



Enhancing Ridership of Chennai Metro

**Ms Lakshmi
Mr Vinod Kumar
Mr Madhvan
CMRL**

**Prof. Sanjay Gupta (Mentor)
SPA Delhi**

Contents

- Background
- Literature Research
- Metro System Profile
- Field studies
- Metro user characteristics
- Non Metro user Characteristics
- Identification of issues
- Strategies for Improving Ridership



Aim and Objectives

Aim

- To evolve strategies for enhancing ridership on Chennai Metro

Objectives

1. To review the existing features of Chennai city and metro system and identify issues of metro ridership
2. To review best practices of metro system planning and approaches for enhancing ridership on metro
3. To assess existing abutting land use, operational features, last mile connectivity and metro users attributes of Chennai metro
4. To identify issues affecting ridership on metro
5. To suggest strategies for enhancement of metro ridership

Background - Chennai City

- Area

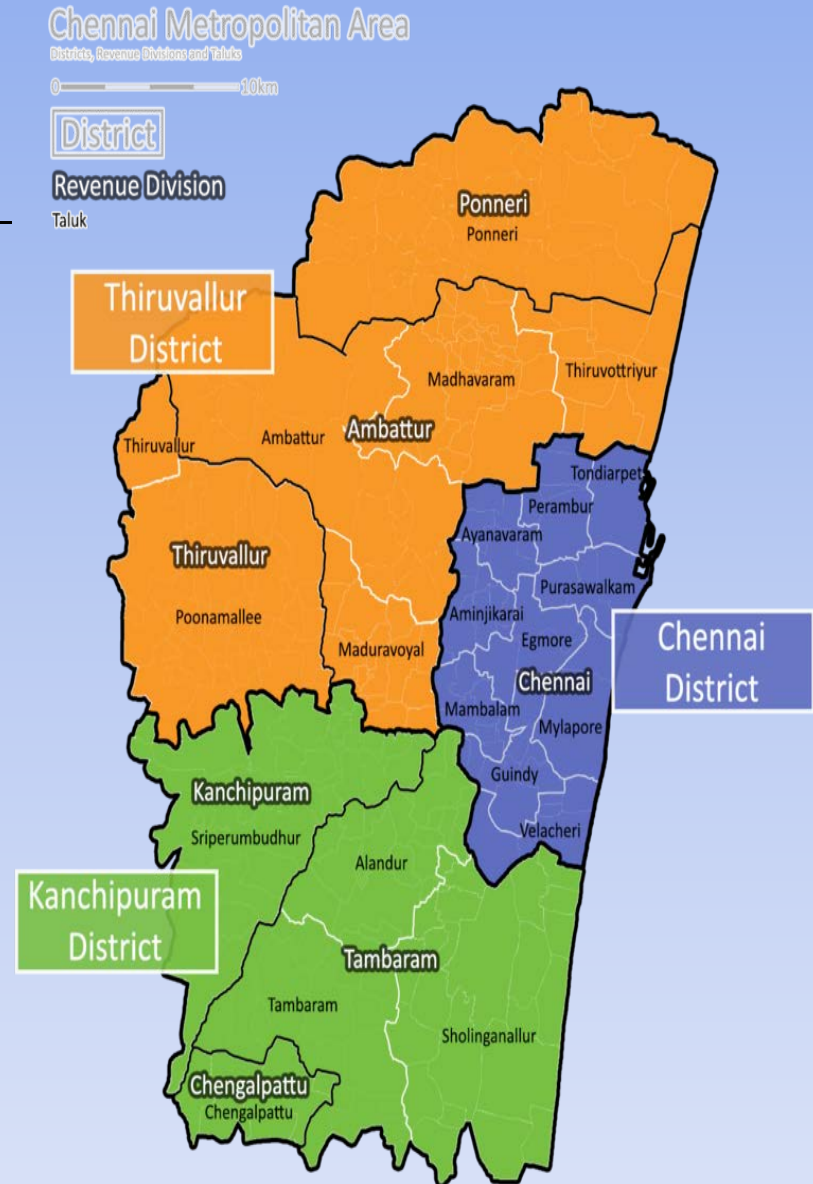
- CMA (Chennai Metropolitan Area) – 1189 sq.km
- Chennai City – 426 sq.km

- Population

- CMA – 8.9 Million
- City – 4.6 Million

- Annual Growth

- CMA – 2.4%
- City – 0.8%



Existing Transport System in Chennai

- Total No. of Registered Vehicles – **4.75 Millions**
- Two wheelers constitute 77% of total registered motor vehicles
- Fleet of **3895** busses approximately
- Private metered call taxis are available at all entry points of the city like airport, railway station and bus terminus.
- Unmetered autos ply across the city providing public transport like service with point to point shared service acting as feeder service to existing public transport system.



