



Understanding the Factors Influencing Multimodal Choice – A case of Chennai

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Objective & Methodology

Objectives

- To research the factors influencing of multimodal transportation
- To understand the travel behavior that affect modal choice
- To understand the travel behavior of Chennai commuters, Questionnaire survey method is used for Quantitative research
- Data required to understand travel behavior
 - Socio-demographic data, Activity questionnaire, travel diary
- The following are the factors considered for understanding Multimodal choice
 1. Age
 2. Gender
 3. Income
 4. Purpose
 5. Trip frequency
 6. Vehicle ownership
 7. Access and egress
 8. Travel distance
 9. Travel time
 10. Travel cost

SURVEY METHODOLOGY

Survey Methodology	
Pilot survey	Final survey
60 respondents	200 respondents

Survey outcome	Nos.	%
Total Individual surveyed	246	
Total trips undertaken	531	100%
No. of Private trips	169	32%
No. of Public transport trips	362	68%

Study area selection

Study area is selected based on following criteria

1. Area should contain an adequate transport supply
2. Should include different types of public transport modes
- MTC bus, local train, MRTS and Chennai Metro
3. Should contain mixed land use pattern
4. Should cover people with different income groups
5. Area should have multimodal, multi-usage, inter and intra transport facilities

Station	Typology
Central station	Interchange commuters, Intercity train commuters, commercials, Hospitals
LIC	Colleges, shopping centres, malls
Guindy station	Residential, Government offices
Koyembedu station	Commercial, Intercity bus commuters
Anna nagar station	Residential



Multimodal Trips

Summary of Public transport trips

Public transport trip break ups	Multimodal trips	Non – multimodal trips
No. of people (total 183 ppl)	45 (25%)	138
No. of Trips (total 362 trips)	84 (23%)	278 (77%)
No. of Two modal trips	78	
No. of Three modal trips	6	

Predominantly used single mode

Main mode	No. of person used	No. of trips	% of trips
Local train	29	56	20%
Metro	22	45	16%
MRTS	5	10	4%
MTC bus	82	167	60%
Grand Total	138	278	

Predominant Multimode combination

Main mode combination	No. of person used	No. of trips	% of trips
Local - Intercity	1	1	1%
Local - MRTS	1	2	3%
Local - MTC	6	12	15%
Metro - Intercity	1	1	1%
Metro - Local	3	6	8%
Metro - Metro	5	8	10%
Metro - MRTS	7	14	18%
Metro - MTC	3	4	5%
MRTS - MTC	3	5	6%
MTC - MTC	12	25	32%
Metro - Metro – Local train	2	4	
Local train - MTC - MTC	1	2	

Socio-Economic Profile

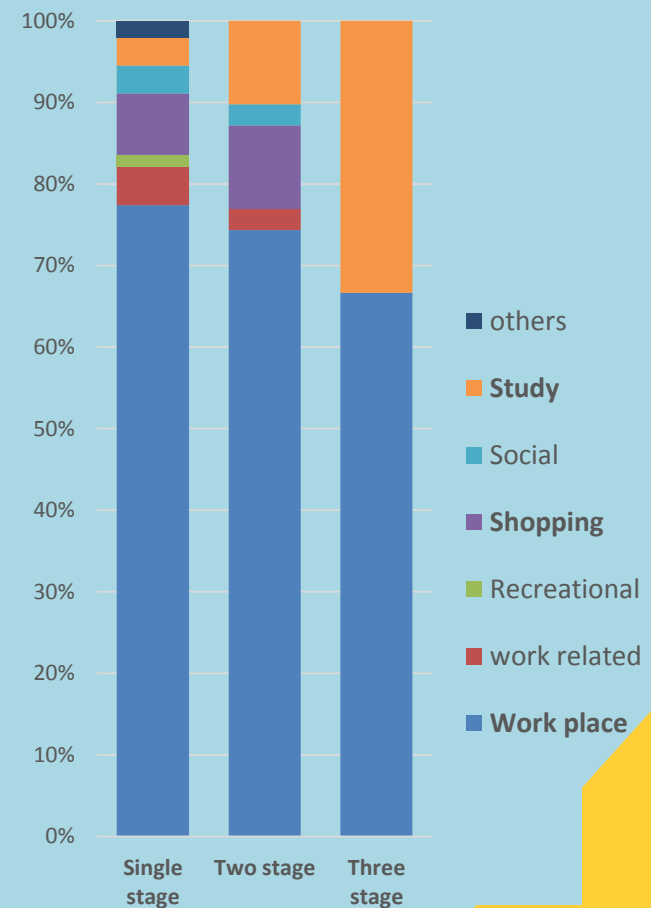
	No. of ppl	No. of Trips
Multi-modal	45	84
Total	183	362

