

CHAPTER-1

INTRODUCTION



Chapter 1

Introduction

1.1 About DMRC

Delhi Metro Rail Corporation Limited (DMRC) was registered on 03 May 1995 under the Companies Act, 1956 for the implementation and subsequent operation of the metro rail in Delhi. DMRC is a joint venture between the Government of India (GoI) and the Government of National Capital Territory of Delhi (GNCTD) with 50:50 equity participation. DMRC is under the administrative control of Ministry of Housing and Urban Affairs (MoHUA), erstwhile Ministry of Urban Development (MoUD).

1.2 Organisation Set up

The Board of Directors of DMRC consists of 13 Directors as on 31 March 2020. The Chairman of DMRC is the nominee of the GoI while the Managing Director is the nominee of the GNCTD and the Chief Executive Officer of DMRC. The Managing Director is assisted by seven functional Directors viz. Director (Project and Planning), Director (Works), Director (Finance), Director (Operations), Director (Electrical), Director (Rolling Stock) and Director (Business Development). The Board of Directors of DMRC also has four GoI nominee non-executive Directors, besides four GNCTD nominee non-executive Directors, whose post was vacant.

1.3 Need for Mass Rapid Transit System for Delhi

In view of the intra-city traffic volume in Delhi and the urgent need for a full-fledged integrated multi modal mass rapid passenger system, Delhi Government entrusted the task of conducting a feasibility study for an 'Integrated Multi Modal Mass Rapid System' to RITES¹ in 1990-1991. Accordingly, Phase-I of Delhi Metro was conceptualised (September 1996) and completed (November 2006) with 65 km of length. This was followed by Phase-II (124.93 km during 2006-2011), Phase-III (160.75 km during 2011-2019) and Phase-IV covering 103.93 km, which is under progress. The last Performance Audit of DMRC was conducted during 2007-2008 on completion of Phase-I and Performance Audit Report No 17 of 2008 was placed before the Parliament of India and the Legislative Assembly of Delhi. Under Phase-II of Mass Rapid Transit System (MRTS) project, Audit of Airport Metro Express Line was conducted in 2012-13 and reported in CAG's Audit Report No 13 of 2013. As per the Detailed Project Report (DPR) (1995) of Phase-I, the ridership was estimated as 31.85 lakh which was subsequently reduced to 22.60 lakh in 2003. As against this, the actual ridership was 6.62 lakh in November 2007 which was 21 *per cent* of the original projection and 29 *per cent* of the revised estimates. Under Phase-II, the estimated ridership of Airport Line was 42,500 against which the actual ridership was 17,794 viz., 42 *per cent* of the estimated ridership. The total ridership of entire DMRC network (Phase-I, II and III) in the year 2019-20 was estimated as 53.47 lakh. Against this, the actual ridership of DMRC was 27.79 lakh (2019-20) only i.e., 51.97 *per cent* of

¹ RITES Limited erstwhile Rail India Technical & Economic Service

projected ridership. In case of Phase-III specifically, as against the projected ridership of 18.56 lakh in 2016 (20.89 lakh in 2019-20) from initially sanctioned four corridors, the actual ridership in 2019-20 was only 4.38 lakh, which is 79.02 per cent lower than projected ridership as per DPR. Similarly, in case of NCR/ other extension, the actual ridership on these corridors was 15.12 per cent to 87.63 per cent lower than projected ridership as per DPRs as mentioned in table 1.1 below. In this Report, Audit reviewed the performance of Delhi MRTS Phase-III.

