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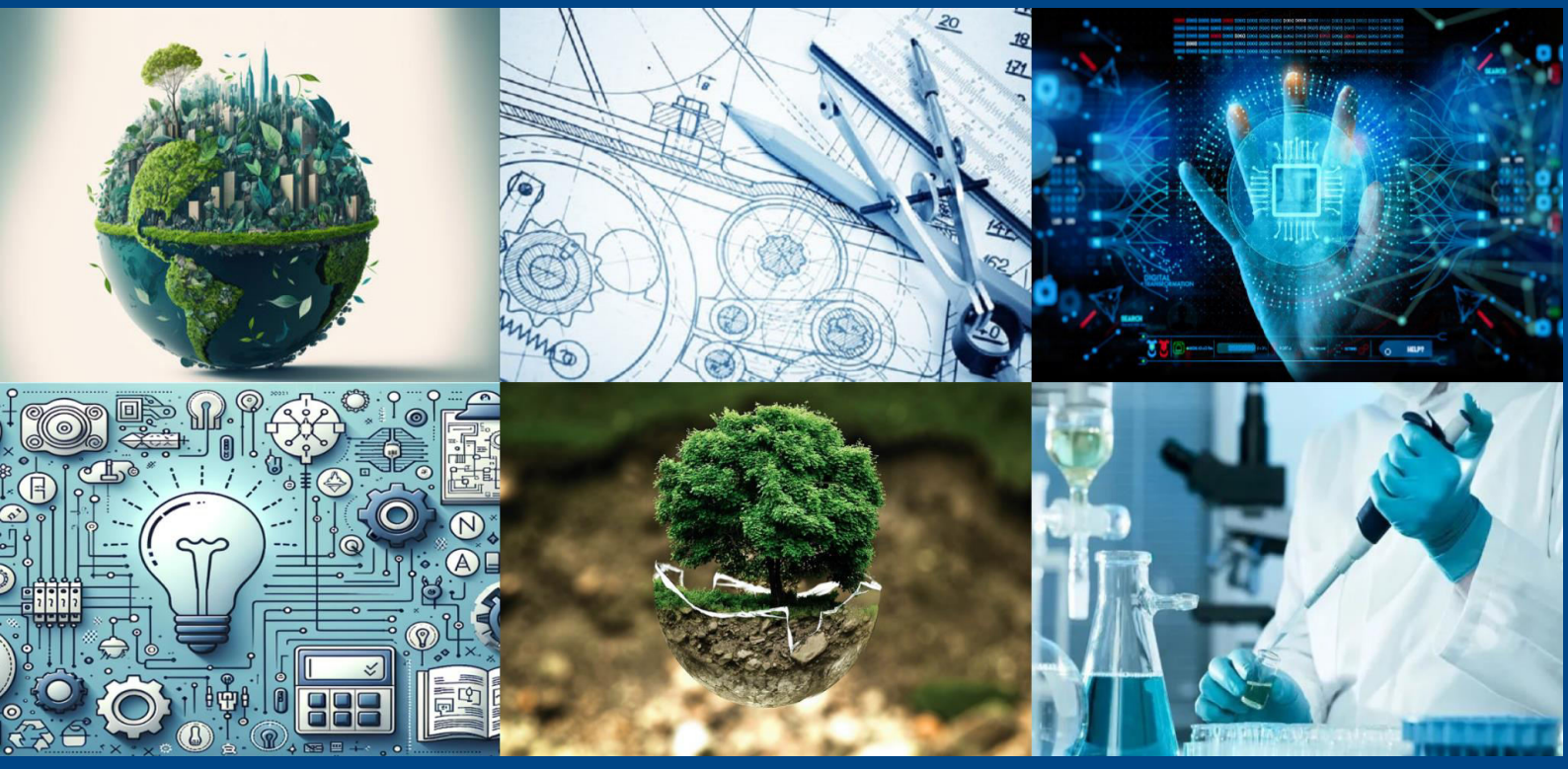

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An Empirical Study on Last Mile Connectivity and Metro Ridership Growth in Chennai Metro Rail Limited