Socio-economic profile of multimodal users

	coeff b	s.e.	Wald	p-value	exp(b)	lower	upper
Intercept	-2.05369	1.335587	2.36442	0.12413	0.128261		
Gender	0.587687	0.400219	2.156235	0.141992	1.799821	0.821414	3.943634
Education	-0.13727	0.200023	0.470987	0.492533	0.871733	0.589011	1.290158
Occupation	-0.1108	0.124759	0.788742	0.374481	0.895118	0.700947	1.143076
HH size	-0.08641	0.187834	0.211633	0.64549	0.917218	0.634728	1.325431
Income	0.05254	0.12535	0.175684	0.675109	1.053945	0.824365	1.347461
4-w ownership	0.065441	1.243132	0.002771	0.958017	1.06763	0.093382	12.20609
2-w ownership	0.269978	0.265782	1.031818	0.309732	1.309935	0.778064	2.205384
Age	0.005701	0.018384	0.096161	0.756486	1.005717	0.970125	1.042615
Purpose	0.301878	0.125888	5.750345	0.016485	1.352396	1.056691	1.730852

All the p-values are greater than 0.05, so **none of the variables have statistically significant impact** on using of multimodal public transportation

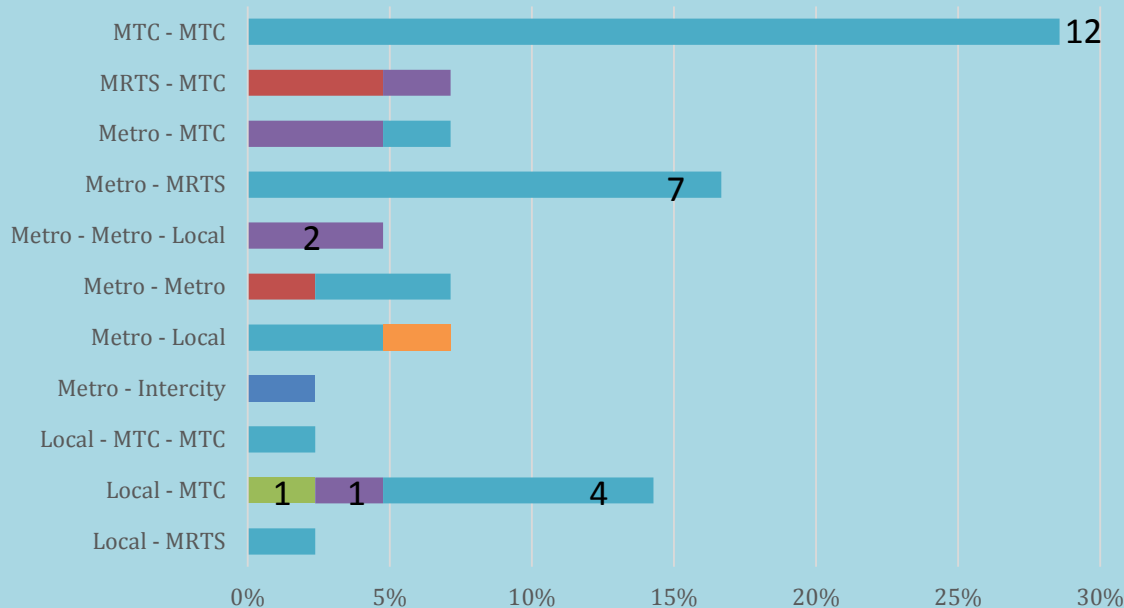
Trip purpose



Trip Purpose

	No. of ppl	No. of Trips
Multi-modal	45	84
Total	183	362

Trip purpose and combination of multimode



The purpose for using Multimodal Transportation is **for Work trip and study trip**. Thus these affects the Multimodal choice