Table 1.1**Details showing projected, actual ridership and shortfall in 2019-2020****(A) Initial Phase-III corridors**

Sl. No.	Name of the corridor	Projected daily ridership as per DPR	Actual daily ridership	Percentage shortfall
1.	Jahangir Puri-Badli (Line-2 extension/ Red line)	52,081	27,600	47.01
2.	Mukundpur (Majlis Park)- Maujpur (Line-7/ Pink line)	11,44,467	1,76,876	84.55
3.	Janak Puri West-Kalindi Kunj (Line-8/ Magenta line)	6,50,188	1,71,262	73.66
4.	Central Secretariat- Kashmiri Gate (Line-6 Extension/ Violet line)	2,42,688	62,578	74.21
	Total	20,89,424	4,38,316	79.02

(B) NCR/ other extensions

Sl. No.	Name of corridor/ section	Projected daily ridership as per DPR	Actual daily ridership	Percentage shortfall
1.	Badarpur-Faridabad (Line-6 Extension/Violet line)	2,98,080	60,648	82.10
2.	Faridabad-Ballabhgarh (Line-6 Extension/ Violet line)	40,793		
3.	Mundka-Bahadurgarh (Line-5 Extension/Green line)	1,27,776	22,968	82.02
4.	Dwarka-Najafgarh (Line-9 Extension/ Grey line)	97,070	12,012	87.63
5.	Dilshad Garden-New Bus Adda (Ghaziabad) (Line-1 Extension/ Red line)	1,72,679	43,617	74.74
6.	Maujpur-Shiv Vihar (Line-7 Extension/ Pink line)	18,724	6,168	67.06
7.	Noida City Centre-Noida Electronic City (Line-3 Extension/ Blue line)	93,312	67,978	27.15
8.	Kalindi Kunj-Botanical Garden (Line-8 Extension/ Magenta line)	51,917	44,068	15.12

1.4 Phase-III of Mass Rapid Transit System

Phase-III of Delhi Metro was conceptualised to provide the required level of metro coverage for the size and spread of population of Delhi. The plan was to generate additional induced ridership on the existing Phase-I² and Phase-II³ corridors through Phase-III corridors and also to maximise the coverage provided by the metro network as a whole. The main objective of the recommended corridors for Phase-III was to give a metro network to the commuters with smooth connectivity by providing more interchange stations for switching from one corridor to another. As per the sanction (26 September 2011) of the GoI, the initial four corridors⁴ of Phase-III were approved for a length of 103.05 km (sanctioned cost ₹35,242 crore which was further extended to 160.76 km with sanctioned cost of ₹48,565.12 crore) after sanctioning of nine more sections/ corridors by the GoI. Against this, DMRC constructed 160.75 km (107.27 elevated and 53.48 km underground section) metro lines during Phase-III as detailed below:

Table 1.2
Corridors of Phase-III of Delhi MRTS project

Sl. No.	Corridor	Date of sanction	Length as per sanction letter (in km)	Sanctioned cost (₹ in crore) Including DVAT	Actual expenditure as on 31.03.2020 (₹ in crore)	
1	Central Secretariat to Kashmiri Gate (Line-6 Extension)*	26.09.2011	9.37	36,702 [@]	38,836.90	
2	Jahangir Puri to Badli (Line-2 Extension)*		4.49			
3	Mukundpur (Majlis Park) to Maujpur (Line-7)*		55.69			
4	Janak Puri West to Kalindi Kunj (Line-8)*		33.49			
5	Badarpur-Faridabad Extension (Line-6)	13.09.2011	13.88	2,494		
6	Maujpur to Shiv Vihar (Line-7 Extension)	11.09.2012	2.72	302.78 [#]		
7	Kalindi Kunj-Botanical Garden (Line-8 Extension)	20.12.2017	3.96	997		
8	Dwarka-Najafgarh (Line-9)	11.09.2012	5.5	1,099.61		1,053.32
9	Mundka-Bahadurgarh	11.09.2012	11.18	2,076.52		1,778.36
10	Escorts Mujesar (Faridabad)-Ballabhgarh	27.03.2017	3.21	580.00		444.60
11	Najafgarh to Dhansa Bus Stand Extension	09.05.2017	1.18	565.00		472.01

² Phase-I comprising of three corridors (Line-1, Line-2 and Line-3) having 65 km length

³ Phase-II (125 km) comprising of three new corridors (Line-5, Line-6, Airport Line) and seven extensions of existing lines