Kaviya.R[1], Ms. Dhanalakshimi S[2]

MBA Student, School of Management Studies, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India[1]

Assistant Professor, School of Management Studies, Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India[2]

ABSTRACT: This study investigates the relationship between last-mile connectivity and growth in metro ridership in Chennai Metro Rail Limited. As urban travel patterns continue to evolve, the convenience of reaching a metro station from the starting point of a journey or continuing travel after alighting has become a major factor influencing public transport usage. In Chennai, despite the expansion of metro infrastructure and improved service quality, ridership growth still depends heavily on how easily passengers can access stations through feeder buses, shared autos, walking paths, cycling facilities, and other supporting transport options. The study explores how gaps in last-mile connectivity affect commuter behaviour and how access improvements can encourage more people to choose the metro for their daily travel. By analyzing commuter needs, station accessibility, and multimodal integration, the study highlights practical ways to strengthen metro usage and support sustainable urban mobility in Chennai.

I. INTRODUCTION

Chennai's metro system has become an important part of the city's public transport network, but its success depends not only on train service, but also on how easily people can reach and leave the stations. This study on last-mile connectivity and metro ridership growth in CMRL examines how access to stations through walking, feeder services, autos, and other transport options influences passenger use of the metro. It aims to understand whether better last-mile facilities can encourage more people to choose the metro for their daily travel and support higher ridership growth in Chennai.

OBJECTIVES OF THE STUDY

1. To identify the major issues faced by commuters while accessing metro stations from their origin and destination points.
2. To study the effectiveness of existing last-mile facilities such as feeder buses, share autos, walking access, and other transport links around metro stations.
3. To analyze how improved station access can encourage more passengers to choose the metro for daily travel.
4. To understand the relationship between convenience, affordability, safety, and commuter preference in last-mile travel.
5. To suggest practical measures for strengthening last-mile connectivity and improving ridership in Chennai Metro Rail Limited.

II. REVIEW OF LITERATURE

Chidambara (2012) explained that last-mile connectivity is a key requirement for making rapid transit systems successful. The study highlighted that even a well-built metro system may fail to attract enough passengers if people cannot comfortably reach the station from their homes, workplaces, or transit points. This idea is especially relevant in Chennai, where station access still shapes the daily travel choices of many commuters.

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Kumar (2015) studied metro users in Delhi and found that last-mile characteristics are closely linked with ridership patterns. The study showed that income, trip length, and land-use conditions around stations influence whether commuters choose walking or other access modes. This suggests that ridership growth is not only about train frequency or fare, but also about how the area around the station supports travel.

Goel and Tiwari (2016) analyzed existing metro users in Delhi and found that vehicle ownership, trip distance, and population density near stations significantly affect last-mile mode choice. Their work is important because it shows that commuters make practical decisions based on convenience and availability, not just on the presence of metro infrastructure. In simple terms, people are more likely to use the metro when the journey to and from the station feels manageable.

Kanuri et al. (2019) observed that poor access to metro stations reduces ridership in Indian cities and that many potential users avoid the metro because the last mile is inconvenient. Their findings strengthen the argument that metro systems need feeder buses, shared mobility, and pedestrian-friendly surroundings to become more useful in everyday life. This also reflects the challenge faced by many Indian metro systems, including Chennai.

Mukherjee et al. (2023) conducted a major three-city survey and found that poor last-mile connectivity is one of the main reasons for lower-than-planned metro ridership in India. Their study also showed that commuters are highly sensitive to waiting time, cost, and service frequency, especially women and lower-income users. This makes last-mile planning a people-centred issue rather than only an engineering issue.

Chennai Metro Rail Limited (2018) introduced feeder support through share autos and share taxis at selected stations to improve station access. The press release shows that passengers actively used these services, which indicates that commuters respond positively when practical feeder options are available. This is a useful local example for your study because it proves that last-mile facilities can directly support metro use in Chennai.

III. RESEARCH METHODOLOGY

Research Design
This study follows a **descriptive research design**. It is used to understand the real situation of last-mile connectivity and its influence on metro ridership in Chennai Metro Rail Limited.

