

The Delhi Metro: Effective Project Management in the Indian Public Sector

Overview

The Government of India (GOI) and the Government of the National Capital Territory of Delhi (GNCTD) formed the Delhi Metro Rail Corporation Ltd (DMRC) in May 1995 to provide a rail-based transport system that would alleviate Delhi's ever growing transport congestion and vehicular pollution. The construction of the Delhi Metro started on October 1, 1998, and the first Delhi Metro was inaugurated on December 24, 2002. Construction has four scheduled phases, and the first phase of the rail system was completed in 2006, three years ahead of schedule. The system is scheduled to be completed in 2021, at which point it will cover 245 kilometers. Currently, three functioning lines connect central Delhi to east, north, and southwest Delhi. DMRC is responsible not only for construction of the system but also for its operation and maintenance. DMRC has expanded its reach beyond Delhi as well, serving as the project consultant for a wide variety of metro and monorail projects across India and beyond, including projects in Dhaka (Bangladesh), Jakarta (Indonesia), and in Lucknow, Ahmedabad, Nagpur, Pune, and a number of other Indian cities. Moreover, the Delhi Metro is clean, punctual, and well maintained, a point of pride among Delhiites that showcases aspirations for a modern transportation system (Joseph 2013).

Key Contextual Conditions

Delhi, the capital of India, and a key political, cultural, and commercial hub, is one of the fastest-growing cities in the world. The population of the city is expected to reach 23 million by 2021 from the current estimated population of 13 million people. Population growth led to expansion beyond the core of the city, but the absence of rail options pushed transportation to the roads. As the population grew, traffic increased, along with associated problems such as traffic jams, pollution, and accidents. These problems were exacerbated by poor drainage systems and flooding on some stretches of road.

Development Challenge

Delhi's roads have faced problems such as congestion, pollution, and increasing numbers of automobile accidents since the mid 1990s. To improve both the quality and availability of mass transport and to alleviate issues associated with Delhi's congested roads, the GOI and GNCTD sought an effective solution in the form of a nonpolluting rail-based mass transit system.

Addressing Delivery Challenges

This section elaborates how DMRC addressed some of the delivery challenges recognized in similar large scale and complicated infrastructure projects, such as (a) complicated project design, (b) overall institutional arrangements,

PROJECT DATA

SECTOR:

Transport

DEVELOPMENT CHALLENGE:

Delhi's ever-growing transport congestion and vehicular pollution.

DELIVERY CHALLENGES:

Project design, institutional setup, stakeholder engagement

COUNTRY:

India

REGION:

South Asia

This brief was adapted by Sruti Bandyopadhyay at the World Bank from an original case study and evaluation report published by the Japan International Cooperation Agency (JICA). To access the original case study and evaluation report, please [click here](#) and [here](#) respectively. Claudio Santibanez from the World Bank and Junko Takahashi and Eri Kakuta from JICA provided helpful feedback and support during the preparation of this brief.

(c) challenges in imparting or acquiring new skills needed, (d) identification and selection of appropriate stakeholders for engagement, and (e) challenges stemming from unviable project financing arrangements.

- **Project design.** In India, major infrastructure projects are often stalled because of lack of funds, political interference, lack of professionalism and accountability, property disputes, and corruption. To preempt these kinds of problems prior to the commencement of the project, the DMRC attempted to put in place effective systems to ensure the smooth progress of the project. To ensure strong leadership, Elattuvalapil Sreedharan, a technocrat with a long history of service in the Indian Railways (IR) and a reputation for completing projects on time and within budget, was appointed as the chairman of DMRC. Second, collaboration and cross-learning with Japanese partners was made an integral part of the project design. DMRC engineers were encouraged to learn tunneling technologies, management ethos, and value for time, as well as other management techniques from their Japanese counterparts. Finally, the DMRC rejected the idea to link its project's design with existing IR systems. DMRC's reasoning for this was based on its recognition that the purpose of IR was quite different from a metro system, with vast coverage stretching across India for long-distance travel. Interchangeability with IR was seen as diverging from core principles of an urban transport system.
- **Institutional setting.** The DMRC board of directors has absolute freedom to make technical decisions and depends on the government principally for funding and land acquisition. This arrangement has proven effective in reducing interference from politicians and bureaucrats. For example, in the initial phase, the first key task DMRC faced was to select a general consultant to provide a team of foreign and Indian experts contracted by DMRC who would help to implement the project, working on project design, contract tender, and supervising construction. A Japanese firm, Pacific Consultants International, and its joint venture partners were found to be most technically qualified for the job, and DMRC issued an acceptance letter. However, vested interests within the government urged DMRC to withdraw the letter of acceptance, arguing that other bidders were cheaper. DMRC defended its decision because the selection process followed the guidelines laid out by JICA. Those guidelines allowed them to accept only the bid of the bidder with the highest technical rank, with an exception only if the financial estimate of this bidder was unreasonably high. This decision definitely helped the initial phase of the project because the selected consultant team not only acted as useful bridge between DMRC and JICA, but also had necessary technical and management expertise and especially knowledge of tunneling technologies, management ethos, and value for time. Also, DMRC could use the consultant and JICA's opinion as an excuse to be free from political and bureaucratic influences.
- **Skill transfer.** To strengthen its own technical expertise and human resources, DMRC made sure that its staff members were central to the project and did not rely overly on general consultants. Beginning in phase 1 with a view toward implementing subsequent phases, DMRC was able to reduce its dependence on external experts in phase 2 by deploying its personnel in consulting services and allowing them to have relevant technical experience from the start. Moreover, DMRC established a training institute to pass on technical expertise from its own personnel to implementers of new metro projects in India. DMRC also disseminated its knowledge and technologies through consulting work on new metro projects both in India and outside the country. These efforts allowed DMRC to effectively accumulate technical expertise and systematically leverage it to establish a strong reputation.
- **Stakeholder coordination.** The importance of effective stakeholder coordination is apparent in the need to coordinate with other agencies during construction of underground sections of the metro. The ground had to be excavated, but beforehand a complicated network of water supply and sewerage pipes needed to be shifted or diverted. Cooperation and communication with other government agencies in charge of these utilities were necessary to get their buy-in and participation. In some cases, these other agencies were reluctant to cooperate, and this delayed construction in stretches of ground utility infrastructure because utilities could not be shifted. To solve this problem, instead of requesting that utility agencies shift pipes and wires, DMRC offered to take the responsibility for the work. This approach allowed DMRC to retain control of this work while also involving other agencies through the preparation and submission of detailed plans for approval. To increase collaboration, DMRC at times recruited retired personnel from utility agencies to meet with their former colleagues. The result was that work speed increased and that DMRC was able to ensure that disturbances to the public were minimized.