⁴ Comprising of two new corridors i.e., Line-7 and Line-8 and two extensions of existing lines i.e., Line-2 extension and Line-6 extension

Sl. No.	Corridor	Date of sanction	Length as per sanction letter (in km)	Sanctioned cost (₹ in crore) Including DVAT	Actual expenditure as on 31.03.2020 (₹ in crore)
12	Noida City Centre-Noida Sector 62	15.06.2018	6.68	1,967.00	1,489.66
13	Dilshad Garden-New Bus Adda, Ghaziabad	14.02.2019	9.41	1,781.21	1,394.03
Total			160.76	48,565.12	45,468.89

**Initially sanctioned Phase-III corridors having length of 103.05 km*

@ It includes ₹1,460 crore towards State taxes as per sanction letter 26 September 2011 issued by GoI

It includes ₹21 crore towards State taxes as per sanction letter 11 September 2012 issued by GoI

1.5 Agency wise funds sanctioned for Phase-III (including NCR extension)

The details of total funds sanctioned of ₹48,565.12 crore and details of total expenditure incurred of ₹45,468.89 crore for Phase-III are depicted below:

Table 1.3
Funds allocated and expenditure incurred of Phase-III as on 31 March 2020

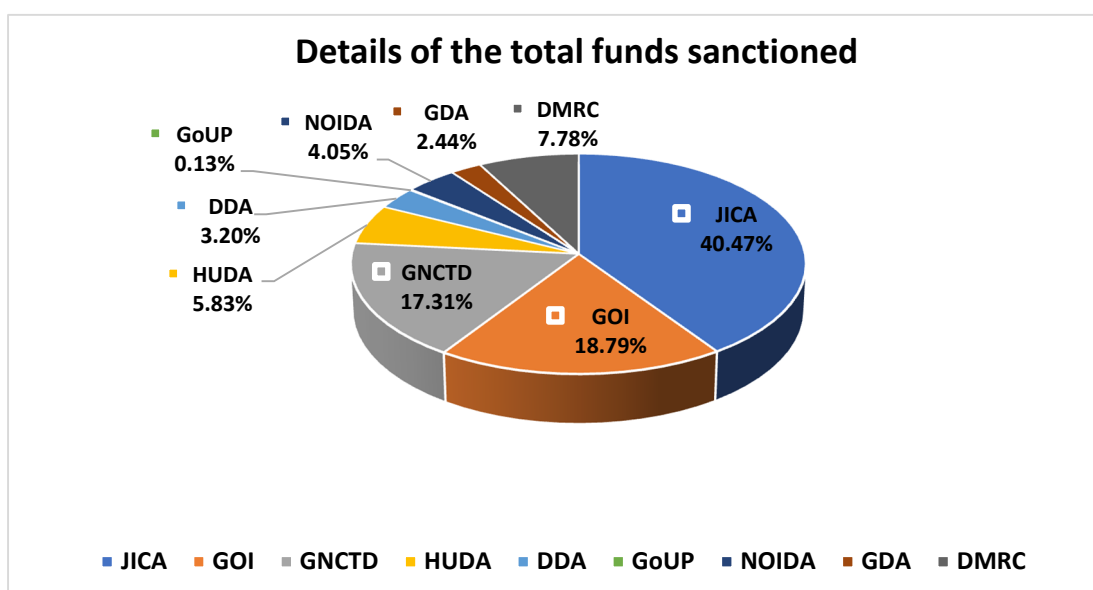
(₹ in crore)				
Sl. No.	Source of fund	Total funds sanctioned*	Total funds received	Expenditure incurred
1	JICA ⁵ loan (through GoI)	19,656.00	19,556.32	18,593.82
2	GoI	9,123.57	9,123.57	8,883.68
3	GNCTD	8,407.38	8,407.38	8,830.39
4	Haryana Urban Development Authority (HUDA)	2,830.16	2,830.16	2,704.76
5	Delhi Development Authority (DDA)	1,554.00	1,554.00	1,554.00
6	Government of Uttar Pradesh (GoUP)	63.27	0.00	63.27
7	NOIDA	1,966.40	1,741.80	1,719.92
8	Ghaziabad Development Authority (GDA)	1,184.34	1,033.36	1,122.05
9	DMRC	3,780.00	544.51	1,997.00 [^]
Total		48,565.12	44,791.10	45,468.89

() Share of sanctioned cost as approved by GoI*

([^]) The excess expenditure against the funds received till 31 March 2020 has been met out of the temporary funds from operation and maintenance etc.