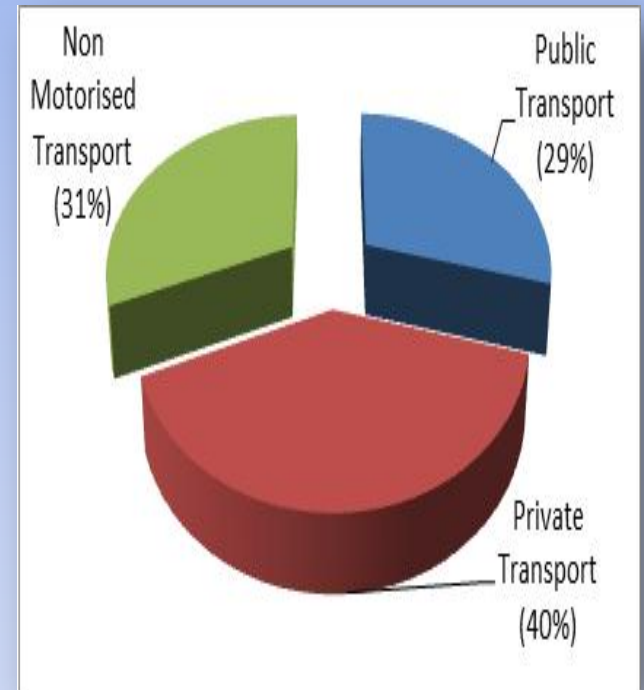
Existing Rail Based Mass Transport System In Chennai

- Suburban Railway – **286kms** covering Northern line (11 stations), southern line (19 Stations) and western line of Chennai (15 Stations)
- MRTS – Total 25 kms. & 21 Stations
- Metro Rail – Phase-1 with Extn. total **54kms**(Operation-27 km)

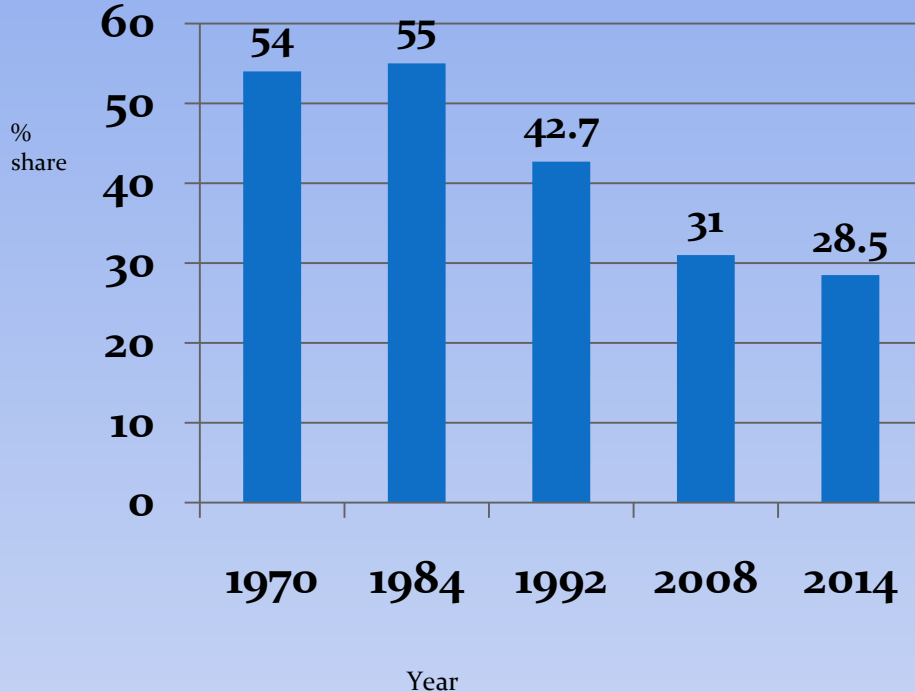


Existing Trend of Mobility Pattern in Chennai

- Personalized vehicles (two wheelers & cars) account for 40% of the total trips
- Public transport system accounts for 29% share