	Local - MRTS	Local - MTC	Local - MTC - MTC	Metro - Intercity	Metro - Local	Metro - Metro	Metro - Metro - Local	Metro - MRTS	Metro - MTC	MRTS - MTC	MTC - MTC
Home	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Shopping	0%	0%	0%	0%	0%	2%	0%	0%	0%	5%	0%
social	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Study	0%	2%	0%	0%	0%	0%	5%	0%	5%	2%	0%
Work place	2%	10%	2%	0%	5%	5%	0%	17%	2%	0%	29%
work related	0%	0%	0%	0%	2%	0%	0%	0%	0%	0%	0%

Multimodal trips

Average travel time, distance and cost based on Trip detail for predominant multimode

	No. of ppl	No. of Trips
Multi-modal	45	84
Total	183	362

Predominant multimode

No of ppl - 19			No. of ppl - 7	Metro - MRTS			No. of ppl - 12	MTC - MTC		
				Distance	Time	Cost		Distance	Time	Cost
Gender	11%	Female	0%				17%	25	105	40
	89%	Male	100%	24	69	63	83%	54	126	72
		Average		24	69	63		49	123	67
Income	11%	1 lakh to 2 lakh	14%	28	85	40	8%	29	125	43
	37%	25,000 to 50,000	57%	24	63	59	25%	19	70	39
	26%	50,000 to 1 lakh	29%	22	73	84	25%	128	242	144
	26%	Below 25,000	0%				42%	24	82	42
		Average		24	69	63		49	123	67
Age	11%	< 55 yrs	0%				17%	25	75	44
	11%	18 yrs - 24 yrs	14%	28	85	40	8%	24	80	50
	32%	25 yrs - 34 yrs	29%	22	73	84	33%	101	211	116
	47%	35 yrs - 44 yrs	57%	24	63	59	42%	22	80	40
		Average		24	69	63		49	123	67
Occupation	11%	Business	14%	28	85	40	8%	22	85	36
		Government								
	11%	Service	0%				17%	23	73	39
	68%	Private Service	71%	22	62	72.6	67%	63	145	83
	11%	Student	14%	28	85	40	8%	19	85	25
		Average		24	69	63		49	123	67

Predominant multimode

No of ppl - 19			No. of ppl - 7	Metro - MRTS			No. of ppl - 12	MTC - MTC		
				Distance	Time	Cost		Distance	Time	Cost
Purpose	100%	Work place	100%	24	69	63	100%	49	123	67
		Average		24	69	63		49	123	67
Frequency	95%	Daily	100%	24	69	63	92%	23	82	39
	5%	Monthly					8%	338	575	367
		Average		24	69	63		49	123	67
Individual/group	100%	Alone	100%	24	69	63	1	49	123	67
		Average		24	69	63		49	123	67

- Predominant Multimodal users are **Male**
- Income range from **25,000 to 1 lakh per month**
- Age group – 35 to 44 yrs
- Occupation – Private service
- Purpose – Work place
- Frequency – Daily
- Individual trips

