 per cent shares each in three Indonesian coal mining companies—KPC, Bumi Resources, and Arutmin—in order to secure fuel supply for its projects.

#### SOURCING MAIN EQUIPMENT FROM ABROAD

Main equipment for the project is being imported from Korea and Japan. Korean equipment maker Doosan is supplying boilers while turbines are being sourced from the Japanese firm Toshiba. Import of equipment for the project is given excise and custom duty exemption.

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<sup>1</sup> Power Line, 2011, New Benchmarks, Vol. 15, No. 11, July 2011.

#### CONTRIBUTING FACTORS TO SUCCESSFUL IMPLEMENTATION

Holistic and sustainable strategies adopted by CGPL throughout the project implementation—from dealing with local communities to ensuring coal supply—were the main factors in the success of Mundra UMPP. In order to speed up the project implementation process, many clearances and approvals were granted in advance. A single window clearance concept used in UMPP was helpful in getting the clearances, thereby making the process less troublesome. Particularly in the case of Mundra UMPP, the state government was proactive in supporting the project. More than 50 per cent of the debt component in foreign currency helped CGPL mitigate some risks due to the volatile nature of the coal and shipping industry.

The strategic approach followed by CGPL in developing the surrounding area, in helping local communities by training them for alternate livelihoods, and in establishing community institutes by fund raising and government support is praise worthy. This project can serve as a role model for other UMPPs which require huge land acquisition as part of project development.

implementation. Both central and state governments are partners in the Namma Metro and in this case good centre-state coordination has contributed to its success. Also in the case of Dahez Port in Gujarat, complete cooperation was extended by the Gujarat Maritime Board in clearing all hurdles for implementing the project.

New technology poses challenges in the execution of projects but the case studies reveal that such projects often succeed, possibly because adoption of new technology generally also involves association of overseas partners (for example, Mumbai Monorail) or procurement of equipment from abroad (Korea, in the case of super-critical equipment for the Mundra UMPP). Advanced technology and expertise required in the setting up of a world class airport was provided by Zurich Airport during the construction of the Bengaluru International Airport.

*Institutional framework:* The Rajasthan rural roads project provides an example of how the state PWD followed good systems for prompt payments and regular monitoring, which helped in the timely completion of this project. A payment schedule was formulated according to the progress of work over

time, which was adhered to in a way that was satisfactory for all concerned. Because the payments were made on time, the contractor was able to meet his own payment obligations to suppliers, labour, etc.

Both the Namma Metro and the Mumbai Monorail benefited from the larger institutional framework represented by the central initiative on urban development since 2006.

*Flexible/responsive decision-making system:* For example, in the case of the Cochin International Airport, the CEO who was a civil servant had experience of the working of the state government and his interventions in the implementation phase of the project ensured its speedy completion.

*Technical competence of the implementing agency:* For example, the presence of strong players in the consortium for the Bengaluru International Airport of Larsen and Toubro and Zurich International Airport provided excellent technical competence for implementing the project.

*Managerial competence:* The CEO of the Cochin International Airport was the driving force behind

the setting up of this airport. His determination and devotion to the project and ability to convince the government on several important decisions is a classic example of how a competent manager and leader can help in the successful completion of a project. In the case of the two rural road case studies also it was found that the two Chief Engineers took personal pride in the completion of the projects and in showcasing their states as role models. Their vision and determination to complete the projects was exemplary.

*Resourcefulness (financial as well as accessing technology and expertise):* Most of the case studies had the good

fortune of having good financial strength and strong technical partners giving them the scope to implement the projects using the latest technology and expertise. Examples include BIAL, CIAL, and all the NH projects in the road sector.

### 2.2.3 Project design

A good project design provides for equitable sharing of risks and responsibilities between the promoting and implementing agencies. The Delhi Airport Metro Project provides a good illustration of this approach (Box 2.3).

#### BOX 2.3: Project Design and Risk-sharing: The Case of the Delhi Airport Metro

The 22.7 km long metro line that connects the city centre to Terminal 3 of the new international airport and runs further to Sector 21 of the Dwarka residential area is the first PPP in the railway sector involving passenger services. Termed the Delhi Airport Metro Express (DAME), the project is a JV between DMRC and a private consortium comprising Reliance Infrastructure and CAF of Spain.

The project cost Rs 5,750 crore of which DMRC's share was 50 per cent. The project was awarded in January 2008 through an international bid in which five consortia, each with a foreign partner participated. The Reliance-CAF consortium won the bid on the strength of the highest concession fee quoted (Rs 51 crore per annum, escalated by 5 per cent annually). The concession period is 30 years and in addition to the concession fee, the firm also pays an annual revenue share that will progressively increase from 1 per cent in first five year period to 5 per cent from year 16 onwards.

The actual construction of the project which is part elevated and part underground and runs through some busy areas was technically challenging. The underground section involved a geo-technical challenge of digging 36 metres below the surface in the Rajiv Chowk area in the heart of the city. This was completed in a record time of 30 months. The total time from invitation of bid to the commissioning of the line (January 2011) was under four years.

DMRC's role included all land acquisition and resettlement, obtaining regulatory approvals, and carrying out EIA and civil works involving tunnels, viaducts, and stations. The tunnel boring was done in advance of the project award, which saved working time. The experience gained by DMRC in the main Delhi Metro Project made this sharing of responsibilities a sound proposition for timely project implementation. The DAME consortium was responsible for the mechanical, electrical, signaling, and communication parts plus ancillary works (like air passenger check-in terminals at select stations) and also the supply of all rolling stock.

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The project's DPR was prepared by DMRC which also firmed up all design issues to which the line was built. However, DAME got a 'Design Project Report' compiled by an experienced overseas design consultant and got its own EIA to assess train noise and effect of night time working by an outside consultant (although it was not under a contractual obligation to do so). On its part, DMRC got a Model Concession Agreement drawn up in advance by engaging a group of expert consultants from India and abroad. Though not without its share of shortcomings (for example, some design changes were made in the course of implementation and the DPR overlooked potential construction risks) the project could be implemented in time mainly because of its design features. The risk-sharing model was favourable for the private partner for the implementation phase. The commercial and operational risks are, however, with DAME. Although unusual in comparison with run-of-the-mill infrastructure projects where the private partner is exposed to higher implementation risks, this model is based on the sound principle of each party sharing the risk that it is best positioned to take. The inherent nature of the project and its political importance obviously weighed in this approach and the successful implementation proves its soundness.

Minimizing the risk to private parties in PPPs enhances their chances of success. This means well-thought out project designs and sponsoring agencies (government or state-owned) taking over responsibilities that they can perform better. Examples of land acquisition for NH schemes, State Support Agreements in the case of ports, and financial support from the state and central governments in the case of BIAL and for the Namma Metro Project are examples of this.

In the case of the Bengaluru International Airport also, land acquisition was hardly an issue as the land for the project was acquired by the government before the start of the project. This acted as a major incentive for the consortium to take up the project and move ahead without having to face any major hurdles on this crucial front. Additionally, the government set up the new Air Traffic Control tower needed for operations at the airport.

#### 2.2.4 Planning and leadership

The DPR's quality leads the field in the efficient planning of a project.

Poor quality DPRs and EIA reports is a general weakness of infrastructure projects in India. This study notes that even DPRs prepared by experienced agencies often carry inexplicable omissions which have the potential to cause delays. The success stories among the case studies were also not free from such weaknesses.

For instance, the DPR for the Mumbai Monorail Project failed to anticipate the need for forest clearance for a stretch of the alignment and for security clearance with respect to a high security prison also falling on the route. It was because of the resourcefulness of the implementing agency that serious delays were avoided.

In the case of Namma Metro, the DPR overlooked the need for escalators in certain stations, a design omission that needed to be rectified during project execution.

In fact, in a majority of the case studies, the DPRs were prepared by external consultants appointed with the consent of both the government and project partners. In the case of State Highway projects, the DPRs did not take into account several utilities that needed to be shifted; hence project promoters had the dual task of actually re-doing the DPRs and carrying the projects forward. Issues related to poor DPRs continue to be a major hurdle in the implementation of infrastructure projects.

*Planning capability all around is a key factor in successful project implementation:* The Bengaluru International

Airport was completed almost on time with a few months delay which is largely attributable to the planning capability of BIAL, good monitoring and performance evaluation of the staff involved in the project, and having back up plans in place in case of a financial crunch and changes in design.

The role of effective leadership for implementing major infrastructure projects is also widely acknowledged. Several of the cases studied were marked by good leadership. As an example, see Box 2.4 which gives details of the Cochin International Airport.

From among the case studies, the Adani Group's role in setting up of the Dahez Port and the contributions of Mr V J Kurien, in the setting up of CIAL, provide examples of effective leadership leading to successful

#### **BOX 2.4: Cochin Airport Project**

##### **Key facts relating to Project**

Cochin International Airport (CIAL) also known as Nedumbassery Airport, is the largest and busiest airport in Kerala. The airport was the first to be developed under a PPP model. The project commenced on 21<sup>st</sup> August 1994 and was completed on 25<sup>th</sup> May 1999. The total cost of the project is estimated to be around Rs. 283 crores. Fifteen hundred acres (6,100,000 m<sup>2</sup>) of land was acquired for the construction of the airport. Approximately, 2,300 landowners and 872 families were resettled under a rehabilitation package. Major electric lines and an irrigation canal had to be delivered for the construction.

##### **Imaginative Approach to financing the project**

The idea of raising money to finance the project through private individuals (in this case Gulf based NRIs) came up from a relatively junior civil servant. Private placement efforts brought in Rs 15 crore as equity. A majority of the NRIs as well as domestic investors were attracted to the project through word of mouth publicity and news about CIAL.

##### **Outstanding Leadership**

Speedy implementation was facilitated by the key interest of the State's top political leadership. The presence of the Chief Minister and legislators as board members facilitated the company to work around complex governmental systems, particularly land acquisition. Dedication and supreme vision of the CEO of CIAL, Mr V.J. Kurien.

*(Contd...)*

### **Land Acquisition Process**

The project CEO took charge of personally convincing the farmers and the locals during the land acquisition process. Employment was provided to all those who gave up their land during the construction of the airport and thereafter at the airport itself.

### **Contribution by Project to Fast Growth of City**

The airport is the primary base for the operations of Air India Express and is a focus city for Air India, GoAir, IndiGo, Jet Airways, JetLite, SpiceJet, and Kingfisher Airlines.

Efficient financial mobilization and the claim on distinction of not losing even one day of project time due to labor unrest has contributed to chain effects on other developments like setting up of 'Smart City'.

The Chief Minister of Kerala remains as ex-officio chairman of CIAL and elected legislators, bureaucrats, nominees of financial institutions (FIs), and investor directors are on the company board. A senior civil servant is the Managing Director.

implementation of projects. As noted in the case studies given elsewhere in this report, chief engineers of the two rural roads surveyed as a part of the study showed good leadership in the completion of the projects.

### **2.2.5 Context and circumstance**

Here we take up factors external to the projects which contributed in some cases to their successful implementation.

Good coordination between central and state agencies in the Namma Metro case has been noted earlier. This was also seen in the case of CIAL where there was continued coordination between the state government of Kerala and the central government for setting up the airport. As also noted earlier, a major external factor in the setting up of CIAL was the financial and other support by non-resident Keralites.

*Political environment:* High importance of the Delhi Airport Metro because of political importance attached to this scheme, involvement of high level

bureaucrats in the case of CIAL and the influence of the GVK group in the setting up of NH projects in the roads sector could be cited in this context.

*Economic environment:* Large high profile projects like new airports and urban rapid transit systems become possible only in a stable overall economic environment. Most of the projects studied were in the relatively advanced states of Karnataka, Andhra Pradesh, and Maharashtra. However, smaller states like Rajasthan and Himachal Pradesh have also done extremely well which is evident from the success of the rural road projects in both these states. Several incentives being offered to investors by the governments in these states are a major attraction for setting up businesses in the growing states of north and northeast India. The case studies covered two from Gujarat which are proving to be role models for PPPs in the country.

*Fortuitous circumstances:* In the Namma Metro case, one particular land acquisition deal was taken to court through a PIL, but the High Court's decision rejected the appeal on the ground of larger public interest in the completion of the project.

The Delhi Airport Metro had the advantage of high political importance which helped in getting cooperation and clearances from other state agencies in acquiring land etc. In the case of Namma Metro, the tag of being the IT capital of India strengthened the resolve of all the major parties involved in the project to finish it at the earliest.

The Rosa Power Project benefited because of spadework done by the power company before it was acquired by Reliance. In particular, environmental clearances were obtained very speedily.

### 2.2.6 Promoters' experience, consortium strength

The experience and strength of promoting groups and of overseas partners (where a consortium is involved) are strong factors contributing to successful implementation. A good illustration is provided by the National Highway scheme (Box 2.5).

The originally estimated project cost was Rs 315 crore but the company managed to complete the project at a total cost of Rs 297 crore, translating into a per

#### BOX 2.5: Tuni Anakapalli Annuity Road Project

##### Key facts relating to the Project

A SPV, GMR Tuni-Anakapalli Expressways Private Limited (GTAEPL) was formed to implement the project in the Tuni Anakapalli section on NH-5 in Andhra Pradesh on a Build, Operate, and Transfer (BOT) annuity basis. The task was to strengthen the 59 km Tuni Anakapalli section on NH-5 from the existing 2-lanes to a 4-lane dual carriageway. It was a part of the 42 individual road expansion projects that were taken up to improve NH-5, 6, and 60 (the Kolkata-Chennai stretch) under NHAI's Golden Quadrilateral initiative. NHAI awarded the concession to GTAEPL in October 2001 after a delay of six months. The delay in initiating the tendering process was the main reason behind overshooting the scheduled date. The concession period for the project is 17.5 years which includes a construction period of 2.5 years.

The concessionaire not only managed to complete the project on time, but also completed the construction at a lower cost. Currently, the project is in operation in its seventh year and it has been progressing without any problems. The company achieved commercial operations on 24 December 2004 and operation and maintenance of the project commenced after achieving commercial operations. The company has started receiving annuities from May 2005.

### Important milestones of the project

Milestones	Date
Project Bids – Request for Qualification	25 December, 2000
Date on which Environmental Clearance was Received	30 June, 2001
Project Bids Awarded – Request for Proposal	1 August, 2001
Signing of the Concession Agreement with NHAI	9 October, 2001
Signing of Engineering, Procurement & Construction (EPC) and Operations & Maintenance (O&M) Agreements with United Engineers (Malaysia), Berhad & United Engineers Development India Pvt. Ltd	10 January, 2002
Commencement of Construction	9 May, 2002
Financial Closure Achieved	26 June, 2002
Signing of State Support Agreement with Andhra Pradesh & NHAI	18 March, 2003
Commercial Operation Date	24 December, 2004
End of Concession Period	November, 2019

Source: GMR annual report 2005-06.

kilometre cost of Rs 5 crore. NHAI is paying the concessionaire a fixed annuity of Rs 29.48 crore semi-annually for 15 years starting from 9 May 2005 to 9 November 2019. The project was funded on a debt equity ratio of 3:1. The term loan component was Rs 154 crore, the non-convertible debentures component was Rs 82 crore, and the equity component was Rs 78.69 crore. The equity funding for the project was primarily through the issue of preference shares (DEA, 2010).<sup>2</sup>

### Promoting Agency

The GMR Group had a 74 per cent stake and United Engineers Malaysia (UEM) had a 26 per cent stake in GTAEPL, which was formed to execute the project. The GMR consortium stabilized its risks by entering into a long-term O&M contract with its own consortium partner United Engineers Development India Private Limited (a subsidiary of UEM), thereby transferring a substantial risk of the project.

<sup>2</sup> Public Private Partnership Projects in India, Compendium of Case Studies, Dept of Economic Affairs (DEA), Ministry of Finance, Government of India, December 2010.

### Shareholding pattern of GMR Tuni-Anakapalli as on April 30, 2006

S. No.	The equity shareholding pattern - Shareholder	Percentage (%)
1.	GMR Power Corporation Private Limited	51
2.	UE Development India Private Limited	26
3.	GMR Infrastructure Limited	10
4.	GMR Energy Limited	13
	<b>Total</b>	<b>100</b>
	<b>The preference shareholding pattern - Shareholder</b>	
1.	GMR Infrastructure Limited	74
2.	UE Development India Private Limited	26
	<b>Total</b>	<b>100</b>

Source: GMR annual reports 2005-06.

#### NHAI and State Government's Support

Approvals and clearances such as from the Andhra Pradesh Pollution Control Board were obtained on time with assistance from NHAI and signing of a state support agreement with the Andhra Pradesh government. Therefore, the role played by NHAI and by the state government was significant in getting all necessary approvals and in obtaining access to all necessary infrastructure facilities and utilities, including water, electricity, and telecommunication.

#### Contributing Factors to Successful Implementation

A proactive concessionaire and an active role played by NHAI were the main factors behind the successful completion of the project. The GMR Group not only managed the risks involved efficiently, it also handled financials resources well. The funds for the project were raised at a cost lower than the cost of project debt by about 3 per cent. This was done through securitization of the future annuity payments to be received from NHAI. Moreover, the

concessionaire had stabilized its risks by entering into a long-term O&M contract with its own consortium partner, United Engineers (Malaysia), Berhad-United Engineers Development India Private Limited, thus transferring a substantial risk of the project.

NHAI obtained environmental clearances before awarding the project. Responsibility of land acquisition was also with NHAI. The State Support Agreement by GTAEPL with the government of Andhra Pradesh and NHAI also ensured that all administrative clearances and approvals were obtained smoothly and on time.

It was easier to get financing for the project due to the fact that it involved minimum risk as it was an annuity based project and this did minimize financial risk due to assured annuity payment by NHAI. Land acquisition risk was also borne by NHAI. All this provided a sense of security to the financial institutions that funded the project. Financial institutions led by IDBI, including major investors like IDFC, UTI, LIC, GIC, and HDFC were involved in sponsoring the project.

Even though Tuni-Anakapalli was amongst the first set of projects completed through the BOT (annuity) model, the project, till date, has been progressing well and has created a demonstration effect for projects to be taken up on similar lines.

Apart from BIAL which has been cited earlier, the Mumbai Monorail and the Delhi Airport Metro are other examples of this strength.

### 2.2.7 Positive political, public perception of project's importance

Several of the cases studied, e.g, CIAL, Delhi Airport Metro, Krishnapatnam port, are examples of a favourable political environment contributing to timely project implementation. The case of the State Highway scheme in Gujarat presented in the Box 2.6 provides another example.

#### BOX 2.6: Ahmedabad-Mehsana State Highway, State Highway No. 41

##### Key facts relating to the Project:

The assignment consisted of linking Ahmedabad (Gujarat) with the industrial township at Mehsana (Gujarat), an important oil town to the north of the city labeled as the State Highway (SH) No.41.

It was the first project of its kind in the state.

A **Memorandum of Understanding (MoU)** was signed between IL&FS and Gujarat and a SPV the Ahmedabad-Mehsana Toll Road Highway or AMRTL was created. This was followed by a detailed feasibility study or DPR conducted by Scott Wilson. International competitive bidding took place following this. Larsen and Toubro (L&T) won the contract and implemented the project on an EPC basis. It was part of the contract that they would also be equity partners in the project.

The quick implementation of the project was aided by the fact that the **government had acquired most of the land** much before the project was taken up. The GoG gave all the land and it was sufficient to start construction (40 km). There were 12 km that were still left to be acquired but this did not hamper progress.

**Public Perception:** The implementation of Land Acquisition and Rehabilitation & Resettlement (LARR) Policies got special mention in a World Bank study.

There were 6 km of bypass that did pose a risk since the land owners were not happy with the compensation rate paid by the government under the Land Acquisition Act. IL&FS used replacement costs to calculate compensation for land and houses. The difference was paid as rehabilitation assistance from project funds.

IL&FS also introduced incentive-based income-generation schemes as part of rehabilitation assistance.

There was **repayment of outstanding debts** on lost assets (as a grant).

- **Other factors contributing to the project's success:** Cooperation of all agencies involved.
- Internationally experienced firm to draw up the DPR.
- Detailed DPR.
- Design of the project which would aid the contractor to build quickly.
- Competitive bidding for EPC contract.

(Contd...)

- Geographical location.
- Professional experiences of all parties concerned.
- Independent engineers.
- The project was done in the earlier years when there was less pressure on land as compared to what it is in 2011.
- Risk matrix which took into account proper account of all risks.
- MS projects used to monitor milestones.
- Pro-active state policies.

## 2.3 Sustainability-related Issues

Transparency is an important element for ensuring smooth execution and long-term sustainability. In the case of SH projects studied, there were several bidders and competitors for the projects. Importance of rule-based decisions that ensure fairness as well cannot also be overemphasized.

Involvement of competent technical agencies like L&T which have vast experience in the setting up of infrastructure projects in India added more credibility to a project as was the case in BIAL.

*Setting up autonomous regulation:* This is still an area where a lot needs to be done in the Indian context. Several other countries which have a robust model of PPPs have set up autonomous regulations in various infrastructure sectors. Many countries have amended (or are currently amending) their existing legislations in order to clearly specify the powers of public bodies to contract out services under PPPs. Legislation addressing PPP arrangements should identify which sectors may make use of PPPs, how PPP tariffs are set and adjusted, the role played by different institutions in making PPPs happen, how PPPs should be procured, and methods for the resolution of any disputes that may arise between contracting partners. In some countries, laws relating to PPPs extend as far as describing the specific procurement

methods that must be employed and the required form and content of contracts. New legislations are particularly useful in helping clarify the overall legal framework for PPPs, by consolidating all provisions needed in the pursuit of PPPs, and by creating dedicated institutions to assist the PPP process. Existing laws can often be used as a framework in the development of secondary legislations and regulations. For example in 2004, Romania passed a law governing PPP contracts and concessions which modified existing legislations, giving responsibility for the elaboration of secondary PPP legislations to the Ministry of Public Finance. The national government of South Africa has also used existing financial management legislations to develop new regulations which insist on oversight by the central government of PPPs procured by the provinces.

For purely public sector schemes, maintenance obligations devolving on contracting agencies contribute to the sustainability of projects. Rural road schemes under PMGSY carry a five year obligation for the selected project contractor to maintain the roads constructed by it.

## 2.4 Other Learnings

Despite efforts, response to the stakeholder questionnaire designed and circulated was much less than expected. However, responses were obtained from

the stakeholders as part of the case studies; some were also collected independently. One point that comes out clearly is that selection processes for projects are now quite fair and leave little room for complaint.

Among the other additional findings of this study are:

Successful projects often involve higher costs — owing to superior inputs — so a cost effective approach is crucial to timely implementation of especially large infrastructure projects. This makes it all the more important that the selection process for project implementers is fully transparent and adequate competition is generated.

International tie-ups could be beneficial in various ways even where new technology is not involved. As noted in the Box on the Tuni-Anakapalle NH project a foreign agency can bring in strengths both with regard to reduced financing costs and timely implementation through a subsidiary company. Another example is of BIAL where the involvement of Zurich Airport made technical know-how a strength in the implementation of the project.

The Namma Metro Project is a collaboration between the central and state governments and is thus a public sector project. However, the association of foreign lenders contributed to improved monitoring and reviewing systems and to successful implementation.

This observation could apply also to the association of an experienced (renowned) indigenous agency like DMRC which helped both the Delhi Airport Metro and Namma Metro.

As noted earlier, the Krishnapatnam Port Project was implemented in record time partly because of turn-key construction by an in-house agency with adequate experience.

Likewise, knowledge of working in a native (even local) environment can be an advantage for successful implementation. Examples of the Tuni-Anakapalle Highway, Krishnapatnam Port, and rural road schemes serve to illustrate this.

Recent experience of the Mundra and Krishnapatnam UMPPs — not a case study project — illustrates that even a successful design for the award of a project could lead to unanticipated problems. In these cases, the price of imported fuel was not within the ambit of *force majeure* and there is uncertainty with regard to project operations and the possibility of disputes. This underlines the need for constant review of the viability of even successful models for project awards.

Also on the negative side, uncertainties regarding future pricing arrangements could pose a question mark over the long-term sustainability of even well-executed projects. The case of the Mumbai Monorail provides one illustration.

Geographical location also plays a key role in the successful implementation of projects. Most of the port and airport projects are on the outskirts of cities giving them ample space to execute the projects without any disturbance to the city's environment and traffic. BIAL, Krishnapatnam Port, and all the NH and SH projects along with the rural road projects, had ideal locations as one of the factors for their success.

This highlights the need for extra efforts to anticipate problems and be ready with solutions in the case of projects not favourably located.

## 2.5 Summing Up

PPPs are still a relatively new phenomenon in India and in a nascent stage compared to the advanced models of PPPs in other countries. Until 2004, there

were only 85 PPPs, but between 2004 and 2005, this figure leapt to 500, and in 2011 the number of PPPs in the country had increased to 840 as per the PPP database of the Government of India. PPPs worth billions are under development across the country, with the largest number of projects in the road and bridges sector, followed by ports. These sectors dominate PPP initiatives. The leading state users of PPPs by number of projects are Madhya Pradesh and Maharashtra, followed by Gujarat, Tamil Nadu, and Karnataka. Almost all contracts have been of the BOT/BOOT type or their close variants, which involve user payments. Table 2.3 shows that the largest number of PPPs in India have been in the road sector followed by urban development, energy, and port sectors.

**Table 2.3: All India PPP Projects in India**

Sector	Number
Airport	5
Education	19
Health Care	8
Energy	72
Ports	62
Roads	445
Railways	9
Tourism	53
Urban Development	167
Total Projects	840

**Table 2.4: PPP Projects in Central and State Sectors in India**

	No. of Projects	Project Cost (Rs. Cr.)
National Highways	172	96,152
Major Ports	21	14,735
Airports	5	19,111
Railways	7	2,418
Energy	4	17,500
Total	209	149,916
<b>State Sector</b>		
Roads	273	123,386
Ports	41	66,479
Airports	-	-
Railways	2	1,494
Urban Infrastructure	166	84,914
Energy	65	56,185
Tourism	50	4,497
Other Sectors	34	3,756
Total	631	340,711
Grand Total	840	490,627

Source: Downloaded from: [www.pppindiadatabase.com](http://www.pppindiadatabase.com) (on 1 December, 2011).

Contrary to common perceptions, most of the PPPs are in the state sector and not the central sector (Table 2.4).

### General trends with regard to shares of projects getting implemented on time.

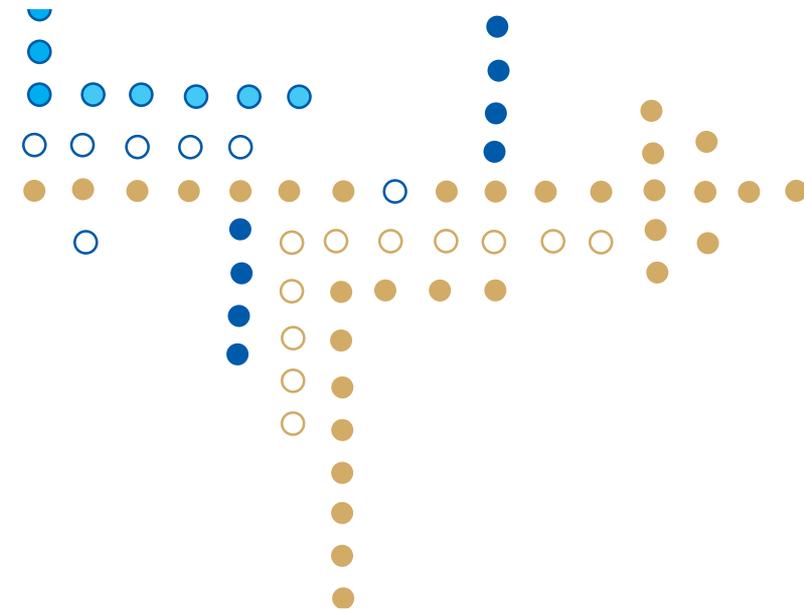
According to a study conducted by KPMG (2010), and the Project Management Institute (PMI), 41 per cent of the 1,053 completed projects over the last 17 years witnessed budget overruns while 82 per cent of them witnessed schedule overruns. According to the study, inadequate design and planning coupled with scope creep and material cost escalations were identified as the biggest reasons for schedule and budget overruns. Cost effective project designs emerged as one of the most efficient tools to control project costs.

PPPs have compensated for the budgetary and borrowing constraints of governments. They also imply efficiency gains, efficient use of resources, availability of modern technology, and better project designs. They have also led to faster implementation, reduced lifecycle costs, and optimal risk allocation. The private sector has welcomed the central government's attempts to encourage private sector-led growth and investment. Projects in the roads sector now attract far more bidders than they did five years ago. Apart from the projects surveyed in the study some projects, such as the Coimbatore Bypass, Mumbai-Pune Expressway, Pipavav and Mundra ports, Delhi and Hyderabad airports, and the Mundra and Sasan UMPPs demonstrate the efficacy of the PPP model in India.

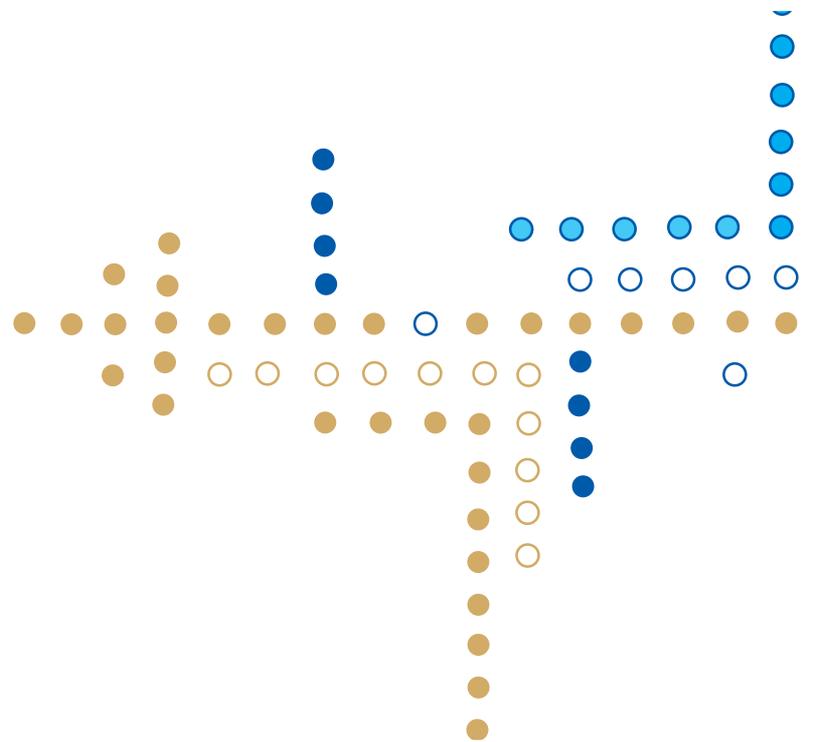
*Economic Survey* (2008-09) noted six key hurdles faced by PPPs: policy and regulatory gaps; inadequate availability of long-term finance; inadequate capacity in public institutions and public officials to manage PPP processes; inadequate capacity in the private sector—both developer/investor and technical manpower; inadequate shelf of bankable infrastructure projects that can be bid out to the private sector; and inadequate advocacy to create greater acceptance of PPPs by stakeholders. Undoubtedly, India has to proceed with caution with respect to PPPs, ensuring necessary checks and balances because the benefits of private sector efficiencies will come at a price.

In this context, and in view of ensuring project sustainability over the long term, the suggestion for independent regulatory bodies in core infrastructure sectors, such as the transport sector—comprising highways, railways, urban metros, ports, and airports—is a welcome suggestion for future reforms. Measures also need to be taken to make existing regulatory agencies in the power sector more effective.

To make PPPs a success, state governments need to establish full-fledged PPP departments mandated with developing core competencies, policy frameworks, and public discourse. Lessons and experiences of other emerging markets in this context would also be helpful. Rigorous assessment of the costs and benefits of large projects would also be critical for achieving broader public support for the projects.



# 3 Compendium of Case Studies



# Roads

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## Tuni–Anakapalli Annuity Road Project

### Background of the Sector

National Highway Development Programme (NHDP) projects are being implemented in four phases—I, II, III, and V. As on 30 April, 2011, out of a 5,846 km stretch of the NHDP Golden Quadrilateral (GQ), 5,824 km had been completed (99.6 per cent) and 22 km were under implementation. Work on the remaining GQ packages is likely to be completed soon. With regard to physical progress along the North-South (N-S) and East-

West (E-W) corridors, work of 4-laning has been completed on a 5,683 km stretch, while another 1,038 km stretch is currently under execution; a 421 km stretch along N-S and E-W corridors still remains to be awarded.

Under NHDP Phase III, out of a total stretch of 12,109 km, 19 per cent has been completed, 48 per cent is currently under execution, and the remaining 33 per cent is yet to be awarded:

NHDP & Other length Projects		Total Already (km)	4-laned (km)	Under implementation (km)	Balance length for award (km)	Contracts under (No.) implementation (No.)	Likely date of completion
NHDP	GQ	5,846	5,824 (99.6)	22 (0.4)	-	8	-
	NS - EW Ph. I & II	7,300	5,683 (78)	1,038 (14)	421 (6)	88	December 2010
	NHDP Phase III	12,109	2,294 (19)	5,805 (48)	4,010 (33)	83	December 2013
	NHDP Phase V	6,500	596 (9)	1,918 (30)	3,986 (61)	18	December 2014
	NHDP Phase VI	1,000	-	-	1,000 (100)	-	December 2015
	NHDP Phase VII	700	-	41 (6)	659 (94)	2	December 2014
	SARDP-NE	388	-	112 (29)	276 (71)	2	-
	NHDP Phase IV	14,799	-	765 (5)	14,034 (95)	5	December 2015
	<b>NHDP Total</b>	<b>48,642</b>	<b>14,397 (30)</b>	<b>9,701 (20)</b>	<b>24,386 (50)</b>	<b>206</b>	<b>-</b>
Port Connectivity		380	316 (83)	64 (17)	0	4	-
Others		1383	936 (68)	427 (31)	20 (1)	6	-
<b>Total by NHAI</b>		<b>50405</b>	<b>15,649 (31)</b>	<b>10,192 (20)</b>	<b>24,406 (48)</b>	<b>216</b>	<b>-</b>

Source: NHAI, 2011. Available at: <http://www.nhai.org/WHATITIS.asp> (accessed on 2 September, 2011).

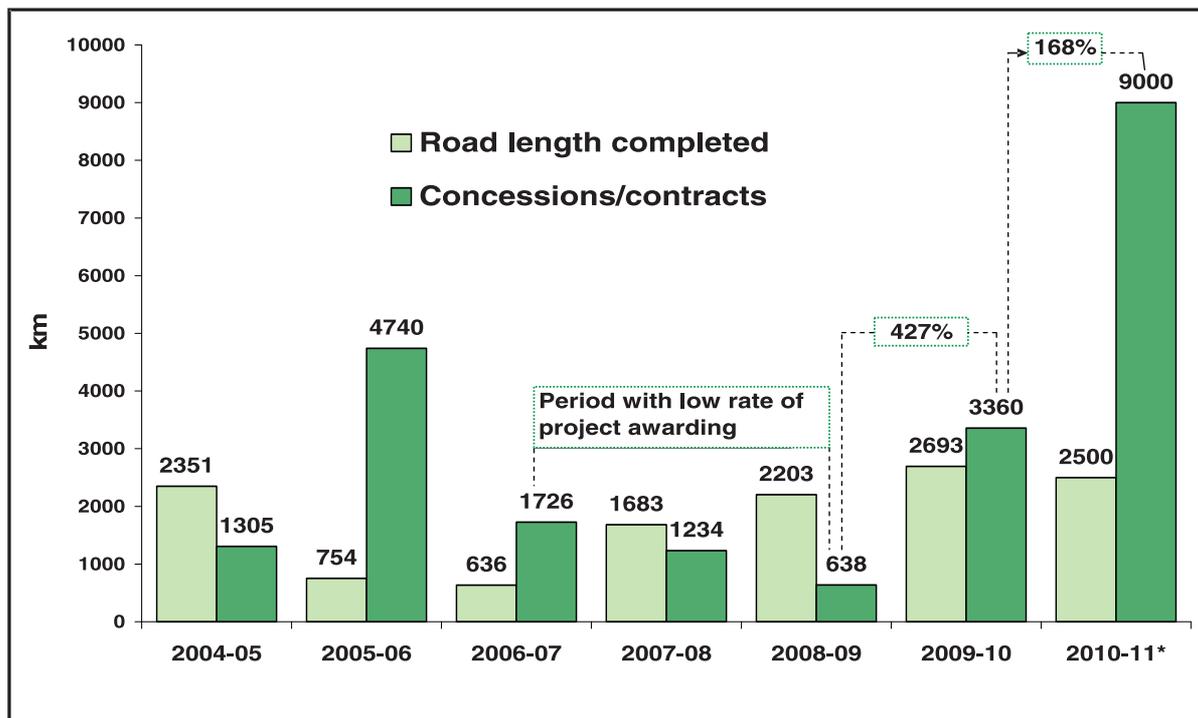
Note: As on 30 April, 2011. Figures in brackets are percentages of total length (km).

As for physical progress under NHDP Phase V, out of a total length of 6,500 km, 61 per cent is yet to be awarded, 30 per cent is under implementation, and 9 per cent work is complete.

The National Highway Authority of India's (NHAI) contract awarding rate was low during 2007–08 and 2008–09 mainly due to the economic slowdown as well as due to change in rules related to MCA that

resulted in policy confusion. NHAI awarded only 21 projects during the period (1,872 km), compared to what it awarded during 2005–06 and 2006–07, 154 contracts (6,474 km). The project completion rate was 81 per cent in 2004–05, which went down to 73 and 79 per cent in 2005–06 and 2006–07, respectively. A 56 per cent completion rate in 2007–08 was the lowest ever under NHDP (IDFC 2010) (see Figure 3.1).

**Figure 3.1: Status of concession award**



Source: IDFC (June 2010).

Note: \*Projected targets per Ministry of Road Transport and Highways (MoRTH).

**A summary of BOT (toll) projects as on 31 March, 2010 is:**

Category	Awarded		Total project cost (Rs in crore)	Awarded cost (Rs in crore)	Completed	
	No. of contracts	Length in km			No. of contracts	Length in km
NHDP Phase I	9	454.1	3,598	718.99 (19.98 %)	9	454.1
GQ	6	373.4	2,679.35	739.79 (27.62%)	6	373.4
Others	3	80.7	918.65	-20.80 (-2.26%)	3	80.7
NHDP Phase II	19	992.66	8,109.77	631.82 (7.790%)	14	713.83
NS - EW	16	787.44	6,849.77	683.916 (9.98 %)	11	508.63
Others	3	205.217	1,260	-52.1 (-4.13%)	3	205.217
NHDP Phase III	72	6138.49	50,451.36	9769.24 (19.36%)	9	518
NHDP Phase V	19	2300.35	21,390.28	661.55 (3.09%)	2	148.3
NHDP Phase VII	2	41	2,335	560.6 (24.00)	-	-
Total	121	9926.6	85,884.41	12342.1 (14.37%)	34	1834.23
DoRTH	3	83.4			2	30

Source: NHAI.

**A summary of BOT (annuity) projects as on 31 March, 2010 is:**

Category	Awarded		Total project cost (Rs in crore)	Awarded cost (Rs in crore)	Completed	
	No. of contracts	Length in km			No. of contracts	Length in km
NHDP Phase I	8	475.57	2,353.57	288 (12.23 %)	8	476
GQ	7	382.57	1,979	246 (12.43%)	7	383
Others	1	93	375	42 (11.2%)	1	93
NHDP Phase II NS-EW	19	961.89	12,811.67	1366.78 (10.668%)	5	328
NHDP Phase III	10	654.9	4,048.34	397.63 (9.822%)	-	-
NHDP Phase IV	1	176.3	2,498.76	290.8 (11.63%)	-	-
Total	38	2268.66	21,712.34	2343.21 (10.79%)	13	804

Source: NHAI.

In the first phase of NHDP—the 5,846 km Golden Quadrilateral—out of 128 projects, nine projects were taken up on a build, operate, and transfer (BOT) (toll) model and eight were constructed on BOT (annuity) model.

In the second phase of the North-South, East-West connectivity corridors spanning 6,161 km, out of 212 projects, 16 projects were built on the BOT (toll) model and 16 projects were constructed on the BOT (annuity) model. According to the mid-term appraisal

of 11<sup>th</sup> Five Year Plan, during the first three years of the Plan, NHAI mainly awarded projects based on

BOT (toll)—during 2009–10, NHAI awarded 38 BOT (toll) based projects and just three annuity based projects:

Year	BOT (Toll)			BOT (Annuity)		
	No. of contracts	Length (km)	TPC (Rs in crore)	No. of contracts	Length (km)	TPC (Rs in crore)
2007–08	8	1,108.80	8,057	1	36.2	209
2008–09	7	638.7	8,151	-	-	-
2009–10*	38	3,188.20	31,638	3	171.8	1,775

Source: Mid-term appraisal, Transport, 11<sup>th</sup> Five Year Plan.

Note: \*upto March 2010.

**Table 3.1: Road Transport & Highways Central Projects (as on 30.06.2009)**

Category*	Total No. of projects	Within time and cost	Within time but with cost over runs	Within cost but with time over runs	With time and cost over runs
Major	178	32 (18)	1 (1)	136 (76)	9 (5)
Medium	18	4 (22)	0	12 (67)	2 (11)
Total	196	36 (18)	1 (1)	148 (76)	11 (6)

Source: Project implementation status report of central sector projects, MoSPI (April-June 2010).

Note: Figures in parenthesis are a percentage of the total number of projects. \* Major projects (each costing between Rs 100 crore and Rs 1,000 crore) and medium projects (each costing between Rs 20 crore to Rs 100 crore).

Time and cost overruns have been the most important issues with highway projects. Table 3.1 gives details on time and cost overruns in road transport and highway projects under the central sector. Overall 87 per cent of the projects under the central sector suffered from either time or cost overruns as on 30 July, 2009. Total cost overruns were Rs 653 crore. Among time overruns, on an average projects suffered time overruns of 28 months. Though Table 1 indicates that time overruns were major as compared to cost overruns, but over the period, time overruns ultimately led to cost overruns due to inflationary situations and increasing cost of raw material and equipment. Time overruns also mean underutilization of existing resources employed by a contractor. As many as 148

out of the 196 road projects under the central sector suffered from time overruns.

#### Private sector Participation Policy

To encourage private investment in the road sector the National Highways Act (NH Act) 1956 was amended in June 1995. This amendment allowed private investors to invest in road projects and also allowed them to levy and collect a user fee. The government has announced several measures to attract private investment, both domestic and foreign, in the road sector. This includes:

1. Government to bear the cost of:
  - a. Project feasibility study,

- b. land for the right of way and wayside amenities,
  - c. shifting of utilities, and
  - d. environment clearance, cutting of trees, etc.
2. Foreign direct investment up to 100 per cent in the road sector.
  3. Provision of subsidy up to 40 per cent of project cost to make projects viable. The quantum of subsidy to be decided on a case-to-case basis.
  4. 100 per cent tax exemption in any consecutive 10 years out of 20 years after commissioning of the project.
  5. Duty free import of high capacity and modern road construction equipment.
  6. Declaration of the road sector as an industry (infrastructure as defined in section 18(1)(12) of the Infrastructure Act includes roads).
  7. Easier external commercial borrowing norms.
  8. Right to retain toll – toll rates are indexed to the wholesale price index (adapted from [www.morth.nic.in](http://www.morth.nic.in)).

Primarily three forms of public-private partnerships (PPPs) have been in use in the highway sector in India:

- (i) Build, Operate, and Transfer (BOT) toll basis;
- (ii) Build, Operate, and Transfer (BOT) annuity basis;
- (iii) Special Purpose Vehicle (SPV) basis.

