



## PERFORMANCE OF DELHI METRO – A SCENARIO

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### Abstract

The public transportation is an essential service for the commuters in urban regions. The passengers demand for the public sector transport is increasing day by day. Therefore, the government adopted different rapid transit systems in urban areas to solve them passenger's problems. Mass rapid transit system or Metro train transport is one of the new rapid transit system in urban transportation in India. In 1984, the first metro introduced in Kolkata, after that, the Delhi metro operation started in 2002, the Delhi metro is the Indian urban rapid transportation trendsetter. The Transportation, especially the metro has contributed much to the development of economic, social, political, cultural and regional fields and upgrading their condition in urban economy. In this article based on secondary data to analyse the progress and performance of Delhi metro.

**Keywords:** Urban Transport, Rapid Transit, Metro Rail, Delhi.

### Introduction

The transportation is an indicator to urban development and urban transport is the key to the economic growth and quality of life in a city. The Indian urban regions are adopted rapid transport system. The metro train transport system is one of the new rapid transport in urban regions in India. The objective is to make metro train transport more competitive with respect to road and general railway transport in cities and also metro train transport are playing a significant role in the rapid transit system in India. Delhi is the capital of India, the Delhi population in 1901 was 4,05,819 and increased to 17,44,072 in the year 1951, 2001 census shows that the Delhi population is increased to 1,38,50,507 and 2011 it increased to 1,67,87,941 populations. The Delhi city is a very rapidly motorization in recent years therefore the city faces some critical transport problems, that is road congestion, parking problems, air pollution etc.. The vehicle population in India increased every year and every decade rapidly that shows in 1951 is 0.3 million vehicles and now in 2011 it increased to 141.8 million motor vehicles therefore government has produced the new rapid transit systems to encourage the public transport. Now, it is the Delhi Metro, that is India's urban-transport trendsetter, sparking modern metro rail construction in at least 10 other Indian cities.

### Objectives

The main objectives of the study are:

1. To **study** the progress of Delhi Metro rail project in India.
2. To **examine** the Delhi Metro Completion cost and Funding Plan.
3. To **analyse** the performance of Delhi Metro rail project in India.

### Methodology

This article is based on secondary data to study the progress and performance of Delhi Metro project in India. The secondary data is collected from important sources like Census, articles in various Journals, Government reports, Delhi Metro Rail Corporation (DMRC) reports and in various websites.

### Progress of Delhi Metro

The India's first metro was introduced in Kolkata. The Kolkata Metro project was sanctioned on 1<sup>st</sup> June 1972 and the foundation stone of the project was laid by Indira Gandhi (Prime Minister of India) on 29<sup>th</sup> 1972. The Kolkata Metro construction work started in the year 1973-74 and it commercial services began on 24<sup>th</sup> October 1984. After that Kolkata metro, In 1984, the Delhi Development Authority and the Urban Arts Commission prepared a proposal for developing the rapid transit system in Delhi, in this proposal decided to Delhi metro transport, the Delhi Metro operation will be start on 24 December 2002. The Delhi metro system serving the metropolitan city of Delhi and its satellite cities of Noida, Gurgaon, Ghaziabad and Faridabad in the National Capital Territory Region of India. The operator of Delhi metro is Delhi Metro Rail Corporation (DMRC) and this project are consists 4 Phases, the phase-1 and phase-2 were completed construction and operation for commercials. The phase-3 is under construction and DMRC prepare the Phase-4 Project details to upcoming construction phase. The Delhi metro network implementation are the Line-1 between Dilshad Gardan to Rithala as known as Red line was made commercial operation services in four stages that is the stage one between Shahdara to Tis-Hazari route start on 25<sup>th</sup> december 2002 for the phase-1, second one is Tis-Hazari to Inderlok stage route start for commercial services with effect from 4<sup>th</sup> october 2003 for the phase-1, the third stage is between Inderlok to Rithala with effect from 1<sup>st</sup> April 2004 for phase-1 and fourth one is Dilshad Garden to Shahdara route start from commercial services with effect from 3<sup>rd</sup> june 2008 for the phase-1.

**Table 1: Delhi Metro Phase-1 Network**

<b>Delhi Metro Network, Phase-1</b>			
<b>Line no</b>	<b>Destination</b>	<b>Length (km)</b>	<b>No of Stations</b>
Line-1	Shahdara - Tri Nagar- Rithala	22.06	18
Line-2	Vishwa Vidyalaya - Central Secretariat	10.84	10
Line-3	Indraprastha - Barakhamba road – Dwarka sub City	32.10	30
	Total	65.00	58