Access and egress mode

	No. of ppl	No. of Trips
Multi-modal	45	84
Total	183	362

Access mode and Main mode combination

Access mode	Local - MRTS	Local - MTC	Metro - Local	Metro - Metro	Metro - MRTS	Metro - MTC	MRTS - MTC	MTC - MTC	Grand Total
2-W	(1) 1%	(3) 4%	0%	(3) 4%	(2) 2%	0%	0%	(5) 6%	(14) 17%
4-W	0%	(1) 1%	0%	(1) 1%	(2) 2%	0%	(1) 1%	0%	(5) 6%
Auto	(1) 1%	(1) 1%	(3) 4%	(5) 6%	(10) 12%	(1) 1%	0%	(2) 2%	(23) 27%
Cycle	0%	(2) 2%	0%	0%	0%	0%	0%	0%	(2) 2%
Walk	0%	(5) 6%	(6) 7%	(2) 2%	0%	(4) 5%	(4) 5%	(17) 20%	(38) 45%
Feeder Auto	0%	0%	0%	(1) 1%	(1) 1%	0%	0%	0%	(2) 2%
Grand Total	(2) 2%	(12) 14%	(9) 11%	(12) 14%	(15) 18%	(4) 6%	(5) 6%	(24) 29%	(84) 100%

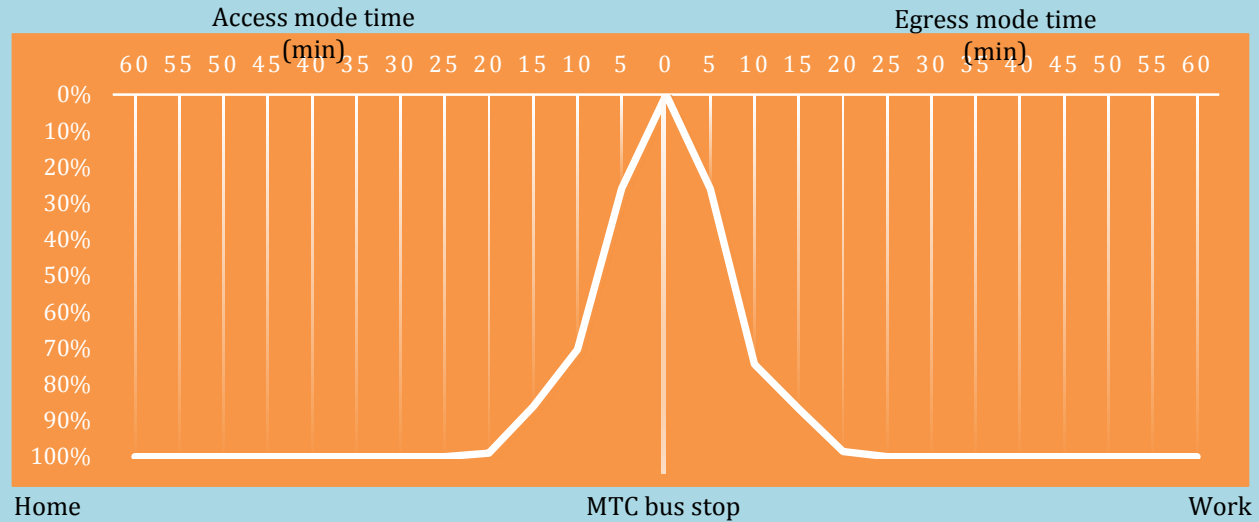
Egress mode and Main mode combination

Egress mode	Local - MRTS	Local - MTC	Metro - Local	Metro - Metro	Metro - MRTS	Metro - MTC	MRTS - MTC	MTC - MTC	Grand Total
2-W	0%	(3) 4%	0%	(2) 2%	(2) 2%	0%	0%	(3) 4%	(10) 12%
4-W	0%	0%	0%	(1) 1%	(2) 2%	0%	0%	0%	(3) 4%
Auto	(1) 1%	(1) 1%	(3) 4%	(1) 1%	(12) 14%	(1) 1%	(4) 5%	(2) 3%	(25) 30%
Cycle	0%	(2) 3%	0%	0%	0%	0%	0%	0%	(2) 2%
Walk	(2) 2%	(6) 7%	(5) 6%	(4) 5%	0%	(3) 4%	(1) 1%	(20) 24%	(41) 49%
Feeder Auto	0%	0%	0%	(2) 2%	(1) 1%	0%	0%	0%	(3) 4%
Grand Total	(3) 4%	(12) 14%	(8) 10%	(10) 12%	(20) 17%	(4) 5%	(5) 6%	(25) 30%	(84) 100%