### Snapshot of the Project

A special purpose vehicle (SPV)—the GMR Tuni Anakapalli Expressways Private Limited (GTAEPL) was formed to implement the project in the Tuni Anakapalli section on NH-5 in Andhra Pradesh on a BOT (annuity) basis. The task was to strengthen the 59 km Tuni Anakapalli section on NH-5 from the existing 2-lanes to a 4-lane dual carriageway. It was a part of the 42 individual road expansion projects that were taken up to improve NH-5, 6, and 60 (the Kolkata-Chennai stretch) under NHAI's Golden Quadrilateral. NHAI awarded the concession to GTAEPL in October 2001 after a delay of six months (the original date for award of the project was March 2001). The delay in initiating the tendering process was the main reason for overshooting the scheduled date (the other details of the project are given in Table 3.2).

**Table 3.2: Project brief of GTAEPL**

Project Brief	
Section	Tuni Anakapalli on NH-5 in Andhra Pradesh
Length of the project	59 km
Type	Build, Operate, and Transfer (BOT)
Basis	Annuity
Project Cost	Rs 2,952.45 million
Annuity Amount	Rs 294.81 million payable half yearly
Partners	United Engineers (Malaysia) Berhad and UE Development India Limited – Engineering, Procurement & Construction (EPC)
Concession Period	17.5 years
	Construction period: 2.5 years
	Operation period: 15 years

The major benefits of the project that were envisaged before it started operations were access to markets for the local population, reduction in vehicle operating costs, fiscal saving for the state exchequer, employment in the local region, investment in industries in the local region, and escalation in real estate prices in the local region.<sup>1</sup>

#### a) Type

The project was undertaken on a BOT (annuity) basis. This BOT (annuity) model involves NHAI paying a fixed semi-annual amount to the concessionaire for the entire concession period. The BOT (annuity) model is generally selected when return on the project is considered to be low to compensate for capital costs and operations and maintenance (O&M) expenses.

#### b) Value

The original estimated project cost was Rs 315 crore but the company managed to complete the project at a cost of Rs 297 crore, translating into a per kilometre cost of Rs 5 crore. NHAI is to pay the concessionaire a fixed annuity of Rs 29.48 crore semi-annually for 15 years from 9 May, 2005 to 9 November, 2019.

The project was funded on a debt-equity ratio of 3:1. The term loan component was Rs 154 crore, the non-convertible debentures component was Rs 82 crore, and the equity component was Rs 78.69 crore. The equity funding for the project was primarily through the issue of preference shares (DEA 2010)<sup>2</sup> (Table 3.3).

It was easier to get financing for the project due to the fact that it involved minimum risk as the annuity nature of the project did minimize financial risks due to assured annuity payment by NHAI. Land acquisition risk was also borne by NHAI. This together provided a sense of security to financial institutions, which funded the project. Financial institutions led by IDBI, including major investors like IDFC, UTI, LIC, GIC, and HDFC are involved in sponsoring the project.

#### c) Promoting Agency

The GMR group had a 74 per cent stake and UEM a 26 per cent stake in GTAEPL to execute the project (Table 3). The GMR consortium stabilised its risks by entering into a long-term O&M contract with its own consortium partner United Engineers Development India Private Limited (a subsidiary of United Engineers (UEM) Malaysia), thereby transferring a substantial risk of the project (Table 3.4).

**Table 3.3: Equity shareholding pattern of GMR Tuni-Anakapalli as on 30 April, 2006**

S. No.	Name of the shareholder	No. of shares of Rs 10 each	(%age)
1	GMR Power Corporation Private Limited	510,000	51
2	UE Development India Private Limited	260,000	26
3	GMR Infrastructure Limited	100,000	10
4	GMR Energy Limited	130,000	13
	<b>Total</b>	<b>1,000,000</b>	<b>100</b>

Source: GMR annual reports 2005-06.

<sup>1</sup> Source: <http://www.pppindiadatabase.com> (accessed on October 2011).

<sup>2</sup> Public Private Partnership Projects in India, Compendium of Case Studies, Department of Economic Affairs (DEA), Ministry of Finance, Government of India (December 2010).

**Table 3.4: Preference shareholding pattern of GMR Tuni–Anakapalli as on 30 April, 2006**

Sl. No.	Name of the shareholder	No. of shares of Rs 10 each	(%)
1.	GMR Infrastructure Limited	5,755,720	74
2.	UE Development India Private Limited	2,022,280	26
	<b>Total</b>	<b>7,778,000</b>	<b>100</b>

Source: GMR annual reports 2005-06.

### How Secured?

The project was secured by a two-stage competitive bidding process. The first stage was to qualify bidders based on their technical experience and financial capability, while the second stage was to select the final developer based on the annuity amount quoted (DEA 2010). The request for qualification (RFQ) stage had 16 bidders while the request for proposal (RFP) stage had six bidders, of which the GMR Group (that included GMR Power Corporation Private Limited, GMR Infrastructure Limited, and GMR Technologies and Industries Limited), in

consortium with the UEM Group of Malaysia, won the project contract to develop, operate, and maintain the Tuni Anakapalli road section (59 km) for a 17.5 years concession period including the construction period of 2.5 years (DEA 2010).

### Implementation

The company started commercial operations on 24 December 2004; O&M of the project started after the commercial operations. The company started receiving annuities from May 2005 (the important milestones of the project are given in Table 3.5).

**Table 3.5: Important Milestones of the Project**

Milestones	Date
Project bids – request for qualification	25 December, 2000
Date on which environmental clearance was received	30 June, 2001
Project bids awarded – request for proposal	1 August, 2001
Signing of the concession agreement with NHAI	9 October, 2001
Signing of engineering, procurement, and construction (EPC) and operations & maintenance (O&M) agreements with United Engineers (Malaysia), Berhad & United Engineers Development India Pvt. Ltd	10 January, 2002
Commencement of construction	9 May, 2002
Financial closure achieved	26 June, 2002
Signing of state support agreement with Andhra Pradesh & NHAI	18 March, 2003
Commercial operation date	24 December, 2004
End of concession period	November, 2019

Source: GMR annual report 2005-06.

## Operations

The project is in its 7<sup>th</sup> year of operations and it has been progressing without any problems.

## Distinguishing Features

Tuni Anakapalli was one of the first BOT (annuity) projects in the country. NHAI came out with the annuity format for the first time to ensure that the public-private partnership model (PPP) went a long way in highway projects where a toll based model of BOT was not feasible.

The concessionaire not only managed to complete the project on time, but also completed the construction at a lower cost. It was able to bring in innovative financing techniques, such as securitisation to lower the overall cost of funds for the project (DEA 2010).

The annuity model ensured that the government had to make no upfront investment in the project and

had a fixed predetermined annual outflow towards the project. The risk of time and cost overruns which are typical of public procurement were transferred to the private sector on account of the annuity model (DEA 2010).

## Evaluation of Project

The project has been making profits as follows;

### Financial Summary of GMR Tuni-Anakapalli Expressways Ltd (Rs Mn)

	FY07	FY08	FY09	FY10
Revenue	590	590	590	590
EBIDTA	520	520	520	434
Profit after tax	129	157	187	122

The problem of social displacement was minimum with this project as it involved expanding the already existing 2-lane road network. Risk allocation with regard to the project is summarized in Table 3.6.

**Table 3.6: Summary of Risk Allocation**

Risk	Description
Pre-construction	Land acquisition to be done by NHAI Rehabilitation and relocation the responsibility of NHAI Concessionaire shall obtain all applicable permits with the assistance of NHAI Technology risk to be borne by concessionaire
Construction	To be borne by the concessionaire as per the project contract
Operational	Incase NHAI operates the toll facility, risks related to toll operations borne by NHAI for the balance services under O&M, the concessionaire shall bear the risks as per the concession agreement
Commercial	Concessionaire does not carry any commercial risks NHAI is allowed to levy, demand, collect, and appropriate the fees from vehicles and persons for using the project highway or any part thereof as per the concession agreement
Financial	To be borne by the concessionaire as per the financial structuring. No pass through in tariffs allowed
Political	For political FM event (expropriation/confiscation/revocation), the costs actually incurred to be borne by NHAI as per the concession agreement for indirect political FM event (war/ strikes/riots, etc.), one half of the costs actually incurred, net of insurance claims, to be borne by NHAI as per the concession agreement
Regulatory	If a change in law results in a financial effect up to Rs 10 million per annum, it is to be borne by the concessionaire. Any change resulting in financial effect exceeding Rs 10 million per annum, to be governed as per concession agreement
Force Majeure	For non-political FM event, costs to be borne by respective parties, inter alia, as per the concession agreement

Source: <http://www.pppindiadatabase.com> (accessed on 1 October 2011).

According to the concession agreement, the concessionaire has to handover the project as per the specific standards defined in the agreement regarding quality of the road. NHAI will also hold back Rs 7.4 crore from the last four annuity payments to ensure it gets a good quality road as defined in the concession agreement.

#### How standard problem areas were tackled

NHAI had obtained environmental clearances before awarding the project. Responsibility of land acquisition was also with NHAI, which was delayed slightly (by a month). According to GMR, issues with land acquisition and transferring land to the concessionaire were solved with strategic cooperation between the GMR Group and NHAI. As per the concession agreement, NHAI agreed to award an extension of 46 days for the date of commencement to compensate against the loss of time for delayed hand over of project land. Therefore, GTAEPL did not have to pay any penalty to NHAI. GTAEPL's state support agreement with the state government of Andhra Pradesh and NHAI also ensured that all administrative clearances and approvals were obtained smoothly and on time.

GTAEPL appointed a turnkey construction contractor for developing the project. The contractor was an affiliate of UEM, thereby diversifying the construction risk.

There were some other challenges like interpretation of project design in the rigid pavement dowel bars. This was a typical case where an interpretation of the Indian Road Congress (IRC) code was required. In addition to support and guidance from NHAI, GTAEPL consulted academicians, including those who had written these codes before arriving at solutions. GTAEPL's approach to problem solving was appreciated by NHAI. In the end, GTAEPL completed the project within the desired framework.

#### Contributing factors for Successful Implementation

A proactive concessionaire and an active role played by NHAI were the main factors behind the successful completion of the project. The GMR Group not only managed the risks efficiently, it also handled financial resources well. The funds for the project were raised at a cost lower than the cost of project debt by about 3 percent. This was done through securitisation of future annuity payments to be received from NHAI. Moreover, the concessionaire stabilised its risks by entering into a long-term O&M contract with its own consortium partner, United Engineers (Malaysia), Berhad - United Engineers Development India Pvt. Ltd., thus transferring a substantial risk of the project.

Approvals and clearances such as from the Andhra Pradesh Pollution Control Board were obtained on time with assistance from NHAI and signing of a state support agreement with the Andhra Pradesh government. Therefore, the role played by NHAI and by the state government was significant in getting all necessary approvals and in obtaining access to all necessary infrastructure facilities and utilities, including water, electricity, and telecommunications.

#### Learnings

Even though Tuni Anakapalli was among the first set of projects completed through the BOT (annuity) model, the project, till date, has been progressing well and has created a demonstration effect for projects to be taken up on similar lines.

It is important to have efficient documentation like a detailed project report (DPR) for a project and a concession agreement, but equally important is the proactive nature of the concessionaire and of government agencies. Land acquisition was done by NHAI almost on time (with a slight delay of a month). Strategic cooperation between the

concessionaire, NHAI, and the state government is reflected in the signing of a state support agreement, which proved efficient in getting all necessary approvals and in obtaining access to all necessary infrastructure facilities and utilities, including water, electricity, and telecommunications.

On the concessionaire's part, it employed innovative measures to manage its financial risk well by raising debt at lower interest rates by securitizing annuity payments received from NHAI. This mode of

funding enabled the concessionaire to repay the term loan and provided access to relatively lower cost funding (DEA 2010).

By entering into a long-term O&M contract with its own consortium partner, the concessionaire managed to transfer a substantial risk of the project. This has worked well as the project was not only completed as per schedule, but it has also been functioning without any problem for the last seven years.

## Jaipur–Kishangarh Road Project

### Background of the sector

Please refer to the Tuni-Anakapalli Annuity Road Project for a background of the road sector.

### Snapshot of the Jaipur-Kishangarh Road Project

The Mahapura-Kishangarh Road Project, popularly known as the Jaipur-Kishangarh Road Project was developed by GVK Jaipur-Kishangarh Expressway Limited, a special purpose vehicle (SPV). The SPV is a consortium of GVK International and BSCPL Infrastructure Limited [formerly known as B. Seenaiah and Company (Projects) Limited] (BSCPL). L&T Infrastructure Development Projects Limited (L&T IDPL) is also a part of the consortium.

The project involves the widening the existing 2-lane divided carriage way to a 6-lane highway, including the rehabilitation of the existing 2-lane section from 273.5 km to 363.9 km (90.38 km) on the Jaipur-Kishangarh section of NH-8 (Delhi-Mumbai section) of the National Highway Development Programme's (NHDP) Golden Quadrilateral project.

The project was designed on a build, operate, and transfer (BOT) toll basis with a life span of 20 years, including the construction period. Since the National Highway Authority of India (NHAI) did not prepare the draft project report (DPR) for the Jaipur-Kishangarh Road Project, the concessionaire had to depend on detailed engineering and its own technical competence to complete the project in the given timeframe.

### Other details about the project include

The GVK Jaipur-Kishangarh Project	
Country/Region	India/South Asia
State	Rajasthan
Project company	GVK Jaipur-Kishangarh Expressway Private Limited
Independent consultant	During (D&C): BCEOM French Engineering During (O&M): The Louis Berger Group
Type of PPI	Concession
Sub-type of PPI	Build, operate, and transfer (BOT)
Project length	90.385 km
Scope of the project	2-lane to 6-lane
Bid criteria	Lowest subsidy/grant required
Type of government support	Fixed government payments
Contract award method	Competitive bidding
Construction period	30 months
Actual completion period	24 months
Contract period	20 years (from 2003)

### Type

The project was awarded on a BOT toll basis with government support in the form of a fixed grant.

### Value

The total project cost was Rs 614 crore, which was funded by a Rs 101 crore equity, Rs 211 crore support grant from NHAI, and a Rs 302 crore debt. In other words, at 49.19 per cent, the debt component was the largest component of the total project cost. The grant received from NHAI was 34.36 per cent of the total project cost while the remaining was in the form of equity capital on the concessionaire's stake.

IDFC acted as a financial advisor to the project and it facilitated in arranging the entire debt component of the project. A part of the debt component (Rs 193 crore) was later funded by a consortium of eight banks. The project achieved financial closure on April 2003. The financial details of the project are:

Particulars	Rs (crore)	% age
Equity Capital (concessionaire's stake)	101	16.45
Grant (by NHAI)	211	34.36
Debt	302	49.19
Total cost of the project	614	100.00

One of the important provisions of the agreement was that the concessionaire will have to share 40 per cent of the total additional revenue earned beyond what was projected with NHAI. The government too offered some incentives, including a subsidy on import duty of the equipment and a tax holiday for 10 years. However, the tax holiday benefit was largely taken away in view of the MAT provision of the Income Tax Act.

### Promoting Agency

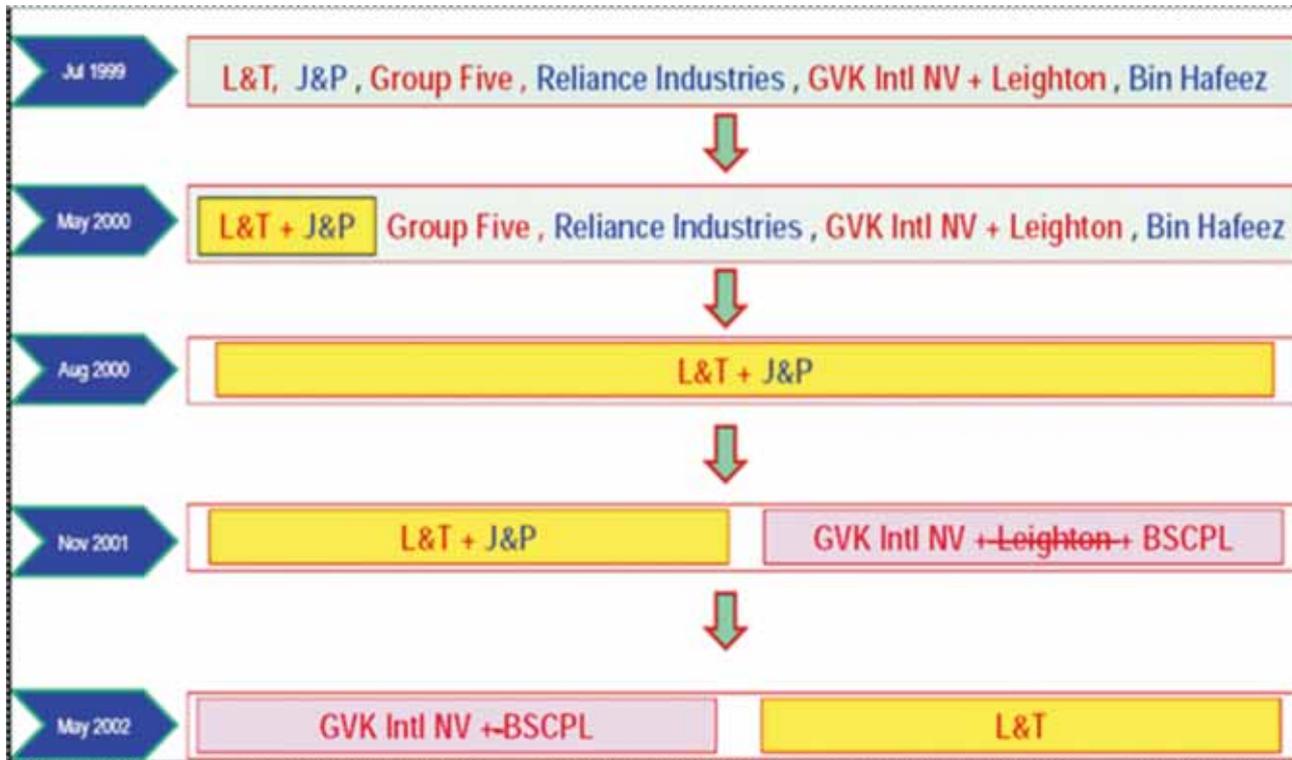
The GVK Group made an entry into the road sector in India through this project. A consortium was formed by the GVK Group and BSCPL Infrastructure Limited. L&T Infrastructure Development Projects Limited (L&T IDPL) joined the consortium later. This consortium formed a SPV—the GVK Jaipur-Kishangarh Expressway Private Limited. GVK, L&T IDPL, and BSCPL hold equity in the SPV in the ratio of 41:40:19.

GVK signed an engineering, procurement, and construction (EPC) agreement with L&T's Engineering Construction and Contracts (ECC) division and BSCPL. L&T ECC took up a 40 km stretch (from 273.5 km to 313.5 km) while the remaining part of the stretch was taken up by BSCPL (from 313.5 km to 363.9 km). GVK did not subcontract the operations and maintenance (O&M) function and decided to carry it out on its own. L&T took up the responsibility for the state-of-the-art toll and highway traffic management system along the entire corridor including in BSCPL's portion. BCEOM was appointed as an independent consultant for the project. Lea Associates South Asia Private Limited was chosen by the SPV as the owner's engineer and for supervising the work done by EPC contractors.

### How Secured

The project was secured through competitive bidding, the bid criteria adopted was the lowest subsidy/grant required. Details of the bidding process are given in Figure 3.2.

Figure 3.2: Bidding Process



NHAI invited global expression of interest in April 1997, which was re-invited in July 1999. However, in August 2000 it received a single bid from the L&T-J&P consortium. Since it received only one bid, NHAI again invited modified bids from pre-qualified bidders in December 2001. After that the GVK Group and BSCPL consortium won the bid and signed the concession agreement with NHAI in May 2002. L&T joined the consortium later.

### Implementation

The revised bids for the Jaipur-Kishangarh Road Project were finalised in February 2002. The Letter of Award (LoA) was issued by NHAI on 1 March, 2002 and the concession agreement was signed in May 2002 after a delay of 13 months.

The process involved in the issuing of LOA is given in Table 3.7.

**Table 3.7: The Issuing of the LOA**

The process	Date
Global notice for expression of interest for pre-qualification	April 1997
Expression of interest for pre-qualification re-invited by NHAI	July 1999
NHAI gave clarification to all bidders and requested confirmation for bids	3 May, 2000
Technical and financial bids received from bidders – the L&T-J&P consortium was the only bidder	30 August, 2000
NHAI invited modified bids from all pre-qualified bidders	7 December, 2001
NHAI issued LoA	1 March, 2002
Contract signing date	8 May, 2002
Financial closure date	April 2003
Date of commencement of construction	April 2003
Construction completion	31 March, 2005
Date of commencement of operations	May 2005

It is important to note the policy changes that took place during this period – the National Highway Act was amended for PPP in 1997 and the first Model Concession Agreement (MCA) for the road sector was introduced in 2001 which was later revised in 2006.

### Operation

The project has been in operation for the last six years without any problems. According to a report by L&T ECC, land prices in the area have gone up steeply, children are able to commute to bigger and better schools, tourist inflow has increased, travel time has come down considerably, and there has been a decline in the maintenance and running cost of vehicles after this project started operations. In short, the Jaipur-Kishangarh Expressway has contributed to the prosperity of all sections of the people in the area. Moreover, as compared to the pre-construction period, fatal accidents have reduced by one-third after operations started.

### Distinguishing Features

Some of the important distinguishing features of the Jaipur-Kishangarh Road Project are:

- It was completed in a record time of 24 months, six months ahead of schedule.
- The Jaipur-Kishangarh Road Project is India's first such 6-lane expressway.
- It is India's largest BOT highway project. Its successful implementation has provided a boost to the overall policy on PPP in the road sector.
- First major road project in India worth more than Rs500 crore and length greater than 90km. This project led to new investments in the sector and also a shift in government policy.
- Led to economic savings in the form of vehicle operating costs, time, and accident levels.
- The first BOT project with highway traffic management and state-of-the-art toll systems.

Since NHAI did not prepare a DPR for the project, detailed engineering was a major milestone in achieving successful completion of the project. Another important feature of the project is that there have been no disputes or arbitrations so far. This is the first BOT road project in India which shares a certain agreed percentage of excess toll revenue over the projected toll fee with NHAI. The concessionaire started revenue sharing with NHAI from the second year of operations as revenue collections were way more than projections (as much as 126 per cent of the projections).

### Evaluation of Project

The progress in project executive was reviewed through regular weekly meetings with EPC contractors wherein progress was monitored through progress S-curves. Monthly meetings involving EPC contractors, the supervision consultant, independent consultant, and NHAI were conducted to assess monthly progress. EPC contractors' performance was measured from the monthly progress reports, that is, planned progress versus actual progress. Incentives were declared for EPC contractors for completing the project within projected timelines.

Further, to get village level panchayats to cooperate, the concessionaire engaged in various activities, including forming a religious committee for re-locating religious structures so that the task could be

done without harming the local people's feelings. It also sub-contracted utility related work to local contractors and provided manpower and machinery to land owners to vacate the project land.

The financial details of the project are given in Table 3.8.

**Table 3.8: Financial Details**

Financial	Q3 2011	Q3 2010
Gross toll revenue	486.7	441.7
NHAI's share	46.1	42.1
EBITDA	353.8	296.9
PAT	214.6	175.5

Source: GVK Annual Report 2011.

Toll charges are governed through a mechanism built into the concession agreement and an annual change in tariff is dependent on the WPI. A state-of-the-art toll collection system ensures the security of revenues while a well-equipped highway traffic management system takes care of vigilance, information, etc. Loads plying on the highway are checked through automatic traffic counters-cum-classifiers but since the tolling is not based on weight, the concessionaire can only record and tell the State Government about the overloads.

The various responsibilities and how they were shared are given in Table 3.9.

**Table 3.9: Sharing of Responsibilities**

Responsibility	Description
Pre-construction	Land acquisition done by NHAI.
	Rehabilitation and relocation NHAI's responsibility.
	Concessionaire obtains all applicable permits with the assistance from NHAI.
	Technology risk to be borne by concessionaire.
Construction	By the concessionaire as per the project contract.
Operational	By the concessionaire as per the project contract.
Commercial	By the concessionaire as per the project contract.
Financial	By the concessionaire as per the financial structuring. No pass through in tariffs allowed.
Political	For political FM events (expropriation/confiscation/revocation), the costs actually incurred to be borne by NHAI as per the concession agreement. For indirect political FM events (war/strikes/riots, etc.), one half of the costs actually incurred, net of insurance claims, to be borne by NHAI as per the concession agreement.
Regulatory	If change in law results in a financial effect up to Rs10 million per annum, this is to be borne by the concessionaire. (1 million = 10 lakh)
	Any change resulting in financial effect exceeding Rs 10 million per annum, to be governed as per the concession agreement.
Force Majeure	For non-political FM events, costs to be borne by respective parties, inter alia, as per the concession agreement.

Source: PPP database. <http://www.pppindiadatabase.com/> (accessed on 14 October 2011).

### How standard problem areas were tackled

The Jaipur-Kishangarh Road Project faced the following problems:

*Land acquisition:* Land acquisition was a major activity in the project as procedure payments to property owners were to be made after the structures were removed from the acquired land. The concessionaire provided manpower and machinery as incentives to the owners for speedy removal of structures. In some cases, when compensation to the owners was outstanding from the competent authorities, the concessionaire paid this money in advance and persuaded the property owners to vacate the land. The land owners returned the money to the concessionaire after receiving compensation from NHAI.

*Shifting/removal of utilities:* Shifting of utilities was done by NHAI through registered contractors. However, during 2003, a number of projects were in progress and the registered contractors were busy. The concessionaire then stepped in to provide men and machinery as an incentive to the contractors for quick removal and shifting of utilities, as a result of which the work was accomplished within the required timeframe.

*Relocation of religious structures:* About 90 temples and four mosques had to be relocated, most of which had no trust boards. Therefore, the payment of compensation became a problem for NHAI due to unclear titles. The concessionaire formed a religious committee, which located suitable alternate land and

facilitated the shifting of these religious structures within a short span of time.

*Public grievances:* The concessionaire formed a public grievance cell which coordinated with NHAI and revenue authorities for speedy settlement of compensation amounts.

*Detailed design:* In the absence of a DPR, detailed engineering was a major requirement for completing the project successfully. Technical competence, relentless efforts, and foresight of the independent consultant made sure that the project was completed within the given timeframe.

Construction in urban areas was challenging as the section passed through about 13 km of a densely populated urban area. However, by sub-contracting some of the activities, such as construction of drains and utility works, the problem was minimized.

### Contributing factors for successful implementation

The project can be rated as being a success as it was completed about 6 months ahead of schedule, the actual costs were close to the projected costs and the quality of the asset is good.

The main factors responsible for the success of the project include a proactive concessionaire, robust project management, and a practical approach followed by executing agencies, that is, the concessionaire and its partners, and enthusiastic support from NHAI.

In the absence of a DPR, the independent consultant assumed a role more dominant than what had been originally envisaged. Many of the ambiguous and unclear provisions of the concession agreement needed interpretation, which was properly done by an independent consultant. Lack of understanding and implementing a quality assurance system by the concessionaire and its agencies made the task of the independent consultant even more challenging. In short, the independent consultant played a very important part in the success of the project.

NHAI's support to the project also played an important role in the success of the project. Even though there were delays in taking decisions and differences over some issues, NHAI played a proactive role.

The concessionaire had signed a state support agreement with the Rajasthan government and NHAI. A retired official from the Rajasthan State Public Works Department (PWD) was engaged by the concessionaire, which helped it to communicate better with the state through an official who had an understanding of the procedures followed by the State Government.

### Learnings

This case study shows that the BOT model if implemented in a proactive manner and if the concessionaire and government agencies follow a community-centric practical approach can go a long way in making the national highway programme a success in the country. If government agencies and private implementing agencies follow proper approaches in building road projects, it will lead to early/in time completion of projects with minimum or no disputes/arbitrations. This would mean safer highways with a lesser number of accidents. The movement away from a contractor mindset to that of a developer by the concessionaire resulted in a professional implementation of the project. Elucidation of the rights and obligations of the stakeholders, i.e. the sovereign, the concessionaire and the road user in the concession agreement is however, discussion with the concessionaire revealed that the replication of the success of a BoT (toll) model, where the risks are appropriately divided between the sovereign and the concessionaire requires a strong political will, which is lacking. The clichéd lack of political will has resulted in poor price discovery as only few developers participate in the bidding. This may be due to lack of a revenue model or even due to dividing of territories. One major reason of developer apathy is the fact that due to political motivations government allows for revenue leakages in these toll highways. Creating parallel service roads without tolling makes the revenue calculations go awry.

## Amritsar-Wagah National Highway

### Background of the Sector

Under the current planning process it is being increasingly realised that good physical connectivity by road in urban and rural areas is not only essential for India's large and diverse transport sector but this would also be a pre-requisite for developing trade, improving the country's transport infrastructure, and more importantly for its sustained economic growth. As per current Planning Commission estimates, the transport sector contributed about 5.5 per cent to the nation's GDP, with road transportation contributing the lion's share.

However, it is also being increasingly felt that the road transport sector has not been able to keep pace with rising demand and is proving to be a drag on the economy. Roads are the dominant mode of transportation in India today, carrying almost 90 per cent of the country's passenger traffic and 65 per cent of its freight and the density of India's highway network—at 0.66 km of highway per square km of land—is similar to that of the United States (0.65) and much greater than China's (0.16) or Brazil's (0.20). However, most highways in India are narrow and congested with poor surface quality, and 40 per cent of India's villages do not have access to all-weather roads.

Currently India's 3.34 million km of road network is the second largest in the world (1 million= 10 lakh). As per present estimates, traffic on the roads is growing at a rate of 7 to 10 per cent per annum while the growth in vehicles is 12 per cent per annum:

Category of road	Length in Km
Total road network	3.34 million
National Highways	65,569
State Highways	1,30,000
Major Distt. Road, Rural road & Urban road	3.14 million

### Administrative Mechanism and Authorities Responsible for Different Categories of Roads

The Ministry of Roads, Surface Transport and Highways is responsible for developing and maintaining National Highways (NHs). The total length of NHs in the country is 65,569 km. This comprises only 2 per cent of the total road network, but carries over 40 per cent of the total traffic. The various categories of roads are also looked after by different government authorities:

Category of Roads	Authorities responsible
National Highways	Central Government (through Ministry of Road, Surface Transport and Highways)
State Highways and Major Highways	State Governments (PWDs)
Rural Roads and Urban Roads	Rural Engineering Organisations, Local Authorities like Panchayats and Municipalities

### Snapshot of the National Highway Development Project

The National Highway Development Project (NHDP) is the Government of India's flagship programme, which is run by the Ministry of Roads, Surface Transport and Highways. The construction of a number of highways in the country has been undertaken under this programme; these have been

implemented by the National Highway Authority of India (NHAI) which is a statutory body constituted under the National Highway Authority of India Act 1995. Currently, NHDP is in its third phase (Table 3.10).

**Table 3.10: NHDP's Progress**

Project	Length (in km)	Target date of Completion
<b>NHDP Phase I</b>		
(i) GQ	5.846	December 2005
(ii) Port Connectivity & others	1.133	December 2007
<b>NHDP Phase II</b>		
(i) N-S Corridor	7.300	December 2007
(ii) E-W Corridor		
<b>NHDP Phase III</b>	10,000	December 2012

#### Key features of NHDP and the transformation it has brought about in the road transport sector

With a view to further augmenting the flow of funds to the sector and for encouraging private sector participation in the road sector, several initiatives have been taken by the government. These include:

- Declaration of the road sector as an industry.
- Provision of capital grants subsidy up to 40 per cent of the project cost to enhance viability of the projects on a case-by-case basis.
- Duty free import of certain identified high quality construction plants and equipment.
- 100 per cent tax exemption in any consecutive 10 years out of 20 years.
- Provision of encumbrance-free sites for work, that is, the government will meet all expenses relating

to land and other pre-construction activities.

- Foreign direct investment upto 100 per cent in the road sector.
- Easier external commercial borrowing norms.
- Higher concession period, up to 30 years.
- Right to collect and retain toll.

#### The Amritsar-Wagah National Highway Project

##### Type

The Amritsar-Wagah National Highway or the NH-1 is a 35.95 km project which was completed on a build, operate, and transfer (BOT) basis. The project was completed by Rohan and Rajdeep Toll Roads Private Limited, the concessionaires for this project under the NHAI process. The Rs 205.88 crore

project involved the 4-laning of the 35.95 km 2-lane stretch on the Amritsar Wagah National Highway (NH-1) in Punjab. An important and unique feature of the project is that it was commissioned within 12–15 months against the official timeframe of 24 months.

#### Main Tasks

Designing, engineering, constructing, financing, operating, and maintaining the 4-laning of the Amritsar-Wagha Section of NH-1 (455.400 km to 491.330 km) in Punjab. This was done on a BOT (annuity) basis. The status of the project is given in Table 3.11.

**Table 3.11: Current status: Phase III/A of the Amritsar-Wagah National Highway Project**

No.	Particulars	Project Details
1.	Total length of the highway (NH-1)	35.93 km
2.	Location	Amritsar, Punjab
3.	Type of Funding given to the developers	Annuity (BOT basis)
4.	Developers	National Highway Authority of India Concessionaire: Rohan and Rajdeep Tollways Private Limited
5.	Project start date	June 2008
6.	Date of project completion	October 2010
7.	Total time taken to complete the project	16 months (against an official estimated time of 24 months)
8.	Total cost of the project	Rs 228.2 crore/\$49.61 million
9.	Current maintenance of the project	By the concessionaire, Rohan and Rajdeep Tollways Private Limited

#### Important Milestones

The project reached an important milestone when it attained financial closure within the ‘cooling period’ of six months from the time of signing the concession agreement. The concessionaires under this project were a joint venture between two Pune-based companies – Rohan Builders and Rajdeep Buildcon. They together hold 90 per cent of the project share. It was expected that the project would be completed in 24 months. However, not only was it completed within 16 months within project costs but various administrative and financial requirements were also complied with during this timeframe.

The concession agreement with NHAI was signed on 18 December, 2007. The project falls under Phase III-A of NHDP and it was implemented on a BOT (annuity) basis under a 20-year concession period, inclusive of construction time.

### About the Developers (Concessionaries for the NH-1 Project)

NH-1 was completed by Rohan and Rajdeep Tollways Private Limited, the concessionaires for this project selected through a bidding process. The concessionaire is a special purpose vehicle (SPV) formed by Rohan Rajdeep IDFC consortium for executing the design, engineering, construction, finance, operation, and maintenance of the Amritsar-Wagah border section of NH-1 from 455.400 to 491.620 km.

### Procedure and Important Stages

The NH-1 Project followed a procedure established by the National Highway Authority of India Act 1995 under NHDP, Phase III. Under this procedure a developer has to enter into a concessionaire agreement with NHAI. The agreement is preceded by number of other stages that the project has to go through. The stages followed for this project included:

*Category of the Project:* There are various modes in place for a project to be worked out with NHAI. Each of these modes has a set of procedural formalities, such as signing of a concession agreement. The NH-1 Project was completed under a BOT basis where the concessionaire was selected through an open bid process.

### Grant of Concession

Rohan and Rajdeep Tollways Private Limited (referred to as company in the rest of the study) was granted the concession in June 2008 and they were authorised to investigate, study, design, engineer, procure, finance, construct, operate, and maintain project facilities and to exercise or enjoy rights, powers, benefits, privileges, authorisation, and entitlements as per the agreement with NHAI. The agreement is for 20 years with a degree of variability after which the road will be transferred back to NHAI by the concessionaire.

### Acceptance of Concession

The company agreed to the concession made for NH-1 in consideration of the initial annuity of Rs 18.6 crore payable in 36 installments for implementing the project and for discharging its duties as were mutually agreed upon by NHAI and the company.

### Handing over of the Project Site

NHAI handed over the project site to the company free of all encumbrances together with the necessary rights of way for the purpose of implementing the project in accordance with the site delivery schedule.

### Legal Clearances

All the legal clearances required for implementing the project were obtained prior to the commencement of work.

The following clearances were obtained by the company:

- i) No Objection Certificate (NOC) from the Punjab Pollution Control Board.
- ii) Approval from the Ministry of Environment and Forests, Government of India that the project did not attract the provisions of the Environment Impact Assessment Notification 2006.
- iii) Approvals from the Ministry of Roads, Surface Transport and Highways.

### Evaluation of the Project

The project faced four major challenges during its execution which were overcome by the implementing agencies due to vertical planning and 'initial stage grip' of the project.

These challenges were:

*Forest Clearances:* Forest clearances (FCs) are a standard clearance process under the Forest Conservation Act 1980 which need to be sought by any infrastructure project that intends to use forest

land. These have to be sought prior to the commissioning of any project. The Forest Advisory Committee in the Ministry of Environment and Forests is the nodal agency for granting these clearances. The procedure is complicated by the Supreme Court Order of 12 December, 1996 in the on-going case of T.N. Godaverman Vs Union of India (WP (C) 202/1995) where the Supreme Court ordered that not even a single blade of grass can be cut without the Court's permission. Since then permissions also have to be sought under FCA from the Supreme Court of India. Currently, FCs are granted at two stages: Stage I in principle Forest Clearance and Forest Clearance with determining Compensatory Afforestation cost.

In this project, the situation was complex as the land for the highway was in the name of the Ministry of Roads, Surface Transport and Highways. Clearly, the land was not recorded forest land. However, the number of trees on the project site and those that had to be cut was a major issue contested by the local forest department. The project implementing agencies took due care of this aspect both at the state and at the central level. Active coordination with the Forest Department when applying for the FC and for preparing the master plan for plantations as per the compensatory afforestation guidelines of the

Supreme Court of India and the Ministry of Environment and Forests were some of these steps.

*Utility Shifting:* Utility shifting was another challenge as the utilities that existed on the land on which the highway was to be constructed were government sector undertakings—the Punjab Power Corporation and certain local departments of the state government. The Office of the Project Director, NHAI took all the measures in a time bound manner to shift each pole of this public sector utility to its new location. There were also seven police establishments (*police chowkis*) which could only be removed with support from the Department of Home Affairs. These were shifted to other locations at project cost.

*Land Acquisition:* This project faced a peculiar situation because the Revenue Department maintained all the land records in Persian and there were serious errors in the mutation process of land records which had also not been updated. The officer in-charge of land records at the village level (Patwari) did not have the records and the implementing agencies had to resort to several painstaking measures, at times even updating the records in the SDM's office before the procedural details could be handled.

#### Evaluation of the Project

From the execution point of view, the project was implemented in a very successful and efficient manner. All the major likely barriers and legal clearances were dealt with and the risk assessment was done with due care. All legal clearances were obtained beforehand and there no post facto clearance. The project's success can be attributed to its efficient supervision, monitoring, and evaluation with deadlines almost on a daily basis.

## Learnings

*Pre-Planning:* Experienced officers both from the private concessionaire and NHAI undertook a mutually supportive pre-planning exercise to deal with all possible barriers that they were likely to face once the implementation started. Due to strong pre-planning the project did not get stuck for any legal clearances which led to its successful and timely completion.

### Obtaining of Legal Clearances beforehand

The implementing agencies worked on the legal complexities that were likely to come up prior to the implementation phase. All the clearances were obtained beforehand and submitted to the line agencies. The DPR made note of all the aspects that needed legal permissions and compliance reports were submitted to relevant agencies and departments.

*Drawing and Designing:* The drawing and designing of the project was handed over to an outside consultant through a competitive bidding process. The consultant was hired on a 'performance and timely delivery basis' with no compromises on the quality,

which led to better management and the completion of project in a timely manner.

*Monitoring and Evaluation:* The NHAI office conducted regular monitoring and strict evaluation at every stage of the project. All the nodal officers regularly reported on the progress made by their departments. Letters were issued on a monthly basis to different nodal persons asking them to report on their progress to the NHAI office with proper information and documents. NHAI conducted monthly monitoring meetings. NHAI also conducted regular review meetings.

*Quality Surveillance:* The implementing agencies got the samples tested from independent labs, which ensured a quality check for the project. Regular quality surveillance exercises were carried out by NHAI at every stage of the project which helped to ensure the quality of the work done.

*Coordination with all line departments:* The project implementing agencies coordinated with all line agencies and departments for the completion of the project.

## Ahmedabad-Mehsana State Highway, State Highway No. 41, Gujarat

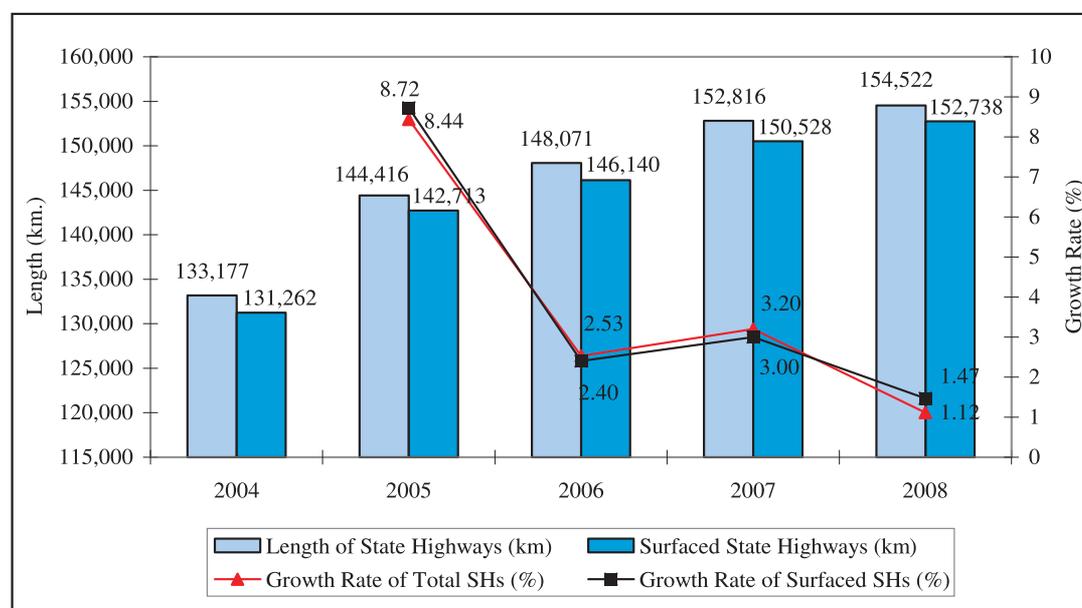
### I. Overview of State Highways in India

National Highways (NHs) and Rural Roads (RRs) have occupied the spotlight in the roads sector over the last decade. In the process, the link between these two types of road networks – the secondary road network has got neglected. This network forms 64.5 per cent of the total road network and carries 40 per cent of the traffic. State Highways (SHs) and Major District Roads (MDRs) make up this network with

the share of SHs in total road network 4 per cent<sup>1</sup> (Figure 3.3).

“The SHs are the arterial roads in a State for inter-district movements. They traverse the length and width of a state connecting the state capital, district headquarters and important towns and cities and link up with the National Highways and adjacent State Highways. The MDRs form the branch roads of the State and National Highways which serve as the main

**Figure 3.3: State Highways, Length (km.) and Growth Rate (%), 2004–08**



Source: Ministry of Road Transport and Highways, Government of India (2010). “Basic Road Statistics of India 2004-05, 2005-06, 2006-07, 2007-08”. MoRTH website ([www.morth.nic.in](http://www.morth.nic.in)). July. Accessed August 18, 2011.

<sup>1</sup> Ministry of Road Transport and Highways (MoRTH) (2011). “Annual Report 2010–11”. MoRTH website ([www.morth.nic.in](http://www.morth.nic.in)). Accessed July 21, 2011.