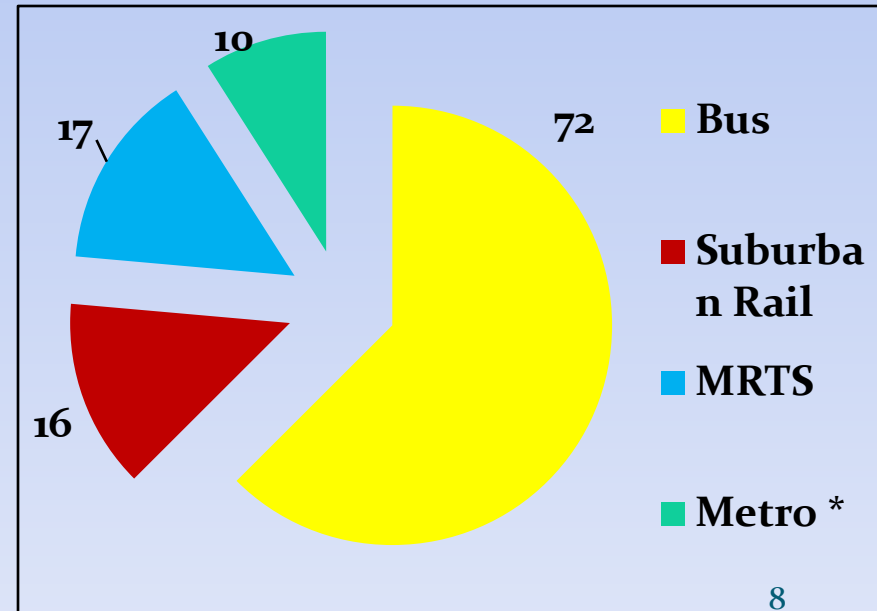


Public Transport Share



Public transport share has declined over the years

% split within Public Transport modes



Public Transport (PT) share Split across modes

Bus – 4.5 Million trips/day

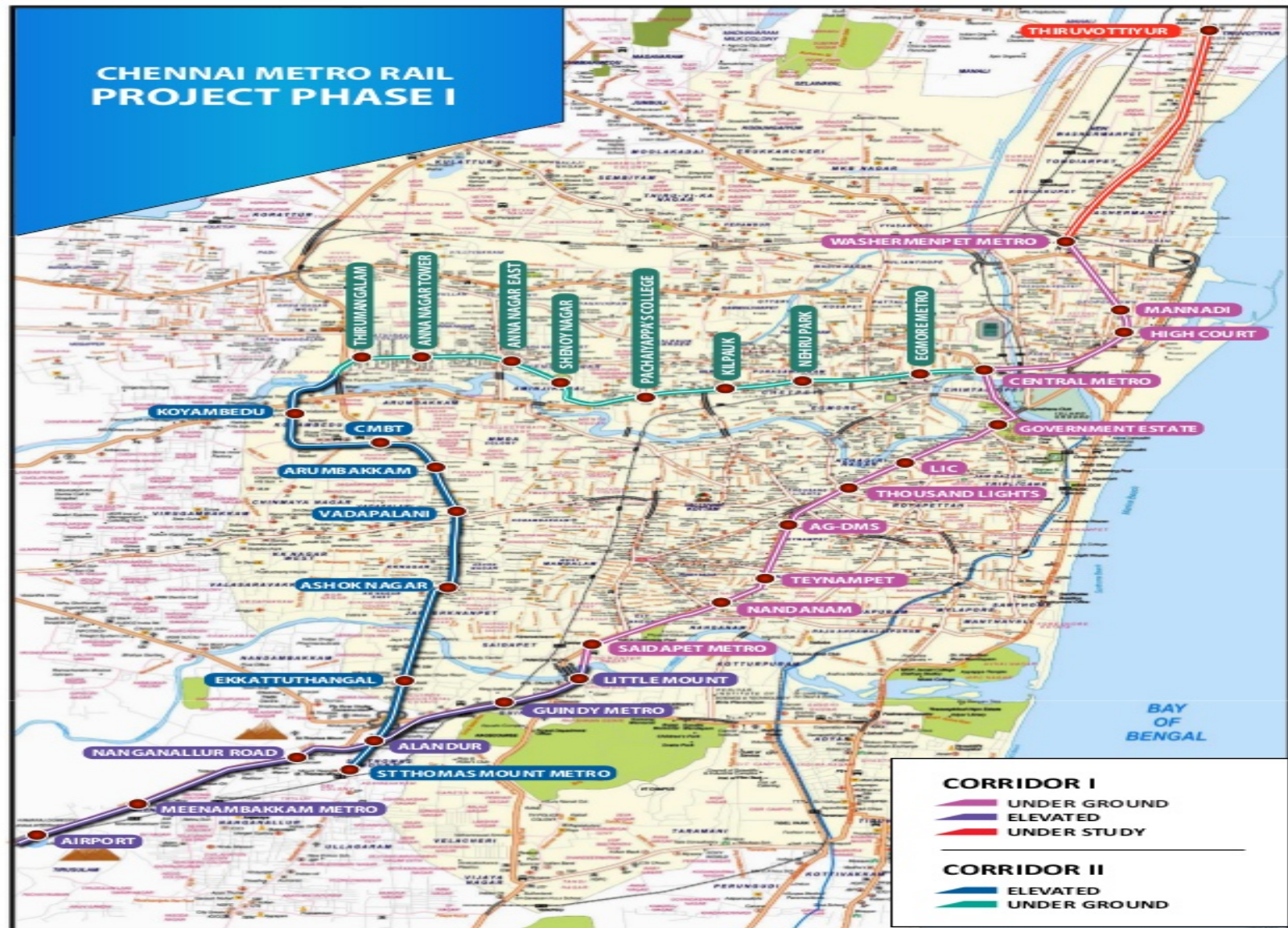
Sub Urban rail – 1.0 Million trips /day

MRTS – Around 0.12 Million trips/day

Metro – 0.65 Million trips/day (After Phase 1 Network Completion - Projected)

ABOUT CHENNAI METRO RAIL PROJECT

CMRL PROJECT (PHASE-I)