- **Project finance.** Globally, most urban metro projects were financially unviable because the fares could not be fixed solely on a commercial basis. If fares were set too high, passenger numbers would remain low as some users were priced out, thus defeating the very purpose of setting up the system. Therefore, the concerned governments generally bore the capital costs of a metro system. To avoid such a situation, the Delhi metro project was conceived as a social sector project. This allowed a significant portion of the project cost to be funded through a soft loan provided by the Japanese government through JICA (former Japan Bank for International Cooperation). The financial loan extended by JICA to the project, which made up 60 percent of funding required for phase 1.¹ The rest was contributed by GOI and GNCTD through equity. Also, over the years, DMRC had earned a substantial amount through consultancy and real estate business and through external projects. During the 2014–2015 fiscal year, the total revenue generated by DMRC was Rs. 3562.27 Crores (US\$555.35 million) inclusive of income from traffic operations, real estate, consultancies, and external projects.²

Lessons Learned

- A strong leadership and vision are key to successful implementation of such large and complicated infrastructure projects. Much of the credit for the success of Delhi metro project goes to one man, Elattuvalapil Sreedharan, the first managing director of the DMRC. He was a key agent of change with a well-deserved reputation for fearlessness and incorruptibility. At DMRC, he created a work culture of punctuality, integrity, professional competence, and social responsibility. His long-term vision in human resource development helped to shape DMRC's recognized brand and encouraged building systems for financial sustainability.
- An important part of DMRC's success was a strategic approach to transparency and media engagement. DMRC was fully aware of what the media might be interested in and what kind of repercussions negative press coverage of such a high-value project would have on public opinion. Delhi Metro, therefore, consciously built its rapport with the media. In fact, public relations was an area that DMRC strategically addressed from its early stages of implementation. And this was done without spending heavily on advertising. DMRC's public relations team engaged with the media to keep the public informed and to project a positive image to society in order to build confidence in the project. This was itself a departure from the norm because earlier railway and urban transport projects in India typically did not give much importance to public relations. DMRC was able to establish a reputation of honest and transparent organization in the eyes of the public. Even in the face of adverse situations, such as the accident in July 2009 during phase 2 construction, DMRC was very open and transparent with the media and was available to respond to any queries that arose. By engaging with media outlets as a conduit to the public, DMRC was able to have a voice in public discussions, thus presenting aspirations of the metro as a transformational force for Delhi and offering the metro as a point of pride for Delhiites.
- Another key aspect worth highlighting is DMRC's taking responsibility for the diversion of utility infrastructure, which relied on good stakeholder coordinator and buy-in from other agencies. In other projects, large-scale infrastructure implementers can use a similar technique of taking on the responsibility for the shift of utilities, thereby eliminating unwanted time loss in construction. Furthermore, by reducing the time required for civil works, the Delhi Metro project ultimately reduced the time the public was inconvenienced.

Endnotes

1. <http://www.delhimetrorail.com/funding.aspx>.
2. JICA's financial loan (called an official development assistance loan) is a low-interest and long-term concessional fund. The loan is provided to developing countries to assist their effort in tackling development issues.

Bibliography

Delhi Metro Rail Corporation Ltd. 2015. "Annual Report 2014–2015," Delhi Metro Rail Corporation Ltd., New Delhi.

Joseph, Manu. "Delhi Metro Reaches Across Class Lines." *New York Times*, July 17, 2013.



WORLD BANK GROUP

© 2017 International Bank for Reconstruction and Development / The World Bank. Some rights reserved. The findings, interpretations, and conclusions expressed in this work do not necessarily reflect the views of The World Bank, its Board of Executive Directors, or the governments they represent. The World Bank does not guarantee the accuracy of the data included in this work. This work is subject to a CC BY 3.0 IGO license (<https://creativecommons.org/licenses/by/3.0/igo>).