Access and egress mode

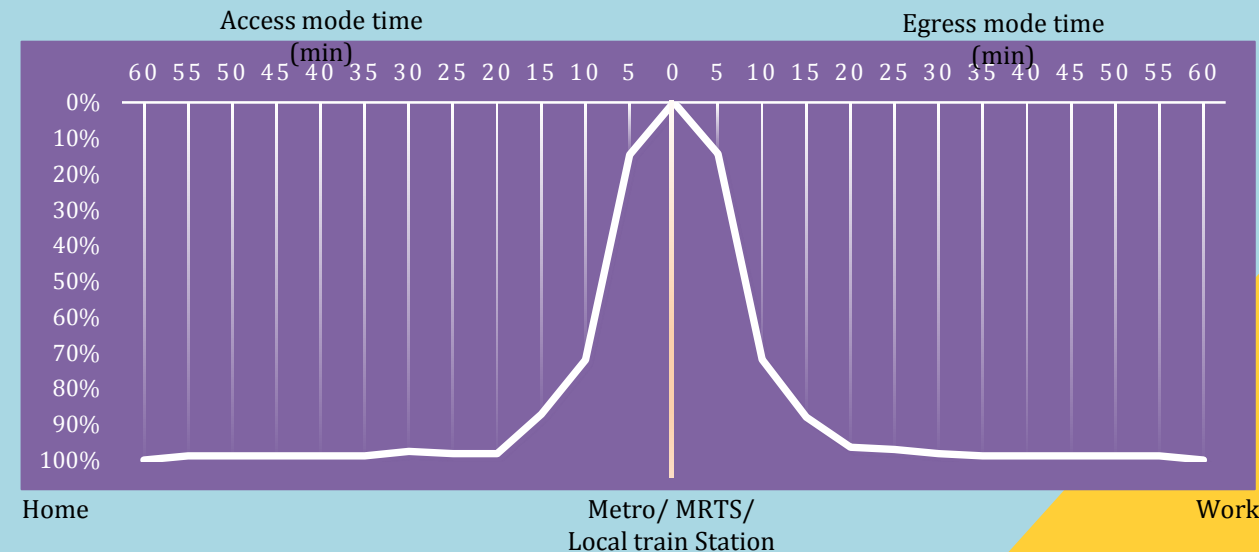
Travel time

Cumulative frequency distributions of access and egress times for MTC bus (top) and MRTS, local train and metro (bottom):



Around 25% (out of 216 trip) of trip access and egressing MTC bus stop for 5 mins

Around 50% of respondents access time and egress time MTC bus stop is 10 mins



Only 15% (out of 111) of trip access and egressing metro/MRTS/ local stop for 5 mins

Around 60% of respondents the access time and egress time is 10 mins for other stops/stations

Inference

1. The **socioeconomic profile does not influence** the multimodal transportation
2. Multimodal trips are mainly influenced by trip purpose, travel distance, travel cost and travel time.
3. Multimodal trips are competitive to single modal trip only on selected **trip purpose – work trip and shopping, selected trip frequency – daily trip**.
4. As the **40%** of the total multimodal trips are **work trips**, the share of people travelling in group is only 26%, that 74% respondents are **travelling alone**.
5. The **average distance** travelled in multimodal trips are **24 kms**, while in single mode is **16 kms**.
6. Multimodal trips have influence on access and egress, **only** when **the access and egress distance is shorter than 2.5 km**.
7. Around 50% of respondents in multimodal trips, **the access time and egress time is 10 mins** to reach the station and to reach the destination from station.

Conclusion

1. The highly travelled people among all three modes are working people within the age group of 18 to 34 years.
2. The multimodal transportation is not influenced by the background of the respondents, rather by activities of the trips such as work and shopping
3. MTC buses are the most successful mode of public transportation over many years in Chennai.
4. It is successful due to its minimum travel cost and good connectivity. Though there is no direct connectivity of MTC bus throughout the city and the respondents needs to transfer between the mode, still they prefer MTC buses as their main transport mode.