⁵ Japan International Cooperation Agency

Chart 1.1



1.6 Audit objectives

Performance Audit on implementation of Phase-III of Delhi Metro was conducted between November 2018 to March 2020. The objectives of Audit were to verify whether:

- (i) Effective planning was done to ensure economic viability and selection of the most appropriate technologies;
- (ii) Implementation in terms of project execution and contract management was done with due care, economy, and in a timely and transparent manner;
- (iii) An adequate mechanism was in existence to monitor the project, to ensure timely completion and conformity of works executed with laid down specifications; and
- (iv) Operation and maintenance of this phase was efficient, and the planned benefits were achieved after commercial operation of Phase-III.

1.7 Scope of Audit

The Performance Audit covered planning, implementation, monitoring and operations and maintenance of completed corridors and outcome of the activities of Phase-III projects for the period since its commencement from April 2011 to March 2020.

1.8 Audit criteria

The criteria to assess the performance of DMRC were derived from the following sources:

- i. Agenda and Minutes of meetings of the Board of Directors and other sub committees;
- ii. Schedule of Powers;

- iii. Detailed Project Reports;
- iv. Applicable General Financial Rules;
- v. Guidelines issued by the Central Vigilance Commission;
- vi. Directions and guidelines issued by the Administrative Ministry;
- vii. Policies, standards, directives and guidelines of the DMRC;
- viii. Annual Reports of the DMRC, and of the Administrative Ministry;
- ix. General Conditions of Contracts and Special Conditions of Contracts;
- x. National Urban Transport Policy, 2006; and
- xi. Annual Sankalp Reports issued by DMRC.

1.9 Audit methodology

Audit methodology included review and examination of the agenda and minutes of the meetings of the Board, Empowered Committee⁶ and Empowered Group of Ministers and below Board level Sub-committees. Questionnaire, audit enquiries and audit requisitions were also issued to DMRC for clarification, information, and records. Other methods adopted include interaction with DMRC officials, physical inspection of project sites, and photographic evidence collection.

Indian Institute of Technology, Delhi (IIT Delhi) was appointed as Technical Consultant on 26 September 2019 to review the technical aspects of civil works, signalling and telecom, rolling stock, heating, ventilation and air conditioning and electrical works executed by DMRC during implementation of Phase-III. Their observations and suggestions have been suitably incorporated in this report.

1.10 Sample selection

A total of 93 contracts were selected using stratified random sampling methodology. The details of the selected contracts are given in **Annexure-I**. The Audit coverage in terms of number of contracts was 36 per cent⁷ and was 53 per cent⁸ in terms of monetary value of the Phase-III project. Besides, four more related contracts⁹ were also selected and audited. The contracts CS¹⁰-03 and CC¹¹-11 were related to the selected contract. However, for better understanding two more contracts, CC-86 R and CC-95 were audited during the Performance Audit.

⁶ Empowered Committee is headed by Cabinet Secretary, the other members are Secretary, MoHUA, Secretary, Ministry of Finance, Secretary, Ministry of Road Transport and Highways (MoRTH), Secretary, Ministry of Environment, Forest and Climate Change (MoEF and CC), Member Secretary, Planning Commission, Member, Railway Board, Chief Secretary, GNCTD and Managing Director, DMRC

⁷ 93 contracts out of 259 contracts above ₹5 crore

⁸ ₹25,616 crore out of ₹48,565.12 crore

⁹ CS-03, CC-11, CC-86 R and CC-95

¹⁰ CS represents contract related to signaling work of phase-III

¹¹ CC represents contract related to civil construction of phase-III

1.11 Audit process

The draft Audit Report was issued to DMRC in two stages, one with Financial and general observations (15 May 2020) and another with technical observations (23 July 2020); responses to which were received from DMRC in July 2020 and August 2020, respectively. Responses of DMRC to the draft report have been duly considered and relevant portions incorporated in this report as appropriate.