Table 3.12: State Highways, March 31, 2008

State/UTs	SHs as per cent of Total Roads (%)	Total SHs (km.)	Per cent Surfaced (%)	State Highways per sq km.	State Highways per thousand population
Andaman and Nicobar Islands	11.22	146	97.26	0.02	0.32
Andhra Pradesh	4.82	10,518	98.47	0.04	0.13
Assam	1.36	3,134	76.26	0.04	0.08
Bihar	3.14	3,767	100.00	0.04	0.04
Chhattisgarh	4.59	3,419	98.86	0.03	0.15
Dadra and Nagar Haveli	6.65	42	100.00	0.09	0.14
Goa	2.64	279	100.00	0.08	0.17
Gujarat	12.58	18,447	98.60	0.09	0.32
Haryana	8.49	2,523	100.00	0.06	0.10
Himachal Pradesh	5.03	1,824	91.50	0.03	0.25
Jammu & Kashmir	0.30	67	26.87	0.00	0.00
Jharkhand	10.76	1,886	100.00	0.02	0.06
Karnataka	8.12	20,738	99.64	0.11	0.36
Kerala	2.02	4,137	100.00	0.11	0.12
Madhya Pradesh	5.27	8,729	100.00	0.03	0.13
Maharashtra	15.08	33,675	99.46	0.11	0.31
Manipur	6.89	1,137	100.00	0.05	0.48
Meghalaya	11.53	1,134	97.88	0.05	0.44
Mizoram	4.21	259	100.00	0.01	0.27
Nagaland	1.81	404	100.00	0.02	0.19
Orissa	1.77	3,806	99.63	0.02	0.10
Puducherry	1.37	37	100.00	0.08	0.03
Punjab	3.08	1,393	100.00	0.03	0.05
Rajasthan	6.55	11,240	99.74	0.03	0.17
Sikkim	9.56	179	100.00	0.03	0.30
Tamil Nadu	5.11	9,264	100.00	0.07	0.14
Tripura	2.17	689	98.55	0.07	0.19
Uttar Pradesh	2.95	8,391	100.00	0.03	0.10
Uttarakhand	3.84	1,576	97.59	0.03	0.01
West Bengal	0.79	1,682	100.00	0.02	0.02

Note: Missing States and UTs means that there are no SHs in those regions.

Population Data used from 2008.

Sources: Ministry of Road Transport and Highways, Government of India (2010). "Basic Road Statistics of India 2004-05, 2005-06, 2006-07, 2007-08". MoRTH website ([www.morth.nic.in](http://www.morth.nic.in)). July. Accessed August 18, 2011. and Registrar General of India.

roads for intra-district movements. They traverse the length and breadth of a district to connect the area of production and marketing in the district to one another and to the National Highways”<sup>2</sup>.

The latest statistics on the secondary road network are available publicly only till March 2008. This is in stark contrast to the monthly updates of the National Highways (NHs) and Pradhan Mantri Gram Sadak Yojana (PMGSY) on the National Highways Authority of India (NHAI) and PMGSY websites, respectively<sup>3</sup>. The disregard for SHs is shown in Figure 3.3, where the growth rates show decline between the periods 2004 and 2008<sup>4</sup>. The data worsens for MDRs and therefore is left out of this analysis. As of March, 2008 the total length of the SHs was 1.5 lakh km<sup>5</sup>. It forms a small share of total roads in each state. Maharashtra and Gujarat are leaders with 15.08 per cent and 12.58 per cent of their total roads being SHs, respectively. States with the lowest share of SHs are Jammu & Kashmir (0.3%) and West Bengal (0.79%). On one hand, the good news is that majority of SHs is surfaced (98.8%) using either Bitumen or Cement Concrete (97.8%), on the other hand, 70.6 per cent of SHs is either single lane or below standard single lane.

Table 3.12 shows state-wise statistics of State Highways as on March 31, 2008. The low density of SHs is very much evident. Amongst the states and Union Territories (UTs), Karnataka, Kerala and Maharashtra have the maximum length of roads relative to their area. When it comes to population, Manipur, Meghalaya and Maharashtra occupy the

top three slots. Table 3.12 also shows that the Southern and Western leaders are relatively doing better than their counterparts.

The Eleventh Five Year Plan (EFYP) discussed that while the quantity of the secondary road network was seemingly adequate, the quality has been abysmal. The deficiencies include<sup>6</sup>:

- (i) “inadequate width of carriageway in relation to traffic demand;
- (ii) weak pavement and bridges;
- (iii) congested stretches of SHs and MDRs passing through cities/towns;
- (iv) poor safety features and road geometrics, and inadequate formation width in hilly and mountainous region;
- (v) missing links and bridges; and
- (vi) several railway level crossings requiring urgent replacement with ROB/road under bridge (RUB)”.

Since the EFYP was written, changes are slowly taking place in this sector. However, the process started earlier in the Southern and Western regions of India especially the process of engaging the private sector. Some of the poorer states are attempting to copy the model of the advanced states. Many of the states are receiving multilateral aid from World Bank (WB) and Asian Development Bank (ADB) to develop their state highways. In order to strengthen Public Private Partnerships (PPPs) at the state level, ADB had approved aid to the Government of India (GoI) in

<sup>2</sup> Ministry of Road Transport and Highways, Government of India (2010). “Basic Road Statistics of India 2004–05, 2005–06, 2006–07, 2007–08”. MoRTH website ([www.morth.nic.in](http://www.morth.nic.in)). July. Accessed August 18, 2011.

<sup>3</sup> The PMGSY scheme is a Centrally sponsored scheme to provide all weather connectivity in rural areas. This rural road scheme was launched on December 25, 2000.

<sup>4</sup> The rest of the statistics in this paragraph have been taken from the following source unless mentioned otherwise – Ministry of Road Transport and Highways, Government of India (2010). “Basic Road Statistics of India 2004–05, 2005–06, 2006–07, 2007–08”. MoRTH website ([www.morth.nic.in](http://www.morth.nic.in)). July. Accessed August 18, 2011.

<sup>5</sup> Ministry of Road Transport and Highways (MoRTH) (2011). “Annual Report 2010–11”. MoRTH website ([www.morth.nic.in](http://www.morth.nic.in)). Accessed July 21, 2011.

<sup>6</sup> Planning Commission. Eleventh Five Year Plan Document. Planning Commission website ([www.planningcommission.nic.in](http://www.planningcommission.nic.in)). Chapter 9. Accessed October 1, 2009.

2006<sup>7</sup>. PPP cells have been established at the state level in Ministry of Finance through this project. The participating states are Andhra Pradesh, Assam, Chhattisgarh, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttarakhand and West Bengal. A summary of the efforts of some of the states to engage the private sector in the roads sector are written below.

*Andhra Pradesh* – The Andhra Pradesh Road Development Corporation (APRDC) was established in 1998<sup>8</sup>. It is responsible for development and upgradation of the State Highways in AP. APRDC has already implemented projects under various schemes of BOT (Toll and Annuity) and is in the process of implementing more. AP had received aid from World Bank (WB) to improve its state highways in 1997. Phase I finished in 2004, AP has received aid from WB again in 2009 for the second phase improvement of state highways. A PPP Cell has also been established in the AP Ministry of Finance.

*Bihar* – Bihar is a late entrant to the game in 2006 when it enacted the Bihar State Infrastructure Developing Act<sup>9</sup>. It was designed to attract private investment in the infrastructure sector. Infrastructure Development Authority was set up based on this Act. Further, in 2009, Bihar State Road Development Corporation Ltd. was established<sup>10</sup>. This is responsible for implementing the Bihar State Highway Project and is also implementing a small number of BOT (Toll) projects. Bihar has also received help from ADB in 2008 to improve its state highways<sup>11</sup>.

*Chhattisgarh* – Chhattisgarh was born in 2000 and received multilateral aid from Asian Development Bank in 2003 to develop its state highways. In 2008, it tied up with IL&FS Transport Networks Ltd (ITNL) to form a joint venture (JV) called Chhattisgarh Highways Development Company Ltd. Again the main work of this JV is to improve the state highways.

*Goa* – Goa also started the process of engaging the private sector in 2001 when it formed the Goa State Infrastructure Development Corporation Ltd (GSIDC) as a SPV (Special Purpose Vehicle)<sup>12</sup>.

*Gujarat* – Gujarat was one of the pioneers if not the pioneer. The Gujarat Infrastructure Development Board was set up early as in 1995 to engage the private sector to build infrastructure in the state. Then in 1999 it formed the Gujarat State Road Development Corporation Ltd to develop the state highways through public-private partnerships.

*Himachal Pradesh* – Himachal Pradesh also one of the early pioneers set up the Himachal Pradesh Road and Other Infrastructure Development Corporation Ltd in 1999 to attract private sector participation<sup>13</sup>. With WB aid it is implementing a state roads project which started in 2007 and is supposed to end in 2013<sup>14</sup>.

*Karnataka* – Karnataka started early in 1999 when it formed the Karnataka Road Development Corporation Ltd (KRDCL) to improve the road connectivity and has been involved in PPP projects<sup>15</sup>. Karnataka State Highways Authority was formed in

<sup>7</sup> Uttarakhand Public Private Partnerships (PPP) cell website (<http://cell.upppc.org/>).

<sup>8</sup> Andhra Pradesh Road Development Corporation website ([www.aprdc.com](http://www.aprdc.com)).

<sup>9</sup> Infrastructure Development Authority Bihar website, [www.idabihar.com](http://www.idabihar.com).

<sup>10</sup> Bihar State Road Development Corporation Ltd website (<http://bsrdcl.bih.nic.in/>).

<sup>11</sup> Asian Development Bank website ([www.adb.org](http://www.adb.org)).

<sup>12</sup> Goa State Infrastructure Development Corporation Ltd website (<http://www.gsidcltd.com/default.asp>).

<sup>13</sup> Himachal Pradesh Road and Other Infrastructure Development Corporation Ltd website (<http://himachal.nic.in/hpridc/>).

<sup>14</sup> World Bank website ([www.worldbank.org](http://www.worldbank.org)).

<sup>15</sup> KRDCL website ([www.krdcl.com](http://www.krdcl.com)).

2001 as an advisory board which would advise the state on planned development of roads in the state<sup>16</sup>. Further the World Bank is providing assistance to the Public Works Department of Karnataka to improve its state highways<sup>17</sup>.

*Kerala* – Kerala also started early in road development within its state like its neighbours in the South. It established a corporation called the Roads and Bridges Development Corporation of Kerala (RBDCK) in 1999 whose main purpose was to construct and maintain roads, bridges etc<sup>18</sup>. The Kerala Road Fund Board was established in 2001 to better manage the funds available to Kerala Public Works Department and to engage the private sector<sup>19</sup>. Kerala is also receiving aid from the World Bank to improve its state highways and major district roads. It started in 2002 and the project has closed in 2010<sup>20</sup>.

*Madhya Pradesh (MP)* – MP established the Madhya Pradesh Road Development Corporation Ltd (MPRDCL) in 2004 responsible for developing the SHs and MDRs under PPP contracts<sup>21</sup>. MP has also received multilateral aid from ADB to upgrade its secondary road network which is being implemented through MRDCL.

*Maharashtra* – Maharashtra, only after Gujarat established the Maharashtra State Road Development Corporation to operate and maintain roads<sup>22</sup>. It is also involved in BOT (Toll) projects.

*Punjab* – Punjab established the Punjab Infrastructure Development Board in 1998 to develop infrastructure

and one of its objectives was to engage the private sector<sup>23</sup>. WB has provided aid to Punjab to develop its state roads<sup>24</sup>. It was approved in 2006 and project is supposed to close in 2012.

*Rajasthan* – Rajasthan was the first state in India to concentrate on state roads. It established the company called “Rajasthan State Bridge and Construction Corporation Ltd” in 1979. In 2000 it renamed the company “Rajasthan State Road Development and Construction Corporation Ltd (RSRDC)” to allow private participation in infrastructure projects<sup>25</sup>. In addition, Road Infrastructure Development Corporation Ltd (RIDCOR) is a JV between Government of Rajasthan and IL&FS is implementing a mega highways project. Rajasthan has also received aid from the WB to improve its state highways.

*Tamil Nadu* – The Tamil Nadu Road Development Corporation was established in 1998. It was JV between Government of Tamil Nadu and Infrastructure Leasing & Finance Ltd (IL&FS)<sup>26</sup>.

Planning Commission (2010) reports that 38 PPP state highways projects are in the pipeline worth Rs 12,557 crore (Table 3.13)<sup>27</sup>. There are four projects coming up in Andhra Pradesh worth Rs 1,335 crore; three projects in Bihar worth Rs 2.625 crore; two projects in Gujarat worth Rs 28 crores, five projects worth Rs 1,130 crore in Karnataka, one project worth Rs 200 crore in Punjab; 5 projects in Uttar Pradesh; and nineteen projects worth Rs 7,239 crore in Uttar Pradesh.

<sup>16</sup> Karnataka Public Works Department website ([www.kpwd.gov.in](http://www.kpwd.gov.in)).

<sup>17</sup> Karnataka State Highway Improvement Project ([www.kship.org](http://www.kship.org)).

<sup>18</sup> RBDCK website ([www.rbdck.org](http://www.rbdck.org)).

<sup>19</sup> Kerala Road Fund Board website ([www.krfb.org](http://www.krfb.org)).

<sup>20</sup> World Bank website ([www.worldbank.org](http://www.worldbank.org)).

<sup>21</sup> MPRDCL website ([www.mprdcl.org](http://www.mprdcl.org)).

<sup>22</sup> MSRDC website ([www.msrdc.org](http://www.msrdc.org)).

<sup>23</sup> Punjab Infrastructure Development Board website ([www.pidb.org](http://www.pidb.org)).

<sup>24</sup> World Bank website ([www.worldbank.org](http://www.worldbank.org)).

<sup>25</sup> RSRDC website ([www.rsrdc.com](http://www.rsrdc.com)).

<sup>26</sup> Tamil Nadu Highways website (<http://www.tnhighways.org/tnrdc.htm>).

<sup>27</sup> All statistics in this paragraph are taken from this source unless mentioned otherwise. Planning Commission, Government of India (2010). “Compendium of PPP Projects in State Highways”. [www.infrastructure.gov.in](http://www.infrastructure.gov.in). June. Accessed August 23, 2011.

**Table 3.13: Summary of PPP Projects in State Highways**

Project Categories	No. of Projects	Projects Cost (Rs. crore)
Completed Projects	73	8,353
Projects under Implementation	62	56,406
Projects in the Bid Process	41	17,591
Projects where feasibility study has commenced	44	13,601
Projects in the Pipeline for 2011–12	38	12,557

Source: Planning Commission, Government of India (2010). "Compendium of PPP Projects in State Highways". [www.infrastructure.gov.in](http://www.infrastructure.gov.in). June. Accessed August 23, 2011.

SH projects, on average, do not attract as much private financing as NHs. Seetharaman (2010) reports on some of the reasons<sup>28</sup>:

- Traffic density is lower than expected and economies of scale are lower than NHs;
- NHs and SHs may be competing with each other
- SHs may not be well aligned;
- Repayment of loans are not guaranteed in the case of SHs (as opposed to NHs);
- Health of state finances are concern especially if the project is on an annuity basis or has viability gap funding because both come from the government; and
- There is the additional political risk as SHs are more susceptible to changes in governments than NHs. Willingness at the bureaucratic level may vary. However, as we discuss later that bureaucratic willingness may also increase because state governments are more directly involved in particular projects ensuring its quick and efficient implementation.

- The aversion of financial institutions to SHs projects means loans to them are pricier than for NH projects. On average, lenders charge 50–100 basis points more for State Highways versus NHs.

We choose two projects – one each from Karnataka and Gujarat – the leaders in PPP projects. The projects were chosen on the basis of the two criteria of least cost and time overruns. The Ahmedabad-Mehsana State Highway project in Gujarat and Bengaluru-Maddur State Highway project in Karnataka finished within time and reasonable cost. We critically examine the projects and explore the reasons why they finished on time and within cost but perhaps fail in other metrics of successful project implementation. Most important of all we try to understand whether any common lessons can be drawn from the above two case studies that can be used to quicken the process of implementation of road sector projects.

<sup>28</sup> Seetharamam, G. (2010). "Lenders chary of State Highways". Daily News & Analysis ([http://www.dnaindia.com/money/report\\_lenders-chary-of-state-highways\\_1347943](http://www.dnaindia.com/money/report_lenders-chary-of-state-highways_1347943)). February 15. Accessed November 23, 2011.

## II. Ahmedabad-Mehsana State Highway, State Highway No. 41, Gujarat

### II.1 Background

**Table 3.14: Snapshot of Project**

PPP	BOOT
Promoting Agency	IL& FS Transport Networks Ltd (ITNL) and Government of Gujarat hold 86% and 14%, respectively in GRICL currently
How Secured	MoU
Implementation	Financial Closure for the project: May, 1999
	Construction Started: May 1, 2000
	Construction Completed: November 20, 2002
	Commercial Operations Date (COD): February 20, 2003
Operations & Maintenance	30 years
Distinguishing Features	Losses due to overestimation of traffic estimates which led to restructuring
	Used replacement costs to calculate cost of land and houses which resulted in four to six times higher valuations than the payment under the Land Acquisition Act.

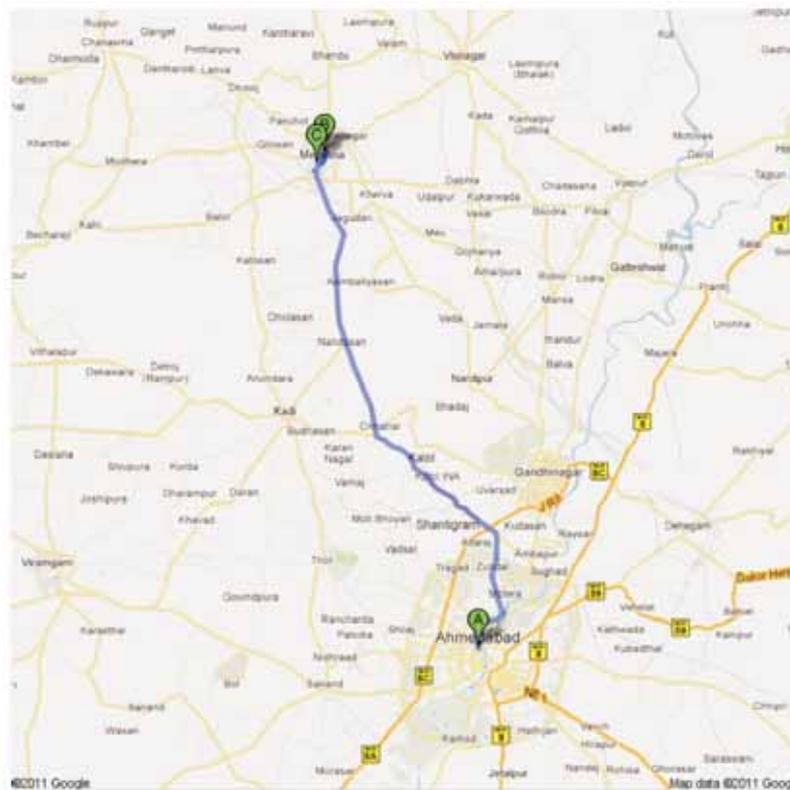
GRICL is a Special Purpose Vehicle (SPV) promoted by the Government of Gujarat (GoG) and the Infrastructure Leasing & Financial Services (IL&FS). The Governor of the State of Gujarat had entered into a Concession Agreement with Gujarat Road and Infrastructure Company Limited (earlier known as the Ahmedabad Mehsana Toll Road Company Limited) for development of Ahmedabad Mehsana Road SH-41 on Built Own Operate and Transfer (BOOT) basis. The erstwhile Vadodara Halol Toll Road Company Limited (VHTRL) and the erstwhile Ahmedabad Mehsana Toll Road Company Limited (AMTRL) have been merged with Gujarat Road and Infrastructure Company Ltd (GRICL). Subsequently IL&FS Transportation Networks Limited (ITNL) has replaced IL&FS as promoter of project and now ITNL and GoG holds 86 per cent and 14 per cent equity, respectively in the GRICL (Table 3.14).

This case study specifically studies the AMRTL and we refer to the concessionaire as such. In 1995, IL&FS and Government of Gujarat discussed three state highway projects along with other projects. They were Vadodara-Halol, Ahmedabad-Mehsana and Ahmedabad-Wire. Kirloskar conducted the feasibility study and found the first two projects promising mainly due to traffic estimates. A Memorandum of Understanding (MoU) was signed between IL&FS and Gujarat and SPV was created called the Ahmedabad-Mehsana Toll Road Highway or AMRTL. This was followed by a detailed Feasibility Study or Detailed Project Report conducted by Scott Wilson. International competitive bidding took place following that. Larsen and Toubro (L&T) won the contract and implemented the project on an EPC basis. It was part of the contract that they would also be equity partners in the project.

The assignment consisted of linking Ahmedabad (Gujarat) with the industrial township at Mehsana (Gujarat), an important oil town to the north of the city labelled as the State Highway (SH) no. 41 (Figure 3.4). The project included taking over an existing road<sup>29</sup>, widening and strengthening the same and constructing bridges, underpass, etc. Furthermore, the project provided for free use service lanes beside the toll road, for local traffic movement. Specifically the project was to build a 52.6 km, 4-lane state highway linking the two cities and also development of 11.5 Km of link road between Kadi to Kalol. The salient features of the project include<sup>30</sup>:

- Widening & Strengthening of Existing 51.6 km long road from two lanes to four lanes divided carriageway and construction continuous Service Roads on either side.
- Widening & Strengthening of Existing 11.5 km long two lanes Kadi-Kalol Spur road.
- Bypass of 2.3 km long at Sertha village on left side of the existing road.
- 2 Nos. main toll plazas – one Ahmedabad side and other Mehsana side and two intermediate toll plazas at Chhatral and Nandasana, respectively.
- 2 Nos. Road over Bridges (RoB) & 2 Nos. Minor Bridges, 1 No. Road under Bridge (RuB) and 5 Nos. Underpasses of minimum size of 5 m x 3 m and 5 Nos. Cattle Crossings of minimum size 3 m x 2.1 m.
- Provision of retro-reflective signboards to improve road safety with very good riding quality to enhance user comfort.

**Figure 3.4: Ahmedabad-Mehsana State Highway**



<sup>29</sup> However, the World Bank classifies this road as Greenfield Investment.

<sup>30</sup> AMRTL website (<http://rnbgujarat.org/amrtl.htm>).

- Toll Rates are based on road user benefits including savings in Vehicle Operating Costs, Fuel and Time.
- Round-the-clock Highway Patrolling.
- 24 hours Ambulance services.
- Extensive tree plantation and transplantation of 1500 nos. trees.
- Provision of roadside arboriculture and landscaping.

The concession period for the project is 30 years from Commercial Operations Date (COD) which is 20<sup>th</sup> February 2003. Financial Closure for the project was achieved in May, 1999. Construction started on May 1, 2000 and was substantially completed on 20 November, 2002 eight months ahead of schedule. The project was commercially commissioned on 20 February, 2003. This Rs 340 crore project, now successfully completed, significantly caters to commercial traffic movement between Gujarat and parts of North India. The project was completed within the budgeted cost of Rs 340.00 crores with the construction costing Rs 224.359 crores.

**Role of IL&FS:** IL&FS developed the project from the concept stage to implementation of the project. It was acting as project sponsor, developer and investment banker to the project. The assignment involved project scoping, structuring, technical feasibility, negotiation of concession agreement, bid documentation and award of contract, financial plans and fund mobilization. The scope covered comprehensive transaction advisory services including commercial, financial and legal advice. The services rendered included, but are not limited to:

- *Feasibility:* Development of technical feasibility through rigorous traffic modelling, pricing studies, detailed engineering studies, environmental and social assessment and environmental and social management plans.
- *Implementation:* The Project was implemented by IL&FS through the SPV especially formed for

the project GRICL (erstwhile AMTRL). In 2004 this SPV along with the Vadodara-Halol Toll Road Project was merged into Gujarat Road and Infrastructure Company Ltd. (GRICL).

- *Financial Advisory:* Evaluation of possible funding options and optimal mix of private and public sector ownership.
- *Regulatory and Legal Framework:* This Concession Agreement has been used by the State Govt. as a model for all other private sector BOT/BOOT projects in Gujarat. IL&FS advised the State Government, to suitably modify the Indian Tolls Act. Gujarat State IL&FS was also involved in the process of creating the State Road Policy for Gujarat, which is now a model policy amongst other Indian States.

**Role of L&T:** Further, L&T was both the EPC contractor and Operations & Maintenance contractor in this project. This project was implemented on BOOT basis. Subsequently ITNL has replaced L&T as O&M Contractor w.e.f. 1<sup>st</sup> May, 2006.

#### **Other Stakeholders**

Independent Engineer: Wilbur Smith Associates Private Limited

Independent Auditor: A.F. Ferguson & Co.

Project Engineer: M/s Lea Associates South Asia Private Limited

Management: Government of Gujarat, IL&FS Transportation Networks Limited

Sponsoring Authority: Roads and Building Department & IL&FS Transportation Networks Limited

Construction Company: Vijay M. Mistry Construction Private Limited

## II.2 Evaluation of the Project (from execution point of view)

### II.2.1 Initialisation

From execution point of view the project is exemplary. Starting from initialisation, Kirloskar conducted the initial study. Since this was really one of the first state highway projects there was no model concession agreement available and therefore the concessionaire agreement using ADB and WB guidelines for PPP projects. Then AMRTL designed the project in a way which would aid the contractor to bid for the project. Then Scott Wilson took six months to prepare the Detailed Project Report (DPR). It conducted detailed site visits, noted existing road details even minor ones, noted various historical sites and coordinated with local representatives. International experience in South Africa helped the company. The DPR accounted for all risks including traffic, financial, rate of interest, environmental and social risks.

The Government of Gujarat (GoG) participated in terms of equity and stakeholders. Then AMRTL invited the bidders, the bidding process based on World Bank standards. It was an internationally competitive bidding conducted in a fair and transparent manner. Larsen and Toubro (L&T) won the bid out of 11 bidders as their presentation was closest to the Indian environment. Further, it was the lowest cost (L1 bidding).

The public sector banks and scheduled investors like IDFC and IDBI provided the funds. The landed cost of the project was Rs 340 crores and the construction cost was Rs 220 crores.

### II.2.2 Implementation

The detailed effort that was given in the DPR shows as there were no major changes. Three minor changes include the following with no significant impact on cost:

- Level crossing for railway line changed to railway overbridge.
- Location of pedestrian overbridge changed.
- Providing foot over bridges for pedestrians for commissioning (this will not show up in the construction costs and therefore the construction cost numbers may be underestimated).

Since this was a first-time experiment and the GoG working in close cooperation with IL&FS, the contract did not raise any problems. As for monitoring the project, it was done by different teams at different frequencies. Daily progress was monitored by AMRTL engineers and daily progress reports made. Monthly Progress Report was published. L&T monitored progress regularly. IL&FS had their own team monitoring on a daily basis. There was a fortnightly review team with the contractors. Independent engineers reviewed twice in a month. Further L&T top management, IL&FS and GoG met once in a quarter to review progress. There were no shortages faced either with respect to materials or manpower and if any regular monitoring and reporting of the IL&FS ensured that this did not stop work. Further, location of the road did aid procurement of manpower and materials since the refinery was so close (Mehsana).

Insurance was taken out on the risks based on the risk assessment framework. During construction, insurance taken against CAR (Contractors all Risk).

MS Projects was used to monitor the progress. Plus to motivate staff-performance related payouts encouraged delivery. For the contractor, the 36 months of project milestone was broken down into various activities. Each month the review took into account the target and achievement. The progress did slow down due to monsoon, a factor which was taken into account in the planning process.

### II.2.3 Commercial operations

Initially traffic and toll revenues proved to be lower than expected and AMTRL was unable to service its debts. In 2004 the debts were restructured and the company was merged into GRICL. Toll collections have since improved and are better than the projections envisaged at the time of restructuring. Revenues increased 31 per cent between fiscal years 2007 and 2008 after GRICL auctioned toll collection.

Service roads were meant for local traffic and were

not tolled. This led to a tendency where through traffic also started bypassing toll plazas by using the service roads at plaza locations. This loop hole has now been plugged by keeping a record of vehicles that bypass two successive toll plazas. Such vehicles are required to pay the toll even though they might have used the service roads. Enforcement is by manual recording of license plate numbers. This has helped to improve the toll revenues.

Schedule of charges are shown in Table 3.15 and they are deemed appropriate. The financial results of GRICL are shown in Table 3.16.

**Table 3.15: Schedule of Charges**

S. No.	Class of Vehicles	Charges for Ahmedabad to Mahesana or Mahesana to Ahmedabad (Rs Per use)	Charges for Ahmedabad to Kalol or Kalol to Ahmedabad (Rs Per use)	Charges for Kalol to Mahesana or Mahesana to Kalol (Rs Per use)
1.	Truck, 2 – axles	135	50	90
2.	For each additional axle beyond 2 – axles	95	30	65
3.	Bus, 2 – axles	135	50	90
4.	Light Commercial Vehicle	75	25	50
5.	Cars	45	15	30
6.	Three Wheelers	20	10	15
7.	Two Wheelers	10	10	10

Source: <http://mbgujarat.org/amtrl.htm>

**Table 3.16: Financial Results**

(Rs in crores)

Category	For Period ended March 31	2006	2007	2008
Profitability	Toll Revenue	37.58	47	61.42
	Depreciation	7.77	9.10	15.28
	Profit/Loss after Tax	(19.12)	(4.40)	0.87
	Gross Cash Accruals	(4.39)	12.38	25.46
Financial Position	Net Fixed Assets	436.07	432.45	417.28
	Total Capital Employed	430.03	421.82	410.16
	Net Worth*	215.35	210.99	211.86
Ratio Analysis	Interest Coverage (times)	0.50	0.87	1.03
	Cash Interest Coverage (times)	0.89	1.37	1.72
	Total Debt	313.15	309.39	296.69

\*Net Worth excludes amount shown as 'Advance towards Capital/debt of Rs 105 crore for FY06, FY07 and FY08 as GRICL proposes to convert the same into subordinate debt subject to CDR approval.

Source: Care Ratings of GRICL.

### II. 3 How Standard Problems were Tackled?

The quick implementation of the project was aided by the fact that the government had acquired most of the land much before the project was taken up. The GoG gave all the land and it was sufficient to start construction (40 km). There were 12 km that were still left to be acquired but this did not hamper progress.

IL&FS had coordinated with ONGC during the DPR process only and shifting of ONGC gas lines, sewage and pipe lines did not create a problem. Again a close coordination between the GoG, ONGC and IL&FS ensured smooth delivery. Getting forest clearances also did not pose any significant risk.

There were six kilometres of bypass that did pose risk since the land owners were not happy with the compensation rate. However, even this effort was so well implemented that it got special mention in a World Bank study. IL&FS used replacement cost

to calculate compensation for land and houses. These were estimated from market surveys, village records, assessments by agriculture specialists and consultation with project-affected persons (PAPs). The resulting valuations were 4-6 times higher than the compensation paid by the government under the Land Acquisition Act. The difference was paid as rehabilitation assistance from project funds. For structures, replacement cost was based on engineering estimates for new construction without depreciation. Compensation was paid at the rates applicable for residential properties for some of the agricultural properties since the PAPs had purchased these lands with the intention of converting them into residential properties.

IL&FS also introduced incentive-based income-generation schemes as part of the rehabilitation assistance. Eligible families who purchased assets needed for self-employment were given assurance of reimbursement in two stages: 50 per cent of asset value at the end of eighteen months; and 50 per cent

at the end of the three years contingent upon the PAPs continuing with the activities and earning the targeted incomes. During this three year period, beneficiaries were offered maintenance allowance in the first year and insurance of the asset against theft, disease, etc, as appropriate thereafter. Few specific innovative measures included:

- Special measures for vulnerable families.
- Old age pension to all above 60 years of age in urban areas.
- Support for income generating activities given to an additional family member for families with older members in a rural setting.
- Repayment of outstanding debts on lost assets (as a grant).

#### II. 4 Contribution to Sector and Host State

This concession agreement has been used by the State Govt. as a model for all other private sector BOT/BOOT projects in Gujarat. IL&FS advised the State Government, to suitably modify the Indian Tolls Act. IL&FS was also involved in the process of creating the State Road Policy for Gujarat, which is now a model policy amongst other Indian States.

#### II. 5 Contributing factors to Successful Implementation

- Already acquired land free of encumbrances
- Resettlement & Rehabilitation Policy
- Internationally experienced firm to draw up the DPR
- Detailed DPR
- Design of the project which would aid the contractor to build quickly

- Competitive bidding for EPC contract
- Close coordination between IL&FS, GoG, L&T and ONGC
  - First Project and there was lot of excitement, initiative and enthusiasm
- Geographical Location
- Professional experiences of all parties concerned including IL&FS, L&T ensured successful implementation
- Independent engineers
- The project was done in the earlier years when the pressures on land hadn't still come in like in 2011
- Risk matrix which will take into account proper account of all risks
- MS Projects used to monitor milestones
- Pro-active State Policies

#### II. 6 Learning

Therefore what lessons does this project hold out for us? The irony is that although the stakeholders involved did everything right, they still were not able to make profits. Although feasibility study and DPR were both done for traffic analysis and a risk matrix put in place, it still came short.

##### II.6.1 What to replicate?

- Execution and Implementation.
- Land Acquisition and Rehabilitation & Resettlement (LARR) Policies especially in the context of the proposed LARR, 2011 Bill.
- Cooperation of all agencies involved.

## II.6.2 What not to replicate?<sup>31</sup>

- Traffic Predictions
  - It is notoriously difficult to predict traffic for twenty years in the future. These forecasting models are based on multiple regression models which may not take into account the changing realities fully into account. Therefore, concession periods should not be more than twenty years.
  - Therefore, it is very important to have a risk matrix which would take into account traffic risks and associated costs.
  - The paradox is that the exuberance of the first set of projects probably diluted objectivity when it came to traffic forecasts. The problem with SHs as mentioned before – states can change policies which radically affect traffic thereby affecting revenues of companies which had banked on those traffic estimates to earn revenue<sup>32</sup>. The question that arises is whether a bidding process would have taken care of these problems. And a larger question is which method is better – MoU or bidding?
- Another lesson is the financial structure
  - The financial institutions agreed to lend money because the concessionaire was assured 22 per cent internal rate of return. If after 30 years it did not reach that 22 per cent, the concession period would continue. This effectively means that this is a perpetual agreement which is not replicable.
  - Debt to equity ratio should be 3 to 1 in case of roads sector for India<sup>33</sup>. This means that for every rupee of Company XYZ owned by the shareholders, Company XYZ owes Rs. 3 to its creditors. Over time senior debt to pure equity ratio in India has increased from 2.2 in 2002 to 4.6 in 2006<sup>34</sup>. In keeping with the times when AMRTL was conceived, its debt to equity ratio was 1.5 to 1, which is low compared to the average.

<sup>31</sup> Based on interview with Mr. Cherian Thomas, Head of IDFC's PPP initiatives.

<sup>32</sup> AMRTL sister project Vadodara-Halol Toll Road Company Ltd also suffered losses due to lower than estimate traffic estimates. The traffic estimates were based on the premise that incentives available for industrial development in Halol would be available for a long time. However, those incentives were withdrawn and the traffic did not materialize (PPP Cell, Department of Economic Affairs, Government of India (2010). "Public Private Partnership Projects in India: Compendium of Case Studies". [www.pppindia.com](http://www.pppindia.com). December. Accessed September 28, 2011.

<sup>33</sup> "Capital-intensive industries tend to have higher debt-to-equity ratios because capital-intensive industries purchase more property, plants, and equipment to operate. In general, a high debt-to-equity ratio indicates that a company may not be able to generate enough cash to satisfy its debt obligations. However, low debt-to-equity ratios may also indicate that a company is not taking advantage of the increased profits that financial leverage may bring". ([www.investinganswers.com](http://www.investinganswers.com)).

<sup>34</sup> Pricewaterhouse Coopers (2007). "Infrastructure Public-Private Partnership (PPP) Financing in India". Draft Final Report for the World Bank. September. <http://toolkit.pppindia.com/pdf/infrastructure-financing-india.pdf>. Accessed November 29, 2011.

## Bengaluru-Maddur State Highway, State Highway No. 17, Karnataka

### Background of the sector

See the case study on the **Ahmedabad-Mehsana State Highway, State Highway No. 41, Gujarat** for a background of the sector.

State Highway No. 17 was the first public-private partnership (PPP) project that the Karnataka Government undertook. The project was delivered in time and was constructed within the estimated costs.

### Snapshot of the project

Karnataka was one of the leaders in developing state highways and the Bengaluru-Maddur State Highway,

The snapshot of the Bengaluru-Maddur State Highway, State Highway No. 17 is given in Table 3.17.

**Table 3.17: Snapshot of Project: Bengaluru-Maddur, SH 17**

PPP	BOT (Annuity)
Promoting Agency	Brindavan Infrastructure Company Limited (BICL) The three promoters are <ul style="list-style-type: none"> <li>• IL&amp;FS Engineering and Construction Ltd.</li> <li>• NCC Infra Ltd</li> <li>• KMC Construction Ltd</li> </ul>
How Secured	Bidding
Implementation	Financial Closure for the project: April, 2004
	Construction Started: 22 May, 2004
	Construction Completed: 30 June, 2006
	Commercial Operations Date (COD): 26 June, 2006.
Operations and Maintenance	8 years
Distinguishing Features	Bidding, financials transparent
	DPR inadequate, design changes
	O & M
	Committed Personality

Karnataka started early on the path of developing its highways when in 1999 it set up the Karnataka Road Development Corporation Limited (KRDCL). To increase private sector participation in building and enhancing the state highway network, as a first project on an experiment basis, it decided to upgrade part of the State Highway No. 17 which goes from Bengaluru to Maddur. Consequently, the Bengaluru-Maddur Highway became the first BOT (annuity) scheme in the state.

The project started with three promoters – NCC Infra Limited, KMC Construction Limited, and Maytas Infrastructure Limited. Since then Maytas Infrastructure has become IL&FS Engineering and Construction Limited. The three promoters formed the SPV, Brindavan Infrastructure Company Private Limited (BICL), with its registered office in Hyderabad. It won the bid in a fair and transparent manner to implement the project. At the helm of affairs in Bangalore was Mr Soans, Vice-President of BICL. Mr Soans is the ex-chief engineer of Karnataka.

The project involved 4-laning of the Bengaluru-Maddur State Highway No. 17 between 11.6 km to 45.4 km, 51.2 km to 59.6 km, and 62.1 km to 82.5 km. The other work that was undertaken includes:

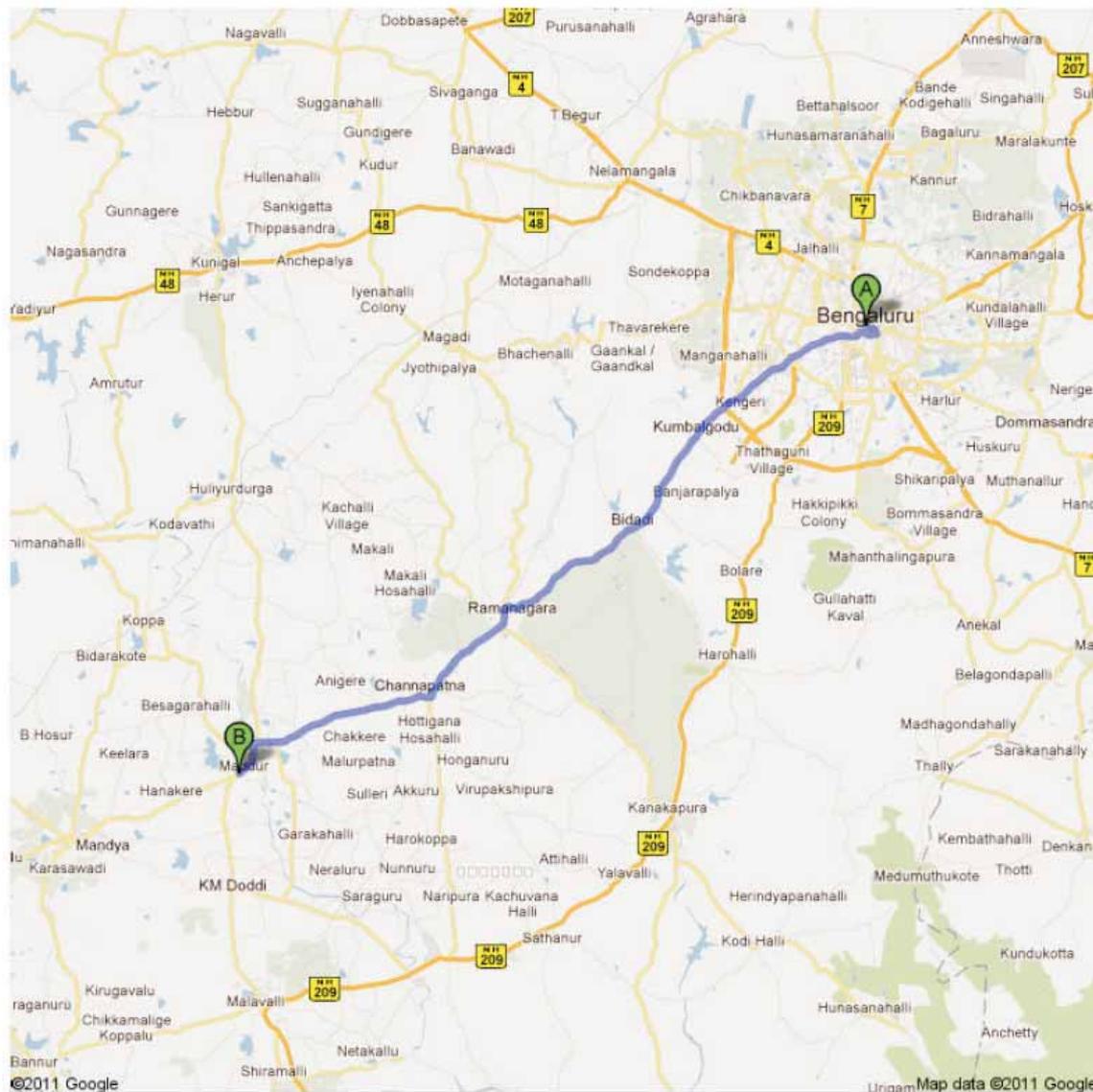
- Upgradation of 4 lanes for the various corridors with or without median and earthen shoulders/footpaths on either side.
- There were to be six major junctions.
- 18 minor bridges (less than 60 m) upgraded.
- 3 major bridges (above 60 m) upgraded.
- 2 new subways for pedestrians having width of 4.5m and a clearance of 3.0 m were to be provided at two different points.
- Upgradation of 163 culverts (approximately) by way of extending or replacing them.
- Retaining walls.
- Drainage:
  - Storm water drainage constructed in the form of concrete drains generally below the footpath along with facilities to accommodate the utilities.
  - Under pavement drainage through granular layer carried to the embankment slope for full width of formation so as to keep pavement as well as the side of the embankment well drained.
  - Properly designed drainage of surface runoff at the junctions.
  - Properly designed sub-soil drainage wrapped in geo-synthetic material with a perforated pipe.
- Traffic signs.
- Road markings – Thermoplastic road markings for lane marking, edge strips, chevron, zebra stripes, direction signs, stop lines, etc.
- Traffic safety measures:
  - Pedestrian guard rails in urban areas.
  - W-shaped steel beam guard rails (crash barriers) at high embankment sections, at bridge approaches, and on horizontal curve locations.
  - Delineators like circular concrete pipe roadway indicators, hazard markers, and object markers with retro-reflective paint.
- Road illumination.
- Planting/landscaping.
- Traffic signal systems.
- Ancillary facilities:
  - 29 bus stops and bush shelters.
  - Truck lay byes at 3 locations:
    - § Illuminated truck lay byes.
    - § Internal signs and markings provided.

The project cost was Rs 247 crore. The EPC was for Rs 188 crore. Financial closure took place in April 2004. Construction was started on 22 May, 2004. Commercial operations started on 26 June, 2006. The project got completed on 30 June, 2006. The termination year for the project is 2014. The total duration of the project is 10 years with two years for construction and eight years for operating the road. BICL will receive semi-annual payments of Rs 29.7 crore for eight years after completion of the project.

The other stakeholders in the project are:

- Project Engineer: M/s Lea Associates South Asia Private Ltd.
- O&M Contractor: BICL.
- Pre-feasibility consultant: M/s Lea Associates.
- Techno-economic feasibility consultant: M/s Infrastructure Development and Corporation (Karnataka) Limited (Figure 3.5).