Source: Annual Report-2014-15, DMRC

The Delhi metro Line-2 between HUDA City to Jahangirpuri as known as Yellow line was made operational for commercial services in five stages that is Vishwavidyalaya to Kashmere Gate with effect from 20<sup>th</sup> december 2004 for the phase-1, Kashmere Gate to Central Secretariat with effect from 3<sup>rd</sup> july 2005 for the phase-1, Vishwavidyalaya to Jahangirpuri with effect from 3<sup>rd</sup> february 2009 for the phase-2, HUDA City Centre to Qutabminar with effect from 21<sup>st</sup> july 2010 for the phase-2 and Central Secretariat to Qutabminar with effect from 3<sup>rd</sup> september 2010 for the phase-2. The Delhi metro Line-3 between Dwarka sector 21 to Noida City Centre as known as Blue line was made operational for commercial services in six stages that is Barakhamba to Dwarka with effect from 31<sup>st</sup> december 2005 for the phase-1, Dwarka to Dwarka Sector-9 with effect from 1<sup>st</sup> april 2006 for the phase-1, Barakhamba to Indraprastha with effect from 11<sup>th</sup> november 2006 for the phase-1, Indraprastha to Yamuna Bank with effect from 10<sup>th</sup> may 2009 for the phase-2, Yamuna Bank to Noida City Centre with effect from 13<sup>th</sup> november 2009 for the phase-2 and Dwarka sector 9 to Dwarka sector 21 with effect from 30<sup>th</sup> october 2010 for the phase-2. The Delhi metro Line-4 between Yamuna Bank to Vaishali as known as Blue line was made operational for commercial services between Anand Vihar ISBT to Vaishali with effect from 27<sup>th</sup> january 2010 for the phase-2. The Delhi metro Line-5 between Inderlok to Mundaka as known as Green line was made operational for commercial services between Kirti Nagar to Ashok Park Main with effect from 27<sup>th</sup> august 2011.

**Table 2: Delhi Metro Phase-2 Network**

<b>Delhi Metro Network, Phase-2</b>			
<b>Line no</b>	<b>Destination</b>	<b>Length (km)</b>	<b>No of Stations</b>
Line-1	Shahdara - Dilshad Garden	3.09	3
Line-2	Indraprastha - Noida Sector 32 City Centre	15.07	11
Line-3	Yamuna Bank - Anand Vihar ISBT	6.17	5
Line-4	Vishwa Vidyalaya - Jahangir Puri	6.36	5
Line-5	Inderlok- Kirti Nagar – Mundka	18.46	16
Line-6	Central Secretariat - HUDA City Centre	27.58	19
Line-7	Dwarka Sector 9 - Dwarka Sector 21	2.76	2
Line-8	Airport Express Line	22.7	6
Line-9	Anand Vihar - KB Vaishali	2.57	2
Line-10	Central Secretariat – Bodarpur	20.16	16
	Total	124.92	85

Source: Annual Report-2014-15, DMRC

The Delhi metro Line-6 ITO to Escorts Mujesar as known as Violet line was made operational for commercial services between Central Secretariat to Sarita Vihar with effect from 3<sup>rd</sup> october 2010 for the phase-2, Central Secretariat to Kashmere Gate (line-6 extension) is Central Secretariat via Janpath to Mandi House with effect from 28<sup>th</sup> june 2014 for the phase-3, Sarita Vihar to Badarpur with effect from 14<sup>th</sup> january 2011 for the phase-2. Newly started commercial operation metro services are ITO station started in 8<sup>th</sup> june 2015 for the phase-3, Sarai- Escorts Mujesar (Faridabad Section) started in 6<sup>th</sup> september 2015 for the phase-3. Jahangirpuri to Samaypur Badli (Extension of Line-2) is started in 10<sup>th</sup> november 2015 for the phase-3 (Yellow line), and Airport Metro Express line between New Delhi to IGI Airport (T-3) – Dwarka Sector 24 started in 23<sup>rd</sup> february 2011 for the phase-2. The Delhi metro Phase-3 have 13 lines with 160.57 km and the construction work progress, 71.82 % of physical work done by year end of the year 2015-16. Delhi Metro Phase-4 have 6 corridors having route length 103.93 km have been proposed under Phase-4 of Delhi Metro Rail Project.

## Delhi Metro Rail Project Cost for Phase-1, Phase-2 and Phase-3

### 1. Phase-1 of Delhi Metro Completion Cost 10,571 Crores

Completion cost of Delhi Metro Phase-1 was 10,571 Crores. The Government of India equity 14.00 %, Government of National Capital Territory Delhi equity 14.00 %, 5.00 % of equity- interest free subordinate debt towards land cost (GoI, GNCTD), 60.00 % of fund for loan of Japan International Cooperation Agency (JICA), 7.00 % of equity is property development of DMRC.

### 2. Completion cost of Delhi Metro Phase-2 – 18,783 Crores

Completion cost of Delhi Metro Phase-2 was 18,783 Crores. The Government of India equity 16.39 %, Government of National Capital Territory Delhi equity 16.39 %, 3.83 % of fund for interest free subordinate debt towards land cost (GoI, GNCTD), 54.47 % of fund for loan of Japan International Cooperation Agency (JICA), 5.59 % of equity is property development of DMRC, 0.59 % grant by HUDA, 2.73 % of interest free subordinate for central taxes.

### 3. Estimated Cost of Delhi Metro Phase-3 – 41,079 Crores

Estimated Cost of Delhi Metro Phase-3 – 41,079 Crores. 48.57 % of fund by JICA loan, 10.04 % of fund by GNCTD equity, 10.04 % of fund by Government of India, 13.39 % fund by land and central taxes, 10.62 % grant, 7.34 % fund by property development by DMRC.