Phase -1 & Extn. : With Total Length 54 Km Along major arterial roads – Two Corridors

Chennai Metro Rail Connecting important Transport hubs

(Air/Rail/Road hub)

- Chennai Airport
- Chennai Central & Egmore station (Express rail & suburban rail)
- Chennai Mofusill Bus Terminus (CMBT)
- Suburban / MRTS Network – Washermenpet, Guindy, St. Thomas Mount Suburban and MRTS



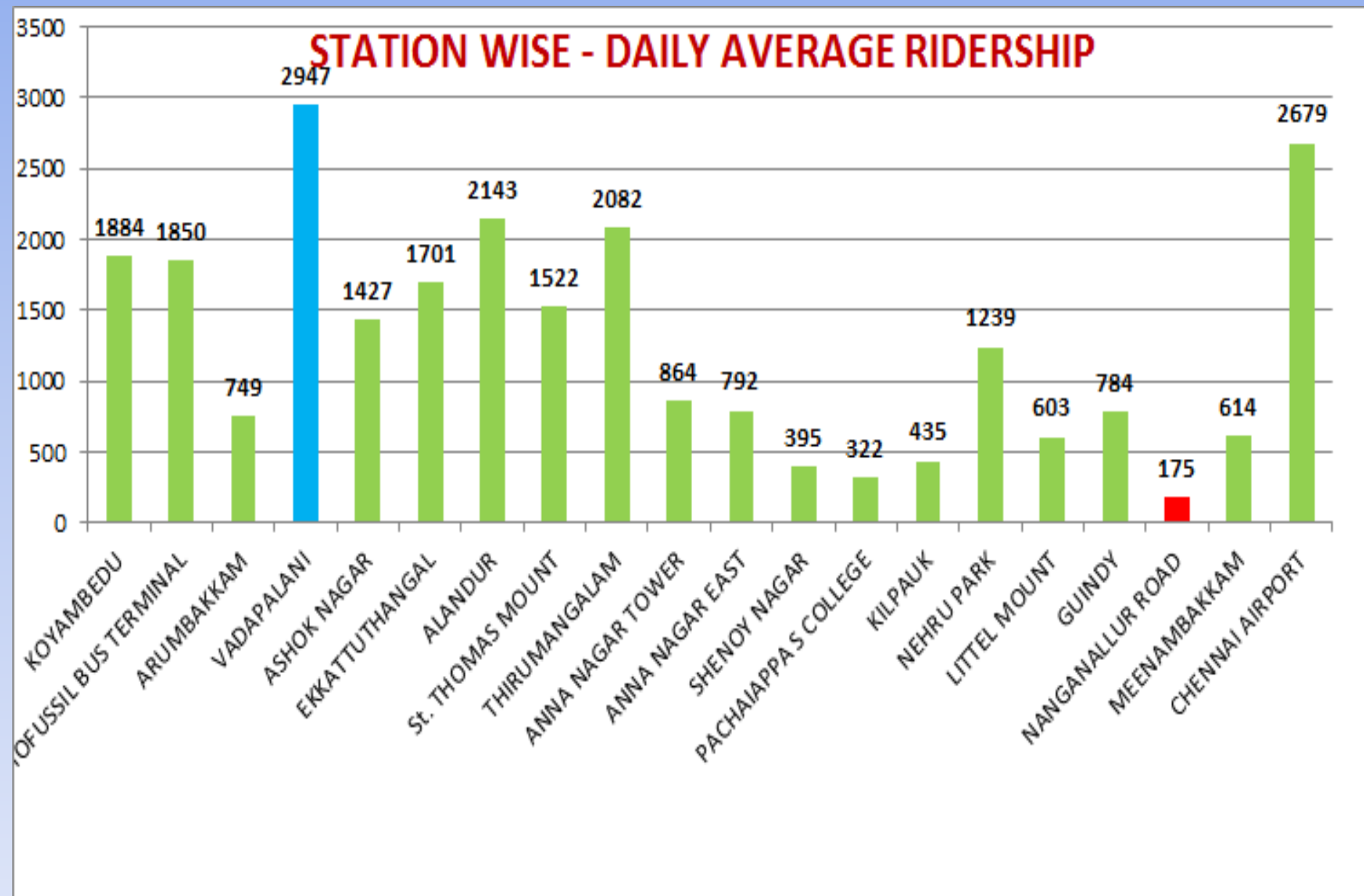
Present Project Status

- The proposed phase 1 of project covers a network of 54 km (45 km + Extension 9 km.) of total 40 metro stations
- Currently 27 Km Stretch is Operational for Revenue Service and consists of 20 Stations.

Phase -1	Total network distance	Currently operational
Corridor -1 + Extn.	32 km (23 +9)	8 km
Corridor -2	22 km	19 km

TOTAL DAILY RIDERSHIP : 24000

Chennai Metro Daily Ridership



Ridership Trends

Year	Distance of Operation	Average Ridership Per Day		% of Actual ridership
		Actual	Projected	
2015	9.5 km	9000	Approx. 5,00,000 for phase-1 in Operation	4.8%
2016	18 km	14000		
2017	27 km	24000		

The projected ridership mentioned above is for full Phase -1 (45kms) in Operation.