Figure 3.5: Map of Bengaluru-Maddur State Highway, SH No. 17



- Transaction Advisor: M/s Infrastructure Development and Corporation (Karnataka) Limited.
- EPC Contractor: BICL.

### Evaluation of the project (from the execution point of view)

#### Initialisation

The process of awarding the project was held in a transparent and fair manner. This process of awarding also stands in contrast to the Ahmedabad-Mehsana State Highway Project. The promoters learnt about the project through advertisements and submitted an expression of interest (EoI) in response. It took a week's time to prepare the EoI and the paperwork was satisfactory. The government response, however, was not as satisfactory. The government said that it would respond in 90 days after the submission of the EoI but took six months.

The government prepared the detailed project report (DPR). While the design of the project was fine, the comprehensiveness of the DPR left much to be desired, especially since the DPR did not take into account the difference in soil that changes quickly in that particular section of the highway. Further, culverts mentioned in the DPR were found to be non-existent. This showed lack of diligence on the part of those who formulated the DPR and lack of auditing on the part of the government, especially since DPRs may cost Rs 70 lakh and more. The approximate cost of writing a DPR is Rs 40,000 per km.

KRDCL got approval from the Karnataka State Pollution Control Board as mentioned in the concession agreement.

The state government gave some incentives to the project. Income tax was lower by 10 per cent. Tax

exemption of 13 per cent was also given. Subsidies of 2 to 3 per cent were given on import of equipment. Further, the biggest incentive was finishing the project on time as this would translate into 50 per cent profits.

The bidding process was satisfactory, transparent, and fair with eight bidders and no foreign competitors. There was no MCA available at that time; the government prepared it for the first time for this project. Since it is just a guideline with a number of ambiguities, it does not affect implementation in any way.

Arranging funds was the easier part of the process. There was a combination of reliance on own funds (Rs 40 crore), loans from banks (Corporation Bank – Rs 50 crore), and loans from other agencies (IDFC – Rs 150.5 crore). Recently, during the O&M stage the company has applied for term loans. Of special mention here is the role of Infrastructure Development Corporation (Karnataka) Limited or iDeCK (and therefore IDFC) who were advisors to KRDCL and ensured a transparent bidding process. iDeCK is a joint venture between the Government of Karnataka, IDFC, and HDFC which was created in 2000.

The bid estimate was Rs 200 crore. Although, factors like floods and changes in design affected the project, finishing the project in time ensured that it was profitable.

#### Implementation

While the initialization stage was satisfactory, the project ran into hurdles when it came to implementing it. The project was delayed by three months or 100 days which cost approximately Rs 50 lakh as the design of the bridges had to be changed.

A peculiar feature of the section of the State Highway (SH) is that the soil changes very rapidly from rocky

to soil. Bengaluru to Ramnagaram is very rocky so the design of the bridge had to be changed twice. The DPR mentioned open rock to form the base but none existed. Then the base design for the bridge changed from well foundation to pile foundation. Basically the homework had not been done properly before the start of the project.

Though the DPR said that there were culverts none were found. The DPR was clear that the culverts had to be upgraded and not constructed a new. This led to a delay of two months.

Floods too washed away part of the road causing a further delay of two months.

The location of the project helped in getting unskilled labour, which was readily available in the area. Procurement was not a problem otherwise.

The key person in the implementation of a road project is the project manager. Project managers were stationed at the site and they monitored the progress regularly and prepared daily reports. No software was involved to track progress. However, targets were set and they were monitored. Independent consultants also monitored the project. Weekly meetings were held to track progress.

As per the concession agreement, 50 per cent of the project site was to be delivered within a month from the signing of the agreement. At the time of the interview in June 2011, there was still 0.2 per cent land which had to be handed over to BICL (land on the side of the roads). This land issue led to legal problems between KRDC and BICL. Therefore, while there was no dispute during the implementation, problems surfaced afterwards. There is a case going on between the two with BICL claiming that land was delivered late and therefore it should get a fair share of the bonus for finishing on time. KRDC claims otherwise. In a way, KRDC's

contracts are not flexible as they do not take into account extra factors like changes in design, bad DPRs, or floods which may cause a delay in implementing the projects.

Given such a situation, the contractors still do not stop work because stopping work hurts them financially. For example, 300 people worked on a site in a day on SH 17, if they were left idling for days it would have cost Rs 25 lakh to the promoters. Plus as mentioned earlier, finishing the project on time meant earning 50 per cent profits.

Land acquisition for this project was done in four stages with each stage taking two to three months. The first instalment of 50 per cent land was handed over fairly quickly but the rest took time. Further, the land is useless unless and until it is cleared of encumbrances. There were problems due to lack of sanction and therefore timely shifting.

Mr. Soans came with considerable experience and being from a government agency helped in finishing the project. He brought in engineering and management skills – a combination that is needed for implementing infrastructure projects.

The government agencies performed in an average manner but the state government's performance was good.

### Commercial Operations

BICL also has problems servicing its debt but not due to traffic woes. Traffic volume increased by 15 to 20 per cent compared to before the completion of the SH. BICL received its first annuity but for the second annuity there was a penalty. Since this was to be used to service the debt it created problems. BICL has been involved in arbitration with KRDC since then and the company has managed to service its debt.

The twice in a month ritual of receiving annuity is a matter of negotiation between KRDCCL and BICL rather than a straightforward transparent process. Such methods create disincentives for the private sector to participate in building infrastructure, especially at the state level.

Further, the annuity does not cover the O&M. According to Mr. Soans, O&M is 50 per cent of the project if not more. BICL does the following to maintain the road:

- Monthly submission of progress reports to KRDCCL.
- Inspection of roads every weekend.
- Government officials and the vice-president of BICL go once in 10 days to monitor the road.
- Average 130 to 150 people work on the road every day in batches of 15-20 people and each batch is given 8 to 10 km to clean. Maintaining the road includes 10 operations like cleaning, trimming, and removing sand. The batches finish 10 km in 15 days.
- 80 per cent of the job is done by machines to prevent any errors. Equipment provides speed and accuracy. A machine like bobcat can replace 150 people and it cleans existing roads and also the sides where sand gets collected. The bobcats cost Rs 18-20 lakh each.
- Pre and post-monsoon cleaning and maintenance are done very carefully.
- Two tests are done – Benkelman Deflection Test is done once in a year and Bump Integrator Test is done twice in a year.
- Overlaying is done once in 4 years.

Despite BICL's best efforts, it has to engage in regular arguments with the locals. Traffic signs are destroyed, garbage is dumped on the side of the road, and the local people do not like barricades.

There are not enough pedestrian crossings and the few that exist are not used by the people. They do not like any kind of barricades. The SH passes through several cities like Ramanagaram where the movement of traffic is very slow. Needless to say bypasses should have been planned on the road to make it safe for pedestrians.

BICL regards policemen as its number one enemy. Both AMRTL and BICL officials maintained that they should be given the power to police their roads. Obviously due to legal and governance issues this is not possible but it does raise questions about outdated governance issues.

Where the roads merge into smaller roads, the exits have not been built properly and are a recipe for future disasters. Further, KRDCCL gives permission for laying down utilities on the side of the road without consulting BICL. BICL stops the construction of such utilities as it believes that such construction structurally weakens the road. BICL wants the cables to be laid outside BICL land. Again this shows lack of training and motivation on the part of the government so much so that it does not want to protect its own assets. Illegally parked trucks also create traffic hazards.

### Major Problems Faced

1. The poor quality of the DPR caused significant delays for BICL.
2. Land acquisition was delayed which has led to arbitration issues between BICL and KRDCCL.

### Contribution to the Sector

Since it was a first time experience for both the parties at the state level, there were several learnings. The concession agreement for this project was used by other southern states like Andhra Pradesh. The financing operations show a transparent bidding

process which is important. Recently, due to problems with the DPR there is an increased movement towards DBFO type of models in roads which will hopefully address these issues.

### Contributing Factors for Successful Implementation

- An experienced engineer with government experience and managerial skills at the helm of affairs who is committed and passionate about the project.
- Regardless of the arbitration, KRDC and BICL are on good terms and did work together closely for this reasonably successful experiment in PPP in state highways.
- No clearances needed for pollution or from the Railways as KRDC had obtained them.

### Learnings

#### What to do

- Do your homework – DPR and design.
- Get a person with engineering and management skills at the top who knows the local language and commands respect.
- Get clearances prior to the project being implemented.
- Land acquisition without encumbrances helps.
- O&M being part of the project is exemplary.

### Conclusion

- BICL had to face a number of problems of land acquisition. It has now become compulsory that 80 per cent of land should be acquired before a project starts. However, the answer is not just acquiring the land but also clearing it of

encumbrances. Clearances from various departments should be taken beforehand. This is important and ensures quick implementation of road projects. Single window clearance might be a good goal.

- Commitment: Since it was a first time experiment, there was a certain involvement, commitment, and excitement in implementing the project successfully. The magic may not last but professional commitment is necessary if projects have to be completed on time.
  - A related but significant point is that implementation of projects in India seems to be personality driven. It depends on the parties involved. Surprisingly, people related to AMRTL, BICL, and the PMGSY road in Himachal Pradesh made the same point—the success of a project depends on the commitment of the people involved both from the side of the government and the contractor.
- L&T, IL&FS, promoters of BICL, and Mr Soans were considerably experienced in this sector. Further, it shows that close cooperation with government agencies is important.
- Competitive bidding ensures fairness and transparency.
- BICL did not do a proper accounting of risks. This is a practice that is very much needed in India and should be adopted fully.
- L1 – bidding is counter productive.
- A comprehensive DPR is a key to the success of a project. Perhaps movement towards DBFO modes in roads reflect this thought process.
- Annuity negotiations need to be simplified.
- Success of SH projects implemented on a PPP basis depends on the location of the project.
- O&M is an important part of the process.

- There has been a lot of heartburn recently on the lack of trained staff, especially civil engineers. There is a need to recognize that project managers and engineers need a background in economics, engineering, managerial, and negotiation skills.
- Even unskilled staff needs training and EPC companies are the best ones to provide this training since they can provide training in the skills that are needed.
- Both the projects show that PPP projects should involve the public, a private party, and a public party. Unless and until the three of them are on the same page, there will be law and order issues. Project designs should involve the public; their behaviour should be kept in mind while designing projects. Bypasses around cities or flyovers on main roads may sound expensive in the short run but are perhaps better in the long run.
- The Bengaluru-Maddur State Highway, State Highway No. 17, Karnataka and the Ahmedabad-Mehsana State Highway, State Highway No. 41, Gujarat show that PPPs are still missing the third element, the involvement of the public.

# Power

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## Tata Mundra UMPP

### Background of the Sector

At the end of the 11<sup>th</sup> Five Year Plan India's installed power capacity will increase to 1,86,943 MW. According to revised targets the total capacity addition during the 11<sup>th</sup> Plan will be 62,374 MW (the earlier target was for 78,700 MW). Out of this, 32 per cent will come from private sector initiatives.

### Revised targets for capacity addition during the 11<sup>th</sup> Plan

Sector	Commissioned till 31 December, 2009	Likely in the remaining period	Total with high degree of certainty	With best efforts
Central	4,990	16,232	21,222 (34%)	4,530 (36%)
State	9,112	12,243	21,355 (34%)	1,130 (9%)
Private	4,990	14,808	19,797 (32%)	6,930 (55%)
All-India	19,092	43,282	62,374 (100%)	12,590 (100%)

Source: Mid-term review the 11<sup>th</sup> Five Year Plan.

Note: The actual capacity addition as on 31 March, 2010 was 22,301.7 MW.

### The anticipated installed capacity at the end of the 11<sup>th</sup> Plan

	Hydro	Thermal	Nuclear	Total
Capacity as on 31 March, 2007	34,654	86,015	3,900	1,24,569
11 <sup>th</sup> Plan Target	15,627	59,693	3,380	78,700
Likely addition during the 11 <sup>th</sup> Plan	8,237 (52.71 %)	50,757 (85.03 %)	3,380 (100 %)	62,374
Likely installed capacity on 31 March, 2012	42,891	1,36,772	7,280	1,86,943

Source: Mid-term review of the 11<sup>th</sup> Five Year Plan.

Note: Figures in brackets indicate percentage of target achieved.

In all, 88 central power sector projects (costing Rs 20 crore and more) are under implementation in the country. Out of these, 36 are mega projects costing

Rs 144.99 billion, 48 projects are major projects costing Rs 20.26 billion, and the remaining four are medium projects (1 million=10 lakhs).

#### The frequency distribution of the projects

Mega Projects		Major Projects		Medium Projects	
Number of projects	Anticipated cost	Number of projects	Anticipated cost	Number of projects	Anticipated cost
36	144,994.65	48	20260.82	4	311.87

Source: Project Implementation Report of central sector projects costing Rs 20 crore and more (April-June 2009), MoSPI.

Note: Status of Projects as on 30.06.2009 (cost in Rs crore).

Further, out of these 88 projects, 72 (almost 82 per cent) projects either suffered cost overruns or time overruns or both; 23 projects suffered cost overruns causing a cost increase of about 18 per cent; 33

projects suffered time overruns (ranging between one to 68 months); and 16 projects (about 18 per cent of the total) suffered both cost and time overruns:

Total Projects				Projects with cost overruns				
No. of projects	Original cost (Rs crore)	Anticipated cost (Rs crore)	Cost over run %	No. of projects	Original cost (Rs crore)	Anticipated cost (Rs crore)	% increase	
88	159,798	165,567	3.6	23	32,478	38,427	18.3	
				Projects with Time Overruns			Range of delay (months)	
				33	70,246	75,475	1-68	
				Projects with cost & time overruns			Range of delay (months)	
				16	29,291	34,612	7-47	

Source: Project Implementation Report of central sector projects costing Rs 20 crore and more (April-June 2009), MoSPI.

Note: Status of projects as on 30.06.2009.

Table 3.18 gives the year-wise plan outlay and expenditure for the power sector. As can be seen from Table 1, the utilisation of central sector outlay was much lower than the utilisation of the state sector

outlay. In some cases, the states spent more than what was allocated to them. However, overall utilisation of allocated funds improved from 85.8 per cent in 2003 to 92.9 per cent in 2009.

**Table 3.18: Plan Outlay/Expenditure for the Power Sector (Rs in crore)**

	2003	2004	2005	2006	2007	2008	2009	CAGR
<b>Allocation</b>								
Central Sector	15,492	18,116	20,042	27,419	32,052	38,490	45,052	19.5
States/UTs	17,265	16,197	18,986	18,676	20,720	26,941	33,494	11.7
All-India Total	32,757	34,313	39,028	46,096	52,772	65,431	78,546	15.7
<b>Expenditure</b>								
Central Sector	10,993	14,328	17,604	21,046	27,271	29,427	39,818	23.9
States/UTs	17,103	17,837	17,035	17,330	22,188	27,243	33,173	11.7
All-India Total	28,096	32,164	34,639	38,376	49,459	56,670	72,991	17.3
<b>Utilisation %</b>								
Central Sector	71.0	79.1	87.8	76.8	85.1	76.5	88.4	—
States/UTs	99.1	110.1	89.7	92.8	107.1	101.1	99.0	—
All-India Total	85.8	93.7	88.8	83.3	93.7	86.6	92.9	—

Source: Mid-term review of the 11<sup>th</sup> Five Year Plan.

The government has been involved with various policy initiatives to encourage private sector participation in the power sector. These include:

- Allowing foreign equity participation up to 100 per cent in the power sector under the automatic route.
- Encouraging the private sector to set up coal, gas, or liquid-based thermal projects, hydel projects, and wind or solar projects of any size.
- Constituting independent State Electricity Regulatory Commissions.
- Deregulating of ancillary sectors such as coal.
- Introducing the Electricity Act 2003 and the notification of national electricity and tariff policies.
- Providing an income tax holiday for a block of 10 years in the first 15 years of operation and waiver of capital goods' import duties on mega power projects (above 1,000 MW generation capacity).
- Un-bundling of State Electricity Boards (SEBs) into generation, transmission, and distribution companies for better transparency and accountability (<http://www.pppinindia.com/sector-power.php>).

### Snapshot of the Mundra Ultra Mega Power Project

The Mundra Ultra Mega Power Project (UMPP) is developed by the Coastal Gujarat Power Limited (CGPL). The project is a super-critical, coal-fired power plant with a total capacity of 4,000 MW. The project is expected to be completed unit by unit.

Commissioning of the first unit was done in March 2011 and of the remaining units at regular 4-month intervals. The project is expected to achieve full commercial operations by January 2013. In other words, the first two units of 800 MW each are expected to be commissioned in the 11th Five Year Plan and the remaining units in the 12th Five Year Plan (see Table 3.19).

**Table 3.19: Completion schedule for Mundra UMPP**

Phase	Capacity commissioned (MW)	Completion year
1.	800	September 2011
2.	800	January 2012
3.	800	May 2012
4.	800	September 2012
5.	800	January 2013
Project Size (MW)	4,000	

The project is located in a coastal area of Mundra taluka in the Kutch district of Gujarat. The project area covers 1,254 hectares of vacant land near the villages of Tunda and Wandh, including 202 ha of right of way outside the project boundary, and is about 2 km from the first-phase development area of the Mundra Special Economic Zone (MSEZ), where a 660 MW power plant project, the Adani Power Project, is being implemented by Adani Power Limited. The project area is about 1.5 km from the sea, with a portion of the MSEZ lying between the sea and the project area. For logistics and accessibility, the project relies on:

- (i) Mundra Port (about 25 km from the project site);
- (ii) State Highway-6 (SH-6) (about 6 km) connecting Mundra and Mandvi;
- (iii) National highway extension (NH 8A) (about 15 km), connecting Gandhidham and Anjar with Mandvi;
- (iv) Adipur railway station (85 km); and
- (v) Bhuj airport (75 km).

An access road will be constructed to provide direct access to the project site from SH-6, bypassing the two villages (see Figure 3.6 for the location).

Figure 3.6: Location of the Mundra UMPP



An environmental and social impact assessment of the project was done through the following six separate but related studies (ADB 2008):

1. A rapid environmental impact assessment conducted by TCE Consulting Engineers Limited of India from March to May 2006.
2. A comprehensive environmental impact assessment conducted by TCE from March 2006 to August 2007.
3. A socio-economic assessment report conducted by TCE from March to August 2006.
4. Rapid marine impact assessment conducted by the National Institute of Oceanography from January 2006 to April 2007; supplementary information provided in October 2007.
5. A supplementary investigation of the cumulative impact on ambient air quality of the project and

- the neighbouring 660 MW power plant prepared by the Tata Power Company (TPC) Limited from late October to early November 2007 in consultation with Vishudda Envirotech of India.
6. A rapid social impact assessment conducted by Saline Area Vitalization Enterprise Limited of India in October 2007.

In the course of the environmental and social assessment, a public hearing was held on 19 September, 2006, and further consultations were subsequently conducted in the villages. The project received environmental clearance from the Ministry of Environment and Forests (MoEF) on 25 April, 2007 based on the rapid environmental impact assessment. All other clearances and permits required for various operations from the national and state authorities have also been obtained.

### Coal Supply

Up to 11.7 million tonnes of coal will be required per annum for the project. Given the limited availability of domestic coal, imported coal will be used. CGPL, taking advantage of TPC's global network will import coal from Indonesia, South Africa, Mozambique, and/or Australia.

Unlike domestic coal which has a high ash content and low calorific value, imported coal has high quality such that it has a higher calorific value, lower ash, and lower sulfur. Good quality coal supply will help CGPL achieve higher environmental standards.

### Seawater Abstraction

During operations, about 15.12 million m<sup>3</sup>/day of seawater will be used for condenser cooling and freshwater production. The spent cooling water and the reject from the desalination plant will be discharged back into the sea.

### Port Services

Mundra Port will be used to unload imported coal for the UMPP as per the agreement signed between CGPL and Mundra Port and the Mundra Special Economic Zone Limited (MSEZL). CGPL can also use the facilities at Mundra Port for unloading plant and equipment required for the construction of the project. MSEZL has agreed to provide the right-of-way for a corridor for the system, road access, and a seawater intake and discharge channel for the project.

### Role of the Ministry of Power

The Ministry of Power (MoF) is playing a crucial role in developing UMPPs by coordinating between various concerned ministries/agencies of the central

government, and with various state governments/agencies. The key areas which require the Ministry of Power's intervention include:

- Coordination with central ministries/agencies for ensuring coal block allotment/coal linkage.
- Environment/forest clearances, water linkage, required support from state governments and their agencies.
- Working out the allocation of power to different states from UMPPs in consultation with the states.
- Facilitating power purchase agreements (PPAs) and proper payment security mechanisms with state governments/state utilities.
- Monitoring the progress of shell companies with respect to predetermined timelines.

### Type of project

The Ministry of Power awarded the Mundra UMPP on a build, own, and operate (BOT) basis through tariff-based competitive bidding in December 2006.

### Value

The project entails an investment of Rs 17,000 crore and is being funded through a debt equity ratio of 75:25. The entire equity is from Tata Power and the debt component is from both foreign exchange and domestic loans. Nearly, \$1.8 billion (approximately Rs 5,400 crore) in foreign exchange loan is being provided by Korean Exim, Korean Insurance, and the Asian Development Bank, etc. The domestic loan of \$1.2 billion (approximately Rs 5,100 crore) will be raised through a consortium of banks led by the State Bank of India (see Table 3.20).

**Table 3.20: Financing the Mundra UMPP**

Financial assumptions	Total requirement	FY09	FY10	FY11	FY12	FY13
Debt	127,500	12,750	12,750	12,750	12,750	76,500
Equity	42,500	4,250	4,250	4,250	4,250	25,500
Total project cost (Rs in million)	170,000	17,000	17,000	17,000	17,000	102,000

### Promoting Agency

Tata Power is an integrated utility company, mainly involved in the business of power generation, transmission, supply, and distribution of electricity and coal mining. It is the largest private sector power company in India with a capacity of 2,976 MW. Its major upcoming projects include Maithon (1,050 MW) and Mundra (4,000 MW). Tata Power's presence across all the facets of the power value chain makes its business model unique. Upcoming projects and the ramp-up in the coal business are the company's main drivers of growth. Considering Tata Power's execution record, secured fuel supplies, and stable financials make it one of the top picks in the power sector.

In the transmission business, Tata Power has a 51 per cent stake in Power Links, a joint venture with Power Grid, and carries power from Bhutan to Delhi. In the distribution business, it holds 49 per cent in North Delhi Power, a power distribution company.

Tata Power also has a distribution business in Mumbai.

To secure fuel supply for its upcoming projects, Tata Power has undertaken backward integration. It has acquired 30 per cent each in three Indonesian coal mining companies—KPC, Bumi Resources, and Arutmin.

CGPL was incorporated on 10 February, 2006 as a special purpose vehicle (SPV) to implement the Mundra UMPP. The Mundra UMPP was awarded to Tata Power and as per the share purchase agreement Tata Power acquired CGPL on 22 April, 2007.

### How secured

The Ministry of Power awarded the Mundra UMPP through tariff-based competitive bidding in December 2006. As many as 13 bidders submitted their bids at the request for qualification (RFQ) stage. Of these, two were rejected at this stage. Of the remaining 11, six submitted their financial bids (see Table 3.21).

**Table 3.21: Bids for the Mundra UMPP**

S. No.	Bidder	Equivalent Levelised Tariff (Rs./kWh)	Ranking
1.	Tata Power Company Ltd	2.26367	L1
2.	Reliance Energy Generation Ltd	2.66119	L2
3.	Adani Enterprises Ltd	2.69601	L3
4.	Essar Power Ltd	2.80054	L4
5.	Larsen & Toubro Power Ltd	3.22049	L5
6.	Sterlite Industries (India) Ltd	3.74625	L6

TPC quoted the lowest levelized tariff for a 25-year period and was awarded the project. Subsequent to the completion of other formalities, TPC paid PFC 27.94 crore to acquire 100 per cent shares of CGPL.

#### Implementation – Dates of Important Milestones

**Name of Developer** – Coastal Gujarat Power Ltd. (CGPL) of Tata Power Ltd.

**Date of LoI received from MoP** – 28.12.2006

**Date of Transfer of SPV to developer** – 22.04.2007

**Date of signing of PPA (Effective date)** – 23.04.2007

The commissioning schedule for Mundra UMPP is:

Unit No.	Months from the date of PPA signing(22.4.2007) as provided in PPA	Schedule COD as workedout from the date of signing of PPA	Revised schedule of COD as per supplemental PPA of July 2008 and as per latest progress report
1.	64	August 2012	September 2011
2.	70	February 2013	March 2012
3.	76	August 2013	July 2012
4.	82	February 2014	November 2012
5.	88	August 2014	March 2013

The land acquisition status for the project is:

S. No.	Type of Land	Total area	Area acquired
i.	Government	1,240.42	1,240.42
ii.	MSEZ	541.14	541.14
iii.	Private	447.24	444.77
iv.	Forest	321.2	321.2
v.	Approach cum public road	12.35	12.35
vi.	Others	662.21	580.45
	Total	3,224.6	3,140.33

Note: Area in acres.

The final forest clearance from the Ministry of Environment and Forests (MoEF) was received on 10.6.2009.

The development of transmission lines was as per the following schedule:

	Scheduled Date	Actual/expected date	Remarks
Signing of BPTA for revised COD	–	31.7.08	No issue
Signing of PPA for revised COD	–	31.7.08	No issue
Transmission lines			All works associated with unit I awarded by PGCIL. Completion Schedule for 400 KV D/C Mundra-Bachhau-Ranchodpura line was scheduled for January 2011, but likely to be delayed to May-June 2011 due to ROW/ forest clearance problem
1. Mundra-Bachhau-Ranchodpuraline	January 2011	May 2011	
2. Mundra-Limbdi line	June 2011	Feb. 2012	
3. Mundra-Jetpur line	June 2011	June 2012	

#### Others

	Remarks
Financial closure	Achieved on 24.4.08
Order for main plant	i) For turbo generator – order placed with Toshiba Corporation of Japan on 20.8.07 and ii) For steam generator – order placed with Doosan Heavy Industries & Construction Company, Korea on 15.5.07
Order for BOP	All packages awarded

Further details on work in progress are given in Annexure 3.1.

#### Operation

The first unit was commissioned in September 2011 and subsequently other units will follow at an interval of five months each. Hence, the second unit will be commissioned by February 2012 and so. The 4,000 MW Mundra Project is scheduled to be fully commissioned by January 2013.

#### Distinguishing Features

Once commissioned, the project will earn the dual distinction of being the first UMPP to be on stream as well as using the 800 MW super-critical units for the first time in the country.

The project is a greenfield one initiated in response to the government's energy policy. Its large capacity and use of super-critical technology, and coal as its primary fuel, make it the most cost-effective alternative for generating electricity to meet the demand backlog and support further economic growth

both in the state and in the country. The power plant and its support facilities are being constructed on marginal land that is not ecologically or culturally sensitive. It adopts a super-critical steam technology, which is about 10 per cent more efficient than a conventional, sub-critical, coal-fired power plant.

The financing of the Mundra UMPP created a number of precedents:

- Its financing represents the single largest foreign debt and the largest limited recourse financing to date in India.
- The largest financing ever done for a power plant in India.
- The largest ever financing by IFC.
- It is also the single largest facility by the Korean Exim Bank and Korea Export Insurance in India.
- The first private sector power project in India to be based on energy efficient super-critical technology.
- The Mundra UMPP is the only UMPP that is running on track out of the four awarded so far.

### Evaluation of Project

Project monitoring and evaluation is being carried out by CGPL covering the progress of implementation as well as any updates on the resettlement plan. The monitoring includes:

- (i) Administrative monitoring—daily planning, implementation, feedback and troubleshooting, database of affected persons, and progress reports (ADB 2008).
- (ii) Socioeconomic monitoring—baseline information for comparing affected persons' socio-economic conditions, consultative processes, and general socio-economic activities.
- (ii) Impact evaluation monitoring and reporting—income standards restored or improved, and socio-economic conditions of the affected persons.

### Contributing factors for successful implementation

The Tata Power-Mundra project integrated sustainability issues right from its bidding stage till its successful implementation. Tata Power incorporated the technical and commercial feasibility elements into the project to meet all the requirements laid down under the Principles of Community Engagement as prescribed by the group (Gupta and Srinivasan 2011).<sup>1</sup>

### Learnings

In the case of the Mundra UMPP, the major issues that were encountered in the land acquisition process included loss of grazing land for local communities, which was addressed by establishing a charitable trust for fodder supply. This was preferred to providing land because of its unsuitability in supporting grazing. The setting up of a bio-gas plant and other community institutions as part of building the ecosystem is of particular relevance. Some of these interventions were not planned, but emerged based on local contextual factors. The unintended outcomes of this intervention were substantial increases in the supply of milk and the selling price of milk thus enabling the greater community's acceptance of the group's community initiatives. This holistic approach towards public-private partnership in establishing trust by fund raising and government support, is an example of a model that can be relevant for other mega projects that require large land acquisition for implementation.

In short, this case demonstrates the need for companies to engage responsibly with communities, particularly when infrastructure requires the acquisition of large land holdings (Gupta and Srinivasan 2011).

<sup>1</sup> Adapted from A. Gupta and B. Srinivasan (2011), 'When Principles Pay: Tata Power Plant Mundra', Working Paper No. 346, IIMB.

## Annexure 3.1

## Progress of work at site

S. No.	Activity	Schedule date of start	Actual Status /date of start	Remarks
<b>6.1.0 Boiler Erection</b>				
6.1.1	Unit-1	12.05.08	5.06.08	99% erection completed. Boiler hydro test completed on 31.3.10. Boiler initial firing done on 28.1.2011. Boiler light-up expected in March 2011.
6.1.2	Unit-2	21.08.08	2.09.08	96.61% erection completed. Hydro test completed on 22.9.2010. Boiler light-up expected in August 2011.
6.1.3	Unit-3	25.12.08	12.02.09	87.21 % erection completed. Boiler hydro test expected by end March, 2011.
6.1.4	Unit-4	30.04.09	12.05.09	72.5% erection completed.
6.1.5	Unit-5	03.09.09	30.08.09	49.88% erection completed.
<b>6.2.0 TG Erection</b>				
6.2.1	Unit-1	April 2010	16.12.09	TG box up achieved on 14.9.2010. Oil flushing completed on 24.12.2010.TG put on barring gear on 2.2.2011.
6.2.2	Unit-2	October 2010	1.4.10	TG erection commenced on 1.4.10. TG box up completed on 7.1.2011.
6.2.3	Unit-3	February 2011	10.10.10	TG erection commenced on 10.10.2010.
6.2.4	Unit-4	June 2011	24.1.11	TG erection commenced on 24.1. 2011.
6.2.5	Unit-5	October 2011	-	TG deck column cast. Structural fabrication and erection work in progress.
<b>6.3.0 Chimney(Shell concreting)</b>				
6.3.1	No.1(2-flue)	2.01.09	8.12.08	Flue can and ducts fabrication completed. Flue can and ducts erection work in progress.
6.3.2	No.2(3-flue)	3.06.09	24.03.09	Roof slab cast on 19.1.2011.
<b>6.4.0 400 kV Switch Yard</b>				
6.4.1	Tower erection	13.1.10	3.12.09	All 39 towers of Unit-1erected. Work in progress in other unit towers. Equipment erection and stringing (within switchyard) work in progress.
<b>6.5.0 Internal CHP</b>				
6.5.1	Excavation, structural fabrication, structural erection, equipment erection	10.8.08	2.4.09	Structural fabrication completed. Structural erection, equipment erection work in progress.

According to CGPL, schedule of commissioning activities is as follows:

S. No.	Name of Works	Schedule	Actual	Forecast
<b>A.</b>	<b>Unit -1</b>			
1.	<b>Boiler Side</b>			
	Hydro test Start	August 2010	31.03.2010	
	Boiler Light-up	February 2011		April 2011
	Steam Blow-off	April 2011		April 2011
	Safety valve floating	April 2011		April 2011
2.	<b>TG Side</b>			
	TG Box-up	February 2011	14.09.2010	
	Oil Flushing Compln.	February 2011	24.12.2010	
	Barring Gear	February 2011	02.02.2011	
3.	<b>Unit Synchronisation</b>	May 2011		May 2011
4.	<b>COD</b>	September 2011		July 2011
<b>B.</b>	<b>Unit -2</b>			
1.	<b>Boiler Side</b>			
	Hydro Test start	February 2011	22.09.2010	
	Boiler Light-up	August 2011		August 2011
	Steam Blow-off	October 2011		September 2011
	Safety valve floating	October 2011		October 2011
2.	<b>TG Side</b>			
	TG box-up	August 2011	07.01.2011	
	Oil Flushing Compln.	August 2011		June 2011
	Barring Gear	August 2011		July 2011
3.	<b>Unit Synchronisation</b>	November 2011		October 2011
4.	<b>COD</b>	March 2012		December 2011
<b>C.</b>	<b>Unit-3</b>			
1.	<b>Boiler Side</b>			
	Hydro-test Start	June 2011		March 2011
	Boiler Light-up	December 2011		November 2011
	Steam Blow-off	February 2012		December 2011
	Safety valve floating	February 2012		January 2012
2.	<b>TG Side</b>			
	TG box-up	December 2011		May 2011
	Oil Flushing Compln.	December 2011		October 2011
	Barring Gear	December 2011		November 2011

(Contd..)

S. No.	Name of Works	Schedule	Actual	Forecast
3.	Unit Synchronisation	March 2012		February 2012
4.	COD	July 2012		April 2012
<b>D.</b>	<b>Unit-4</b>			
1.	<b>Boiler Side</b>			
	Hydro test Start	October 2011		June 2011
	Boiler Light-up	April 2012		February 2012
	Steam Blow-off	June 2012		April 2012
	Safety valve floating	June 2012		May 2012
2.	<b>TG Side</b>			
	TG box-up	April 2012		October 2011
	Oil Flushing Compln.	April 2012		February 2012
	Barring Gear	April 2012		March 2012
3.	Unit Synchronisation	July 2012		June 2012
4.	COD	November 2012		August 2012
<b>E.</b>	<b>Unit-5</b>			
1.	<b>Boiler Side</b>			
	Hydro test Start	February 2012		October 2011
	Boiler Light-up	August 2012		June 2012
	Steam Blow-off	October 2012		August 2012
	Safety valve floating	October 2012		September 2012
2.	<b>TG Side</b>			
	TG box-up	August 2012		March 2012
	Oil Flushing Compln.	August 2012		June 2012
	Barring Gear	August 2012		July 2012
3.	Unit Synchronisation	November 2012		October 2012
4.	COD	March 2013		December 2012

## Rosa Power Plant

### Snapshot of the Rosa Power Plant

**The Rosa Power Supply Company Limited (RPSCL)** was incorporated on 1 September, 1994. A subsidiary of the Aditya Birla Power Company Limited (ABPCL), it was transferred to Reliance Power subsequent to a share purchase agreement that the two entered into on 1 November, 2006. Now it is a fully owned subsidiary of Reliance Power. The Rosa Power Project is being implemented in two phases (Phase I and Phase II) at Rosa village in Shahjahanpur, Uttar Pradesh. Since the project is a greenfield one, it was not bid out by the government.

In February 1999, the Government of Uttar Pradesh (GoUP) and RPSCL entered into an implementation agreement, which was subsequently amended in November 2006. Further, GoUP agreed to extend all benefits and support under the Uttar Pradesh Power Policy notified by GoUP in 2003 to Rosa Phase I. It agreed to treat Rosa Phase I as a 'priority project', promptly revalidate all approvals and licenses obtained from it in relation to the project, and appoint a government official to provide approval-related assistance.

GoUP also agreed to provide support in relation to the procurement and transportation of raw material and equipment and lease government owned land for the project. GoUP agreed to take all necessary steps within its administrative powers to ensure UPPCL's performance under the power purchase agreement (PPA). The PPA, however, required the power supplier to guarantee certain minimum performance standards, such as plant availability and generation

capacity. The tariffs arrived at also assume a certain heat rate and other technical norms.

After taking over the project in 2007, Reliance Power put it on fast track, with land being expeditiously acquired, signing of the PPA, obtaining all statutory and regulatory clearances and approvals, and signing coal supply and transportation agreements. Rosa Phase I took 33 months to complete as compared to the 40 months that were projected.

Rosa Phase I employs the sub-critical Pulverized Coal Combustion (PCC) technology in its power plant. The sale of the entire power to be generated from the project is secured through a PPA with the Uttar Pradesh Power Company Limited (UPPCL) on a cost plus tariff basis based on the tariff guidelines set by the Uttar Pradesh Electricity Regulatory Commission (UPERC). Central Coalfields, a subsidiary of Coal India Limited is supplying the fuel for the power project.

Phase I of the Rosa Power Project entailed an investment of almost Rs 3,000 crore which was funded with a debt equity ratio of 70:30. The power generated from the plant will be evacuated using Uttar Pradesh's transmission network. The water required for the power plant is sourced from Garrah river located 1 km from the project site.

RPSCL is currently developing Rosa Phase II, a 600 MW expansion of Rosa Phase I that will create a coal-fired plant with a combined generating capacity of 1,200 MW. RPSCL got approval from the Chief Secretary, Government of Uttar Pradesh to expand

the capacity of the project from 600 to 1,200 MW on 1 December, 2006, provided that the project proponent would meet the time line prescribed by UPERC in relation to the earlier approved 600 MW project and would also get requisite approvals for capacity expansion from it.

### Type

The project is a private project with a PPA between RPSCL and UPPCL signed in November 2006. In Stage II of the Rosa Power Project, 300 MW of power will be supplied to UPPCL and the remaining 300 MW power will be sold on a merchant basis. The project has become the first thermal independent power producer (IPP) to start generation in the northern region. The payment obligations for Rosa Phase I, are hence, guaranteed by the state government.

### Off-Take Arrangement

#### *Purchase and Sale*

RPSCL agreed to sell and UPPCL agreed to purchase and accept delivery of all power generated by Rosa Phase I, in a 'take-or-pay' agreement. RPSCL may sell power to third parties subject to certain conditions.

#### *Term*

The term of the PPA is 25 years from the commissioning of the project and is renewable by mutual agreement. Once the time limit for the PPA is over, RPSCL is free to sell the power generated to a third party. If RPSCL decides to sell the power project and related assets upon the expiration of the PPA, UPPCL will have the first right to purchase it at a mutually agreed price, which shall not be lower than the market price of the power project.

#### *Tariff*

The tariff payable by UPPCL consists of a fixed charge, a variable charge, and an incentive charge:

- The fixed charge includes the total amount of interest on debt, interest on working capital, depreciation, operations and maintenance (O&M) expenses, taxes on income (excluding any penalties imposed by reasons of RPSCL's default), and return on the equity at a rate of 14 per cent on the equity component, which may equal up to 30 per cent of the total capital. The fixed charge is fully recoverable at 80 per cent availability (making the project available 80 per cent of the time on an average annual basis).
- The variable charge includes the cost for coal and oil based on certain normative assumptions as set out in Central Regulatory Electricity Commission (CERC) guidelines.
- An incentive charge of Rs 0.25 per kWh is paid for power generated in excess of 80 per cent plant load factor (PLF) and the fixed charge is reduced on a pro rata basis if availability is below 80 per cent.

Under UPERC approval the project cost is capped at Rs 26,416.3 million (1 million = 10 lakh) for purposes of determining the tariff, which does not include working capital margin.

### Rosa Phase II

Arrangements for the power off-take of 300 MW would be similar to the existing arrangements. Rosa Phase II plans to enter into a long-term PPA with UPPCL for this. For the remaining 300 MW capacity RPSCL entered into a Memorandum of Understanding (MoU) with Reliance Energy Trading Limited (RETL) on 2 September, 2007. Under the terms of the MoU, RPSCL is willing to sell upto 300 MW of power to RETL for a full term of a PPA of 15 years that may be extended further as mutually agreed upon between the parties. RETL may sell the power to any third parties, including any power utility outside the state of Uttar Pradesh. Power for off-take by RETL will be evacuated using the transmission network operated by the Power Grid Corporation of India Limited (PGCIL). RETL will

coordinate with the procurer and other agencies to obtain open access for transfer of power from the interconnection point to the point of supply to the procurer. This MoU will remain valid for a period of one year from the date of its execution. However, if

the PPA and tariff cannot be finalized within 12 months of its execution to the satisfaction of both parties, then it will stand terminated.

The implementation details of the two phases of the Rosa project are:

S. No.	Details	Capacity (MW)	Commissioning schedule			
			Original		Actual	
			Syn./Comm.	COD	Syn./Comm.	COD
1.	<b>Rosa TPP (Phase I)</b>	<b>600</b>				
2.	Unit I	300	12.09 02.10	03.10	12.09 02.10	03.10
3.	Unit II	300	03.10 05.10	06.10	05.10 06.10	06.10
4.	Date of TEC	19.09.1997				
5.	Estimated Approved Cost	Rs 2641.93 crore				
6.	Financial Closure	25.06.2007 (IDBI)				
7.	Type of Fuel	Coal				
8.	Fuel Linkages	Ashoka mines, North Karanpura block of CCL in Jharkhand				
9.	Date of Order	6.3.07 on M/s Shanghai Electric Corpn. China (BTG) and UEEPL (BOP)				
10.	Power Evacuation	Line in Line out by UPPCL for start up power and evacuation from the existing double circuit Rosa-Hardoi 220 kV line				
11.	MOE&F Clearance	March, 2006				
12.	UPERC accorded its approval on the project cost	1 December, 2006				
13.	UPERC accorded its approval on PPA	8 December, 2006				
14.	PPA signed between RPSCL and UPPCL	12 November, 2006				
15.	M/s Shanghai Electric Corpn. China selected as engineering, procurement and construction (EPC) contractor through competitive bidding. Notice to proceed (NTP) issued	18 June, 2007				
16.	Date of Land Acquisition	Land Lease Agreement for 1,465 acres signed on 18 January, 2007				
17.	Fuel supply agreement	FSA signed with Central Coalfields Limited on 4 May, 2007				

## Rosa Phase II

S. No.	Details	Capacity (MW)	Commissioning schedule			
			Original		Actual	
			Syn./Comm.	COD	Syn./Comm.	COD
1.	<b>Rosa TPP (Phase II)</b>	<b>600</b>				
2.	Unit III	300	01.11 03.11	04.11	10.11 12.11	03.12
3.	Unit IV	300	05.11 06.11	07.11	01.12 03.12	06.12
4.	Date of TEC	–				
5.	Estimated Original Cost	Rs 2,500 crore				
6.	Financial Closure	Achieved in July, 2009				
7.	Type of Fuel	Coal				
8.	Fuel Linkages	Central Coalfields, a subsidiary of Coal India Limited				
9.	Date of Order	23.3.08 on M/s Shanghai Electric Corporation China (BTG) & UEEPL (BOP)				
10.	Power Evacuation	Power from the project shall be evacuated on 400 KV lines of PGCIL. Open access has been granted to the project and Bulk Power Transmission Agreement signed with PGCIL on 23 November, 2009				
11.	MOE&F Clearance	July, 2009				
12.	M/s Shanghai Electric Corpn. China selected as EPC contractor through competitive bidding. Notice to proceed (NTP) issued	15.09.2008				
13.	Date of Land Acquisition	Land Lease Agreement for 1465 Acres signed on 18 January, 2007				
14.	Fuel Supply Agreement	Letter of Allocation for 2.2 MTPA issued to the project on 1 June, 2009. All milestones completed and Central Coalfields has been requested to sign FSA				

Source: CEA 'Broad status of thermal power projects in UP'.

Note: Syn. – Synchronized, Comm. – Commissioned, COD – Commercial Operation Declaration, TEC – Techno Economic Clearance.

## Evaluation of the Project

According to Mr J.P. Chalsani, CEO, Reliance Power, 'The Rosa plant operated at a PLF of 92.7 per cent during the quarter ending 30 June, 2011 and availability was at 94 per cent. However, sub-optimal load factor of the Rosa Power Plant was a major concern. Rosa Phase 1 (600 MW) plant operated at 54 per cent PLF for the December quarter

in 2010 and at 90 per cent of the target generation estimated by the Central Electricity Authority. The renegeing of the fuel supply agreement (FSA) was cited as the reason, which has been now addressed by importing coal. Rosa is now among the country's top thermal power plants in operating terms, firmly establishing the company's execution and operational capabilities.'