## Performance of Delhi Metro

Metro train transportation has some positive impact on economy that is, reducing the fuel consumption. But if you believe the adage that “a penny saved is a penny earned”, the Delhi metro doubles up as an oil well, saving India 1,200 core rupees every year, according to the Central Road Research Institute. The Mass Rapid Transit System has proven to be most efficient in terms of energy consumption, space occupancy. In a recent response to parliament, these were listed as the metro’s effects on Delhi: Annual reduction of 2.76 lakh tons of fuel (about 2 million barrels) and saving the fuel cost. India imports more than 70% of its petroleum requirements and oil is the single biggest reason for India’s trade deficit. The Delhi Metro saves 2 million barrels every year by taking petrol and diesel vehicles off the roads. Given that the oil price averaged around \$100 per barrel until a few months ago, this means an annual saving of \$200 million or 1,200 core rupees. The metro reducing the traffic/ number of vehicle of the road also saves air quality of the city when the people using the metro means lesser cars and other vehicles on the road. In a recent response of parliament, Daily reduction of 3.9 lakh vehicles from the roads on Delhi, these were listed as the metro’s effects on Delhi. The metro reducing the air pollution, reducing greenhouse gasses and it saves emission cost. Metro is environment friendly, this is like a chain, introduces Metro-People start to use- Less number of vehicles on road - Less fuel emission -Less Pollution-emission cost save. In a recent response to parliament, these were listed as the metro’s effects on Delhi, Annual reduction of 5.77 lakh tons of pollutants. The metro saving the time of travel and cheaper way of commute and safety. The metro travel will be anytime much cheaper than any other transport like cab, auto or buses. And also with the use of metro cards, it will become very convenient to commute from one part of the city to another without bothering about buying tickets or carrying cash to pay for autos.

**Table 3: Revenue of DMRC from Rail Operation and Other Sources(Land Development)**

Year (yearend of 31 <sup>st</sup> March)	2012-13	2013-14	2014-15	2015-16
Revenue (in Lakhs)	268,748.02	319,801.89	357,096.52	434,425.20

Source: Annual Reports-2015-16, DMRC

## Operational Performance of Delhi Metro 2015-16

- 212.60 km – total length of the Delhi metro network
- 8.73 % increase – in ridership compared to previous year
- Maximum 31.7 lacs – passengers in a day on 28<sup>th</sup> August 2015
- Average 25.9 lacs passenger travelling everyday
- 56 % increase in average daily ridership in last five years

## Environmental Performance of Delhi Metro 2015-16

- Renewable energy source – is being further improved by installation of more Roof Top Solar Power Plants.
- 464 Rain water harvesting structures (RWHS) are provided in depots, stations, viaducts and the Metro Bhawan.
- 93 additional rain water harvesting structures provided in 2015-16.
- 85 % survival rate of trees planted by Delhi Metro Rail Corporation.
- 100 % segregation of waste at source is intended in all operations.



- Total energy consumption per passenger journey increased by 0.35 % in 2015-16.
- Traction energy consumption for car kilometre has decreased by 3 % compared to the year end of the year 2014-15.
- Car kilometre have increased by 12.83 % compared to 2014-15.

Metro is safer commute and it has strict security checking unlike other transport and metro is faster, it reduces journey time by 50% to 75%, the metro projects contribute the new shopping centres and city centres around it stations that's like Metro connecting the suburban train stations, airports and bus stops and it will help to the growing of city centres. The metro rail projects are the long term revenue source of the governments to improve the urban transport which is shown in table-3, that is DMRC earn annually 434,425.20 lakhs (2015-16) for the source of metro operational for commercial and property development sources. Metro create new employment and more job opportunities, Metro rail and metro stations can't maintain themselves, people are needed for its maintenance, that means more job opportunities for people. Metro reduces road accidents, more people die on roads in India than anywhere in the world it shows, 137,000 lakhs in 2013 and average 375 deaths every day. It will also reduce the road accident when metro operations in Delhi., In a recent response to parliament, these were listed as the metro's effects on Delhi Reduction in deaths on roads (125). The another important of metro project is low land occupation, the metro train road or tracks are occupation low land of city that is two-meter width only for elevated rail.

### Conclusion

The 21<sup>st</sup> century all countries are rapidly developed and all urban regions and its infrastructure are also developing very rapidly in the world. Hence all the countries are developing their urban rapid transport system to clear the problems of urban transportation to promote Urban development which is the key to development of the nation and development of economic life of cities. Urban infrastructure includes the transport, sanitation, drinking water, market, housing, industries, shopping malls, government offices etc. Finally, I conclude that the transportation is indicator to urban development and urban transport is the key to the economic growth and quality of life in a city and Metro has credit for changing the face of public transport in urban regions in 21<sup>st</sup> century, especially Delhi Metro, that is India's urban-transport trendsetter, sparking modern metro rail construction in at least 10 other Indian cities. Once metro projects commissioned and operational in urban areas, these will bring down the **congestion in cities, decrease the air pollution and also decrease the fuel consumption and accidental deaths.**

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