- The realised ridership is 4.8% only compared to projected values .**
- About 900 riders/km are presently observed on Chennai Metro**

Metro Rail Ridership (Projected Vs Actual)- Global Review

A study of **10 rail projects** in the US, done by USDOT, found that on average **actual ridership was 65% lower** than forecasted. UK study, by TRR Laboratory, of **9 metro systems** in both developing and industrialized nations found that the **ridership forecast was over 100% above** the actual ridership.



World Metro-Ridership -Airport Express line

	Hong Kong	Tokyo-(02) Narita Express	London Heathrow
Mode	Metro	Metro	Metro
Dedicated/Shared	Dedicated	Dedicated	Dedicated
Distance to CBD(miles)	22	35.7	15
Opening of Airport	1998	1978	1946
Opening Express	1998	1991	1998
Track Length(Miles)	21.2	32	16.5
Passengers(2009) (Million)	45.5	36	66
Mode Share	23%	14.9%	9.3%
Alternate Transport	Bus	Bus/Local Trains	Taxi
Alternate Transport Mode share	47%	35%	26.8%
Ridership	Below Expectation	-	Below Expectation

Hongkong

- MRT overall is profitable, the airport express itself is not an overall profitable operation due to too low ridership .
- It is apparent that even with a good design and well/integrated railway service, the Airport Express does not have inherent advantages over more direct single mode bus travel. For the Tung Chung line, **2,66,000 passengers** were estimated in 1999. In 1999, **actual ridership was 72,000 per day** (MTRC Airport Railway -Information Guide 1992).

Mode	Share
Car(Taxi & Pvt.)	20.4%
Rail	23.4%
Bus	47.4%
Others	8.8%

Tokyo- Narita Express

- Since ,the establishment of the new airport-rail links, rail mode share has steadily increased and bus service first plummeted to 23%, but then increased again to over 41.6%.
- Buses enjoy the greatest mode share of all transit modes despite very good train connectivity to national and metropolitan destinations and cheap local trains.

Mode share at Narita:

Mode	Share
Car(Taxi & Pvt.)	15%
Rail	
(a)Sky liner	8.1%
(b)Narita Express	14.9%
(c) Local trains	17.3%
Bus	41.6%
Others	3.1%

London – Heathrow

- The Heathrow express is oriented towards Central London and is not integrated with the UK's national rail service. National rail service is accessible via a number of specialized shuttle buses.
- A big gap exists between forecast and actual ridership for 2003.
- Between 1999 and 2004, after opening of the Heathrow express, public transportation mode share remained mostly constant.

Mode	Share (Actual - 2003)	Share (Forecast-2003)
Car(Taxi & Pvt.)	64.3%	60%
Underground	14%	10%
Heathrew Express	8.9%	19%
Bus	12.8%	11%
Others	.2%	-

Factors Influencing For Successful Airport Express

- Journey time advantage over other modes of transport
- Extended service of Operation to match Flight arrivals & departure timings of local and express trains of Railways.
- Providing transport check-in baggage from Metro Station.
- Direct Access to the city
- Fare & simple ticketing system
- Terminal Access
- Provision of Information

Delhi Metro

Ridership study during initial four years of Operation

Year	Distance of Operation	Average Ridership Per Day		% of Actual ridership
		Actual	Projected	
2006	33 Km	4,92,750	24,97,300	20%
2007	65 Km	6,21,830	27,59,517	23%
2008	68 km	7,67,662	30,49,266	25%
2009	76 Km	8,89,094	33,69,439	26%

- It can be seen that the actual ridership remained, at most, one-fourth of the projected figures
- The realised ridership as a share of projected ridership increases with increase in network of operation.

Bangalore Metro

Bangalore Metro Ridership Study – Phase 1:

Line	Opening Date	Last Extension	Stations	Length(Km)	Terminals
Purple Line	20.Oct.11	30.Apr.16	17	18.10	Baiyyappanahalli -Mysore Road
Green Line	01.Mar.14	18.june.17	23	24.20	Nagasandra-Yelachenahalli

Year	Kms	Projected Ridership
2011	6.5	9,964
2012	6.5	18,538
2013	6.5	18,589
2014	16.5	30,812
2015	26	52,414
2016	31	1,50,196
2017	42	3,38,000



Study on Airport express line by various Metros

Delhi Metro Airport Express

- When (DMRC) took over the line in 2013, The "high-speed" link — which was re-opened after being shut because of defects in civil structure in January that year — started at 50kmph and was carrying **only 9,000 passengers daily**.