Revenues from the Rosa Power Project jumped to Rs 474 crore in the fourth quarter ended 31 March, 2011. The profit after tax from the project was Rs 131.5 crore at the end of financial year 2011.

According to Chalsani, once the entire plant is commissioned, it will be able to make an annual contribution of 9,000 million units to Uttar Pradesh, light up as many as 4 million homes, besides helping in bringing down load-shedding by at least 25 percent. The project is expected to provide permanent direct employment to 300 people.

Reliance Power is also all set to commission the 600 MW Phase II of the Rosa thermal plant in Shahjahanpur district at least three months ahead of schedule. Efforts are under way to synchronize both the 300 MW units by March 2012. The scheduled commissioning is due in March and July 2012 respectively for the two units. With this, Reliance Power's 1,200 MW project will become fully operational by the end of this financial year. This will be the company's second commissioning on the trot which will be ahead of schedule. In December 2009, the company had brought Phase I of power plant online, three months ahead of time.

To ensure that the project starts operations before time, the company has intensified construction activities at the plant site. The boiler of the first of the two units was test fired in August, making the project almost ready.

The entire 1,200 MW project will be fully operational by the end of the financial year, well ahead of the planned schedule. While the two units of Rosa Phase I supply 10 per cent power to the state, the entire 600 MW from Phase II will be sold to the state, thereby going a long way in reducing power cuts, especially in peak summer months.

According to experts in the power sector, once fully operational, the project will supply almost 10 per cent of the power requirements of the state. Moreover, since the project is located right in the middle of demand centres, such as Lucknow, Kanpur, and Agra in the state, it will not incur any additional transmission costs to evacuate power from the project

to these places.

### Land Acquisition

In January 2007, RPSCL entered into a lease agreement with Uttar Pradesh State Industrial Development Corporation (UPSIDC) for 1,465 acres of land, which was expected to be sufficient to meet the land requirements for both the phases of the project. The term of the lease is 90 years with effect from 23 November, 2006. RPSCL is required to pay a yearly rent to UPSIDC at a rate which will be revised at the end of each 30-year period. RPSCL has also made an upfront payment of Rs 225.7 million to UPSIDC for the lease.

### Equipment and Raw Material Supply

Reliance Power entered into a fixed price turnkey contract with its raw material suppliers. It is using boilers and turbines from Shanghai Electric, which according to company sources are cost-effective and have faster deliveries. RPSCL entered into an EPC contract with the Shanghai Electric Group Co. (SEC) and Utility Energytech and Engineers Private Limited (UEEPL) in March 2007 for the two phases of the Rosa Project. The agreement is a fixed price turnkey contract. SEC agreed to supply the Boiler Turbine and Gas (BTG) units and UEEPL agreed to provide the onshore supply of all equipment and material to be sourced, onshore services of engineering, civil and structural work, and inland transportation, customs clearance, customs duty, service tax and other taxes. The contract price is payable in multiple installments according to the payment schedule provided in the agreement.

The first BTG unit for Rosa Phase I was supplied within 19 months from the date that RPSCL issued the notice to proceed and the second BTG unit for Rosa Phase I was supplied within 22 months from the date that RPSCL issued the notice to proceed. The notice to proceed was issued in June 2007. If there were delays in completion, penalties had to be assessed against SEC in accordance with the terms of the EPC contract.

### Fuel Supply

The coal requirement for Rosa Phase I is estimated

to be 2.7 mtpa at 80 per cent PLF. RPSCL entered into a coal supply agreement with Central Coalfields Limited (CCL) in May 2007 to supply 2.7 mtpa. The terms of the agreement will continue till 31 March, 2026. In January 2007, RPSCL submitted an application to the Ministry of Coal for long-term coal linkage of 4.7 mtpa in addition to the existing coal linkage for Rosa Phase I. The additional coal linkage, besides operating Rosa Phase II at 80 per cent PLF, will be used to operate Rosa Phase I and Rosa Phase II at a higher PLF.

The agreement provides that the first delivery date (date notified by the buyer on which the seller is obliged to commence deliveries of coal) will fall within a four month period that commences not before 26 months from the date of execution of this agreement and not later than 32 months from such date. RPSCL will indicate the four month period within 30 days of the financial closure.

Under the agreement, CCL has absolute obligation to sell and deliver and RPSCL has absolute obligation to purchase and pay for the coal. In case of its failure to do so, whether due to force majeure or default, CCL is required to source the requisite quantities from alternate sources for RPSCL. If CCL fails to deliver the required quantities then RPSCL can procure the shortfall from other sources, on giving CCL a notice of seven days prior to releasing such a procurement order. Any difference in the price of the landed cost of coal will be borne by CCL for such coal which RPSCL will buy from other sources in case CCL is not able to deliver the required quantity. Further, in case the supply of coal by CCL falls substantially than what is required and RPSCL loses generation of electricity due to inadequate supply, CCL is liable to pay liquidated damages to RPSCL.

RPSCL is required to deposit with CCL an amount of advance equal to the estimated 'as-delivered' price of the contract quantity for a full operating year within 30 days before the first delivery date. Further, it is also required to furnish four bank guarantees representing amounts equivalent to the 'as-delivered' price.

On presentation of a provisional invoice, RPSCL will have to make the payment in full in accordance with

the invoice within three business days. This agreement provides that if RPSCL does not make the payments, it will be liable to pay interest at the prevailing cash credit rate. If default continues beyond 30 days then an additional 2 per cent over and above the cash credit rate will be charged.

The purchase price (as-delivered price) for coal will be the sum of base price, sizing charges, transportation charges up to the delivery point, statutory charges, and risk premium charges. The statutory charges comprise royalties, cesses, duties, taxes, levies, and without limitation all other payments of a similar nature.

CCL is entitled to terminate the agreement upon purchase of coal by RPSCL from any third party other than as provided under the agreement or upon RPSCL's failure to accept minimum standard tonnes of coal quantity under this agreement. Except as provided in this agreement, neither party can assign or otherwise transfer any of its rights or obligations under the PPA without the prior written consent of the other party.

RPSCL entered into a coal transportation agreement with East Central Railways in January 2007 that provides for the transportation of coal from its source in the Ashoka mines of the North Karanpura block of CCL in Jharkhand to the project site by rail, a distance of approximately 870 km, using the existing Indian Railways system.

### Transmission

Power generated from the project has been stepped up to 220 kv and is evacuated through seven 220 kv feeders to the UPPCL sub-station, approximately 20 km from the project site. UPPCL constructs and maintains the transmission lines from the project site to the interconnection point. The project is expected to lead to a considerable reduction in load generation for the northern grid as Shahjahanpur is a load sector due to the presence of industrial units and absence of any power plant. The Rosa Power Plant is hence expected to provide stability to the grid by reducing transmission losses.

### Financing Arrangements

Rosa Phase I obtained rupee denominated debt

financing consisting of a Rs 19,450 million loan facility and dollar denominated debt consisting of a US\$50 million facility, each of which was entered into on 25 June, 2007. Each of the loans may be drawn in part from time to time upon notice to the lenders except that no drawdown may be made after 25 December, 2010. The loans will mature on 1 October, 2022. The principal has to be repaid in 48 equal quarterly installments commencing from 1 October, 2010. Interest is payable on the first day of each calendar month after the first drawdown for the rupee denominated debt and on the first day of each calendar quarter for the US dollar denominated debt.

All existing and future RPSCL assets have been provided as security to the lenders. RPSCL is required to procure certain undertakings from the promoters including that:

- (i) REL, Reliance Power, and AAA Project will arrange for the subscription of 100 per cent of the equity of RPSCL, estimated to be Rs 5,404 million and of which at least Rs 1,080.8 million must be subscribed to upfront.
- (ii) REL, Reliance Power, and AAA Project will hold, directly or indirectly, a minimum of 51 per cent of the equity of RPSCL.
- (iii) REL and AAA Project will hold a minimum of 51 per cent of the equity of Reliance Power.
- (iv) Reliance Power will not create a lien over 51 per cent of the equity of RPSCL or dilute its shareholding below 51 per cent of the equity in RPSCL, although its shareholding may be reduced to 26 per cent of the equity of RPSCL if 75 per cent of the loan has been repaid so long as there is no default under the facility.

RPSCL has to maintain a debt service reserve account or provide a letter of credit or bank guarantee for an amount equal to six months of principal and interest payments. The debt service reserve account had been established by 25 December, 2007. RPSCL also agreed not to make certain restricted payments, including the payment of dividends and redemption or repurchase of any class of its shares that will result in a long-term debt to equity ratio higher than 4:1, pre-paying any indebtedness prior to its maturity date or making equity investments, unless all the following

conditions are satisfied:

- (i) there is no occurrence of default,
- (ii) repayment of rupee loan has commenced,
- (iii) all reserve accounts under the financing documents, including the debt service reserve accounts are funded, and
- (iv) the debt service coverage ratio is greater than 1.15 for the preceding 12-month period.

RPSCL intends to finance approximately 20 per cent of the cost of Rosa Phase II with contributions from Reliance Power and approximately 80 per cent from third party debt. The final amount from Reliance Power and thirdparty debt will be determined at the time of financing.

#### Payment Security Mechanism

Payments due from UPPCL are secured by a three-tier payment security mechanism:

- An irrevocable revolving letter of credit issued in favour of RPSCL by a scheduled bank with a value equal to one month's billings based on 85 per cent PLF.
- An escrow account holding fund equal to 1.25 times the monthly tariff amount based on 85 per cent PLF for the purposes of guaranteeing the reinstatement of the letter of credit on a monthly basis under this agreement.
- A state guarantee from GoUP for payments by UPPCL under PPA.

#### Contributing factors for Successful Implementation

Discussions with officials connected with the project revealed that its success could be attributed to skilled project management. It is not that the project did not face 'surprises' during its execution. According to a senior official of Reliance Power who is closely associated with the project, 'surprises' in infrastructure projects of this magnitude are to be expected, but what differentiates this project from the others is that a strong issue management team was empowered to take quick decisions. A good project management team to negotiate the surprises was key to the success of the project. Continuity of the management team

from inception till the end of the project was an additional factor. As compared to public sector projects the flexibility and independence provided to project management teams in private sector projects is far more and this was also the case with the Rosa Project.

Reliance Power installed a world class O&M system in Rosa. All the O&M manuals, standard operating procedures (SOPs), and IT enabled generation management systems were also installed. SAP for management of plant assets was installed which ensures that all activities, including plant maintenance, material management, employees, and finance are managed and monitored on a real time basis. Thus, adopting a technologically sophisticated project monitoring system with real time virtual monitoring helped in planning ahead for the various activities associated with the project. Reliance Power installed a centralised monitoring centre for optimisation of resources and manpower. Latest reliability-centred maintenance techniques were employed in Rosa which gives the project significant benefits in terms of diagnostics, preventive maintenance, and reduction of outages.

The O&M systems installed in Rosa will be replicated in other Reliance Power projects as and when they are commissioned and the centralised monitoring centre will manage all the projects with an overall optimisation perspective ([http://www.reliancepower.co.in/1104/7\\_102.pdf](http://www.reliancepower.co.in/1104/7_102.pdf)). There is a strong O&M team at the site supported by an experienced O&M team in the corporate office. A training simulator, which is a replica of a unit distributed control system, has been set up at Rosa for training operation staff at regular intervals. Employees are provided in-house training as well as specialised training by equipment manufacturers.

A strong in-house engineering team prepared a detailed project report (DPR), and during the execution of the project there were no revisions of the drawings. There was an acute shortage of skilled contractors and supplies for the Balance of Plant equipment. For most of the major packages, there were no more than 2-3 skilled contractors. However, the plant was still commissioned before time due to

skilled management.

One of the reasons for the smooth transfer of land for the power project was the corporate social responsibility activity undertaken by RPSCL. This helped in getting a buy-in from the locals.

The project was granted long-term fuel linkage of 2.7 million tonnes per annum by Coal India Limited and accordingly a fuel supply agreement (FSA) was signed with Central Coalfields Limited. However, the FSA has been kept in abeyance by CCL pursuant to implementation of new a coal distribution policy, and currently the project is being supplied only 50 per cent of its coal requirements by CCL. This has meant that the project is procuring its remaining requirements through open market sources, including through imports.

In view of the small pool of skilled manpower and the large demand in the power sector, this project faced shortages of skilled manpower. However, there were no delays because of this.

However, a closer analysis of the project implementation makes us to conclude the nature of the regulatory contract – awarded through an MOU and hence covered by a ‘cost plus’ pricing regime reduced the risk to the promoter and helped them to meet the situation arising from failure of CCL agreement through imports. The incentives created through a cost plus regime transfers all the risk to the GoUP in this case. This is an area of concern as the private party hardly bears any risk at all and transfers it to the sovereign. Two other elements of risk mitigation are the long-term PPA with UPPCL and the tie-up with a sister concern RETL for a good share of the remainder of the output, means that RPSCL was shielded from any demand risk in a take or pay contract. So, while government commitment to the project is a plus, sovereign guarantee are not the preferred mode. Last, but not the least the promoter benefited by entering the project after much spadework on clearances, land, etc. was done by the previous promoter, who exited. This is to be considered as a fortuitous plus factor.

# Railways

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## Delhi Airport Metro Express

### Snapshot of the Project

The Delhi Airport Metro Express (DAME) is the first public-private partnership (PPP) project within the Railways sector with respect to a passenger carrying train.

DAME runs from the city centre (New Delhi station) to Dwarka Sector 21 via the Indira Gandhi International (IGI) Airport. The airport station provides connectivity with India's largest aviation hub, Terminal 3 (T3).

DAME is a fast train which takes 18 minutes from New Delhi to the airport and the ticket costs Rs 80.

The line has six stations en-route – New Delhi, Shivaji Stadium, Dhaula Kuan, Delhi Aerocity, IGI Airport, and Dwarka Sector 21. Two stations (New Delhi and Shivaji Stadium) have City Airport Terminal (CAT) facilities and are equipped with ticket counters and check-in facilities (passenger and baggage check-in). The Dhaula Kuan station provides passenger check-in facility only. Full passenger and luggage check-in facilities are being provided for India's three leading domestic airlines – Air India, Jet Airways, and Kingfisher.

### Bidding Process

There were five bidders for the DAME Project, all of whom had their international consortiums on board:

1. Bombardier and IL&FS.
2. Siemens Transportation, Leighton Asia and Gammon Infrastructure Projects.
3. GE Transportation and Larsen & Toubro.
4. Reliance Energy and CAF from Spain.
5. YTL Corporation.

The bid to award the contract took a year. Two pre-bid meetings were organised by the Delhi Metro Rail Corporation (DMRC) to clarify any doubts, and seek additional information, etc.

On 23 January, 2008 DMRC awarded a 30-year build, operate, and maintain (BOM) PPP contract to the Reliance-CAF consortium for DAME. However, DMRC paid for half the overall project cost and executed the tunnelling and civil work.

The consortium entered into a joint venture and the Reliance Group created a special purpose vehicle (SPV), the Delhi Airport Metro Express Private Limited (DAMEPL) to deliver and manage this project, and act as the concessionaire for DMRC and the DAME project.

DAMEPL is a subsidiary of Reliance Infrastructure (the Anil Ambani Group) and Construcciones y Auxiliar de Ferrocarriles, S.A. (CAF from Spain). Reliance has a 95 per cent stake in this project and CAF has 5 per cent stake. DAMEPL was tasked with most of the work, including key decision making. CAF built the trains in Spain and exported them to India but did not have any management responsibilities.

## Award of Contract

Reliance paid DMRC a concession fee of Rs 51 crore at the time of the win (it was the highest bidder for the DAME project). It will continue to pay DMRC Rs 51 crore, as concession fee, every year for the next 30 years, along with an increment of 5 per cent every year.

In addition, Reliance will pay DMRC a share of the revenues for 30 years for operating DAME trains. DMRC's share of revenue is:

- Year 1 - 5: 1%
- Year 6 - 10: 2%
- Year 11 - 15: 3%
- Year 16 - 30: 5%

## Revenue

Reliance will raise its revenue and recover costs in the following ways:

- **Ticket prices:** A ticket from New Delhi station to the Airport station at present costs Rs 80.
- **Retail Outlets:** Reliance is also setting up retail shops at two of its main train stations – New Delhi and Shivaji Stadium. The shops will be ready by December 2011. They will be on lease or rented out for 8-9 years.
- **Advertising:** Advertisements, which have been integrated with the urban transport system in the city will be another source of revenue.

## Detailed Project Report (DPR)

RITES prepared the DPR for DMRC. Overall, the DMRC-RITES DPR was comprehensive and provided details about the project, alignment, and the technological system to be implemented, along with financing options. It was equally clear in terms of the clearances required, other related requirements, structures, and civil design. Even the number of trees that had to be cut was explicitly mentioned in the DPR.

However, it was not accurate regarding cost estimates, which were on the lower side. For example, cost of rolling stock in the DPR was less than the actual amount spent. Also, the DPR did not cover or assess potential risks.

## Design of the project

Although not a contract requirement, and in addition to DMRC's DPR, DAMEPL put together a 'Design Project Report' at the start of the project. DAMEPL brought in MTR from Hong Kong as its technical design consultant.

This DAME Project was also unusual because the design of civil work had already been done by DMRC, and DAMEPL had to fit in their equipment, trains, and system, etc. within the existing physical structures. DMRC's rationale for this approach was to save time as the tendering process, including agreeing on the concessionaire, can take up to two years.

Although this did save time, it caused other problems, especially for DAMEPL. Coordination and fittings in some places became difficult as civil work had already been done by DMRC. DAMEPL would have preferred to carry out the entire process, that is, work from a blank landscape, and do the design from the start.

## Tendering process

DMRC had ready made the tenders, documents and had contractors and consultants on board from their other projects, especially their recent and successful Delhi Metro project. For example, tunnel boring had been done in advance, and according to DAMEPL this proved to be a big advantage. DMRC is following the same approach for its Jaipur Metro project as well. DAME commenced commercial operations on 23 February, 2011.

### DMRC's Role

- Land acquisition.
- Rehabilitation and resettlement of project affiliated population.
- Responsible for the shifting of utilities (electric lines, sanitation pipes, and phone cables, etc.), shifting of public places and places of worship.
- Carried out all the other necessary approvals including regulatory approvals.
- Traffic – permission to block traffic, etc. – done by DMRC to execute civil work and related construction.
- Carried out the Environmental Impact Assessment (EIA).
- Carried out all the civil work on the project, that is, constructing the viaduct, tunnels, and stations (this was half of the total cost of the project).
- Multi-level car park constructed by DMRC on top of the New Delhi Railway Station. The 1<sup>st</sup> floor is already operational; the other floors will come up soon.
- Obtained the safety clearance and certification from the Commissioner of Railway Safety for Metros (Ministry of Railways).
- DMRC acts as a regulator and overseeing authority, which checks on the level of service provided by the train and by Reliance.

### CAF's Role

CAF was responsible for the rolling stock, that is, building trains in Spain, which were imported by DAMEPL in India.

### Reliance's Role

Under the concession agreement, DAMEPL was responsible for getting its own clearances, with support from DMRC:

- Responsible for mechanical systems and the complete electric traction system.
- Carried out the signalling and communication work.
- Set up CATs in each station, including passenger and baggage check-in facilities, where required.
- Commercial operations including automatic fare collection.
- Sales – undertook commercial activities like telecom and vending machines.
- Responsible for retail at two stations (New Delhi and Shivaji Stadium).
- Responsible for overall advertising.
- As the concessionaire, Reliance will operate the DAME train line for the next 30 years.
- Maintenance of the trains – set up a dedicated Operations and Maintenance (O&M) depot to repair and replace (if necessary) DAME trains at Dwarka (land was provided by DMRC).

### Project Costs

The total cost of the project is approximately Rs 5,750 crore. The project was partially funded by the government and DMRC paid Rs 2,900 crore which does not include land acquisition costs. The concessionaire paid the remaining Rs 2,850 crore (equipment costs were approximately 70 per cent with the remaining 30 per cent being spent on construction, finishing, installation, testing, and commissioning of equipment).

### Technical Details

Technical features of the Airport Express Line are given in Table 3.22.

**Table 3.22: Technical features of the Airport Express Line**

Airport Express Line	
<b>Overview</b>	
<b>Type</b>	Airport Express Train
<b>Terminals</b>	New Delhi station and Dwarka Sector 21
<b>Stations</b>	6
<b>Website</b>	www.delhiairportexpress.com
<b>Operation</b>	
<b>Owner</b>	Delhi Airport Metro Express Pvt. Ltd (DAMEPL)
<b>Operator (s)</b>	Reliance Infrastructure and CAF Beasain
<b>Character</b>	At-grade, underground, and elevated
<b>Rolling stock</b>	CAF Beasain (from Spain)
<b>Technical</b>	
<b>Line length</b>	22.7 km
<b>Track gauge</b>	standard gauge
<b>Electrification</b>	25 kV, 50 Hz AC through overhead catenary
<b>Operating speed</b>	105 km/hour approx.

DAME trains are currently operating at a speed of 105 km/hour. The express train takes its passengers from New Delhi Railway Station (starting point) to the airport in 18 minutes and to Dwarka Sector 21 (last/sixth stop) in 20 minutes.

The trains run at a frequency of 15 minutes. With an increase in demand, the frequency and operation timings may be increased. Reliance hopes to increase the frequency to every 10 minutes in the near future.

The speed of the trains will soon increase to 120 km/hour. It is currently awaiting safety clearance from the Commissioner of Metro Railway Safety (Ministry of Railways) for this.

#### **Operation and Timings**

DAME trains operate from 5 am to 11 pm (New Delhi Railway Station timings) but will soon increase operations to 20 hours from 4 am to midnight.

### Capacity

There are six coaches per train. The seating capacity is 334 passengers, and seating + standing capacity is 1,150 passengers (crush load). At present the train is doing 144 single trips.

### Fare

The fare has been fixed at Rs 80 for travel from New Delhi Railway Station to IGI Airport and Rs 100 for commuting from New Delhi to Dwarka Sector 21. The fare increases/decreases by Rs 20 per station.

### Expansion plans

A further extension of the line to Gurgaon, possibly allowing a transfer to the Blue Line, is being planned.

### Technology

Siemens Mobility, is providing signalling, power transmission, and baggage handling system enabling passengers to check-in with baggage at the New Delhi Railway Station and at Shivaji Stadium. This facility comes at a cost of Rs 34 million, and has the capacity to check-in 1,200 passengers per hour.

Alcatel is supplying the communication systems, Indra Sistemas the ticket machines, Faiveley platform screen doors and Bluestar/ Honeywell is the Control & Automation Provider for the Station Management System (SMS). Bluestar is the main BEMS system provider.

The airport line will be the first line in the country to be mapped on the Geographic Information System to enhance safety, maintenance, and traffic regulations and will help in mobilizing emergency services in case of an accident.

Reliance mostly outsourced its core technology contracts outside India while civil work, building services, and finishing contractors were sourced from within India. These were identified in the post bidding phase.

### Rolling stock

Eight 6-car trains supplied by CAF Beasain of Spain are being imported via the Mundra Port. The trains

on this line are different from the others as they have in-built noise reduction features for a noise-free ride. The coaches are equipped with LCD screens for entertainment and also provide flight information. The trains are fitted with an event recorder which can withstand high levels of temperature and impact and the wheels of the trains have flange lubrication systems for less noise and better riding comfort.

### Tracks

To ensure safety, the tracks are fitted with RHEDA-2000 technology, which allows trains to travel up to 400 km/hour. The entire 22.7 km route is ballast-less track, which costs 40-50 per cent more than a normal train track, but does not take longer to lay. The rails rest on rubber pads on concrete sleepers – this is something new for metro in India but this technology is being used in Germany and other European countries.

The 7 km elevated section from Buddha Jayanti Park to Mahipalpur was built with 25 metre long girders for the first time in India. The 504 girders weigh 120 tonnes each and were cast in Mahipalpur and transported on 35 m long trailers with 64 tyres.

## Project Implementation

### Environmental Impact Assessment (EIA)

The EIA report was done by DMRC.

In addition, DAMEPL got an independent agency to prepare a separate EIA (the Environmental Management Centre in Mumbai). This EIA captured train noise, night working, etc. Reliance has a corporate policy which requires it to carry out an EIA for every project it wins before it starts work on the project. These two EIAs were then integrated.

Further, because of the Delhi Metro Act, EIA submission to the government was not mandatory. The DAME Project did not require any other environmental clearances, because under the Delhi

Metro Act, the metro has been classified as an environmentally friendly mode of public transport.

#### Tax, exemptions, subsidies

No subsidies, no tax exemptions (income tax or other), no viability gap funding or any (fiscal) incentives were offered by the central government to Reliance for the DAME Project.

The only relief given was a 5 per cent relief on custom duty relating to imports for the project.

With regard to any change in tax laws, standard contract procedures are being followed, that is, if a change in tax law will hinder DAMEPL, then DMRC will subsidise this loss. However, if the change benefits DAMEPL, it will pass on this benefit to DMRC.

#### Model Concession Agreement (MCA)

DMRC made an MCA available for the project. A consortium of DMRC's consultants prepared the MCA. The companies involved were: PB, PBI, Systra, RITES, JARTS, and PC.

The MCA improved the efficiency of the implementation process for DAMEPL, as it clearly specified the project's obligations, revenue sources,

and restrictions, etc. It also helped Reliance in preparing for pre-bid meetings and in drafting the bid.

Further, the MCA was part of RFP and according to Reliance its clauses were quite clear.

Reliance used only 30 per cent of its own equity; the rest of the money was raised from financial institutions for implementing the DAME Project.

Reliance used an equity: debt ratio, and based on its business model, went for a 30:70 arrangement, that is 30 per cent of its own equity and 70 per cent as a loan.

DAMEPL started work with its own equity (30 per cent) so it did not have to wait for financial institutions to give loans, which was required for the balance 70 per cent. This is a contract condition for the project promoter for most PPP projects.

#### Changes during Project Implementation

The DAME Project had to undergo some changes during the implementation phase. These are given in Table 3.23.

**Table 3.23: Changes during the Implementation Phase**

Area of change	Description	No. of times of change	Costs (amount of increase or decrease)	Time (amount of increase or decrease)
Scope of work	Baggage handling tunnel	1	NA	NA
Quality of material				
Design	Track	2	NA	NA
Traffic estimates				
DPR	Change in scope of DPR, MCA - Dwarka station was added			
Others				

**Baggage handling tunnel** – The contract requirement was for carrying passenger luggage via road from the airport metro station to DIAL premises near the airport (DIAL, is the GMR group which handles all the luggage and clears it for security at the airport and has been authorised by the Government of India to do so). The Government of India did not consider this process to be safe, secure, and reliable, so it asked DMRC to put in a tunnel. DMRC in turn asked DAMEPL to build the tunnel. DMRC did the civil work; DAMEPL did the system installation, and ventilation, etc.

**Track design** – Single Fast Clip technology (SFC) for track design was proposed by DAMEPL, but DMRC asked it to install RHEDA instead.

Although the RHEDA technology adopted was good, it took additional resources and time both for DMRC and DAMEPL.

### Contract Management

The DMRC-DAMEPL contract allows for change in scope, which can be at any stage—RFP, execution, etc. This tends to have an impact on time and costs. However, the contract does not allow for any price re-negotiations. Further, delays pertaining to delivery lead to penalties for DAMEPL.

DAMEPL divided its entire remit into 18 different packages/ lump sum, that is, separate contracts for baggage handling, systems, security, and signalling, etc. All these were sub-contracted by DAMEPL to globally renowned players.

DAMEPL carried out quality assurance checks and monitored progress against time and costs for their sub-contractors.

### Procurement

- **Manpower**

DAMEPL engaged some ex-railway officials for their contacts in the government and also for their relevant expertise.

DAME's project work required specialised manpower. However, since this is a new business, a lot was learnt on the job and some expertise was also brought in from abroad due to its unavailability in India.

DAMEPL is a SPV of 600 staff that will work as a company for the next 30 years on this project. This reduces legal obligations on the parent company.

Reliance's own 200 staff members were used on this project, of which 150 were required for construction work. However, initially DAMEPL also hired DMRC's train drivers. Now DAMEPL is doing in-house training through training the trainer programmes using DMRC experts, expats, consultants, and contractors, etc.

DAMEPL has also set up a DAME Operations and Maintenance depot. Reliance is also working towards setting up its own training centre for simulations, drivers, controllers, and to train staff and station staff, etc. It has developed its own training modules. MTR from Hong Kong has helped, so has the Reliance office in Mumbai.

- **Location / Connectivity**

The stations are located in the heart of the city and the airport is a high security zone. The movement of men and material was restricted in these areas. Moreover, as the Delhi Commonwealth Games were approaching, stringent regulations were in place on the movement of men and material. All these caused significant problems. However, Reliance got necessary help from DMRC to resolve the issues and take things forward.

### Project Management

DAMEPL used Primavera for project management. It also did internal reporting to DMRC using MS project. In addition, MTR carried out its own project

planning. It got a 'Hazard Log' which is like a risk register for technical risks and issues.

DAMEPL came up with a master plan to integrate all systems and sub-contractors, to align key dates of delivery and then issued these to the sub-contractors to monitor delivery and update progress.

### Performance Management

DAMEPL measured the efficiency of its contractors on cost-effectiveness.

DAMEPL's staff members were measured against Key Performance Indicators (KPIs). KPIs for each staff member were linked to the master plan's KPI and the boss's performance and Reliance's internal performance management systems. Therefore, it was in everyone's interest to maximize performance and adhere to timelines.

Further, both DMRC and DAMEPL had penalties/incentives in place for their contractors and sub-contractors with regard to (poor/good) performance, missing deadlines, and safety (zero fatal delivery and timely delivery).

DMRC gets monthly reports from Reliance on four key metrics – level of service, statement of revenue, safety records (any incidents), and penalties.

### Land Acquisition, Shifting of Utilities, and Rehabilitation of People

DMRC did the land acquisition, shifting of utilities and public places, and rehabilitation of the affected population. Though DAMEPL assisted in this process, the onus was on DMRC because according to the contract, this was DMRC's responsibility.

DMRC is used to R&R and land acquisition as it has been doing this for the last 10 years for its other projects, particularly the most recent and successful project, the Delhi Metro.

DMRC also had to get several approvals from various government agencies mainly for the following activities:

- Carrying out civil work, tunnels, construction of viaducts, and stations.
- Acquiring land and the shifting of utilities etc.
- DMRC required the Supreme Court's approval for cutting trees which were obstructing an alignment across the Ridge Road .
- The DAME train line passes through sensitive areas like army cantonment and Dhaula Kuan both of which are defence areas.
- DMRC had to seek clearance for the airport area, again, a high security zone.
- Required another permission as it had to build a tunnel in the airport area (to carry checked-in luggage from the train to airlines' areas).
- DMRC acquired land in the defence and air force areas, and the Ridge Road.
- In Sector 21 Dwarka, there was DDA land and railway land that had to be acquired. DMRC acquired the land and provided it to DAMEPL to construct an O&M depot.

### Risks

The execution risk of the project was the responsibility of DMRC.

An important risk associated with this project was getting 'safety clearances' which meant meeting approved government standards for each sub-system like tracks, traction, train, fare collection, signalling, fire safety regulations, tunnel ventilation, and glass door opening and closing.

Another risk, although a calculated one according to DMRC, was doing the civil work (tunnel, stations, and viaduct) in tandem with tendering for the project/looking for a suitable concessionaire. The risk here was that DMRC's design may not be in line with that of the concessionaire. This did cause some problems. However, as it was a calculated risk, DMRC was

prepared to make changes during the project's implementation phase. This saved the project significant time.

### Time taken

Overall, the DAME Project took just under four years.

One of the main reasons for this short time taken was that DMRC had already built the structures for the project in tandem with looking for a suitable concessionaire.

Some other key factors that helped DMRC save significant time were:

- DMRC had carried out other work like tunnel boring in advance of finalising the concessionaire. It had readymade tenders, contract documents; most of these were from their Delhi Metro project. Otherwise the tendering process can take up to two years.
- It had consultants and contractors already on board; most of them were the same ones as those used for the Metro project.
- The same applied to senior officials, with extensive experience in railways and metros, either in a management capacity or as technical experts who too were on board.
- DMRC got the 'final safety clearance' from the Commissioner of Railway Safety to expedite the process.

### Successes

- According to Reliance, it set up the project in a short time, even though there was delay by DMRC in handing over the project. It took DAMEPL 27–30 months to set up the project, which according to Reliance, is record breaking given the project's size and complexity.
- This project was unusual because the design of civil work had already been done by DMRC, and

DAMEPL had to fit in its equipment, trains, and system, etc. within the existing physical structures. According to DMRC, since commercial operations started 10,000 people a day are using the DAME train line leading to a reduction of about 5,000 passengers on the road.

### Challenges with solutions

- DMRC had a different design philosophy. DAMEPL had to fit its equipment and system into DMRC's existing structures and ensure that they matched DMRC's design requirements.
- Getting permissions for Ridge Road, defence and air force areas was tricky. However, DMRC feels that it got lucky in getting these approvals as it got good agencies to do the project's civil work, especially in security tight areas. It did have contingency plans in place.
- The DAME train line was supposed to go elevated on Sardar Patel Marg, but after environmental organisations opposed this, changes were made to the project design to take the train underground for 2.5 km to keep to the timeframe. The technology was also changed and new technology the Ostian tunnelling method was used because this tackled the 2.5 km tunnel from four points and did not increase costs.
- Also changed normal tunnelling – two separate tunnels were replaced by one big tunnel.
- The train alignment passed through Rajiv Chowk (a busy area and in the heart of the city). There was a geo-technical challenge 36–37 m below that. DMRC took timely action, used contingency plans and got it sorted out.
- Out of 22 km of train line, only 7 km is elevated.
- Within the airport (2 stations) – 1.5 km of the track was changed from elevated to underground for security reasons.
- An additional 4 km, compared to original spec, was changed from elevated to underground which resulted in increase in costs.

## Mumbai Monorail

### Background

The monorail is a lightweight, intermediate capacity, guided urban transit system which permits smaller, less obtrusive, and easier to construct elevated guideway structures. This unique system uses 0.80 m wide beams to guide the rubber tyred wheel trains and to provide support.

It is a short train which has a capacity of carrying up to 700 people (in six cars) at one go, it occupies less space, moves on a single track on two beams, and can go in busy and overcrowded areas.

A monorail has a gradient of 5 per cent (2.5 per cent for a flyover). It takes the curvature of up to 50 metres (a metro requires 180–200 metres), that is, it can take sharp turns. At 80 decibels its noise levels are much lower than that for a metro. It requires a small foot print, a 0.9–1 metre pier whereas a metro requires a 1.5–2 metre footprint.

In addition, the monorail does not block sunlight or air. It is fully air conditioned and can be constructed quickly leading to less disruptions in the surrounding environment.

In the past, monorails were used only for recreation purposes (in the US), but now they are being used as a rapid transport systems (RTS) in several countries, such as Malaysia (Kuala Lumpur), Japan (Tokyo, Kitakyushu, and Okinawa; total network of 100 km), China (Chongqing), Dubai, and now India. Recently

Brazil also took up the construction of a 25 km monorail in San Paulo.

Moreover, monorail is now being considered as a key mode of transport in B-type cities.

Due to its numerous advantages, monorail is proving to be an effective and viable transport system in the face of rapid urbanisation of cities and is an environment friendly mobility alternative to commuters (monorail's fumes go upwards, therefore it does not affect houses and buildings on either of its sides).

### Snapshot

The Mumbai Monorail which is a design and build project, is the first of its kind in India, and will be the second largest corridor in the world.

It will traverse from the Saint Gadge Maharaja Chowk to Wadala via Chembur, covering a total track length of approximately 20 km, and connect to the suburban railway network and the Mumbai metro at some stations.

This is a much-needed mode of transport for Mumbai because in 2005 the city had a population of 20.5 million (1 million = 10 lakh), which is expected to reach 34 million by 2031. In a city of this size, the monorail will act as a feeder mode of transport to supplement the mass transport system, help connect to the suburban railway network and the metro where

possible, and essentially cover routes that have little or no scope for widening. Over the long run, it may even replace buses in crowded areas.

The passenger per hour per direction (PPHPD) for the Mumbai Monorail will be 7,500. In the remaining hours, passenger movement will be low. Total usage expected in 2016 is 1.25 lakh passengers/day.

The first phase of the Mumbai Monorail is due for completion in 2012 and the second phase in 2013.

### Type

The project is being promoted by the Mumbai Metropolitan Regional Development Authority (MMRDA) and the Government of Maharashtra. There are two key project partners: Larsen & Tubro (L&T) and Malaysia based Scomi.

In 2008, an engineering, procurement and construction (EPC) contract was awarded to the L&T and Scomi consortium to design, build, operate, maintain, and transfer the monorail for a period of three years post completion (until 2016). Within the L&T and Scomi consortium, L&T has a 55 per cent share of the contract, while Scomi has the remaining 45 per cent.

L&T will be responsible for civil infrastructure work, stations, mechanical systems, automatic fare collection, and complete electric traction system including substations and Scomi will be responsible for the rolling stock (built trains/ cars in Malaysia), signalling, and communications.

### Funding

MMRDA made Rs 2,896 crore available to the L&T and Scomi consortium for the Mumbai Monorail project. This included a contract fee of Rs 2,460 crore, taxes capped at Rs 256 crore, and an additional Rs 180 crore for operations and maintenance (O&M) costs for the monorail for a period of three years post-completion in 2013.

Taxes include customs duty, octroi, and other related taxes but not service tax. The service tax is not capped. However, MMRDA is trying to get this waived from the central government and in turn will waive it for the consortium.

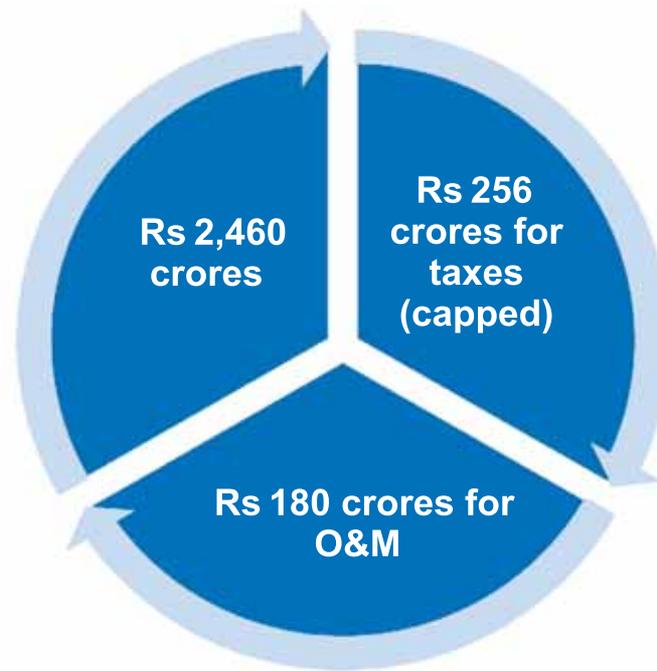
### Expenditure

The master plan includes a total track length of 100 km serviced by seven monorail corridors spanning across Mumbai. The total cost of construction estimated in the master plan is Rs 20,296 crore.

The cost of setting up the monorail service is approximately Rs 140 crore/km, including the cost of the elevated monorail which is Rs 40 crore/km.

According to L&T, the actual costs will be more because there have been several variations in the project's scope and changes in the original request for qualification (RFQ) and detailed project report (DPR). For example, the station design in the DPR did not have a provision for escalators and the traffic projections were not accurate. Moreover, further changes have been made to the size of the stations and their platforms (see Figure 3.7).

Figure 3.7: Cost details for the Mumbai Monorail



### Revenue

MMRDA has fixed the price of a monorail ticket between Rs 6 and Rs 20 (1.5 times the Mumbai bus fare).

Once commercial operations start, the entire revenue fair box (for example, ticket sales) and any additional income earned from running the monorail, will be given to MMRDA for a period of three years post-project completion (until 2016).

However, MMRDA will pay the consortium a fixed amount of earnings for three years, as a part of the agreement for operating the monorail. The consortium will be paid on a 'per trip basis'; a different model.

Expected revenue for the consortium is approximately Rs 200 crore over a 2-year period with an increment on a yearly basis.

The risk of ridership does not lie with L&T.

### Timeline

On 7 November, 2008, the Chief Minister of Maharashtra signed and approved the Mumbai Monorail Project. LEA Associates carried out the DPR, and in January 2009, Phase I of the project commenced with the construction of Line 2 (Wadala-Chembur).

Phase I of the Mumbai Monorail was due to be completed in November 2010 and Phase II in May 2011. Overall there has been a delay of 18 months due to a combination of factors like the terrorist attacks, changes in the scope of the project, delays caused due to securing environmental clearances, a few rehabilitation and resettlement (R&R) issues, and some land acquisition cases which went to court.

Phase I is now due for completion in May 2012, and the second phase in early 2013.

At present, MMRDA is focusing on building only the first monorail corridor. This corridor is split

between Line 1 and Line 2, starting from the heart of the city and stretching to its outskirts.

The monorail will traverse from the Saint Gadge Maharaja Chowk (GMC) to Wadala via Chembur, covering a total track length of 20 km in Phase I.

The consortium decided to build Line 2 first (Wadala-Chembur). Therefore, Line 2 was built in Phase I and Line 1 will be built in Phase II (see Table 3.24).

**Table 3.24: Mumbai Monorail – Corridor 1 = 20 km: GMC–Wadala–Chembur**

Construction Phase	Monorail Line	Open to public	Route	Stations	Distance
Phase I	Line 2	May 2012	Wadala–Chembur	6	8.80 km
Phase II	Line 1	Early 2013	GMC–Wadala	11	11.20 km

The consortium also considered Line 3—Bhiwandi-Kalyan-Thane—for the monorail project. A feasibility study for this has been done by RITES. MMRDA is considering the public-private partnership (PPP) mode for this but due to a poor viability gap funding (VGF) of 60-70 per cent, it has not been able to attract any bidders. Therefore, Line 3 has been shelved for now.

### Project Implementation

RITES carried out a DPR for Phase I and Phase II of the Mumbai Monorail which took eight months to complete.

### Land Acquisition

According to the consortium, land acquisition was a big issue and impacted on time and cost overruns. Some of the problems that the consortium faced were missing land records, red-tapism, no available farm land, and interference from active NGOs and the bureaucracy.

Contractually, L&T was not obliged to resolve land acquisition matters because these were MMRDA's responsibility. MMRDA eventually resolved these

issues (though a few still remain), with additional support from L&T, which was beyond the agreed scope of L&T's contract.

Mumbai has a MMRDA Act which states that land can be acquired quickly if it is for development/ public welfare projects contributing to growth. As a result, people could have been moved by giving them a week's notice if the monorail was passing through their areas.

Therefore, MMRDA had few land acquisition issues as compared to other cities both because of this act and also because of its previous experience.

The situation was different when it came to shifting of utilities where the Mumbai Monorail Project faced a number of problems.

### Rehabilitation and Resettlement of Project Affiliated Population

The monorail's route passes through congested areas because of which R&R became a big issue. Further, the R&R issue was not adequately reflected in the DPR which led to changes in the project's execution, thereby resulting in increased cost and time.

However, according to MMRDA this was not a big issue as it replaced slums on either side of the monorail corridor (when 70 per cent of the slum residents agreed) with modern sky rise buildings (30+ floors in each building) with appropriate set backs, that is, 3 metres from the road with the balcony being 1.5 metres from the road. The slum residents were given free flats and some money.

MMRDA had developed an expertise in R&R because of its last big project, the Mumbai Urban Transport Project (MUTP Phase I), where approximately 20,000 families were rehabilitated for the project's road and rail components. For this MMRDA had made several rehabilitation tenements of 225 square feet each. Many of these were vacant, so these were used for the rehabilitation of residents affected by the monorail project. The Bhakti Park complex is an example of this. This complex also has commercial shops with some flats in each building in this complex being kept aside for R&R.