The Entry Conference before commencement of Performance Audit with DMRC was held on 12 November 2018. An Exit Conference with DMRC was held on 27/ 28 July 2020 to discuss the financial and general observations. This was followed by an Exit Conference on 18 September 2020 to discuss the technical observations. The draft Audit Report was issued to the Ministry/ GNCTD with a copy to DMRC on 2 November 2020 followed by an Exit Conference with Secretary, MoHUA on 11 January 2021 wherein it was suggested by Secretary, MoHUA that one more opportunity may be provided to DMRC to provide responses to some audit observations which the Ministry considered to be technically justified. Accordingly, a follow up Exit Conference was held with DMRC on 18 January 2021. The views expressed during the Exit Conferences along with MoHUA's reply (01 January 2021) and GNCTD's reply (29 January 2021) have also been duly considered while finalising the report.

1.12 Structure of the Report

Chapter 1 of the Report gives the background information of DMRC, the need for MRTS project, audit objectives, scope of audit, audit criteria, audit methodology, sample selection etc. Audit findings have been broadly categorised into four chapters aligning with four audit objectives.

Chapter 2 on Policy, Planning & Selection of Technology contains audit findings on the first audit objective and brings out inefficiencies in planning, which adversely affected economic viability and selection of appropriate technology. The audit findings include non-compliance of funding pattern prescribed in the National Urban Transport Policy, inconsistencies in computation of Financial Internal Rate of Return and traffic estimation to make the corridors viable, infirmities in formulation of DPRs including preparation of DPRs in contravention of Working Group on Urban Transport recommendations, non-approval of revised DPRs by the Board of Directors, execution of unviable corridors, violation of General Financial Rules, introduction of Unattended Train Operation without cost benefit analysis, deficiencies in Rolling Stock and rails, deficiencies in Communication Based Train Control system, and installation of transformer of higher capacity.

In Chapter 3 on Contract and Project Management, audit findings on the second audit objective are addressed which indicate deficiencies in project execution and contract management. Deficiencies include appointment of General Consultant on nomination basis, grant of special advance beyond the contractual provisions, delay in execution of Trilok Puri section affecting smooth connectivity on Line-7, flawed design of Hauz

Khas metro station, construction of two metro stations without the approval of GoI and GNCTD, and non-compliance to environmental requirements.

Chapter 4 on Project Monitoring addresses the third audit objective and highlights inadequacies in the mechanism for project monitoring. Audit findings under this chapter includes significant delay in completion of various corridors of Phase-III of MRTS, poor quality of civil structure, lack of uniform project Quality Management Plan, absence of real time monitoring, capacity control, and energy saving strategies, lack of real time monitoring of heating ventilation & air conditioning and absence of automatic monitoring of the health of rails.

Chapter 5 on Operation & Maintenance and Revenue Management contains audit findings on the fourth audit objective and highlights deficiencies in operation and maintenance leading to shortfall in achievement of planned benefits after commercial operation. These include DMRC's failure to accomplish the projected ridership with only 21 *per cent* of the total projected ridership of initial Phase-III corridors being actually achieved in 2019-20, non-compilation of line-wise operational profit/ loss, sub-optimal performance of DMRC in providing last mile connectivity services, inefficient operational performance of DMRC with increasing operating ratio, and non-implementation of all components of Multi Modal Integration.

The overall conclusion of the Report based on the major audit findings on the four audit objectives is brought out in Chapter 6. Audit recommendations on the key audit findings have also been included for each audit objective.

1.13 Acknowledgement

The assistance provided by the Technical Consultant (IIT Delhi) and cooperation extended by DMRC, MoHUA, GNCTD during the conduct of this audit is appreciated and acknowledged.