To ensure that more people use this line

- DMRC revised the fare twice (Max & Min fare Rs.60/- Rs 10).
- Extension of timings to suit passengers of Shatabdi Express trains.
- Improvement of frequency from 15 minutes to 10 minutes & speed from 70 kmph to 80 kmph.
- Seamless interchange between the Indian Railways station at New Delhi and Metro stations have been taken.
- Metro smart cards were made valid for travel on the line from May 1, 2015. On August 12, 2016, the ridership reached 50,077.

Factors For Successful Metro Ridership

- Moderate to high population density along the alignment
- Wide coverage of network
- Good last mile connectivity
- alignment to serve activity and residential areas
- Less competition from other mass transport modes
- Seamless connectivity across modes of transport
- Smooth transfer facility at interchanges
- Affordable fares

DATA COLLECTION



Surveys conducted with Metro & Non Metro Users

- A sample survey of total 100 Metro & Non- Metro passengers was conducted during the month of September, in 2017 (see Annexure 1 for the questionnaire).
- Survey was carried out at Nanganallur, Airport, St.Thomas and Velacherry & in other area of Chennai.

SURVEY ON MODE OF TRANSPORT

Locality of Survey:..... Date:.....

1. Name :

2. Gender :

3. Age :

4. Status : Student ☐ Employee ☐ Unemployed ☐ Retired ☐
House maker ☐

5. How often do you use Metro Train. Tick that apply.
Never ☐ Occasion (Once in a Month) ☐ Often (Once in a Week) ☐ Daily ☐

6. What mode of transport you use for commuting within Chennai? Tick all that apply.
Regular User
Metro Train ☐ Bus ☐ Suburban Rail ☐ MRTS ☐ Auto ☐
Self- 2 wheeler ☐ Self- 4 wheeler ☐ Taxi ☐ Share Auto ☐ Cycle ☐
walk ☐
Alternate Mode of Transport Used :
Metro Train ☐ Bus ☐ Suburban Rail ☐ Auto ☐
Self - 2 wheeler ☐ Self -4 wheeler ☐
Taxi ☐ Share Auto ☐ Cycle ☐ Walk ☐

7. Reason for :
(i) Opting Metro rail Transport
(ii) Not opting Metro rail Transport(Tick the specific or Any other Reason Specify):
☐ Lack of last mile connectivity
☐ More Transfer Time
☐ Lack of Ease of Access
☐ Lack of connectivity
Any other reason specify:.....
.....

8. Suggestions if any for patronage of Metro Train usage:

Survey on case metro stations

- Focus on Nanganallur Metro Station – with lowest ridership

Reasons for clocking minimum Ridership among other stations.

- Terminal stations - St.Thomas Metro Station & Airport Metro Station

Scope for further enhancement of Ridership

Summary of survey findings

- Lack of last mile connectivity
- More Transfer Time
- Ease of Access
- Lack of network connectivity

SUGGESTED IMPROVEMENT STRATEGIES



Suggested strategy 1: Integration of MRTS and CMRL at St. Thomas Mount Station

- Connectivity with MRTS can enhance ridership at St. Thomas Mount Metro Station.
- Presently MRTS is plying from Chennai Beach to Velacherry Station (25km stretch of 21 Stations) with an average daily ridership of 100,000 commuters a day and there is no connectivity from Velacherry to St. Thomas Mount Metro Station which is of distance approximately 4 Km by road.
- Two MRTS stations namely Puzhuthivakam and Adambakkam is planned between Velachery & St. Thomas metro.



Incomplete link of MRTS viaduct with Chennai Metro

- Due to Non-integration of MRTS and CMRL at St.Thomas Station, passengers approach and disperse from the Stations (Velacherry MRTS Station/ St.Thomas Metro Station) in different modes from pedestrians to bicycles to motorized two wheeler to motor cars to public transport.
- A line map depicting the Rail based connectivity in Chennai City is represented below.



Inter section of MRTS, Suburban & CMRL at St. Thomas Mount Metro **Incomplete link of MRTS viaduct with Chennai Metro**





Suggested strategy 2: Providing Stoppage of long distance EMU trains (Fast trains) at St. Thomas Mount Suburban Station

- The EMU fast trains (long route) operated between Chennai beach & outskirts of Chennai are not having stopping at St. Thomas Mount station of southern railway which has been already linked with St. Thomas mount Metro.
- stopping of those trains at St. Thomas mount Station of Southern Railway, it will be most beneficial for the passengers who wish to interchange to Metro network & avoid multiple interchange & time saving.





Suggested strategy 3: Improving access to Metro Station

Study on Highest ridership & Lowest ridership Station of Chennai Metro has been carried out.

- **Vadapalani Station**

- attracted highest ridership is located in Centre of city & a commercial area.
- surrounding areas include Hospitals, 22 Storey Malls, AVM studio, IT Companies like HCL, TCS, temple and cinema theatres and Marriage Halls, hotels, schools etc.
- Within 0.5 kms, BUS depot available and Public transport available in frequency.