MMRDA also did a swap with the Municipal Corporation of Greater Mumbai (MCGM) for some flats to house slum residents who did not want to shift too far. Also, MMRDA gave floor space index (FSI) to some slum residents where no cash was given; instead right of construction was given instead of cash.

### Shifting of Public Utilities

Shifting of utilities was L&T's responsibility which was supposed to come up with a report detailing the issues and their solutions. As per the contract, all expenses incurred by L&T for undertaking this exercise would be borne by MMRDA. L&T paid the costs for shifting utilities, which were subsequently reimbursed by MMRDA. This, however, led to further delays.

Shifting of underground utilities (power cables, telephone lines, and sewage, etc.) posed a huge problem in Mumbai as there were big unknowns, which in turn caused a significant impact on time and

costs as they warranted considerable variations in scope.

It was difficult to follow the DPR completely as some utilities could not be removed/ moved so the design had to be changed, which resulted in increased costs and time. For example, a temple on the monorail route could not be moved. As a result, 17 stations were built instead of the 18 listed in the DPR. As it was a variation in the project's scope, L&T will have to refund the money for the 18<sup>th</sup> station to MMRDA.

### Clearances and Approvals

#### The following clearances and approvals were taken for the Mumbai Monorail Project:

- **Environmental Impact Assessment (EIA):** The Mahul Creek (from which the monorail will pass) required environmental clearances. However, since this was not reflected in the DPR, construction started without environmental clearances. This was the only environmental clearance that was required for the project, and its EIA was jointly prepared by L&T and MMRDA. This EIA caused a delay of four months.
- **Archaeological Approval:** A location on the monorail route required an archaeological clearance as a temple was being constructed in that area. As this too was not mentioned in the DPR, it caused a further delay and increased costs.
- **Other Approvals:** Another delay was caused because a slum dwelling (*chawl*) on the monorail route, which is regarded as a heritage sight, could not be moved. The Bombay Metropolitan Corporation (BMC) did not give permission, which too impacted severely on the time and cost of the project.
- **Necessary Approvals:** Arthur Jail Road Prison required a special clearance, which caused a further delay of a few more months.
- **Safety Clearances:** This is likely to become a big issue as L&T is not sure about who will give the

clearances. However, according to MMRDA it will get a safety certification from the Commissioner of Railway Safety before the monorail is opened to public.

- **Regulatory Approvals:** These have to be got from the Railways and involve an elaborate process for ascertaining safety approvals for the structure and public usage.
- **Traffic:** L&T hired consultants to conduct its own Traffic Diversion Surveys. The Indian Institute of Technology (IIT) and Systra (for an internal study) were commissioned for these. BMC and Traffic Police were also consulted/ involved.

#### Tax, incentives, and other exemptions

MMRDA is providing 100 per cent funding for the monorail project. No subsidies were made available, either from the state or central government, which according to L&T is unusual given the size of this project.

The only tax exemption that the monorail project has received is a reduction in the tax to import equipment. The tax for such imports tends to be 7–10 per cent. However, the consortium will have to pay only 5 per cent as tax, which is a significant relief as Rs 1,000 crore worth of equipment has been imported.

Service tax has been reduced for the consortium from 12 to 10 per cent. MMRDA is trying to get an exemption on service tax from the central government. There is a good possibility that this will come through soon.

MMRDA has capped the overall taxes at Rs 256 crore that it will pay to the consortium. However, MMRDA will pay for any new tax. But any change (increase or decrease) in tax as per changing laws will have to be borne by the consortium.

These incentives came after project was commissioned.

#### Contract Management

According to L&T and Scomi, the contracting process was fair and transparent, with reasonably easy paperwork to support it. It was a global tender and the project was awarded 7–8 months after the initial PQQ, which is fairly efficient given the size and complexity of the project and also as it was the first of its kind in India.

However, the contract between MMRDA and the consortium was not flexible as it did not allow for re-negotiations. What it did allow for was changes and variations. For example, 18 stations were listed in DPR but only 17 were built due to the non-shifting of a temple, so L&T had to refund money to MMRDA. Also, the contract had specific provisions for variations but agreeing on these was an issue.

#### Procurement

##### a. Manpower

- L&T and Scomi used their own staff and Scomi hired some technical experts for completing the requirements for proposal (RFP).
- L&T faced problems with regard to sourcing unskilled and semi-skilled labour. However, this is a general problem in Mumbai, and not specific to this project.
- L&T used technical experts from Korea for monorail's civil work.
- L&T hired retired officials from the Railways for their knowledge of networks and processes and technical expertise.
- People from Delhi metro working on the L&T monorail project also shared their knowledge and expertise.

**b. Location/Connectivity**

- Although L&T provided on-site offices for their sub-contractors (manpower, equipment, HR, and training, etc.), the project location did pose a problem.
- L&T outsourced all its administration work, document control, IT, securities, transportation, and housekeeping, etc.

**Project and Performance Management**

- a. **Project Management:** Primavera was used to monitor the progress made by the project. This was a contract requirement for project monitoring. Regular progress reports were done using a well-

developed IT system. Although not a MMRDA requirement, L&T provided it with daily progress reports.

- b. **Performance Management:** There were penalties for delay and incentives for early completion for L&T in the contract (10 per cent of contract = Rs 246 crore). For internal performance management, L&T used robust systems for its staff and vendors. Standard L&T process and procedures were followed.
- c. **Timely payments:** With regard to payments, MMRDA payments to L&T were severely delayed but have now improved.

According to L&T, MMRDA is not sufficiently equipped to understand key technical issues and to

**Table 3.25: Changes during the Implementation Phase**

Area of change	Description	No. changes	Costs (amount of increase or decrease)	Time (more or less)
Scope of work	Yes	Alignment of monorail route was changed – reduced. Now 4.5 minutes for Phase II/ GMC-Wadala and 9 minutes for Phase I/ Wadala-Chembur.	Route changes also cause changes in signalling system, therefore, further increase in costs	
Quality of material	No			
Design	Yes	4-5 times	Increased, figures not confirmed yet	Increase but not as much
Traffic estimates	No			
DPR	Yes- huge variations			

manage the project. Their front face is, Louis Berger, a Project Management Consultancy, which is not that technically well-equipped either.

**Implementation: Changes in project specifications**

L&T expected very few changes in scope during the implementation phase because it is a design and build contract. It said that there were no major changes in

the project spec but the DPR was not comprehensive (see Table 3.25).

### Operations and Management (O&M)

The O&M responsibility lies with the consortium. L&T has created a separate O&M depot (in Wadala) which was also a contract requirement. O&M will include train replacement. L&T has a train wash plant, it will carry out repairs (electrical and mechanical), fare collection system repairs, and traction motor repairs (by using the spare motors in stock – first replace with spare and then repair), etc.

### Dispute Resolution

The monorail project is following the Tramway Act. Maharashtra adopted this Act in 1968. According to L&T, this act is not attractive for any operator (for example, in case of any incident, all the criminal liabilities fall on the operator).

According to L&T, there are key standards in place which include independent trials. However, many cases have been through arbitration. It feels that a Dispute Resolution Board (DRB) would have expedited the arbitration process.

### Technical features and related details

At present, MMRDA is funding the first corridor which covers 20 km of track length, from the centre of the city to its outskirts. There are 17 stations under construction at the moment. The monorail will traverse from Sant Gadge Maharaja Chowk (GMC) to Chembur via Wadala in Mumbai.

### Train Information/Rolling Stock

- 15 monorail trains were built by Scomi in Malaysia and subsequently imported to India.
- Each train has four cars (45 metre length), with a driving cab at both the ends. This will be reviewed once the monorail becomes operational and may

go up to six cars, depending on the demand and requirements.

- The current capacity of the monorail is 568 passengers.
- The passenger per hour per direction (PPHPD) is 7,500.
- The number of passengers expected to travel every day in 2016 is estimated at 1.25 lakh.

### Salient Features

- Route Length 20 km
- Alignment Elevated
- Max Gradient: 5%
- Min Radius: 55m
- Min clearance above ground: 5.5m
- No. of Stations (elevated): 17 17
- Maintenance Depot: 1 (at Wadala)  
1 (Wadala)
- Platform Length: 65m 65m

### Technical Features

- The monorail will be approximately 11 metres above the ground.
- Traction: Power rails are fixed on both sides of its beams.
- Traction Voltage: 750 v DC traction.
- Design Headway: Every 3 minutes.
- Scheduled Speed: 31 km/hour.
- Top Speed: 80 km/ hour.
- Computer based interlocking, automatic train control and protection.
- Automatic fare collection.
- TETRA digital radio communication, SCADA monitoring.
- Smart card/ tokens for multiple/ single journey.

### Operation and Passenger Information

- The monorail fare has been fixed between Rs 6 – Rs 20
- Timings: Every day from 5 am to 12 midnight.
- Frequency of service: The monorail will run every 5 minutes. However, at present: Line 1 (GMC-Wadala) is taking 4.5 minutes and Line 2 (Wadala-Chembur) is taking 9 minutes.
- Monorail Travel Time: It is estimated that Line 1 (GMC-Wadala) will take 25 minutes to traverse through its route, and Line 2 (Wadala-Chembur) will take 19 minutes.
- Lifts available for differently abled people.
- Passenger announcement system and display system available in three Indian languages – Marathi, Hindi, and English.

### Reasons for success of project implementation

- The global tender was fair and transparent.
- Contract awarded seven months after PQQ – efficient process given the size and complexity of the project, and that it is the first of its kind in India.
- EPC contract so paperwork easier than for a project undertaken in the public-private partnership (PPP) mode.
- Finalized project alignment within two months (Delhi Metro took 1.5 yrs). Tested car on beam in less than 1 year (Delhi Metro did this within 30 months).
- MMRDA takes quick decisions unlike other government organizations.

### During the implementation phase the project faced the following challenges:

- MMRDA has sufficient background but not enough technical expertise.
- Safety clearance will be an issue as there is no

clarity about who will give the approval.

- Lost three months due to terrorist attacks on Mumbai (project started two days before the attack).
- Overall 18 months delay due to land acquisition, shifting of utilities, and getting all the necessary approvals and environmental clearances.
- Shifting of utilities is a big issue in Mumbai which caused change in design /scope which had a significant impact on time and costs.

### Learnings

- A DPR must be realistic. If it is not comprehensive, it tends to cause severe problems, changes in scope, and subsequently has a significant impact on time and costs.
- According to L&T the planning was not right. There is a need to integrate infrastructure development into city planning. Integration of services, organizations, and government agencies becomes a must or else it causes delays in spite of all the technical expertise and availability of funds.
- Unlike in Japan and Singapore, pricing in Indian Railways is low. In Japan, the railways were initially government run and they incurred losses, but they are now run by six private companies and are making profits and have written off their debts. Therefore, there is a need to link railways' development with the commercial sector. This should be negotiated directly with builders/commercial complexes.
- In Singapore, the land development authority controls everything but in Mumbai there are different government authorities. The Delhi Metro Rail Corporation (DMRC) (although an exception) too worked as a single authority, changed laws, and had been empowered to make things happen.
- A rapid transport system (RTS) requires high cost investments and is capital intensive and though it has a social viability cost, it is not financially viable.

A way forward for the remaining six monorail corridors in Mumbai is via the PPP route.

- There is a need for simplifying the tax structure and corresponding paperwork to attract foreign investment (for example, Gujarat has simplified its tax laws and seen tremendous foreign investment and growth).
- The Indian government should force/incentivize banks to focus on long-term borrowing but with low interest rates to make projects viable (Japan has come up with 50-year bonds).
- Banks should do priority lending, for example, 10 per cent for social housing, and 20 per cent for infrastructure, etc.
- To have clear cut guidelines on VGF (currently 20 per cent by state and 20 per cent by the centre which can go up to 26 per cent). The Indian government should have explicit VGF for different sectors – RTS, roads, and ports, etc.
- The responsibility for land acquisition, R&R, and shifting of utilities must lie with the government. Also, a change in archaic Indian land acquisition laws is a must.
- Centre and state government(s) should provide subsidies, incentives, and tax breaks to incentivize companies to bid for the implementation of infrastructure projects.

## Namma Metro, Bengaluru

### Budget, Funding, and Costs

The estimated project cost based on 2006-07 prices was Rs 8,158 crore for Phase I which will cover 42.3 km of total track length (initially 33 km with an extension of 9 km). However, the new costs for completing the construction of Phase I (42.3 km) based on 2010 prices, including inflation, is now Rs 11,609 crore. In all the Namma Metro has two phases I and II.

Fifty-five per cent of this cost has been provided by the Government of India and the Government of Karnataka in a combination of equity and subordinate debt. The balance 45 per cent is a loan from JICA (which has a majority share at 25 per cent), ADB, Korean-EXIM Bank, and other Indian financial institutions.

Overall 50 per cent of the money will be spent on civil work and the rest on system costs (electrification, rolling stock, signalling, and coaches, etc).

### Land Acquisition

As land had to be acquired in the centre of the city for both a station and for building tracks, there were a number of objections. However, BMRC offered an attractive compensation package; so many people came forward to offer their land/ property. The land acquisition process is now complete. Some of the other highlights of the land acquisition process include:

- Only 5 per cent of all the land acquisition cases went to court; it took between 6 months to a year to dispose of these cases.

- 70 per cent of land was acquired from the state government (via a high powered committee), the rest was from private/ general public.
- Total land acquired was 287.08 acres (226.48 from the government, 60.60 acres private).
- Approximately 629 properties were acquired, which included a combination of government, defence, public sector, private, and community properties.
- The project affected about 1,500 families.
- Land has been acquired for the Namma Metro under the Karnataka Industrial Areas Development Act 1966 (a state act). This has significantly helped in acquiring land in a short span of time and with minimal hassles.

### Resettlement and Rehabilitation

- Attractive compensation to landlords and tenants was given, over and above the price of land and building at current rates.
- BMRC offered its R&R package to those affected due to acquisition of private property only. This package did not apply to government and public property.
- The R&R package was based on three basic principles: replace assets lost; give an economic allowance until the affected had time to resettle; and compensate to the extent of costs that they would incur in shifting residences, and commercial

establishments, through provision of allowances (shifting allowance, inconvenience allowance, transitional allowance, business loss, commercial/residential rental income lost, and business premises re-establishment allowance) Table 3.26.

- Shifting of public places and places of worship.
- BMRC worked in coordination with the Bangalore Water Supply & Swage Board (BWSSB), Karnataka Power Transmission Company Ltd. (KPTCL), Bangalore Electrical Supply Company (BESCOM), Bharath Bengaluru Mahanagar Palike (BBMP), Bharat Sanchar Nigam Ltd (BSNL), and the traffic police for shifting utilities.

#### Increase in time and costs

Phase I of the Namma Metro was to be commercially operational by December 2011. However, it will now be ready by 2013. Reach 1 will commence operations from September 2011. The main reasons for the delay and increase in cost are:

- Underground (UG) tunnel went up from 6.7 km to 8.8 km to avoid disfiguring Cubbon Park (a famous spot in Bangalore).

- Tunnelling under a high water table and hard rock conditions in Bangalore.
- Increase of one UG station.
- Elevated station areas are larger than the Delhi stations due to site conditions.
- Construction of an additional depot at Peenya based on operational necessity (can serve future increase in network too).
- The provision for escalators and elevators was not a part of the DPR.
- Substantial increase in prices of materials – cement price increased by 108 per cent and steel by 118 per cent. These increases had not been built into the contract.
- Constraints of site conditions – working areas (especially roads) in Bangalore are much narrower than in Delhi.
- According to BMRC, the DPR was inadequate and the root cause for the delay in completion and for the subsequent increase in overall project costs.

Details of the final completion schedule are given in Table 3.27.

**Table 3.26: Properties acquired for the BMRC – Namma Metro Project**

Details	Number of properties		
	Developed	Vacant	Total
Private commercial	374	11	385
Private residential	172	4	176
Others like temples, churches, etc.	7	0	7
Total number of private, commercial, residential, and other properties	568		
Total number of government, defence, and public sector properties	54		
Total number of government, defence, public sector, private, and community properties	629		

Source: BMRC documents.

**Table 3.27: Entitlement**

Type of loss	Rehabilitation Package
Loss of residential property	<ol style="list-style-type: none"> <li>1. Compensation as per KIADB Act or consent award – market value to be used for obtaining consent</li> <li>2. Shifting allowance</li> <li>3. Inconvenience allowance</li> <li>4. Right to salvage material</li> <li>5. Transitional allowance</li> <li>6. Rental income loss compensation</li> </ol>
Loss of commercial property	<ol style="list-style-type: none"> <li>1. Compensation as per KIADB Act or consent award – market value to be used for obtaining consent</li> <li>2. Business loss</li> <li>3. Business premises re-establishment allowance</li> <li>4. Shifting allowance</li> <li>5. Right to salvage material</li> <li>6. Rental income loss</li> </ol>
Tenants commercial	<ol style="list-style-type: none"> <li>1. Business loss</li> <li>2. Business premises re-establishment allowance</li> <li>3. Shifting allowance</li> </ol>
Tenants residential	<ol style="list-style-type: none"> <li>1. Shifting allowance</li> <li>2. Inconvenience allowance</li> </ol>
Common property resources	The project will meet the cost of restoring the affected portion of public property – schools, hospitals, parks, religious structures, etc.

Source: BMRC R&R Package documentation.

Table 3.28 gives details of the number and types of utilities shifted (identified and completed).

**Table 3.28: Number and Types of Utilities Shifted**

Reach	U	Numbers of:					Length in Metres	
		UGD	WS	SL	TS	T	TL	ELC
R-1								
R-2								
R-3								
R-4								
Grand Total	Identified	14	40	972	51	27	49500	61040
	Completed	11	31	904	47	25	40000	45500

Source: Based on Namma Metro-BMRC Annual Report, 2009-10.

Note: For R-3a, R-3b, R-4a, survey of existing utilities and estimates of cost were completed.

U: Utilities; UGD: Underground Drainage; Water Supply: WS; Street Lights: SL; Traffic Signals: TS

Transformers: T; Telephone Lines: TL; Electricity Lines/Cables: ELC

## Project Implementation and Management

### Reason for time delay and increase/impact on costs

- The project has been delayed because of the time taken in getting clearances and approvals with regard to land acquisition and the shifting of some utilities. As there was some opposition from NGOs and local residents, a few cases went to court and took almost a year to clear. BMRC said that Phase I of Namma Metro finished a year before Phase I of the Delhi Metro was completed.
- The impact of this delay on costs has not been much on capital costs as they form a lump sum, that is, Rs 11,609 crore (for Phase I till December 2013). The original budget was set at Rs 8,644 crore, based on 2003–07 prices. With a 5 per cent inflation escalation every year from 2007 to 2011, this amounts to an approximately 20–22 per cent increase from the original budget. BMRCL started in 2007, so according to it, a budget of approximately Rs 11,000 crore seemed reasonably justified.
- There were some important and costly items

which were not included in the DPR, like the price of escalators and elevators.

- In 2006, Rs 6,395 crore was approved for 33 km, an additional Rs 1,763 crore for 9 km, that is a total of Rs 8,258 crore was approved. However, the sanctions only came in 2010.
- Deadline for completion was December 2012, but this has now been fixed at March 2013 for the entire network, North-South and East-West.
- Significant increase in costs: Price escalation, scope variation, insufficient/ inadequate DPR (a major reason) led to increase in costs. For example, DPR/ DMRC said x no. of escalators, but no money was provided for these in the budget. The biggest concern was for the underground track.
- Further, the Namma Metro DPR was based on DMRC's costs for the Delhi Metro, which stated that 75 per cent of the costs borne in Delhi would suffice for Bangalore. However, Bangalore (due to a booming IT industry and other factors) is an equally expensive city. Also, unlike Delhi, Bangalore has hard rock and the water table is high, so in reality costs turned out to be higher in Bangalore than they were in Delhi.

The key dates are given in Table 3.29.

**Table 3.29: Key Dates**

Approval Date	11 May 2006 (without extensions) 21 January 2010 (including extensions)
Approved By	Union Government

### Operation and Maintenance including Recruitment & Training of O&M Staff

There are two administration wings – Operation and Maintenance (O&M) and Project Management (PM). This section discusses O&M (as PM has already been covered earlier). There are six admin segments: Reach 1-4, and Underground 1 & 2.

- O&M – overall 1,696 staff members: 1,624 non-executive and 72 executive posts. This has been approved for Phase I (42.3 km)
- Out of the 1,624 non-executive posts, 411 non-executive posts and 32 executive posts have been approved for Reach 1 (7.5 km)
- There is an agreement between Delhi and Bangalore Metros and they cannot poach on each other's staff members.
- Recruitment and training for 411 non-executive posts was conducted in five months.
- Rs 4.5 crore was given to DMRC to train Namma Metro's first batch of 153 employees (this does

not include an additional payment to DMRC for the remaining 48). This included approximately 200 O&M staff members (technical staff).

- This worked out to Rs 2,000 per person per day to DMRC.
- 153 staff members who were sent to DMRC for training for a period of five months included engineers, maintenance staff, station controllers, train operators/drivers, and customer relation managers.
- It took BMRC five months from application to recruitment to train Namma Metro staff members.
- Currently, the second phase of recruitment is going

on for 288 posts for Reach 2.

- BMRC has decided to establish its own training institute, the building and infrastructure for which is ready, including training syllabus. It will be fully functional by December 2011.
- BMRC plans to train Reach 2 staff members in-house. This will be the first batch to be trained in-house. 288 O&M non-executive staff members who have already been selected will be trained in time for the commencement of commercial operations of Reach 3. scheduled for April 2013.

The O&M wing will continue until 2017–18, that is, till the end of Phase II of the project.

#### Difference between Delhi Metro and Bangalore/Namma Metro

DMRC – Delhi Metro	BMRC – Namma Metro
Delhi got exemption from the Central and State Government for taxes	Bangalore gets reimbursed for State Government taxes, but has to pay Central Government taxes
According to BMRC, a metro cannot recover its costs and survive just on fare collection. Hence, it needs to go in for land/commercial development, advertisements, etc.	
Large tracts of land were given to Delhi. For example, 20 acres were required for Delhi metro stations, but Delhi was given 40 acres	Bangalore was not given so much land to do land/ commercial land development
Delhi generates approximately 30-35 per cent of its metro revenue from land development	
Additional revenue also coming from consultancy services provided to other metros in India like Bangalore, Mumbai, and Hyderabad	
DMRC has an advantage in the quick process and single authority under Mr Shreedharan (DMRC MD)	Bangalore will be a leader in technology and systems. For example, the per km cost in Bangalore is less than that in Delhi, time taken for Reach 1 is going to be less that it was in Delhi
Per-km cost of Delhi metro	Delhi compares well with per-km cost of the Bangalore metro (with new revised budget of Rs 11,609 crore) (not consistent with the earlier statement)

(Contd...)

Wide roads, so less time on construction	Narrow roads, especially on the sides which affected shifting of utilities
	Old city, therefore has only one big, long road, which makes it difficult to undertake construction
	Location and access to material only for 10 hours a day. Therefore more costly and time-consuming

### Train Details – Generic and Technical

	Technical details
Gauge	Standard Gauge (1.435 m)
Traction	750V dc Third Rail
Speed Scheduled	32 km per hour
Speed Max	80 km per hour
<b>Rolling Stock</b>	
Fleet	39 units
Formation	Three-car, internally gangwayed
	<b>Generic Information</b>
No. of Stations	41
Track Length	Total = 42.3 km (33 km + extension of 9.3 km). East-West corridor: 18.10 km; starting from Baiyappanahalli and terminating at Mysore Road terminal. North-South corridor: 24.20 km; begin at Nagasandra and terminate at Puttenahalli.
Travel Time	33/44 Minutes, end to end (33 minutes on East-West corridor, and 28 minutes on North-South corridor)
Initial peak frequency	3 minutes (to reduce to 2 minutes)
PHPDT Capacity	40,000
Train Capacity	980 passengers in a train of three coaches and 2000 passengers in a train of six coaches
<b>Other related info.</b>	
Bangalore Population	84.74 lakhs (9.5 million)
Number of passengers expected to travel everyday	Estimated: 10.20 lakhs in 2011, 12 lakhs in 2013 and 19 lakhs in 2021
Metro Fare	To be considered at about 1.5 times the ordinary bus fare
Timings	5 am to midnight, everyday
Monorail	Plans exist for around 60km (37 miles) of monorail lines to act as feeders to Namma Metro

# Airports

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## Bengaluru International Airport Limited

### Snapshot of the Project

Bangalore International Airport Limited (BIAL) is an international airport serving the Silicon city of Bangalore. This airport is also an example of public private partnership (PPP) in India. Work on this Greenfield international airport started in July 2004 and was completed in 2008 at an estimated cost of \$600 million.

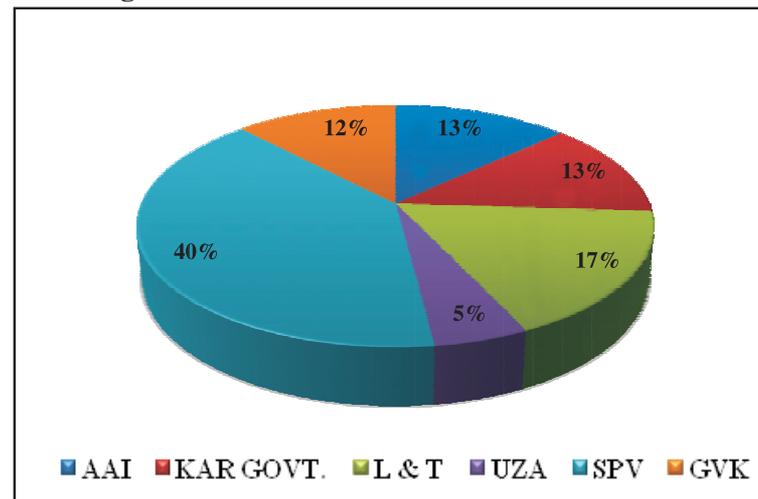
BIAL is located 4 km south of Devanahalli and is 40 km from the central business district of the city. In the current financial year 2010–11, it was the fourth busiest airport in the country in terms of domestic passenger traffic (11.59 million). It was also the fifth busiest airport in terms of international passenger traffic, for which it was awarded 'India's best airport' for 2011 in a survey conducted by Skytrax. In 2009, BIAL handled about 9.3 million passengers and had air traffic movements (ATMs) of about 280 per day.

The airport is expected to handle 17 million passengers in 2015. It is host to 10 domestic airlines and 21 international airlines connecting the city to about 50 destinations across India and in the rest of the world.

### Type

**Project Specification:** Private promoters hold a 74 per cent stake in BIAL while the state holds the remaining 26 per cent. The project was undertaken by a foreign consortium consisting of Siemens, Zurich Airport and Larsen and Toubro (L&T). These three companies hold equity in the project although at the moment the overall operations and financial control are still with the Airports Authority of India (AAI). In November 2009, Zurich Airport (UZA) sold 12 per cent of its stake in the airport to GVK Power & Infrastructure (GVKPIL) for \$98.5 million. The shareholding of the project thus is Figure 3.8.

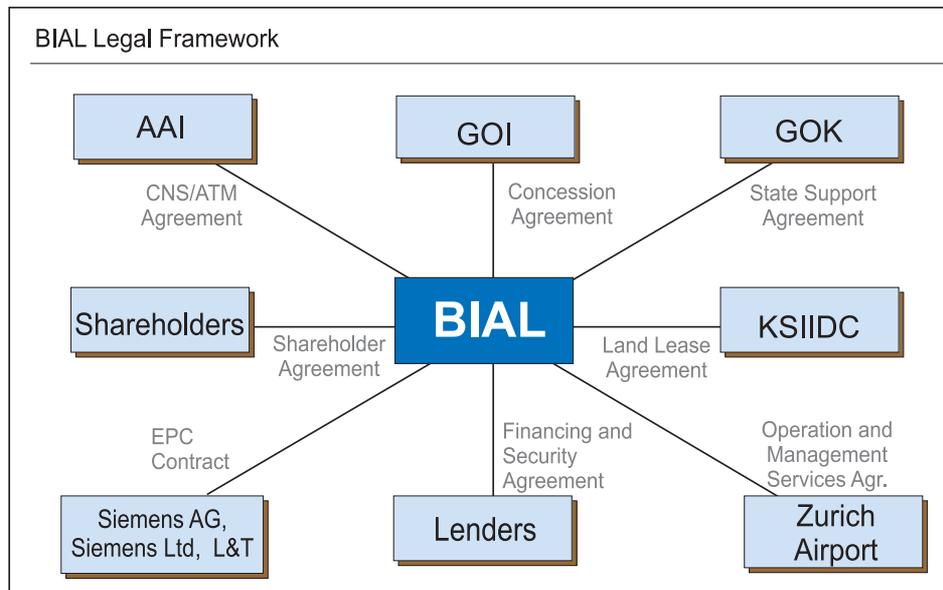
Figure 3.8: Different Stake Holders in BIAL



**Project Design and other Works:** BIAL was designed by Kaufmann and Van der Meer Planer AG of Switzerland. The civil engineering and construction work started in July 2005. L&T was responsible for this contract. BIAL awarded a contract to the Siemens Industrial Solutions and Services Group and Siemens India Limited for the job of

equipping the airport in Bangalore with technical systems. The \$75 million contract included the supply, engineering, and installation of lighting at the airfield, IT and communication systems, baggage handling system, and the power supply and building services automation system.

**Legal Framework:** BIAL's legal framework is given in the following flow chart:



**Concession Agreement:** The concession agreements between the government and the private promoters are:

Government	Private promoters
<ul style="list-style-type: none"> <li>To grant concession to build and operate airport</li> <li>To close the existing airport</li> <li>To grant exclusivity within 150 km</li> <li>To allow business related to airport activities (including non-aviation activities)</li> <li>To allow select service providers for example, for cargo, ground handling, and catering</li> <li>To guarantee non-discrimination disclaims explicitly to any risk to the project</li> <li>No financial guarantees given</li> </ul>	<ul style="list-style-type: none"> <li>To build and open the new airport within the defined time frame</li> <li>To operate the airport according to best international practices</li> <li>To develop/expand the airport according to demand</li> <li>To pay the concession fee</li> <li>Take all the risks</li> </ul>

## Evaluation of the Project

**Implementation: The factual dates of important milestones are:**

Milestones	
1999	Forming of consortia and pre-qualification
2004	Signing of concession agreement
2005	Financial closing, construction starts
2 July, 2005	Start of construction
2006	Redesign and capital increase
24 May, 2008	Airport opens

### Operation

The construction of BIAL began in July 2005 and following negotiations between the government and the airport authority the project's first phase (which had been conceived in 1993) got underway. The terminal and airport went through some last-minute design changes in late 2005 to accommodate an increase in expected passenger traffic for the projected opening date in 2008. The redesign of the airport project was based on the revision of traffic forecast done in June 2005. The study estimated traffic flows for the new Bangalore International Airport in its opening year (2008) at 6.7 million passengers. The redesign included an increase in the size of the passenger terminal building, number of aircraft stands, taxiways, passenger boarding bridges, and the main access road so that the airport could match expected traffic increases in the coming years. The airport handled 11.2 million passengers and 210,000 tonnes of cargo in 2010. It recorded 110,437 air traffic movements in 2010.

### Facilities

The passenger terminal is a single, 4-level building capable of accommodating international and domestic operations. The basement houses retail storage and rest and service areas. The arrival and departure areas are separated vertically with a modern, simple, straight-ahead flow system. The terminal is designed for ease of operation and minimum maintenance.

The total floor area of the new airport is approximately 171,000m<sup>2</sup> (1,840,000ft<sup>2</sup>). The terminal building is designed to accommodate 3,000 passengers at peak time. The design reflects the best industry practice and caters to 24-hour operations, under all weather conditions. All facilities meet IATA standards.

The airport can handle 14 million passengers a year with 27 aircraft movements an hour. It also has common-use terminal equipment (CUTE) enabled check-in counters: 117 counters and also 66 self check-in counters. A new VIP lounge was inaugurated at level one of the terminal on 21 January, 2011. The airport has 40 gates and 18 air bridges, including nine double arm and 19 remote bus bays. There are a total of 82 aircraft stands, all of which have fuelling pits. This is the first time that parking stands in an Indian airport have their own fuelling pits.

A car park for 4,000 cars has been built in front of the terminal building at the ground level. The airport currently has one runway, which can accommodate all types of aircraft, including the Airbus A380. There are plans to build a second runway when the annual traffic at the airport reaches 18 million passengers a year which is currently estimated to be around 2013–14. The runway, orientated 09/27, is 4,900m (16,076 ft) by 45m (150 ft) with light paved shoulders making it 60 m (200 ft).

### Terminal expansion

An expansion of the passenger terminal is expected to begin in June 2011 at an estimated cost of \$221 million. The project will take 18 months to complete. The expansion will double the terminal space and increase the airport's passenger handling capacity from the present 11.6 million to 17 million per year.

The construction partners in the project include Larsen & Toubro. Designed by HOK, the expanded terminal will be 134,000 m<sup>2</sup> in size and have an additional 23 boarding gates, 83 check-in counters, and 13 baggage reclaim belts. The seating capacity will be increased to 5,300.

### Cargo Village

The airport's cargo village, which is spread over 11 acres of land, began operations in early January, 2009. It is expected to strengthen commerce and trade in Bangalore and ensure speedy clearances of import and export consignments from the cargo terminal at the airport.

An investment of about \$2.5 million has been made towards the facility, which was completed over a period of 10 months. The facility will house 120 freight forwarders and 80 custom house agents.

### Partners for Airport Services

Bangalore International Airport is the first airport in India to operate under a truly open-access model. This allows every qualified fuel supplier to use the facility against a fixed throughput fee and allows airlines to get the best fuel prices available in the market.

BIAL has selected its strategic partner for the new airport's aviation fuel facility. The consortium is Indian Oil/Indian Oil tanking/Sky tanking. Indian Oil is the largest oil company and also the largest aviation fuel company in India. Sky tanking is a major independent jet fuel handling company which operates various aviation fuel facilities worldwide, especially in Europe and the United States. It is owned by the Hamburg-based Marquand and Bahls. Indian Oil tanking is a 50:50 joint venture between Indian Oil and Marquand and Bahls. Each party holds one-third equity in the consortium.

BIAL has also selected its catering partners—LSG Sky Chefs and Taj SATS. Each of the selected consortiums is responsible for the design, construction, finance, and operation of the flight kitchen at the new airport. The combined investment is over \$14 million and the duration of the contract is 15 years. BIAL may award a third license for air catering at a later date.

### User Development Fee

The Ministry of Civil Aviation approved a user development fee (UDF) of over \$5 for all domestic outbound passengers using BIAL, with effect from 16 January, 2009.

The approval came after more than seven months of commercial operations at the airport. Until mid-January 2009, international passengers were levied a UDF of \$22.

UDF is charged globally from passengers primarily to generate aeronautical revenue for the sustenance, maintenance, operations, management, and development of airports. The UDF levied on domestic and international passengers is used for providing passenger amenities and services. The concept of user fees is evolving gradually in India with expressways and highways charging toll and airports charging UDF. Independent regulatory authorities monitor and determine the user fee.

### Road and Rail Infrastructure

As the new airport is 40 km outside the city, a new high-speed rail link, Namma Metro, will connect the city to the airport when it opens in 2011.

Bangalore Metropolitan Transport Corporation (BMTTC) runs 11 bus routes from locations in the city to connect to the new airport. The airport can be reached through Hebbal via Bellary Road and through NH-Yelahanka. People can also reach the airport through Yelahanka via Vidyanarayapura where traffic is less congested.

BMTTC has 46 Volvo buses plying to the airport, and the number of buses on each route ensures a frequency of at least one bus every 30 minutes. The buses are

equipped with luggage racks, and can carry up to 30 passengers on each trip. Tickets for the bus ride can also be booked online.

#### **Official Transportation by BIAL:**

- Meru cabs and Easycabs for taxi services
- Hertz and Akbar Travels for luxury transport services
- BMTC Vayu Vajra a/c Volvo buses
- BMTC Suvarna and Vahini non-a/c buses

Several campaigns have been carried out in Bangalore to highlight the lack of connectivity to the new airport as a section of the road is very narrow and unsafe for motorists.

Traffic build-up can at times increase travel time from the city centre to the airport to three hours, moderate traffic on the road after midnight till 6 am allows travel time of an hour.

A series of fatal accidents on this road led the Bangalore City Traffic Police to deploy interceptors that monitor vehicular speed using high resolution video cameras. Speeding vehicles (above 80 km/hour) are stopped and fined.

Indian Railways is also planning to construct a railway terminal at the airport to run a special shuttle from the Cantonment railway station to the new airport.

#### **Surrounding Area**

Bangalore International Airport at Devanahalli will be surrounded by some of the most eco-friendly settlements and no development will be allowed on the natural river valleys in the area. This is despite the fact that there will be greater population pressure in the area.

According to the Outline Development Plan (ODP) notified by the Bangalore International Airport Area Planning Authority (BIAAPA) which is the primary land-use sanctioning authority for the area, no development will be allowed to destroy the natural river valley network in Doddaballapur, Devanahalli, and Vijayapura on the outskirts of the city.

BIAAPA is also proposing rainwater harvesting in the airport, as water is one resource that the region

and its residents are short of. The airport area – covering three towns and 347 villages – will ensure that the entire course of water resources and catchment areas are maintained.

The ODP, projecting land-use zoning in the next 15 years, also proposes separate sewage treatment plants for each of the major towns. The population in the area increased from 2,000 to over 10,000 by the time the airport was finished and the water resources required for this additional population is 90 to 100 million litres a day.

#### **How the Problems were Handled**

**Disputes:** In 2008 Bangalore City Connect filed a lawsuit against the new airport. The citizens advocacy group contested the government's 2004 commitment to Bangalore International Airport Limited—which owns and operates the new facility—to close down the city's old, state-managed airbase, which was built in 1964 to test military planes and was later pushed into civilian service. In its petition, City Connect alleged that public interest had been neglected in granting monopoly rights to the new company. The Karnataka Government had also failed to build a high speed expressway from the city centre providing high speed connectivity to the new airport.

A lesson that can be learnt from the experience with BIAL is that the Union Government needs to view every project in its totality by making an inventory of the amenities that a state or a municipal authority is expected to provide. The fees, toll, and levies accruing to sub-national governments from any project must be linked to these milestones. When the rules of the game have to be changed midway—as at times they must be—it helps if these judgments have been made by independent regulators who have the expertise to make nuanced, data-based decisions that may be acceptable to all stakeholders.

#### **Contributing factors and lessons learnt in successful implementation**

- Involvement of an international airport operator and consortium with a strong local partner.
- Government has to act as one entity with one access.

- No major change during construction desirable.
- Reasonable concession fee, better obligation for future investment.
- Tariff under control of regulator with clear guidelines from the beginning.
- Holistic view of the air traffic infrastructure – landside access and ATC to be developed simultaneously.
- Airport city, economic zone, etc. add to the attraction and viability of the new airport.
- Pooling of common resources to improve efficiency and lower costs. Central management and allocation of resources for:
  - Ground handling
  - Airport resources like counters, belts, stands, and gates
  - IT systems – CUTE, CUSS, BRS, Wi-fi, etc.
- Competition at all levels, no monopolies – this promotes better service quality and lowers costs.
- Added value of an international operator. Close cooperation with an experienced international airport operator is vital – Zurich Airport provided support in:
  - Design of the airport
  - Recruitment/training of staff
  - Selection of concessionaires
  - Airport readiness programme (trial runs)
  - Monitoring/improving operational and commercial performance
  - Attracting new routes
  - Introducing CDM approach and AOCC
  - Commercialisation through hospitality and experience

### Key Achievements

**Punctuality** – Bangalore Airport manages to achieve an airport punctuality of 85 per cent, which means that 85 per cent of all the flights depart from the airport on time (with a 15-minute tolerance from the scheduled time of departure).

All key airport infrastructure and systems have achieved a serviceability of over 99 per cent month over month. This has resulted in a high level of satisfaction among partners and customers of Bangalore airport.

**Customer Service Quality** – Bangalore Airport has appointed Airport Council International’s agency DKMA to conduct airport customer service quality surveys in line with the requirements of the concession agreement. Bangalore Airport achieved a rating of 3.94 on a scale of 1 to 5 in the first quarter of this survey.

**Baggage Delivery** – Bangalore Airport has achieved very high standards of baggage delivery for arriving passengers. For domestic passengers, the average time for first bag delivery is six minutes and last bag delivery is 14 minutes. For international passengers, the average time for first bag delivery is seven minutes and last bag delivery is 30 minutes.

**Aviation Safety** – Bangalore Airport is among the first airports in the country to set up a non-punitive safety culture and has over the last few months achieved an excellent safety record.

### Some of the Awards won by Bangalore Airport

Best Airport India 2011 by Skytrax’s World Airport Awards.

- Best Emerging Airport – Indian Sub-continent by EMA, Dubai.
- Best Managed Airport by CNBC Travel Awards 2010.
- NASSCOM-CNBC-TV18’s IT user Awards 2010.
- ASQ: 4.09 in 2009 and 4.12 in 2010 (out of 5) – this score places Bangalore Airport as a top performing airport globally.
- IATA Platinum Certification for the first 100% Bar Coded Boarding Passes (BCBP) compliant airport in India.
- ISO 14001:2004 and 27001 certified.

# Cochin International Airport Limited

## Snapshot of the Project

Cochin International Airport also known as Nedumbassery Airport and CIAL, is the largest and busiest airport in Kerala. It is located at Nedumbassery, 30 km north east of Kochi. In financial year 2010–11, it was the seventh busiest airport in India in terms of overall passenger traffic—it carried 4,340,736 passengers. It was also the fourth busiest in terms of international passenger traffic ferrying 2,358,579 passengers. The airport is the primary base for the operations of Air India Express and is a focus city for Air India, GoAir, IndiGo, Jet Airways, JetLite, SpiceJet, and Kingfisher Airlines.

## Type

Cochin International Airport is the first airport in the country which was developed under a public private partnership (PPP) model. The airport pioneered the concept of private investment in the airport sector after being incorporated as a public limited company, receiving investments from nearly 10,000 non-resident Indians (NRIs) from 30 countries.

The airport handled 4.3 million passengers and had air traffic movements (ATMs) of about 411 per week in 2009–10. The airport handles approximately 800 aircraft per week, with 10,800 passengers each day. Eight domestic airlines and 16 international airlines connect Kochi with nearly 40 destinations nationally and internationally.

## Evaluation

**Construction:** The original proposal for the airport outlined an estimated cost of \$22.3 million and an expected date of commissioning in 1997. The approval was granted in May 1993. The funding for the airport was envisaged from interest-free loans from non-resident Indians, donations from industrial undertakings, exporters, cooperative societies, and loans from the state government. A body called the Cochin International Airport Society, under the chairmanship of the Chief Minister of Kerala, was registered in July 1993 to execute the project. For the purposes of better fund mobilisation, as well as administrative convenience, a public limited company, the Cochin International Airport Limited (CIAL) was registered in March 1994 with an authorised capital of \$20.07 million.

Fifteen hundred acres (6,100,000 m<sup>2</sup>) of land was acquired for the construction of the airport. Approximately 2,300 landowners and 872 families were resettled under a rehabilitation package. Major electric lines and an irrigation canal had to be diverted for the construction.

The facility was formally inaugurated by the President of India on 25 May, 1999 and the first commercial service began on 10 June, 1999. The operations from the old naval airport were moved to CIAL on 1 July, 1999.

## Technical and Other Details

**Initial financing plan:** The funds required for the new airport were estimated at roughly Rs 200 crore based on discussions with the Airports Authority of India (AAI) and aviation experts. One of the sub-collectors proposed the idea of raising money from Gulf-based NRIs (Keralites) who stood to benefit most from the new airport (Gulf bound air passengers were forced to spend two days in transit in Mumbai or other cities. Their representatives had been demanding direct connections from Kerala. Thiruvananthapuram and Kozhikode airports had direct connections to the Gulf, but the demand far outstripped supply). Investments could come in the form of interest-free loans and donations from NRIs as well as from corporates and other societies.

**Building the airport:** AAI had agreed to provide technical advice and runway design to CIAL free of charge. The foundation stone for CIAL was laid on 21 August 1994 and CIAL appointed KITCO, a state government enterprise as the technical consultants. KITCO was responsible for monitoring the progress of the project and for its coordination. CIAL can also claim the distinction of not losing even one day of project time due to labour unrest, otherwise a common feature in Kerala.

**Financial resource mobilization:** In March 1995, HUDCO sanctioned a term loan of Rs 25 crore at 16.5 per cent interest. The Government of Karnataka (GoK) sanctioned Rs 1 crore towards equity. The government contributed the next instalment of Rs 5 crore to the equity. Private placement efforts brought in Rs 15 crore as equity. The company decided to adopt the public issue route.

The public issue was discussed with merchant bankers and financial institutions whose response was not very encouraging. GoK indicated its inability to contribute more resources but was at the same time concerned about losing control if another strategic partner was brought in. The 12th meeting of CIAL's board of directors suggested that for maintaining control GoK

should hold at least 51 per cent equity in the project. The government accepted this decision and a notification was issued in September 1997 enhancing GoK's equity participation in principle to 51 per cent.

This notification became the policy governing future investment decisions in CIAL.

Since GoK was not in a position to contribute its share of the equity, efforts were made to raise equity from other stakeholders. Three public sector oil companies were approached for giving refueling rights in CIAL. BPCL won the exclusive rights in exchange for a Rs 5 crore contribution towards equity. Equity contributions also came from other service providers and the public. The equity holding community was spread in 30 countries.

A majority of the NRIs as well as domestic investors were attracted to the project through word of mouth publicity and news about CIAL. The company also contributed its bit towards public relations through press releases and public meetings in different parts of Kerala. NRIs, businesspersons, and local self-governments were personally contacted and requested to commit to the project. The idea of owning a share in an airport was emotionally irresistible for many. The public relations drive directly handled by CIAL's managing director prompted many service providers as well as small investors to look at CIAL favourably.

**Revenue model:** During initial operations, monthly average flights were 280 in the domestic sector and 109 in the international sector. These numbers continued till December 2000. However, the projected averages were 330 domestic flights and 190 international flights even during the first year of operations. International flights were less since foreign airlines could not land at CIAL. Even after it was declared as an international airport, lack of bilateral agreements did not allow foreign airlines to land in Cochin.

CIAL's business model was heavily dependent on Gulf-based NRIs. Employment trends in the Gulf

region indicated that job opportunities were shrinking as a result of the Emiritization drive and fast-changing job profiles in Gulf countries. Unskilled and semi-skilled labourers who had gone there during the boom period were returning in thousands causing a severe strain on Kerala's economy.

At the same time, the trend was shifting towards employment markets in Europe, the Far East, and the US. Kerala was also fast becoming a tourist destination and a critical point in the southern circuit which was considered an alternative to the traditional golden triangle. However, national carriers were restricting themselves to the Gulf sector which was lucrative for them. Allowing direct flights from other sectors was necessary for CIAL's long-term viability. This would pre-empt the competition from Kozhikode which has Gulf bound traffic as the only market segment as well as boost Kerala's tourism development efforts.

**Cargo operations:** Cargo operations at CIAL began in September 1999. In the first 16 months (until December 2000) the monthly average was 159 tonnes in the domestic sector and 244 tonnes in the international sector, adding to a total of 403 tonnes. The projected average for the first year of operations was 1,250 tonnes. It is interesting to note here that in the international sector, the export traffic was twice the import traffic.

The monthly average operating expenditure was Rs 62 lakh during June 1999 to March 2000 and Rs 59 lakh during April to December 2000. During the latter period, the actual was about the same as projected. Personnel costs were restricted to half the projected costs through control on intake and deferring a revision of the compensation structure (CIAL had patterned the compensation following AAI. When the AAI stakes were revised only AAI deputationists were paid according to the revised scales). While maintenance charges were lower than projected, the general expenses were higher. Expenditure on

electricity and water as well as reimbursements to AAI were significantly higher than the projected figures. CIAL had an operating surplus right from the first year of its operations. However, the margin was inadequate to cover the debt servicing. As per projections, complete debt servicing was expected to be feasible from the second year. The actuals indicate otherwise leading to the need for financial restructuring.

**Corporate governance:** The position of chairperson, board of directors of CIAL was held by the Chief Minister of Kerala. Other members on the board were elected legislators, bureaucrats, nominees of financial institutions (FIs), and investor directors. The board had provisions for 15 members including three positions reserved for nominees of financial institutions.

The composition of the board as on 31 March, 2001 indicated that two positions for FI nominees were vacant.

The composition of the board, particularly its political nature, has been a subject of criticism. Apprehensions about political and official influence on the CIAL project were raised at different points of time. However, CIAL was of the opinion that the presence of the Chief Minister and legislators as board members facilitated the company to work around complex governmental systems, particularly land acquisition. The minority shareholders (Indian public and NRIs) who numbered around 10,040 had also demanded representation on the board. Under the umbrella of Cochin International Airport Share Holders Association (CIASHA) their nominees had planned to contest for directorship. However, they withdrew these nominations on a request by the Chief Minister of the state. . The other demands placed by the association included immediate payment of dividend, while an infrastructure project in the normal course requires a longer gestation period.

The general elections held in April 2001 witnessed a complete reversal of fortunes of the then ruling front. The political alignment (which was in power when the project was initiated) had reiterated its commitment to the development of CIAL. However, a section now demanded removal of all political nominees of the previous government from the CIAL board and maintained that the new Chief Minister should assume its chairmanship. One argument was that since the Chief Minister of Kerala occupied the position of Chairman of the CIAL board, the previous Chief Minister automatically ceased to occupy the position once he lost power. However, there was another point of view. Since the existing board appointment was made at the annual general body meeting (AGM), it would be prudent to wait till the next AGM for appointing the new chairman. In addition, a former Chief Minister of Kerala also indicated an interest in the chairmanship. Air India, which had equity and other financial investment in CIAL, also demanded board-level representation. It also cited the absence of air transportation professionals who could offer guidance to the company at the board level as a risky practice.

### Capital Structure

The project cost as on 31 December 2000 was Rs 283 crore. CIAL had an authorized capital of Rs 90 crore and a paid up capital of Rs 78.93 crore as on 31 March, 2001. The Government of Kerala (as per a CIAL board decision dated 23 September, 1996 and the related government order or GO dated

29 August, 1997) had decided to hold at least 51 per cent equity in CIAL directly and through state-owned enterprises. This was to have effective government control over the company. GoK's contribution stood at Rs 32.45 crore, which was 39.85 per cent of the paid up capital. To make GoK's share 51 per cent, under the current paid up capital the authorized capital has to be increased to Rs 94 crore.

Airport service providers (Air India, Bharat Petroleum Corporation Limited, State Bank of India, and Federal Bank) had brought in Rs 21.25 crore as equity. NRI directors and their relatives had contributed Rs 14.14 crore; 6,160 Indian residents and 3,880 NRIs were equity holders in the project with contributions of Rs 4.48 and Rs 5.4 crore respectively. Two banks—India Overseas Bank and Dhanalakshmi Bank Limited—together contributed Rs 0.75 crore as equity.

In order to make payments towards the HUDCO term loan CIAL wanted to raise additional equity by offering a 1:1 rights issue. The closing date for this issue had to be extended twice. GoK's inability to contribute its share had shaken the confidence of other investors who refused to pay AAI. AAI rejected the offer on the grounds that the AAI Act did not permit equity holding. According to press reports, while the international investment community and Indian FIs had shown interest in CIAL, the state government was against such investments due to perceived dilution of its interest.

CIAL's capital structure is given in Table 3.30.

**Table 3.30: Capital Structure (as on 31st March, 2001)**

Equity Participation	Rs crore
Government of Kerala and public sector undertakings	32.45
Non-resident Indians and others	24.23
Airport service providers	21.25
Total	77.93
<b>Loan Funds</b>	
HUDCO-term loan	152.72
Federal Bank	24.69
State Bank of Travancore	27.51
District Cooperative Bank	216.92
Total	216.92
<b>Interest Fee Deposits</b>	
M/s Air India	11
M/s Thomas Cook	0.5
M/s Indian Oil Corporation	0.75
M/s Alpha Retail-Duty Free Shop	10
Retail Outlets	2.75
Total	25
<b>Grand Total</b>	<b>319.85</b>

Source: CIAL records.

Note: The equity contribution of non-resident Indians and others was expected to be Rs 36.3 crore, to make the total equity Rs 90 crore.

### Problems faced

**Land Acquisition:** All matters related to the acquisition of land for project purposes were governed by the Land Acquisition Act, 1894. The Act empowered the central and state governments to acquire land for what was considered to be a public purpose. From inception, 'public purpose' was defined in vague terms. The Supreme Court also supported the view that the term need not have a strict definition. The apex court was of the view that the conditions which existed during the time of acquisition needed to be taken into consideration and hence it would be better if the term was not defined clearly. The power

of the Act could be leveraged by the government for notifying the intention of taking the land.

The process also gave the affected public an opportunity to voice their reservations. Past experience of land acquisition in India showed that the process led to acquiring more than the required land. The additional land was often kept without any economic activity. The CIAL project also acquired more land than it needed for its core operations and further expansion. Further, the project had built in income from land sale and commercial exploitation of surplus activity as major sources of revenue.

During the process of land acquisition complete information about the extent of land required was kept hidden from the public. In this case land acquisition and the project proceeded almost together. While this approach could have phased out the pressure on payments, operationally it was not a desirable process. At a later stage the project layout had to be altered under political pressure and to meet the convenience of influential individuals. The process that was followed led to avoidable misperceptions among the public and considerable energy had to be diverted towards resolving the conflicts.

A section of landowners was able to obtain a decision from the CIAL board to have their land returned. This decision which is awaiting governmental approval could set a precedence of returning land acquired for public purposes.

#### Compensation for land acquired

To clear the flight path, trees had to be cut and compensated for by evoking the relevant provisions of the Aircrafts Act. While the land ownership remained, there were restrictions on further construction in the area. The residents of the area had to put up with noise pollution, loss of agricultural income, and damage to houses. The Aircraft Act denied compensation for any of these effects. Hence,

legal and mass action was initiated to have CIAL compensate for the land. Compensation for acquired land thus became a contentious issue in land acquisition.

Further, the practice for determining the price based on prices declared in governments records did not work as these prices are normally understated. Acceptable compensation could be arrived at only by leveraging the political process and at rates close to the real market value. It was equally important to manage public perception that the evictees had received a fair deal and the local community would also benefit from the project. In spite of this there were legal battles that needed to be anticipated and prepared for.

**Risk Mitigation:** CIAL faced a variety of risks including political, revenue, operating, and regulatory risks.

The political risk was due to non-continuity of political leadership, lack of clarity on the decision-making roles of the centre and the state, and local political activism. Effective corporate governance and clear national policy on air infrastructure would be essential to mitigate this risk. The revenue risk was due to demand uncertainties (driven by the market environment,



Curt Carmemark/World Bank

service, and policy on bilateral agreements) and pricing. This risk can be mitigated by creating better dependence on non-aeronautical revenue, developing and executing marketing strategies aimed at different market segments (foreign and domestic airline companies, charter flight operators, and cargo), being customer friendly in service delivery, lobbying for more traffic through bilateral agreements, and in doing sufficient homework to take appropriate pricing decisions.

The operating risks were due to cost escalations, unanticipated delivery of obligatory services like security in the manner determined by external agencies, staffing, labour union relations, and lack of coordination among various agencies. Each of these causes are complex and need to be dealt with in a generic manner through better anticipation and professional management.

The regulatory risks were due to uncertainty in licensing (by DGCA), and fixing of tariff and revenue sharing with AAI. Clarity in the policy for air infrastructure would help mitigate the risk.

**Staffing:** Key people who managed the airport's development came from state government services and AAI. The first managing director was from the IAS with prior experience in district administration and management of state enterprises. CIAL had recruited some senior professionals for critical positions like finance, fire services, and a company secretary from the market. All technical personnel came from AAI on deputation. Staff for critical administrative functions like personnel and administration and land acquisition came on deputation from the state government. Some deputationists chose to join CIAL at a later stage. The state government appointed the present managing director, who also belonged to the IAS.

Airport operations are a niche area that require high quality trained personnel. Currently AAI is the only source of trained people which has developed captive recruitment and human resource development

capabilities. As private airports increase the natural inclination will be to recruit personnel from AAI. This might hurt AAI's interests (the national air carrier, Indian Airlines Limited, faced a similar situation when the airline sector was opened). Planned interventions at the national level to develop human resources for managing airports are required.

## Expansion

**Phase 1 and 2:** The airport had 250,000 sq ft (23,000 m<sup>2</sup>) of floor space at the time of its inauguration. CIAL envisioned six phases of expansion over a period of 20 years, the third phase of which was completed in 2009. Most of the expansion has occurred in the international terminal, as it accounts for more than 78 per cent of all traffic at the airport. In 2002, the original airport's floor area had increased to 300,000 sq ft (28,000 m<sup>2</sup>) due to the expansion of the international departures block.

With the number of airlines operating from the airport increasing, CIAL decided to construct an exclusive terminal for international arrivals which increased the floor space to 420,000 sq ft (39,000 m<sup>2</sup>), increasing passport controls and baggage carousels in addition to expanding the international departures floor space. As part of Phase 2 of the expansion plan, an airline centre complex of 58,000 sq ft (5,400 m<sup>2</sup>) was constructed on the western side of the terminal to accommodate offices of airlines operating from the airport and CIAL's administrative offices. The cargo terminal was also expanded in the second phase.

**Phase 3:** Work on the third phase was intended to accommodate 5 million passenger movements annually and was started in 2007. The third phase involved the commissioning of a central block, connecting the domestic and international terminals, and enlarging the airside area to accommodate more gates and waiting areas along with increased shopping areas. This increased the built-up area by another 160,000 sq ft (15,000 m<sup>2</sup>). The airside area of the international arrivals and departures blocks were integrated together and glass walls were installed to

allow for more natural light. The runway was re-surfaced in 2008. The third phase also completed the expansion of the cargo village and a second aircraft taxiway to the MRO facility.

**Phase 4:** The fourth phase of expansion was originally planned to upgrade the domestic terminal, which had remained untouched in the first three phases. However, the plan was changed completely when the new UDF Government took over the administration of the state in May 2011.

As per announced plans, the current international terminal will be converted completely into a domestic terminal, while a new state-of-the-art international terminal is also being planned. As per the new plans announced by the board of directors in September 2011, the new international terminal will come up on the eastern side of the existing structure. The built-up space for the new terminal will be 1,000,000 sq ft (93,000 m<sup>2</sup>) (1 million sq ft) having segregated departures and arrivals at different levels. The terminal will have 16 aerobridges and an additional 30 parking bays. The new terminal will have the capacity to handle 4,000 passengers at any given point of time. The arrivals section will have 10 baggage carousels

and increased immigration facilities. The new terminal is expected to be commissioned by the last quarter of 2014.

With the completion of the fourth phase, the total built-up area of the airport will increase to 1,600,000 sq ft (150,000 m<sup>2</sup>), making the airport the third largest in the country in terms of size.

The current domestic terminal will be converted into a Royal Pavilion, for handling VIP and private chartered flights and jets. The current international terminal, once converted into the domestic terminal, will have 5 aerobridges and 6 boarding gates, apart from increased parking bays.

**Management:** Cochin airport is the first airport in India to be built in PPP mode and is owned by the public limited company Cochin International Airport Limited, better known as CIAL, floated by the Government of Kerala in 1994. The Kerala Government owns a 33.36 per cent stake in the company, a consortium of multinational companies also holds significant stakes, including the Abu Dhabi-based Emke Group; the Oman-based Galfar Group; UAE-based Majeed Bukatara Trading;



Dominic Sansoni/World Bank

Kochi-based Synthite Group; and several local businesses. Central government enterprises like Air India, Bharat Petroleum Corporation Limited (BPCL), Airports Authority of India (AAI) and scheduled commercial banks, such as the Federal Bank, State Bank of Travancore (SBT), and Canara Bank also own stakes in the company. The remaining shares are held by the general public. Over 10,000 personal investors from 29 countries, mostly NRIs, hold shares in the company. In financial year 2009–10 the airport recorded a gross income of \$47.19 million, a growth of 22.3 per cent over the previous year. Profit after tax was \$17.28 million, a growth of 30.7 per cent over the previous year.

The Chief Minister of Kerala is the ex-officio chairman of CIAL. V. J. Kurian was appointed the managing director of the company on 10 June, 2011.

### Cargo

Cochin Airport has a dedicated cargo centre located on the eastern side of the airport complex. The cargo centre is one of the largest facilities in the country with a total floor space of 120,000 sq ft (11,000 m<sup>2</sup>) spread over 50 acres (200,000 m<sup>2</sup>) of land. The cargo terminal handled around 40,000 MT of cargo last year registering a more than 25 per cent growth. There are three complexes in the cargo village:

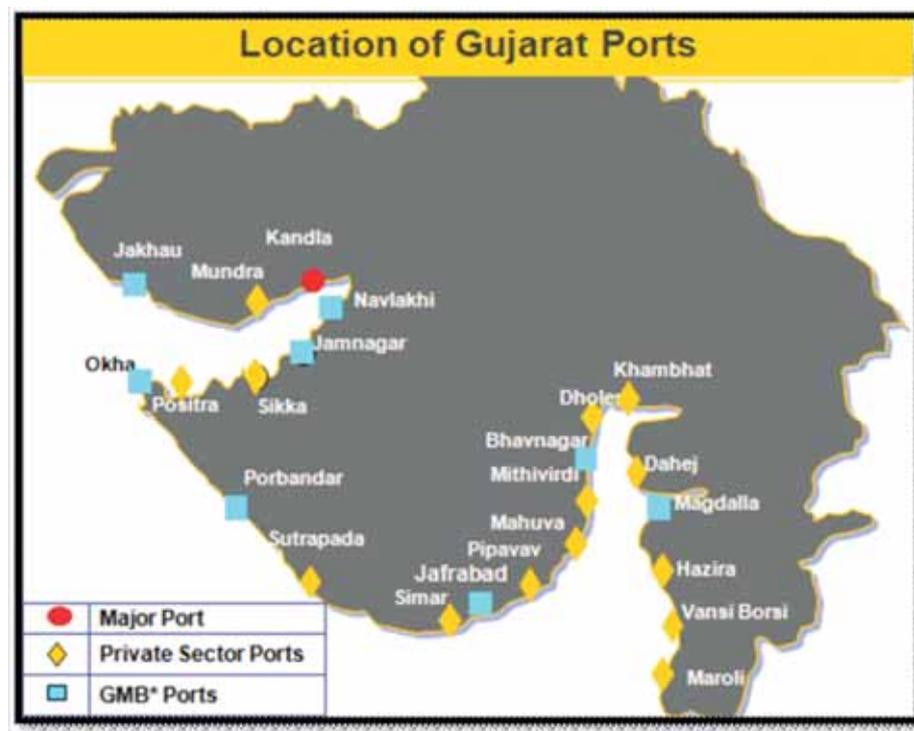
- The Centre for Dry Cargo (CDC), with an area of 50,000 sq ft (4,600 m<sup>2</sup>), has a dedicated warehousing facility and air-customs inspection facility for both import and export.
- The Centre for Perishable Cargo (CPC) is the largest dedicated cold storage centre for perishable goods in the country. It has a floor area of about 22,000 sq ft (2,000 m<sup>2</sup>) and can handle approximately 25,000 MT of cargo. It was commissioned in 2008 at a cost of \$8.47 million jointly by CIAL, the Government of India through the Agricultural and Food Promotion Export Development Authority (APEDA), and the Government of Kerala.
- The Transshipment Cargo Complex is a dedicated warehouse allocated for transshipment cargo. The import and export cargo from the customs warehouses in the catchment area, as well as from airports like Chennai, Bangalore, and Coimbatore is handled and stored at this centre for export.

In addition, an exclusive domestic cargo complex has also been constructed for private domestic logistics firms and India Post services.

# Ports

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## Dahej Port



### Background of the Sector

Ports, which are an important part of infrastructure development play a crucial role in the transportation sector in India.

India has an extensive port infrastructure covering 12 major ports and 187 minor (non-major) ports. The non-major ports are in the following states: Gujarat (42), Maharashtra (48), Tamil Nadu (15), Karnataka (10), Kerala (17), Andhra Pradesh (12), Orissa (13), Goa (5), West Bengal (1), Daman and Diu (2), Lakshadweep (10), Puducherry (2), and Andaman & Nicobar (23).

Non-major ports in India collectively handled 213.22 million tonnes of cargo during 2008–09 compared with 206.38 million tonnes of cargo handled in 2007–08. The year-on-year growth in cargo traffic in 2008–09 was 3.3 per cent as compared to 11.6 per cent in 2007–08. At a disaggregated level, the overseas cargo traffic increased by 3.5 per cent in 2008–09 as compared to an increase of 26.6 per cent recorded in 2007–08. Coastal cargo traffic increased by 2.1 per cent in 2008–09 as compared to a decrease of 35.1 per cent in 2007–08. Overseas traffic (183.5

million tonnes) comprised 86.1 per cent of the total traffic handled at non-major ports during the year.

### Snapshot of the project

Dahej is an all-weather direct berthing multi-cargo port situated on the south west coast of Gujarat in the Gulf of Cambay, at the junction of Guljaria and Ban Creek. It is a natural deep water port with draft availability ranging up to 25 m depending upon the length of the trestle proposed for construction of a berthing arrangement.

**Present Infrastructure:** The port is about 45 km from Bharuch, which is now being connected to the **Port of Dahej** through a broad gauge rail siding with an initial capacity of 25–30 rakes/day. The nearest airports are at Ahmadabad and Vadodara. A deep draft multi-cargo berthing facility is being proposed with a 3 km water front towards developing **Port of Dahej** as per the directives of the Gujarat Maritime Board (GMB).

### Type

**Ownership:** In addition to the Port of Dahej, there are 4–5 other port facilities at Dahej which are owned by Petronet LNG Limited (including bulk terminal sub-concessioned to Adani), GCPTCL, Birla Copper, and Reliance Industries.

### Present Facilities: Captive and Private Jetties at Dahej

- Dahej Harbour Infrastructure Limited (Birla Copper).

- Gujarat Chemical Port Terminal Company Limited (GCPTCL).
- Petronet LNG.
- Reliance Industries Limited (IPCL).
- Petronet Adani.
- ABG Shipyard Limited.
- Ro-Ro Terminal and Port Development.

### Other Facilities

Tugs, launches, barges, and cranes are generally available from private parties at the Old Dahej Port. The captive jetties are fitted with cargo handling equipment.

#### • Transit Shed/Godown:

Transit godown – 1 (1,116 sq m).  
Transit sheds – 4 (1,690 sq m).  
Platform for storage – 5 (10,000 sq m),  
2 (21,300 sq m in Kutch).

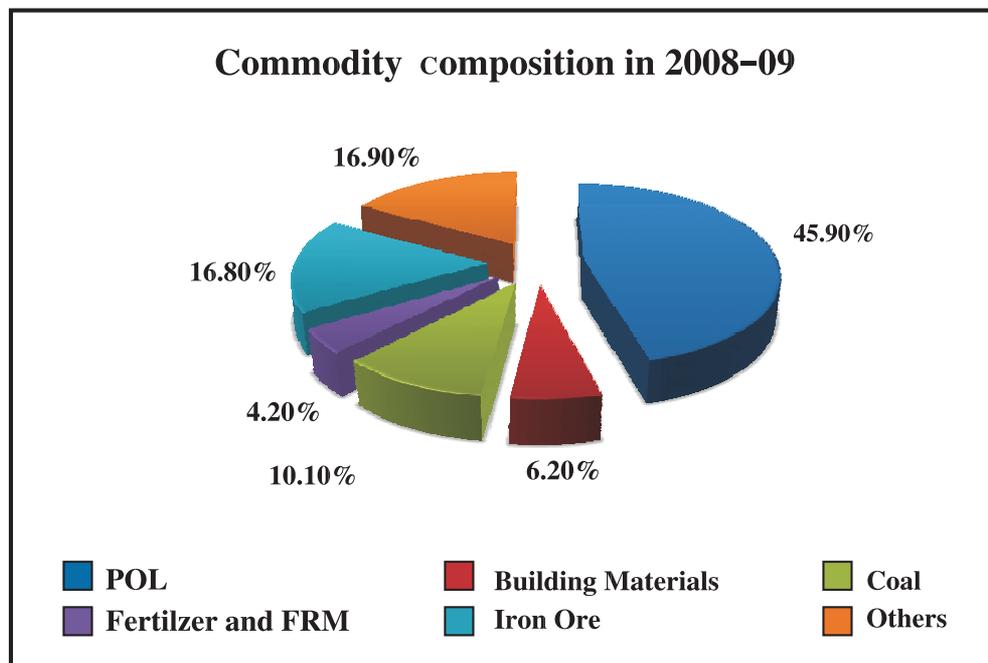
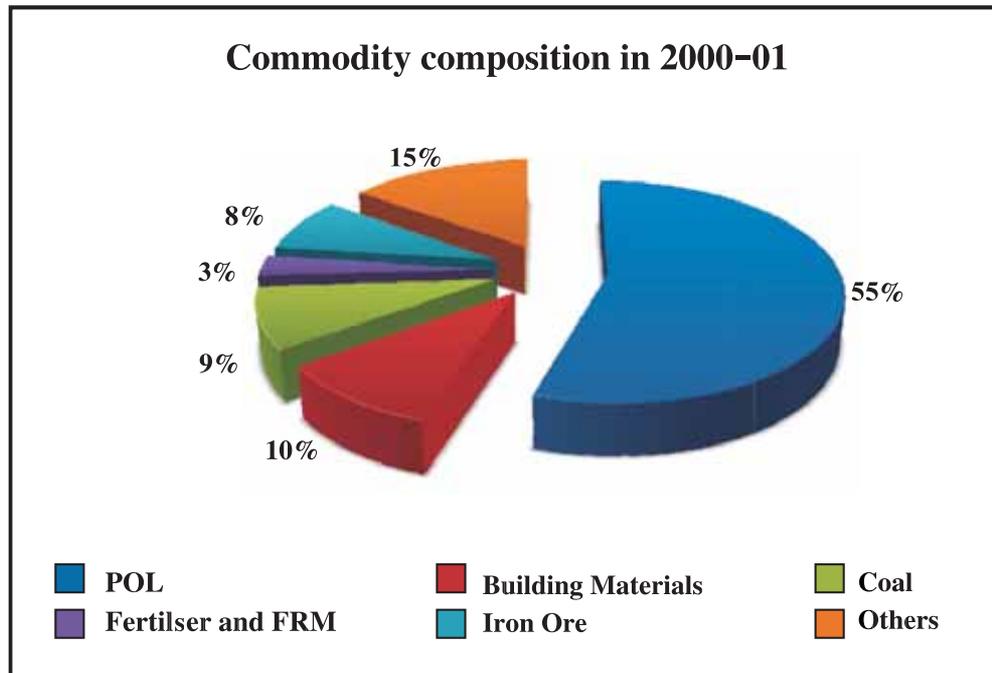
#### 1. Old port

- The old GMB jetty of 100m length has been upgraded by M/S Welspun Company Limited.
- A land lease and possession agreement has been executed between the Gujarat Maritime Board and M/s Sanghi Industries Limited.
- For setting up of silos for storage of cement and other related activities like a packaging plant.

6,000 sq m of backup land has been allotted to M/s Sanghi Industries Limited.

**Commodity composition of non-major ports (export-import):** Commodity composition of traffic handled by non-major ports during the past few years is given in Figure 3.9.

Figure 3.9: Commodity Composition of Cargo Traffic in Non-Major Ports



Trade Flow in Dahej Port	Name of Commodities
Export	POL, Chemicals
Import	Fertilizers, Rock Phosphate, Coal and cock, Salt, Chemicals, etc.

### CARGO traffic handled in Gujarat

Gujarat is India's principal maritime state with a natural coastline of about 1,200km (16 per cent of India's total coastline). The state has 40 non-major ports which are under the jurisdiction of GMB since April 1982. Out of the 40 non-major ports, traffic is handled through 17 non-major ports. The remaining 23 non-major ports are used for fishing activities and have a small volume of traffic.

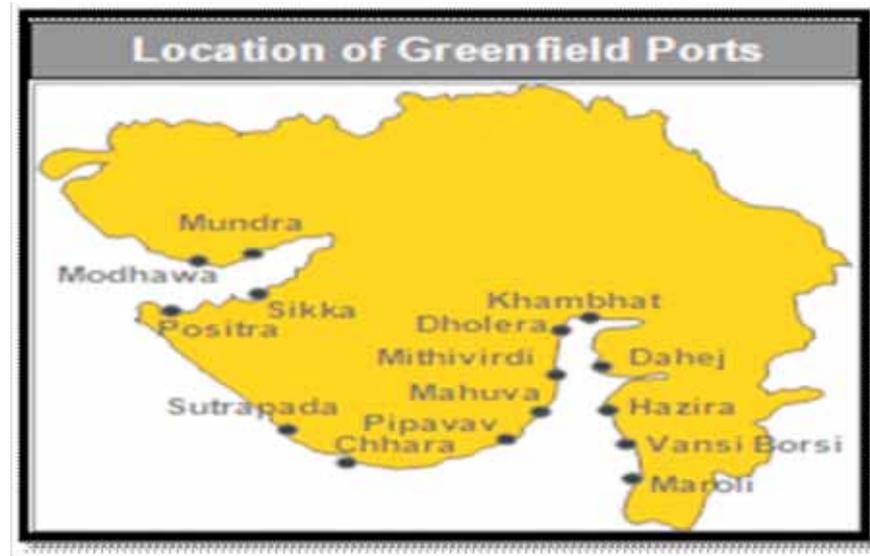
The total cargo traffic handled at the non-major ports in Gujarat during 2008–09 was of the order of 152.81 million tonnes as against 150.52 million tonnes in 2007–08, reflecting an increase of 1.5 per cent. Non-major ports in Gujarat account for close to 72 per cent of the total cargo handled by non-major ports in India. Overseas traffic in 2008–09 was 134.43 million tonnes with the remaining 18.38 million tonnes being coastal traffic. The traffic handled at important non-major ports of Gujarat during the past few years is given in Table 3.31.

**Table 3.31: Gujarat: Traffic Achieved at Select Non-major Ports**

Year/Port	Traffic handled (Million Tonnes)	
	2000–01	2008–09
Sikka	47.19	65.28
Magdalla	8.89	14.05
Jafarabad	4.04	4.81
Bedi	3.12	2.6
Mul-Dwarka	3.26	3.43
GAPL	3.47	35.62
<b>Dahej</b>	<b>3.45</b>	<b>11</b>
Pipavav incl. (GPPL)	1.57	3.71
Others	4.55	12.31
<b>Total</b>	<b>79.54</b>	<b>152.81</b>

Source: Performance of Non-major Ports, Ministry of Shipping, Government of India.

## Greenfield Ports in Gujarat



GBM under its port privatization model has been actively promoting and developing greenfield ports. It has identified 11 greenfield sites to develop all-weather direct ports in participation with well-known private port players. These capital incentive port projects are being developed under the build-own-operate-transfer (BOOT) mode and will be transferred back to GBM after completion of the 30-year BOOT period.

### Developed Greenfield Ports

#### 1. Dahej Port:

- It has been built by Petronet LNG Limited, Adani Group and GMB.
- The port has been operational since 2004 with a terminal handling capacity of 10 MMTPA LNG.
- The port handled 6.46 million tonnes of LNG during 2008–09. The company is also constructing a solid cargo berth at its port which is expected to be completed by June 2010.

- Further augmenting its role, Dahej Port developed a chemical port terminal at its base in 2001.

**Other ports:** Pipavav Port, Mundra Port, and Hazira Port.

#### Proposed additional facilities/investment plan

- With two gulfs dividing the state in three segments, Gujarat is an ideal location for ferry services.

#### Ro-Ro ferry services:

- GMB has planned a dedicated Ro-Ro ferry service to grab the advantage of saving travelling distance, fuel, and expenses and also providing a safe mode of transport.
- GMB has decided to develop a world class Ro-Ro ferry terminal at Gogha and Dahej in Phase 1 and will extend this up to Mumbai in subsequent phases.



- ii. Solid cargo terminal at Dahej – Phase 1 - Construction work of Phase 1 A is in progress. Likely to be completed by June 2010.
- iii. Plan for an SEZ linked port.
- iv. Expansion of LNG handling facilities at Dahej.
- v. Solid cargo terminal at Dahej – Phase 2.

## Krishnapatnam Port

### Background of the Sector

India has an extensive coastline of 7,517 km, excluding the Andaman & Nicobar Islands. Indian ports handle around 95 per cent of the total volume of the country's trade and about 70 per cent in terms of value. India has 13<sup>1</sup> major ports and 200 non-major ports (minor and intermediate ports) spread across nine (coastal) maritime states. Ports are under the Concurrent List of the Indian Constitution. Major ports are under the jurisdiction of the union government; these are managed by the Port Trust of India while minor ports are under the jurisdiction of the respective state governments. While major ports handle 75 per cent of the total cargo traffic, minor ports account for 25 per cent of the traffic.

The capacity of major ports increased to 532.07 MTPA in 2007–08 (with a provisional increase estimated at 555.67 MTPA by 2008–09) and the traffic during the same period touched 519.3 million tonnes. This was 97.6 per cent of the total capacity. Thus, the capacity of the major ports is already stretched to the limit.

### Non-Major (Minor) Ports Development Scenario

As non-major ports or minor ports are placed in the Concurrent List of the Constitution they are administered under the Indian Ports Act 1908. The act defines the jurisdiction of central and state governments over ports.<sup>2</sup> Non-major ports are under the administrative control of state governments. At the state level, the department in charge of ports or the State Maritime Board (SMB) (created through state legislation as in case of Gujarat), is responsible for forming water front development policies and plans, regulating and overseeing the management of state ports, attracting private investment in the development of state ports, and enforcing environmental protection standards, etc. In 2008–09 the four maritime states of Gujarat, Maharashtra, Goa, and Andhra Pradesh together accounted for 96 per cent of the total cargo traffic handled by the non-major ports.

Currently, the country has four SMBs in Gujarat, Tamil Nadu, Maharashtra, and Andhra Pradesh. The Government of India (GoI) has asked all states to establish SMBs to coordinate security efforts. In the

<sup>1</sup> There are 13 major ports in India — Chennai, Cochin, Ennore, Jawaharlal Nehru Port Trust, Kolkata, Kandla, Marmugao, Mumbai, New Mangalore, Paradip, Tuticorin, and Vishakhapatnam, including the recent one at Port Blair.

<sup>2</sup> It lays down rules for safety of shipping and conservation of ports. It regulates matters pertaining to the administration of port dues, pilotage fees, and other charges.

10<sup>th</sup> Five Year Plan the traffic at non-major ports increased at an annual average growth of 13 per cent but slackened to 6.5 per cent in 2007–08 and to 2 per cent in 2008–09.

The growing importance of non-major ports in handling cargo has helped in alleviating the congestion at major ports.

### Policy and Regulatory Mechanism for Ports in India

The legal framework governing the port sector comprises the Indian Ports Act 1908 and the Major Port Trusts Act 1963. Major ports under the central jurisdiction are governed by policy and directives of the Ministry of Shipping in the Government of India. Minor ports are under the state's jurisdiction and are governed by policy and directives of respective state government's nodal departments/ agencies.

**Tariff Authority for Major Ports (TAMP)** was constituted for regulating tariffs in major ports and for ensuring uniform and transparent norms relating to fixing tariffs as well as prescribing the quality of service for port authorities/terminal operators.

**National Maritime Development Programme (NMDP):** The Ministry of Shipping, Road Transport and Highways (MoSRTTH) recently formulated a comprehensive National Maritime Development Programme (NMDP), which envisages improvements in port capacity and hinterland connectivity projects across the 13 major ports over a 10-year time frame. In addition, the Indian government recently announced a series of measures to promote foreign investment in the port sector:

- No approval required for foreign equity up to 51 per cent in projects providing supporting services to water transport, such as operations and

maintenance of piers, loading, and discharging of vehicles.

- Automatic approval for foreign equity up to 100 per cent in construction and maintenance of ports and harbours. However, if the total foreign equity investment exceeds \$ 0.30 billion (Rs 15 billion), the proposal will be referred to FIPB.
- Open tenders to be invited for private sector participation on a build, operate, and transfer (BOT) basis.
- Evaluation of bids will be based on the maximum license period which will not exceed 30 years and at the end of the BOT period all assets will revert to the port in accordance with the conditions of the agreement.
- The government has announced guidelines for private/foreign participation that permit formation of joint ventures between major ports and foreign ports, between major ports and minor ports, and between major ports and companies.

**Model Concession Agreement (MCA):** One major development has been the new model concession agreement (MCA), which was approved by the union government in January 2008. Under the new MCA, the port trust can now directly approach the inter-ministerial Public Private Partnership Appraisal Committee (PPP-AC) for final project approval without having to first acquire in principle approval.

**Maritime States Development Council (MSDC):** To have an integrated approach for the development of both major and non-major ports, the Maritime States Development Council (MSDC) was constituted in May 1997 under the chairmanship of the Honourable Minister of Shipping. The ministers in-charge of ports in all maritime states, union territories of Puducherry, the administrations in Andaman & Nicobar, Daman & Diu, and Lakshadweep are its members. The deliberations and

decisions of the MSDC provide the institutional framework for coordinated development of major and non-major ports. So far 10 meetings of MSDC have been held.

### **A Summary view of the Legal and Regulatory Framework on Ports in India**

In 2010, the Ministry of Shipping, Road Transport and Highways embarked on a plan to convert 12 existing major ports to corporate entities in order to give them freedom to set up tariffs and compete with other international and domestic ports. Currently, Ennore Port is the only corporate entity among the major ports in the country. By virtue of this, Ennore Port will also be governed by the Companies Act 1956 while other ports continue to be governed as trusts set up by the Major Ports Trust Act 1963. The Tariff Authority for Major Ports (TAMP) is an independent authority for the regulation of tariffs in major ports. TAMP was constituted in April 1997 (The Major Port Trust Act 1963 was amended by the Port Laws (Amendment) Act 1997 to constitute TAMP), to provide for an independent authority to regulate all tariff, both vessel related and cargo related, and rates for lease of properties with respect to major port trusts and the private operators located therein. TAMP has jurisdiction only over major port trusts and private terminals therein. It is responsible for prescribing the rates for services provided and facilities extended by them and also rates for lease of port trust properties. This authority is empowered not only to notify the rates but also the conditionalities governing application of the rates. The Ministry of Shipping recently finalised the draft Major Ports Regulatory Authority Act 2009 (MPRRA 2009). This act is envisaged to be a successor to the provisions currently enshrined in the Major Ports Trust Act 1963 as far TAMP's working is concerned. With regard to non-major ports, GoI, state governments, and private port developers have administrative control over close to over 187 non-major or intermediate ports.

### **Transition in the Port Policy for the accelerated and Corporatised Port Development in India**

Realizing that for operations to be made efficient ports have to be operated on commercial lines in 1996, GoI came up with guidelines for the corporatisation of ports which have to be enforced for increasing the financial and other powers of the Port Trust. Subsequently, a decision was taken to corporatise the existing major ports in a phased manner. Accordingly, Ennore Port near Chennai and Jawaharlal Nehru Port Trust were brought under the purview of the Companies Act 1956. GoI decided that all new ports will be set up as companies under the Indian Companies Act and the existing port trusts will also be gradually corporatised and set up as companies. This decision is based on the belief that corporatization of ports will necessarily make ports operate on commercial principles and make it possible to evaluate their performance on the basis of their profitability. It will also expose the ports to financial markets for meeting their working capital and project funding requirements and thereby subject them to market discipline. Also corporatisation of ports could eventually lead to their privatisation.

### **Establishment of Maritime Boards: As a Factor for the Growth of Minor Ports in India**

In order to realise the objectives of the new port policy and increased participation of states, the constitution and establishment of maritime boards was seen as the way forward. Accordingly, maritime boards were constituted through special Maritime Boards Act in different states. So far four states have come up with Maritime Board Acts — Gujarat, Maharashtra, Andhra Pradesh, and Tamil Nadu. Maritime Boards (MBs) perform different functions pertaining to minor ports, such as administration, control, regulation, and carrying out the management of minor ports. The Maritime Boards Act provides a more

efficient and effective environment for developing ports on a corporate pattern to compete with global standards.

The Andhra Pradesh Maritime Board is still to come into existence as the Andhra Pradesh Maritime Bill is being discussed by the government. However, for the construction and development of Krishnapatnam Port the state government of Andhra Pradesh played an important role.

### **Snapshot of the Project: The Krishnapatnam Port**

#### **Key facts**

The Krishnapatnam Port Company Limited (KPCL), located in Krishnapatnam port town in the Nellore district of Andhra Pradesh was formed by after it won the contract from the Government of Andhra Pradesh through a competitive bidding process to develop the existing minor port into a modern, deepwater, and high productivity port, on a Build-Operate-Share-Transfer (BOST) concession basis for 50 years. As KPCL is being developed on a BOST concession basis, the developer becomes the Port Authority under the current mechanism and will share a portion of the revenue with the state government and continue to carry out port operations

on a concession basis for 50 years starting from the date of concession mentioned in the agreement. Thereafter the port will be transferred to the state government or the lease may be extended as decided by the state government.

KPCL initiated the engineering, procurement and construction (EPC) bidding process and fund-raising exercise for its Rs 900 crore deepwater port development project in 2003. The project was started after the completion and procurement of the bid in 2007. The company was formed by the Hyderabad based CVR Group with a share of 74 per cent and NatcoPharma Limited with a share of 26 per cent. Navayuga Engineering Company Limited (NECL) is the flagship entity of the CVR Group and is the EPC contractor for Krishnapatnam Port.

#### **Three Phases**

The Krishnapatnam Port is being built in three phases. Construction of the first phase was completed in 18 months and it commenced operations on 21 March, 2009. The first phase consists of 10 deepwater berths (for coal, iron ore, and general cargo) and two breakwaters which are all operational. The details of the three phases are given in Table 3.32.

Table 3.32: Details of the three phases of the Krishnapatnam Port

Phase I	Phase II	Phase III
<p><b>Construction started – January 2007. Completed April 2008</b></p> <ul style="list-style-type: none"> <li>Fully mechanised bulk material handling system for coal and iron ore.</li> <li>Modern harbour mobile cranes for other bulk and break bulk cargoes.</li> <li>Vast open storage and covered transit sheds with road and rail linkages for bulk and break bulk cargo.</li> <li>Environment friendly green belts, advanced dust suppression systems, rain harvesting, lakes, and parks.</li> <li>Internal railway system of 18.5 km with a side arm charger, a twin wagon tippler for iron ore, and mechanised wagon loading system for coal.</li> <li>38 million cum. of capital dredging for handling 1,05,000 DWT ships.</li> <li>In Phase I, 4 Berths completed by March 2009: Iron ore – 2, berths, coal – 1, berths, general cargo – 1. Depth available is 16.50 mts.</li> <li>The port handling capacity is 20 million tonnes.</li> <li>Commercial operations are commenced from 20-3-2009.</li> <li>During 2009–10 cargo handled 16.12 million tonnes and during 2010–11 cargo handled was 15.91 million tonnes.</li> </ul>	<p><b>On-going activities in Phase II (expected to be completed by mid-2012)</b></p> <ul style="list-style-type: none"> <li>4 more berths constructed for general cargo and are in operation.</li> <li>3 more berths are in the under construction stage.</li> <li>Dedicated berths for handling coal for power plants like UMPP, APGENCO, and private power plants.</li> <li>Container berth with handling equipment.</li> <li>Additional general cargo berths for augmenting handling of agri products and fertilisers.</li> <li>A heavy lifts berth with design strength of 12 T/m<sup>2</sup> for handling over dimensional cargo.</li> <li>Mechanized system for handling fertiliser cargo.</li> <li>cruise and repair and maintenance facility.</li> <li>Provision for crude, POL and LNG berths.</li> <li>5,800 acres of land Land available for port development and port based industries.</li> </ul>	<p><b>Proposed activities in the final phase<sup>3</sup></b></p> <ul style="list-style-type: none"> <li>After the completion of Phase II, 15 berths will be available.</li> <li>Port handling capacity will be 85 million tonnes by 2016 after completion of Phase II.</li> <li>Scope for development 51 berths with a handling capacity of 135 MTPA in addition to 7.0 million TEUs of container.</li> <li>Integrated container complex with a quay length of 2,500 m.</li> <li>A dedicated port for marine and passenger</li> </ul>

## Consultants and Partners in KPCL's Development

Howe (India) was the key consultant for Phase I of the project that included the preparation of the detailed project report (DPR) for Navayuga Construction Company Limited, a sister concern of KPCL that played a key role in designing and carrying out the construction of the port in a timely and efficient manner. It is India's premier maritime and port consultancy, which offers services in maritime and port policy, port development and privatization, shipping commerce, and allied areas.