- **Nanganallur Metro Station**

- with lowest ridership is located near Officer training Academy and near to defence accommodation area
- there is no major commercial center around 5 Km radial distance of the metro station.
- very less availability /frequency of public transportation in this area and there is no proper public transportation available around the catchment area around 5 Km distance from the metro station and there is no Bus Stop available at the said station.

Issue in Access to Nanganallur Metro Stations :

- The access to Nanganallur Metro Station is restricted as there is only one entry point and there is no entry point to the Metro Station on the other side of the Road.
- The Passengers who intends to board the Metro train on other side of the Nanganallur Station has to cross the Heavy traffic Road with no pedestrian cross.
- There is no Bus Stop available at the said Metro Station. The mode of access to Nanganallur Metro Station are as follows:-

Mode of Access	%Age
Walk	70%
Share Auto/OLA/taxi	30%
2 Wheeler-Motor	15%
Bi-cycle	4%
Personal car	1%



Suggested strategy 4: Providing ease of access to Chennai Airport Metro

Distance between Airport terminal Departure / Arrival and Metro Station is approx. 200 meters which needs to be connected.

Majority of the air passengers prefers to use call taxi to reach their destination due to ease of access & door step service.

- Shuttle service has been arranged but limited & lack of awareness to passengers on shuttle service availability between airport and Metro Station
- Synchronization of shuttle service with Metro trains and Aircraft arrival & departures shall reduce waiting time of passengers.
- Provision of Walklator from Airport terminal to Metro Station shall be expedited.



SHUTTLE SERVICE AT AIRPORT –BATTERY OPERATED VEHICLES (4 SEATERS)/21 Seater





CONNECTING DOME WITH WALKLATORS (300 MTRS) – AIRPORT METRO STATION AND AIRPORT TERMINAL – Work under progress





Suggested strategy 5: Introducing Last Mile Connectivity

- Presently there is no last mile connectivity available at many Metro Stations.
- The passengers after disembarking from the metro train have to either use their personal vehicle/Auto / Taxi to reach their destination.
- Provision of Shuttle service / small bus may improve the last mile connectivity.

Suggested strategy 6: Common ticketing for Public transport mode (BUS/MRTS/CMRL/SUB –URBAN)

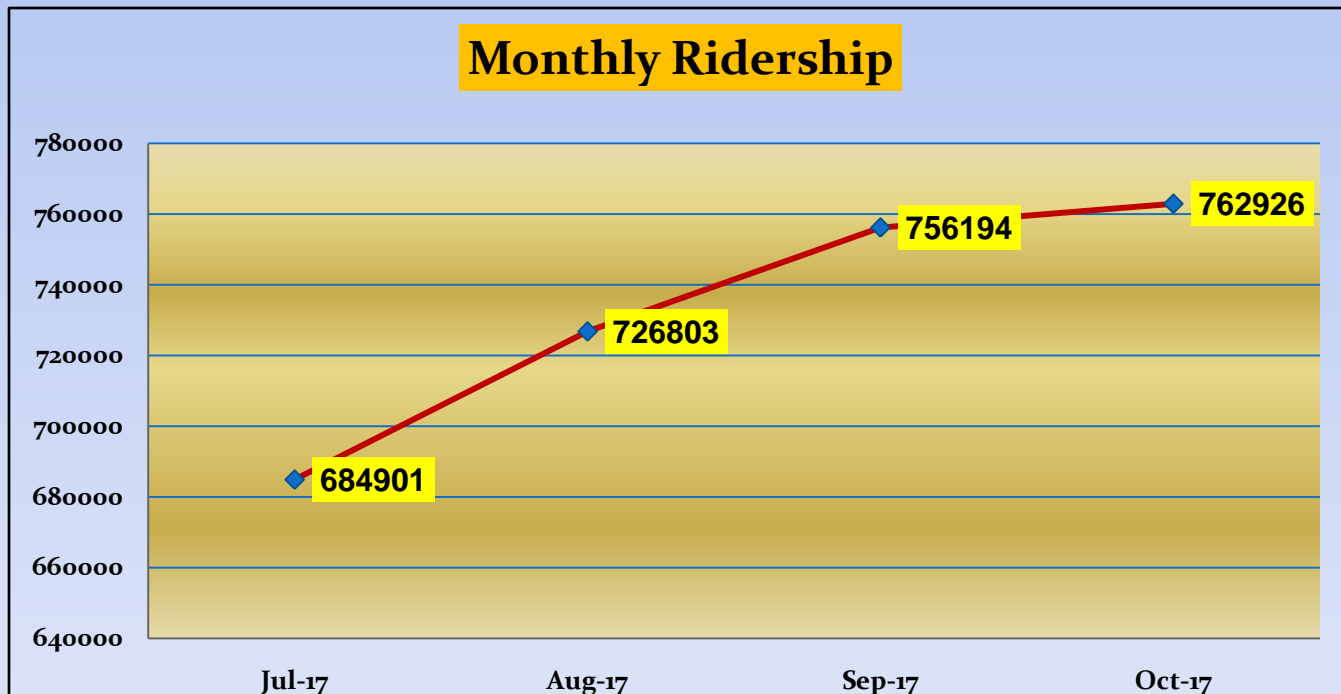
- Unified ticket system for seamless travel with multiple mode of public transport are not available at Chennai.
- Providing unified ticketing system would encourage commuters to use Public transport.