## Execution

### Financial achievements

The financial closure for Phase I was achieved in December 2006. The project was funded by a consortium of 10 banks led by the State Bank of India at a cost of Rs 1,200 crore. Phase I consists of 10 deepwater berths (for coal, iron ore, and general cargo) and 2 breakwaters which are all operational. Currently the second phase of development is underway which will add seven more berths to the port (four dedicated for coal, two for general cargo, and one for containers). This is being funded by a consortium of 16 banks. The second phase has an outlay of Rs 4,000 crore and is expected to be commissioned by January 2012.

## Project details

### Location

**Connectivity: A new railway-cum-road-cum-pipeline link to the hinterland connectivity as a distinguished feature**

The Krishnapatnam Port has very good hinterland connectivity covering southern Andhra Pradesh, the

districts of Rayalseema, North Tamil Nadu, and Eastern Karnataka. The Krishnapatnam Rail Company Limited (KRCL) is a special purpose vehicle (SPV) comprising of the Government of Andhra Pradesh, KPCL, and Rail Vikas Nigam Limited, which was formed to provide rail connectivity to the port. This has been fully operational since 2010. This 114 km long rail line passes through Venkatachalam, which is 23 km from the port, on the existing broad gauge line connecting Chennai with Kolkata. There is a dedicated 26 km 4-lane road (earlier a 2-lane road existed that connected Nellore to the minor port that existed earlier) connecting the port to National Highway-5 (Chennai-Kolkata Highway). This will be upgraded to a 6-lane road for which land has been acquired. The development of this road alongside the development of the port was a special condition seen as critical support to be provided by the Andhra Pradesh government. Therefore, the construction of the 'rail-cum-road-cum-pipeline corridor' comprising of rail and road connectivity to the port has been achieved in a timely manner. The port is 180 km from the international airport at Chennai and 120 km from the domestic airport at Tirupati. An air strip dedicated to the port has been proposed and there are port owned helipads inside the port area.

### Government cooperation and engagement

AnMoU was signed to establish a new broad gauge rail line between Obulavaripalle in Cuddapah district and Krishnapatnam Port under a SPV comprising of the Government of Andhra Pradesh, KPCL, and Rail Vikas Nigam Limited, a Government of India enterprise formed specifically to develop and fund viable rail lines under the PPP mode. This link will reduce the distance between the port and the regions of south-eastern Karnataka and south-western Andhra Pradesh by about 70 km, leading to substantial savings for exporters and importers.

**Rail sidings**

Cargo-wise, dedicated rail sidings inside the port have been operational from July 2009.

**Air connectivity**

The port has easy access to two major airports - Chennai (180 km) and Tirupati (120 km).

**Berths**

Currently 11 multipurpose berths are operational. Construction of three more berths will commence shortly.

**Back-up area**

6,500 acres of back-up area is planned to be procured with the assistance of the Andhra Pradesh government. Also around 10,000 square yards of paved storage is ready for usage.

**Warehouses**

1.5 million square feet of covered storage for agri commodities and fertiliser storage.

**Equipment capacity of the Port**

- The port has 11 state-of-art, tyre mounted mobile shore cranes (8 x Leibherr, 2 x Gottwald & 1 x Sennebogen). These cranes provide a discharge rate of 750 to 900 MT per hour per crane.

- Dedicated port owned equipment – tippers, pay loaders, and excavators, etc.
- 20 weighbridges of 120 MT and 60 MT capacities for road movement and in-motion railway weighbridge for rake movements.

**Liquid cargo handling facilities**

A 16 inch pipeline for handling edible oil is operational. This pipeline provides a discharge rate of up to 600 TPH, which is one of the fastest discharge rates in the country for edible oil.

**Dedicated cargo-wise railway sidings**

Cargo-wise dedicated railway sidings are operational - four lines for coal, two for iron ore, three for bagged cargo, and two for general cargo.

**Mechanisation**

The management at Krishnapatnam Port believes in fast turnaround of vessels which it handles by providing modern and efficient technological solutions in the form of advanced mobile harbour cranes, a conveyor system with a capacity of 2,500 to 4,000 TPH, and connecting berths to the storage yard supported with a stacker cum re-claimer. A comparative overview of container handling capacity of KPCL and the Jawaharlal Nehru Port Trust (JNPT) will help in understanding KPCL's mechanization and cargo handling capacity.

Jawaharlal Nehru Port Trust	Krishnapatnam Port: The Present Status
<p>JNPT is the second youngest port after Ennore. It is located at the eastern end of Mumbai in the Nhava Sheva area. JNPT's channel depth is 11 m and depth at berths is 13.5 m. JNPT can take in vessels having laden draft up to 12.5 m. The width of the channel is 400 m at the entry point and 460 m off the berths. Port cargo handling facilities include container terminals, a liquid handling terminal, and a shallow water berth which can handle both break-bulk and container traffic.</p> <p><b>Port Highlights</b></p> <ul style="list-style-type: none"> <li>• Ranks 31st among the top 100 container ports in the world.</li> <li>• Handles 56 per cent of India's total containerized cargo.</li> <li>• Highly automated and computerized operations with single window system.</li> <li>• Recipient of Indira Priyadarshini Vrikshamitra Award – 1996 for the greenest port in India.</li> <li>• Equipped with the latest vessel traffic management system (VTMS) to track/monitor vessel movements ensuring safe navigation.</li> <li>• Spread over an area of 2,584 hectares.</li> <li>• Served by 16 container freight stations and over 23 inland container depots.</li> <li>• Well connected by the national rail/road network.</li> </ul>	<ul style="list-style-type: none"> <li>• Fully mechanized bulk material handling system for coal and iron ore.</li> <li>• Modern harbour mobile cranes for other bulk and break-bulk cargo.</li> <li>• Vast open storage and covered transit sheds with road and rail linkages for bulk and break-bulk cargo.</li> <li>• Environment friendly green belts, advanced dust suppression systems, rain harvesting, lakes, and parks.</li> <li>• Internal railway system of 18.5 km with a side armchamber, a twin wagon tippler for iron ore, and mechanized wagon loading system for coal.</li> <li>• 38 million cum. of capital dredging for handling 1,05,000 DWT ships.</li> <li>• In Phase I, four berths completed by March 2009. Iron ore - two berths, coal - one berth, general cargo – one berth.</li> <li>• Depth available is 16.50 m.</li> <li>• <b>The port handling capacity is 20 million tonnes (1 million= 10 lakh).</b></li> <li>• Commercial operations are commenced from 20-3-2009.</li> <li>• During 2009-10 cargo handled 16.12 million tonnes of cargo handled and during 2010-11 15.91 million tonnes of cargo handled.</li> </ul> <p><b>Activities in the final phase as per the master plan</b></p> <ul style="list-style-type: none"> <li>• After completion of Phase II, 15 berths will be made available.</li> <li>• Port handling capacity will be 85 million tonnes by 2016 after completion of Phase II.</li> <li>• Scope for development of 51 berths with a handling capacity of 135 MTPA in addition to 7 million TEUs of container.</li> <li>• Integrated container complex with a quay length of 2,500 m.</li> <li>• A dedicated port for marine and passenger cruise and repair and maintenance facilities.</li> <li>• Provision for crude, POL, and LNG berths.</li> <li>• 5,800 acres of land available for port development and port based industries.</li> </ul>

### Information technology

For efficient operations, an enterprise port management system (EPMS) connecting all port functions and sharing data with port users and minimising paperwork has been implemented at the Krishnapatnam Port. High-end software for weather forecasting and tidal predictions for safety of ship movement is also provided. An automatic vehicle location system (AVLS) and RFID technologies for better tracking of vehicles inside the port premises are also available.

### KPCL – Edible Refinery Hub

The Krishnapatnam Port is fast emerging as a recognised hub for edible oil refineries with optimal blend of port infrastructural facilities and greenfield opportunities. The efficiency and operational dynamism of the largest upcoming port in India is a clear advantage, making it the perfect destination for port based industries. Till date, five edible oil refinery plants have started (see Table 3.33).

**Table 3.33: Operational Edible Oil Refineries**

S. No.	Edible Oil Refineries	Capacity in MT/day
1.	South India Edible Oils	1,000
2.	AdaniWilmar	650
3.	SaraiwaalaAgri Refineries	650
4.	Gemini Oils	650
5.	Foods, Fats, & Fertilizers	650

### Port Infrastructure for Edible Oil - Business

- The Krishnapatnam Port is presently developing a 16 inch pipeline facility from the berth to all the refineries, providing end-to-end connectivity.
- Provision for 4-pipeline infrastructure for multi-product refineries as well as for upgrading increased capacity.

### Advantages for Edible Refineries at Krishnapatnam Port

- Strategic location – covering Andhra Pradesh, Karnataka, and Tamil Nadu. Major consumption centres like Hyderabad (490 km), Bangalore (380 km), and Chennai (180 km) can be serviced from the Krishnapatnam Port.
- Excellent connectivity – rail connectivity and a 4-lane road connecting National Highway-5 (Chennai-Howrah).

- Large tracts of clean land available for setting up integrated plants.
- High discharge rate of 500 to 600 TPH because of a 16 inch pipeline.

### Related Operational Advantages of Krishnapatnam Port

- Dedicated customer service providing immediate response to all customer needs.
- Single window clearance with end-to-end solutions.
- Modern facilities to ensure efficient operations in all the areas.
- Huge back-up area with the possibility of dedicated storage areas.
- Strong 3-tier security system for safe handling of cargo at all times. Krishnapatnam Port has checks and systems at every stage to ensure safe storage and evacuation of cargo.

### KPCL as the Coal Hub of India:

**Thermal Power Plants:** Thermal power plants have confirmed their presence within a radius of 7 to 8

km of Krishnapatnam Port with a projected total capacity of 14,000 MW. These plants are based on imported coal and expected coal imports will be in the range of 60 Mn MT per annum (see Table 3.34).

**Table 3.34: KPCL as the Coal Hub of India**

S. No.	Plant	Capacity (MW)	Expected COD
1	Reliance UMPP	4000	FY14
2	Krishnapatnam Power	1980	FY13
3	Kineta Power	1980	<u>FY11</u>
4	Thermal Power Tech	1980	FY12
5	AP Genco	1600	<u>FY11</u>
6	Nelcast	1320	<u>FY12</u>
7	Meenakshi Group	540	FY13
8	Simhapuri Power	540	FY12

Apart from this captive coal requirement, KPCL's hinterland will require about 20 Mn MT per annum and hence Krishnapatnam Port will be handling about 80 Mn MT of coal per annum making it the coal hub of India.

### Special Economic Zone (SEZ)

Krishnapatnam Infratech Private Limited is setting up a multi-product special economic zone in Chillakurmandal, SPS Nellore district. The Government of Andhra Pradesh has sanctioned 12,000 acres of land to Krishnapatnam Infratech Private Limited for developing this special economic zone in two phases – 6,000 acres for each phase. Under Phase I, 2,625 acres has already been registered in the name of the company and the remaining land is already in its possession. The Board of Approval for Special Economic Zone, Government of India granted formal approval for setting up the special economic zone on 10 March 2010.

### Other Industries

Various other industries are developing in the vicinity of the port – SBQ Steel Plant, a leather park, IFFCO

Kisan SEZ, Coke oven plants, and sugar refinery, etc.

### How Standard Problem Areas and Major Challenges were Tackled

#### a. Land in the Coastal Area

Procuring land belonging to fisherfolk in the coastal regulation zone (CRZ) was a major challenge. The land to be procured also belonged to the category of common land. However, KPCL has not faced any legal issues in procuring the land till date. The transfer of land went off smoothly and the fisherfolk were compensated adequately as per government rules. The compensation was determined by the district administration for the families that had to be rehabilitated. Compensation of Rs 31 crore was proposed by the district collector, of which Rs 19 crore was mutually agreed upon. The cost of land and loss of livelihood were together taken in the compensation package and as per the port authorities going by its corporate social responsibility (CSR) policy, the company also provided jobs to youth in the local area. On behalf of the state government, the district administration coordinated the dialogue between the fishing community and KPCL and the settlement was reached mutually where in addition to the cost

of the land the rehabilitation package also provided other civic amenities to the families.

#### b. Legal Clearances

Any project on the coast faces two kinds of legal challenges – environmental laws that are available for infrastructure projects and special laws of the coastal regulation zone that are applicable for the development purposed in these areas. The Krishnapatnam Port project obtained legal clearances prior to the start of the project development work. All the legal clearances were obtained within 2006–07 and as per the laws applicable for the development of ports in the CRZ.

#### c. Environmental Clearances

The company obtained due environmental clearances which are mandatory for any port project whether major or minor. Environmental clearances were obtained within one year of application by KPCL. Environmental clearances for port projects also include CRZ clearance; the Expert Committee on Infrastructure and Development in 2009 stated that though these are two separate clearances under two separate legislations, that is, the Environment Impact Assessment Notification of 2006 and Coastal Regulation Zone Notification 1991/2011, both are required. Navayuga, being the main construction company for planning and execution of construction work with experience and expertise in developing a number of ports in Andhra Pradesh commissioned the National Institute of Oceanography for preparing a detailed comprehensive Marine Environment Impact Assessment (Marine EIA) report for the Krishnapatnam Port.

#### d. Dredging and reclamation

Dredging is essential for any port project and causes maximum environmental damage to marine biodiversity. The law requires that the material required for dredging is not obtained by disturbing the local ecology of the area. Not many port projects

that have come up so far have been able to achieve this. KPCL reflected some environmental sense in this regard.

#### Contributing Factors for the Successful Implementation of the Project

An important achievement in terms of the implementation of the project was that construction started in January 2007 and the port received the first vessel in April 2008. The port was inaugurated in July 2008. The total time taken for the completion of the project was 14–15 months. However, some other sources maintained that the time taken for the completion of the ‘take-off stage’ was 18 months. The port started its trial operations soon after that. Towards this end, KPCL adopted a number of strategies that helped in the accelerated development of the project:

- **Land Acquisition without conflict with project affected families:** A major portion of the land required for the development of this project belongs to the Andhra Pradesh government which did not require any kind of acquisition proceedings. The only requirement was of land use change which was done successfully by government agencies. However, there were around 2,500 families living in the area who owned land and were dependent on the sea for their livelihood. These families were rehabilitated with a total rehabilitation package of Rs 19 crore approved by the collector. Besides rehabilitation, some youth have also been given employment in the port in skilled and semi-skilled jobs, such as security guards and technicians for small operations.
- **Speedy Legal Clearances:** All the legal clearances for the project were obtained beforehand. The Ministry of Environment and Forests was approached by the state government for forest clearances,

environmental clearances, and CRZ clearances, which were accorded in 2004-05.

- **Navayuga Construction Company as the main strength:** Navayuga Construction Company is KPCL's main strength. The key strength of the project has been KPCL's sister concern doing the construction. Therefore, no work was sub-contracted or done on a contractor basis. Navayuga has the expertise of developing a majority of the small ports in Maharashtra and this being its flagship project it completed its targets very fast.
- **Effective Monitoring and Evaluation by the Construction Company:** Monitoring and evaluation of construction and operation targets was also done by Navayuga in close coordination with KPCL's key officers. Since Navayuga belongs to the same group, the work was carried out at a fast pace.
- **State Port Policy as a Facilitative Tool:** As per the Andhra Pradesh Port Policy, creating capacity in ports needs huge investments for which the Government of Andhra Pradesh has formulated an open policy to encourage the private sector in port development. The private sector is invited to design, build, finance, operate, and manage ports based on their technical feasibility, traffic projections, and planned investments.

#### **The Andhra Pradesh government provides the following incentives and assistance to port developers:**

- Investors are free to fix their own tariffs for various port services without detriment to the development of the port in shorter/longer periods.
- Concessionaire is declared as the port conservator as per Indian Ports Act 1908.
- Investors are given complete freedom to follow their own personnel and employment policies without being governed by the rules and practices in other Indian ports.
- The government assists in acquiring land on payment by investors. Wherever port land is available, it is provided to the parties at the rates prescribed by the government.
- Land required for those industries which need to be located close to a port to take advantage of bulk handling of material/products, can be acquired on the basis of a feasibility report done by the investor. If the investor wants to own the land and lease it out to industries, such land can be acquired at market prices under the Land Acquisition Act.
- The government gives all possible help in providing fresh water and power supply to investors.
- With regard to other incentives for port based industries that are going to be set up, whatever incentives are available as on date as per the government policy will be extended.
- Concession fee of almost 2.5 per cent of gross income per annum is payable to the government in case of greenfield ports.
- Wherever feasible, captive jetties/captive ports will be permitted.
- Suomoto proposals for development of any port project or port facility will be entertained subject to treatment of the proposals under Swiss challenge.
- Exemptions on sales tax, seigniorage charges, and stamp duty, etc. will be considered on a case-to-case basis depending on the viability of the project

#### **Lessons learnt**

##### **Employment opportunities for fisherfolk**

KPCL tried to provide employment opportunities to local youth in the area. It tried to provide them semi-skilled jobs, such as technicians in some of the utilities in the port. Youth are also being employed as labour for the next phase of construction of the project.

### **Security Academy—A flagship programme of KPCL**

KPCL has created a security academy by co-opting local fishermen youth in the port as security guards. These security guards are being given proper training by retired army officers. This way the port is training security staff and the local youth are getting employment.

### **Mass kitchen and pickle making centres for women**

KPCL has established huge facilities as kitchen establishments and pickle making centres where women from coastal communities find employment opportunities and the food supply and demand of the local people and labour working in the port area is met.

### **Providing homes to fishermen's families**

KPCL has provided houses with basic civic amenities to fisherfolk and tried to ensure good standard of

living by providing hospitals, schools, and playing grounds in the colonies.

KPCL and the state government took a number of steps for the rehabilitation and resettlement (R&R) of fisherfolk and their families outside the affected zone. The R&R package was shared between KPCL and the state government.

Before the package was arrived at a number of meetings were held with representatives of the affected families. After consultations, Rs 31,54,54,125 was sanctioned for giving one-time financial assistance to 2,535 families outside the notified project affected zone identified as eligible for financial assistance. KPCL has provided financial assistance of about Rs 19 crore towards implementing this R&R proposal in the interest of the project, on reimbursable basis on actuals based on the expenditure incurred, as proposed by the District Collector, Nellore commencing from the financial year 2009–10.

# Rural Roads

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## Bajaura to Kandhi Road (Mandi, Himachal Pradesh)

### Background of the Sector

Notwithstanding the efforts made at the state and central levels through different programmes, about 40 per cent of the habitations in the country are still not connected by all-weather roads. It is well-known that even where connectivity has been provided, the roads constructed are of such poor quality (due to poor construction or maintenance) that they cannot always be categorised as all-weather roads. Rural road connectivity is not only a key component of rural development as it promotes access to economic and social services it is also a key ingredient in ensuring sustainable poverty reduction.

The Pradhan Mantri Gram Sadak Yojana (PMGSY) which was launched in 2000 is a 100 per cent centrally sponsored scheme. This scheme envisages connecting all habitations with a population of 500 persons and above in the plains and 250 persons and above in hills, tribal, and desert areas.

According to latest figures made available by the Himachal Pradesh State Governments about 1.67 lakh unconnected habitations are eligible for coverage under PMGSY. This involves the construction of about 3.71 lakh km of roads for new connectivity and 3.68 lakh km for upgradation.

The primary focus of PMGSY is on providing all-weather road connectivity to eligible unconnected habitations. An all-weather road is one which can be negotiated during all seasons of the year. This implies that the road-bed is drained effectively (by adequate

cross-drainage structures, such as culverts, minor bridges, and cause ways), but this does not necessarily imply that it should be paved or surfaced or black-topped. Interruptions to traffic as per permitted frequency and duration are allowed.

There are also fair-weather roads which are fordable only during the dry season, because of lack of cross-drainage (CD) work. Conversion of such roads to all-weather roads through provision of CD work is treated as upgradation.

PMGSY permits upgradation (to prescribed standards) of existing roads in those districts where all the eligible habitations of the designated population size have been provided all-weather road connectivity. However, it must be noted that upgradation is not central to PMGSY and cannot exceed 20 per cent of the state's allocation as long as eligible unconnected habitations in the state still exist. For upgradation priority is given to 'Through Routes of the Rural Core Network', which carry more traffic.

Provision of connectivity to unconnected habitations is termed new connectivity. Since the purpose of PMGSY, among other things, is to provide market access to farms, new connectivity involves 'new construction' where a link to the habitation was missing and additionally, if required, 'upgradation' where an intermediate link in its then-present condition could not function as an all-weather road.

PMGSY covers only rural areas; urban roads are excluded from the purview of this programme. Even

in rural areas, PMGSY covers only rural roads, that is, roads that were formerly classified as other district roads (ODRs) and village roads (VRs).

- **Other District Roads (ODRs)** are roads that serve rural areas of production and provide them with an outlet to market centres, taluka (tehsil) headquarters, block headquarters, or other main roads.
- **Village Roads (VRs)** are roads that connect villages/habitations or groups of habitations with each other and to the nearest road of a higher category. Major district roads, state highways, and national highways cannot be covered under PMGSY, even if they happen to be in rural areas. This applies to both new connectivity roads as well as upgradation work.

The total coverage across the country under PMGSY is:

Work Type	Himachal Pradesh			India (All States)		
	No. of habitations covered	Length (in km)	Total cost (Rs in crore)	No. of habitations covered	Length (in km)	Total cost (Rs in crore)
Upgradation	48	3770.77	615.53	65,903	155,288	38,611.12
New connectivity	3,556	9,564.31	2,048.71	103,656	244,383	70,245.81
<b>Total</b>	<b>3,604</b>	<b>13,335.08</b>	<b>2,664.25</b>	<b>169,559</b>	<b>399,670</b>	<b>108,856.9</b>

### Snapshot of the Bajaura to Kandhi Road Project

#### Type

The project comes under rural roads constructed under PMGSY. It met the technical specifications and geometric design standards given in PMGSY's Hill Roads Manual (IRC:SP:48).

A detailed project report (DPR) was prepared after site inspection by the Superintending Engineer (PWD). It covered proper embankment/drainage and adequate number of cross-drainage (CD) works based on site requirements ascertained through investigations.

After the project proposals were cleared and technical sanction accorded, the executing agency invited tenders.

The Bajaura to Kandhi road in Mandi was awarded as a tender through competitive bidding. Tender

notices were put out on the Internet and in newspapers. Advertisements for this specific tender were published on 12 January 2009. Time for tender formulation was one month. The expected date of initiation of the project was 16 June 2009 and completion was 31 March 2011. Five local parties submitted bid for the tenders.

The basis of the award was qualification of technical bid and the lowest quotation in the financial bid.

As per the agreement the contract had the following details: the agreement and notice to proceed with work (work order). It also had a letter of acceptance and the contractor's bid. The contract also had Special Conditions of Contract (SCC) and General Conditions of Contract (GCC) along with the specifications, drawings and bill of quantities. The other details of the project implementation process after the tender had been awarded include: Implementation.

Project Details			
Date of advertisement	12.01.2009	Date of tender	21.01.2009 to 18.02.2009
Date of receipt	20.02.2009	Bid Security	Rs 4,52,000 for 12 months
Date and time of opening the bid	20.02.2009 at 11.30 am	Date of Commencement (tender)	16/06/2009
Estimated cost	Rs 22,577,152	Date of Commencement (actual)	16/06/2009
Completion cost	Rs 24,654,199	Date of Completion (tender)	31/03/2011
Land acquisition	Upgradation work (no fresh land acquisition)	Date of Completion (actual)	15/06/2010
From	Bajaura	to	Kandhi
Project funded by	World Bank & Govt. of India	Work Executed by	HPPWD, Government of Himachal Pradesh

### Pre-Mobilization Activities

Within 15 days of the date of work order, signboards along with PMGSY's logo were erected at the site of road works.

### Insurance

The contractor was required to provide an insurance cover from the start date to the date of completion as per clause 13 of the GCC. Insurance policies and certificates were delivered by the contractor to the engineer for approval before the start date.

### Sub-contracting

After the work order had been issued, the engineer first ascertained whether there was any sub-contracting allowed within the contract. As per clause 4.2(k) of ITB, the contractor had proposed to sub-contract the work and the proposal had been accepted by the competent authority.

### Mobilization advance

The contractor received 5 per cent mobilization advance and 5 per cent towards machinery payment.

### Mobilization Activities

The contractor mobilized men, material, and machinery within 10 days after the date of issue of the work order. The time between the date of issue of the work order and the date of actual commencement of work is termed as 'Mobilization Time'. This was an important time for the contractor as well as for the engineer because during this period the complete planning of the work and mobilization of men, material, and machinery was carried out.

The following activities were completed, in the suggested order, by the engineer and the contractor during the mobilization time:

- a. **Deployment of contractor's personnel.**
- b. **Listing of requirements by the engineer:** As per the Bill of Quantities (BOQ), the requirements for material, labour, and machinery during the construction period divided suitably in defined durations was listed by the engineer. The engineer also prepared a list of the equipment required to establish a field laboratory.
- c. **Work programme:** Based on the BOQ and the list of requirement of men, material, and machinery, the engineer guided the contractor in preparing the work programme which showed the general methods, arrangements, order, and timing of all the activities in the work along with monthly cash flow forecasts for the construction.
- d. **Handing over of the site to the contractor:** The engineer handed over the full possession of the work site to the contractor.
- e. **Working drawings and designs:** While the engineer handed over the possession of the work site, a complete set of working drawings were handed over to the contractor which, inter-alia, included L-section, cross-section, and plan of road alignment, drawings of CD works, and designs as decided by the engineer.
- f. **Specifications and drawings of temporary work:** The contractor submitted the specifications of the drawings of the proposed temporary work for the approval of the engineer as per clause 18 of the GCC. The contractor was responsible for temporary work as well as for the safety of all the activities on the site.
- g. **Approval of work programme:** Once these activities had been completed, the work

programme was submitted by the contractor for approval of the engineer and the engineer, after checking that the work programme was realistic (keeping in view seasonal factors) accorded his approval.

- h. **Establishment of field laboratory:** The contractor established a field laboratory at a convenient location as approved by the engineer. The contractor ensured that the laboratory had all the equipment as required by the engineer.
- i. **Pre-commencement levels:** Recording of pre-commencement levels was the first activity of the work programme. After handing over the possession of the work site, actual measurements of pre-commencement levels were recorded by a representative of the engineer in the presence of an authorized representative of the contractor in the measurement book.

## Post-Mobilization Activities

### Commencement of Work, Progress, and Time Control

The contractor started work as per the work programme on 16 June 2009. The engineer monitored the progress of execution of work in relation to the work programme and as per clause 26 of GCC. In case the contractor was not in a position to carry out the work as per the work programme, the updated/ revised work programme was submitted by the contractor, without affecting the total stipulated duration of the contract. In case of an initial delay in activities, the contractor could adjust the activities of further work within the stipulated duration and furnish the revised work programme within the duration prescribed in the contract date for approval as per the provisions of the contract. Two engineers, five supervisors, one lab assistant and 150 labourers were employed for a period covering 14 months of the implementation of the project.

The various activities performed were:

- Retaining wall
- Breast wall
- Edging
- Culvert old
- Pipe culvert new
- Bridge
- Premix
- Metaling tarring
- Side drain
- Formation cutting
- Parapet

### Updating Work Programme

The revised/updated work programme showed the actual progress achieved for each activity and the effect of the this progress on the timing for the remaining work, including any changes in the sequence of activities. The contractor was free to revise the programme and to submit it to the engineer at any time. The revised/updated work programme showed the effect of variations if any and compensation events.

### Sub-contracting During Construction

To enable the contractor to complete the work as per the terms of the contract, the employer considered the following before according approval:

- a. The contractor should not sub-contract the whole work and
- b. The contractor should not sub-contract any part of the work without prior consent of the employer.

The engineer satisfied himself before recommending to the employer whether:

- a. The circumstances warranted such sub-contracting and
- b. The sub-contractor so proposed for the work possessed the experience, qualifications, and equipment necessary for the job proposed.

The contractor proposed sub-contracting part of the work during execution generally to make up for unexpected delays which could not be made up in the normal course of the execution of the project.

The various activities undertaken during the three phases of pre-mobilization, mobilization, and post-mobilization are given in Table 3.35.

**Table 3.35: The Various Stages Covered during the Project**

Pre-mobilization	Mobilization	Post-mobilization
<ul style="list-style-type: none"> <li>• Insurance</li> <li>• Sub-contracting</li> <li>• Mobilization advance</li> </ul>	<ul style="list-style-type: none"> <li>• Deployment of contractor's personnel</li> <li>• Listing of requirements by the engineer</li> <li>• Work programme</li> <li>• Handing over of the site to the contractor</li> <li>• Working drawings and designs</li> <li>• Specifications and drawings of temporary works</li> <li>• Approval of work programme</li> <li>• Establishment of field laboratory</li> <li>• Pre-commencement levels</li> </ul>	<ul style="list-style-type: none"> <li>• Intimation of mobilization</li> <li>• Management meetings</li> <li>• Commencement of work, progress, and time control</li> <li>• Updating work programme</li> <li>• Sub-contracting during construction</li> <li>• Completion</li> <li>• Maintenance</li> </ul>

## Completion

The project was completed on 31 March 2011, when the engineer issued the certificate of completion. However, in actual terms the project had been completed on 15 June, 2010, except for some minor work like drainage and parapet. For routine

maintenance, the engineer satisfied himself before issuing such a document.

## Maintenance

The maintenance norms prescribed by the Indian Government which were followed for the Bajaura to Kandhi Road Project are given in Table 3.36.

**Table 3.36: Maintenance Norms followed during the Project**

S. No.	Name of Item	Frequency of operations in the year
<b>Routine maintenance activities for civil works</b>		
1.	Clearing of road side gutters and drains	Twice and as and when required
2.	Pot hole filling (WBM & BT)	Make the road pothole free immediately after rains and in every quarter
3.	Filling up edges of bituminous surface and replenishing of material on earthen/hard shoulders	a) Single Lane – twice b) Intermediate/double lane – four times
4.	Dressing of berms	Immediately or after rains and once in between
5.	White washing guard stones	Twice
6.	Fixing disturbed caution board/village name board/speed limit board, etc.	Once in a year and as and when required
7.	Re-fixing displaced guard stones	Once in a year and as and when required
8.	White washing and <i>geroo</i> painting of trunks of trees?	Once
9.	Pruning of shrubs, etc.	Once
10.	Maintenance of catch water drains	Once in a year and as and when required
11.	Clearance of CD works	Twice—before and after rains
12.	Clearing of wild seasonal growth on berms and road side structures	Twice—after rains and during spring
13.	White washing parapets of CD works	Thrice
14.	Earth works in berms, de-silting of drains, etc.	Before and after rains and once in between
<b>Routine maintenance bio-engineering works</b>		
15.	Watering	Twice in a year and as and when required
16.	Weeding, hoeing, and preparation of plant basins	Once in three months
17.	Trimming and pruning	As and when required

(Contd...)

18.	Protection from insects, pests, and diseases	Immediately after an insect pest attack
19.	Replacement of damaged plants	Immediately after the mortality of the plant
20.	Maintenance of barbed wire fencing and ballies	As and when required
21.	Clearance of wild seasonal growth around the plantation	Twice—after the rains and during spring
22.	Re-fixing of displaced tree guards	As and when required

### Problems Faced

- **Labour: Shortages in migrant labour** created problems for the contractor.
  - \* Increasing labour costs were also a cause of concern. Labour costs increased by 30–40 per cent during the period.
- **Use of Paver:** At present, it is necessary to use pavers in all road construction projects. Using pavers on single-lane roads leads to major traffic jams. Sometimes it is not possible to use pavers on some stretches where the roads are very narrow. Most of the roads in Himachal Pradesh are narrow because it is a hilly area so using pavers was a problem.
- **Landslides:** Landslides blocked the drainage system on the roads. Moreover, the drains could not be cleaned on a daily basis because of insufficient maintenance funds.
- Delay in **disbursement of funds** from officials was also a serious concern, as the contractor was

also obliged to make further payments. So fund management was a tough task.

- The contractor was not able to avail certain benefits like excise exemption due to delay on the part of the officials.

Contributing factors for successful implementation

The following factors were responsible for the success of the project:

- Cooperation from authorities/bureaucratic ease
- Excellent project management
- Transparent bidding process
- Proper monitoring by government officials
- A stable macroeconomic environment
- Competent contractor
- The contractor is a local resident and so had good relations both with the local people and government officials

## Bassi to Kheda Manpura (Tonk, Rajasthan)

### Background of the Sector

Please refer to the Bajaura to Kandhi Road Project in Mandi, Himachal Pradesh for a background of the sector. The coverage under PMGSY in Rajasthan is:

Work Type	Rajasthan			India (All States)		
	No. of habitations covered	Length (in km)	Total cost (Rs in crore)	No. of habitations covered	Length (in km)	Total cost (Rs in crore)
Upgradation	3,433	15,708.55	3,412.67	65,903	155,288	38,611.12
New Connectivity	11,235	35,410.25	5,537.83	103,656	244,383	70,245.81
<b>Total</b>	<b>14,668</b>	<b>51,118.8</b>	<b>8,950.50</b>	<b>169,559</b>	<b>399,670</b>	<b>108,856.9</b>

### Snapshot of the Bassi to Kheda Manpura Rural Road Project

#### Type

#### The Bidding Process

Executants for constructing roads were selected through an open competitive bidding for which the well-established procedure for tendering was followed by the State Government. As per the provisions, the bidders who had the prescribed qualifications and the capacity to execute the work were asked to take part in the bidding process. The bidding process followed the following steps:

- **Advertisement** – Advertisements for this package were put out on 15 April 2006.

- **Pre-bid meeting** – A meeting between the contractors and government officials was held before the bidding to discuss in detail all the work required to be done.
- **Tender bidding** – Two forms of tenders were required from bidders—a technical bid and a financial bid. In the technical bid, the companies were reviewed to see if they had the necessary resources to carry out the project. The financial bids were to see the quotations given by the companies and awarding the tender to the one with the lowest quote.
- **Opening of quotations** – Out of the seven companies which applied, only three were shortlisted after the technical bid. These were then screened for the next selection process, which was the financial bid. M/s Sunil Kumar Madan was selected as it had the lowest quote.

- **Allotment of tender** – M/s Sunil Kumar Madan was allotted the tender by the signing of the agreement in which the contractor deposited 5 per cent of the total project cost. Following this, a work plan was submitted by the contractor and work was started by detailing the layout of the project by demarcating where the road was to be built and the setting up of a quality control laboratory.
- **Land acquisition** – No land was required from any private party, since the demarcated land was already owned by the government. State Government officials handled the demarcating of the land required by the project.

The other details for the project are given in Tables 3.37 and 3.38.

**Table 3.37: Details of the Bassi to Kheda Manpura Rural Road Project**

Name of the Work		Bassi to Kheda Manpura	
<b>A&amp;F sanction with reference and amount</b>		F-2 (5)PW/AS/2006/D-44 Dt. 15.04.2006, Rs 64.87 lakh	
<b>Technical sanction with reference and amount</b>		S.E. PWD Circle, Tonk	
Scheme	PMGSY Phase- VI 2006-07 Batch- II	Package No.	RJ-31-48
Sanction length	4.050 km	Amount of work order	139.22 lakh for 3 roads
Stipulated date of commencement	01.09.2006	Stipulated date of completion	31.05.2007
Actual date of commencement	10.09.2006	Actual date of completion	22.05.2007
Period of defect liability	30.05.2012	Date of DLP completion	21.05.2012
<b>Brief of Work</b>			
Carriage way width	3.75 metres	Length	<ul style="list-style-type: none"> <li>● BT – 3.28 km</li> <li>● C.C. Pavement – 0.77 km</li> </ul>

**Table 3.38: Technical Details**

<b>Name of work</b>	Construction of BT Road from Bassi to Kheda Manpura under PMGSY package RJ-36-02
<b>Necessity</b>	Village Khera was not connected by any road. The residents of this village had no facility for higher education, medical treatment, or market access for their general needs. Therefore it was necessary to satisfy the needs of the villagers by connecting them with the nearest market.
<b>Village details</b>	Village Khera has a population of 671 as per Census 2001. It is located at a distance of approximately 25 km from Newai, a block in Tonk district of Rajasthan.
<b>Road details</b>	The road to Khera village was approved by P.S. Newai and Zila Parishad, Tonk. The length of this road was 4.050 km and there are four CD works on the alignment. The contractor is also liable to maintain the road for 5 years after completion.
<b>Estimated cost</b>	The estimated cost of this road was Rs 64.83 lakh on PMGSY New BSR; the estimate was approved by the state.
<b>Specifications</b>	The following specifications were proposed over the existing surface of the road:
1. Granular sub-base	215 mm compacted thickness of granular sub-base material having PI 4 to 6 shall be provided.
2. Grade-I WBM work	Not required as per design.
3. Grade-II WBM layer	One layer of 75 mm compacted thickness of metal size 63-45 mm graded size (hand broken) was proposed which will be compacted with screening and binding material.
4. Grade-III WBM layer	One layer of 75 mm compacted thickness of metal size 53 mm to 22.4 mm graded size crusher broken was proposed.
5. Shoulders	15 cm compacted thickness in width 1.875 metres on both sides.
6. Bitumen course	Primer coat and 20 mm PMC with seal coat by paver finisher using CRMB-60.

### Pre-Mobilization Activities

#### Insurance

The contractor was required to provide an insurance cover from the start date to the date of completion as per clause 13 of the GCC. Insurance policies and certificates were delivered by the contractor to the engineer for his approval before the start date.

### Sub-contracting

After the work order was issued, the engineer first ascertained whether there was any sub-contracting allowed within the contract. As per clause 4.2 (k) of ITB, the contractor had proposed to sub-contract the work and his proposal had been accepted by the competent authority.

### Mobilization Advance

The contractor received 5 per cent mobilization advance and 5 per cent towards machinery payment.

### Mobilization Activities

The contractor mobilized men, material, and machinery within 10 days of the date of issue of the work order. During this mobilisation time the complete planning of the work and mobilization of resources was carried out.

The following activities were completed, in the suggested order, by the engineer and the contractor during the mobilization time:

- a. **Deployment of contractor's personnel.**
- b. **Listing of requirements by the engineer:** As per the Bill of Quantities (BOQ), the requirement of material, labour, and machinery during the construction period divided suitably in the defined durations was listed by the engineer. The engineer also prepared a list of equipment required to establish the field laboratory.
- c. Based on the BOQ and the list of requirement of men, material, and machinery, the engineer guided the contractor in preparing the work programme which showed the general methods, arrangements, order, and timing of all the activities in the work along with monthly cash flow forecasts for the construction.
- d. **Handing over of the site to the contractor:** The engineer handed over the full possession of the work site to the contractor.
- e. **Working drawings and designs:** While the engineer handed over the possession of the work site, a complete set of working drawings were handed over to the contractor which, inter-alia, included L-section, cross-section, and plan of road alignment, drawings of CD works, and designs as decided by the engineer.
- f. **Specifications and drawings of temporary work:** The contractor submitted the specifications of the drawings of the proposed temporary work for the approval of the engineer as per clause 18 of the GCC. The contractor was responsible for temporary work as well as for the safety of all the activities on the site.
- g. **Approval of work programme:** Once these activities had been completed, the work programme was submitted by the contractor for approval of the engineer and the engineer, after checking that the work programme was realistic (keeping in view seasonal factors) accorded his approval.
- h. **Establishment of field laboratory:** The contractor established a field laboratory at a convenient location as approved by the engineer. The contractor ensured that the laboratory had all the equipment as required by the engineer.
- i. **Pre-commencement levels:** Recording of pre-commencement levels was the first activity of the work programme. After handing over the possession of the work site, actual measurements of pre-commencement levels were recorded by a representative of the engineer in the presence of an authorized representative of the contractor in the measurement book.

### Post-Mobilization Activities

**Manpower Resources:** Two engineers, three supervisors, one accountant, one lab assistant, and 120 labourers were employed for the project.

### Commencement of Work, Progress, and Time Control

The contractor started work as per the work programme on 10 September, 2006. The engineer monitored the progress of execution of work in relation

to the work programme and as per clause 26 of GCC. In case the contractor was not in a position to carry out the work as per the work programme, the updated/ revised work programme was submitted by the contractor, without affecting the total stipulated duration of the contract. In case of an initial delay in activities, the contractor could adjust the activities of further work within the stipulated duration and furnish the revised work programme within the duration prescribed in the contract data, for approval as per provisions of the contract.

### Updating Work Programme

The revised/updated work programme showed the actual progress achieved for each activity and the effect of this progress on the timing for the remaining work, including any changes in the sequence of activities. The contractor was free to revise the programme and to submit it to the engineer at any time. The revised/ updated work programme showed the effect of variations if any and compensation events.

### Completion

The project was completed on 22 May, 2007, when the engineer issued the certificate of completion.

### Maintenance

- As this project falls into a 5 year guarantee scheme, it will be maintained by the contractor for 5 years after construction.
- Government officials visit the road on 15-day intervals.
- Maintenance funds are issued on a half yearly basis.
- The various maintenance activities performed by the contractor are:
  - General clearance
  - Berms repair
  - Patch repair

### Contributing factors for Successful Implementation

Some of the major factors which were responsible for the success of the Bassi to Kheda Manpura Road Project include:

- The General Chief Engineer, Mr Hira Lal Mina was **active and enthusiastic**. He monitored the project on a day-to-day basis and performed his responsibilities efficiently.
- **Competent contractor** – The contractor was AA rated, which is the highest rating. He owned sufficient machinery and equipment; had financial competence and was self-dependent for funds and so the project did not face any financial problems.
- **Proactive officials** – The government officials who were associated with the project were cooperative.
- Government officials had a good relationship with the villagers. Mr. Ram Gopal Sevaliya, the Assistant Engineer in PWD Newai, was a local resident who was fluent in the local languages and was thus able to communicate with the villagers. Apart from this, he was also well versed in the local culture, which resulted in few disputes and misunderstandings.
  - **Use of villagers as labour** – Local villagers were used as un-skilled labour which was beneficial both for the project and the villagers. This provided a means of livelihood for the villagers and led to them having faith in the project as they were associated with it.
- **Proper alignment/land acquisition** – As this was a new connectivity project, the officials were responsible for the alignment of the road. As per the contractor, the alignment was proper and was helpful in the timely completion of the project.
- **Less work load** – The contractor was doing only one project at that point of time and was thus able to give enough time to it. He was also able

use manpower, funds, machinery, equipment, and raw materials efficiently.

- **No encroachments** – There were no land encroachments which saved time.
- The government made timely payments and thus the contractor was able to meet his obligations. The payment schedule was adhered to, which was satisfactory for all concerned.
- The workforce involved in the project was trustworthy and was motivated by the contractor which enabled them to work at an optimum pace completing the project on time.
- **Geographical location** – The construction site was plain land so the construction was easy. The site was located only 25 km from the block office in Newai and was well-connected which also contributed to the timely completion of the project.
- **Availability of material** – The basic raw material was procured from local mines and various nearby sources. The availability of material at the door step was also a supporting factor in the timely completion of the project.