Unified ticketing in Chennai:

- To start with unified ticketing, Chennai metro shall first integrate fare box ticketing and parking ticketing under single card which may not need any clearing system as both are operated by Chennai metro.
- Next Chennai metro shall integrate with Chennai major Bus Transport provider (MTC) under unified ticketing. This needs setup of Common clearing house to share and settle the earnings between operator. The central clearing house shall be a set up by State as a separate entity other than participating operator to avoid conflicts.
- Next shall integrate with Sub-urban / Metro Railways where smartcard system is already in place for purchase of Railway tickets.

Suggested strategy 7: Fare subsidies

During the study, it was found that fare subsidies has only a little improvement in ridership. Recently a promotional offer was introduced by extending 20% discount on normal fare for Chennai metro rail passengers w.e.f 25.8.2017. However the raise in ridership was only 10% as below:



Suggested strategy 8: System expansion

During our study on system expansion, it was found that System expansion substantially increases ridership as given below:

Year	Kms. in Operation	Average Ridership Per Day
2015	9.5kms	9000
2016	19kms	14000
2017	27kms	24000

RECOMMENDATIONS

Study Recommendations to Improve Ridership

1) Integration of MRTS and Metro Rail Network

- Presently two stations between ST.Thomas Mount Metro Station and Velacherry MRTS station construction work is under progress. In order to integrate MRTS and Chennai Metro Rail, the construction work of two stations and laying of viaduct has to be expedited. On integration, the MRTS passengers shall transit to CMRL metro network at St.Thomas Mount Metro Station. Bus routes to be rationalised between Velacherry & St.Thomas Mount (4 Km) as an interim measure to facilitate passenger transit.

2) Availability of inter change of long distance EMU trains (Fast trains) at St. Thomas Mount Sub-Urban Station:

There is no stoppage of EMU trains (long route fast) at St.Thomas Mount station (Sub-Urban Station). These fast moving EMU trains operate between Chennai beach & outskirts of Chennai. The St.Thomas Station (Sub-Urban Station) is already linked with St. Thomas mount metro station. Hence a proposal for stoppage of all Fast moving EMU trains at St.Thomas Mount Suburban Station will help passengers to transit from suburban station to Metro network which will improve the ridership of the Metro.

3) Provision of Bus Stop & Dedicated Feeder Service for Nanganallur Metro Stations

Presently there is no Bus Top near to Nanganallur Metro Station and also no shuttle service available at the said Station. Hence provision of Bus stop near to Metro Station and provision of feeder service around the catchment area of Metro Station shall improve the ridership. A route map for plying the feeder service for the identified location around the Metro station is indicated below :-



Deployment of Mini Bus /tempo traveller around the Nanganallur Metro Station

Station	Catchment Areas
CMRL NANGANALLUR STATION	OTA, PARANGIMALAI, CHURCH, ST.THOMASMOUNT STATION, NANGANALLUR, INNER RING ROAD AND PAZVANTHANGAL

Proposed Feeder Service Routes at Nanganallur Metro Station

STATION	ROUTE NO	ROUTE	ROUTE DISTANCE
Nanganallur Metro Station	1	Nanganallur Metro Station- Inner Ring Road-St.Thomas Mount Station-Railway Station Road- Nanganallur Metro Station	3.7 Km
	2	Nanganallur Metro Station-OTA-Parangimallai-St.Thomas Mount Orthodox Church- Wesley Church-Nanganallur Metro Station	9 Km





Ease Access Nanganallur Metro Station

- Presently only one entry is available for the said station
- Pedestrians on the opposite side of the station entry face difficulty in accessing Metro Station at Nanganallur Road Metro Station





- Due to non-availability of pedestrian cross over/subway/foot over bridge for the passengers to reach the metro station entry from the opposite end .Creation of one more Entry way for Nanganallur Station on the Other side or provision of FOB shall attract passengers from the other end of the station entry to use metro network.

4) Improvement of facilities to Airline passengers to motivate them to use Metro services :-

- Create awareness on shuttle service availability by announcement at Metro Stations and at Airport terminals.
- Synchronization of shuttle service based on arrival/departure of Metro trains and Aircraft .
- Request Airport Authority of India to Expedite the execution of Provision of Walklator from terminal to connecting doom of Airport Metro Station



5) Improvement for Last Mile Connectivity at all Stations :

- Provision of free Bi-cycle service for to-fro from metro station for metro passenger and tie up with Private CABS to pick/drop at Metro Stations. Also tie up with MTC for rationalization of bus routes around metro station area to facilitate metro passengers commutation.

6) Provision of Unified Ticket for MRTS/BUS/CMRL:

- Passengers seamless travel between public transports shall be achieved by introducing common wallet for ticketing.





Thank You