Sample Size
The sample size is **220 respondents**.

Data Collection
The study is based on **primary data**. The information was collected directly from metro users, which makes the data current and relevant. This helps the study present real commuter experiences instead of depending only on secondary sources.

Method of Data Collection
The data was collected through a **survey** using a structured questionnaire.

Sampling Technique
The study used **convenience sampling**, selecting respondents based on availability and willingness to participate.

TOOLS USED FOR ANALYSIS
The main tools used for descriptive analysis, percentage analysis, correlation and chi-square.

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PERCENTAGE ANALYSIS

TABLE:1 - HOW FREQUENTLY DO YOU USE METRO SERVICES?

Frequencies for Frequency of Metro Usage

Frequency of Metro Usage	Frequency	Percent	Valid Percent	Cumulative Percent
Daily	101	45.9	45.9	45.9
Occasionally	46	20.9	20.9	66.8
Rarely	7	3.2	3.2	70.0
Weekly	66	30.0	30.0	100.0
Missing	0	0.0		
Total	220	100.0		

INTERPRETATION:

From the above table.1, most respondents (45.9%) use the metro daily, followed by weekly users (30%), and occasionally (20.9%), indicating that metro rail is a major mode of regular urban transportation.

TABLE 2 - AVAILABILITY OF TRANSPORT NEAR METRO STATION IS?

Frequencies for Transport Availability

Transport Availability	Frequency	Percent	Valid Percent	Cumulative Percent
Average	93	42.3	42.3	42.3
Excellent	21	9.5	9.5	51.8
Good	56	25.5	25.5	77.3
Poor	50	22.7	22.7	100.0
Missing	0	0.0		
Total	220	100.0		

INTERPRETATION:

From the above table.2, most respondents (42.3%) rated transport availability as average. (25.5%) Felt it was good, (22.7%) rated it poor, and only (9.5%) considered it excellent, indicating moderate availability with scope for improvement.

TABLE 3 OVERALL SATISFACTION WITH LAST MILE CONNECTIVITY?

Frequencies for Overall Satisfaction

Overall Satisfaction	Frequency	Percent	Valid Percent	Cumulative Percent
Dissatisfied	64	29.1	29.1	29.1
Highly Satisfied	16	7.3	7.3	36.4
Neutral	76	34.5	34.5	70.9
Satisfied	64	29.1	29.1	100.0
Missing	0	0.0		
Total	220	100.0		

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INTERPRETATION:

From the above table.3, most respondents (34.5%) are neutral about overall satisfaction. (29.1%) are satisfied and (29.1%) are dissatisfied, showing mixed opinions, while only (7.3%) are highly satisfied, indicating moderate satisfaction and improvements are needed to enhance passenger experience.

HYPOTHESIS:

Null hypothesis (H0): There is no significant relationship between gender and frequency of metro usage.
Alternative hypothesis (H1): There is a significant relationship between gender and frequency of metro usage.

TABLE:4 CHI-SQUARE TEST

Chi-Squared Tests

	Value	df	p
X^2	1.198	3	.754
Likelihood ratio	1.193	3	.755
N	220		

Note. Continuity correction is available only for 2x2 tables.

The Chi-square test showed that there is no significant relationship between gender and frequency of metro usage, as the p-value is greater than 0.05. Since the p-value **is 0.754**, which is greater than **0.05,** the result is not significant. So, the Null hypothesis is accepted. Hence, there is no significant relationship between gender and frequency of metro usage.

IV. FINDINGS

- Last-mile connectivity has a direct influence on metro ridership growth in Chennai Metro Rail Limited.
- Better station access through feeder services, walking facilities, and integrated transport options encourages more people to use the metro.
- Poor pedestrian access, unsafe crossings, and a lack of nearby transport options remain major barriers for commuters.
- Feeder services and multimodal hubs are important for reducing the gap between the station and the final destination.

V. SUGGESTIONS

- Increase feeder bus and shared auto services near metro stations.
- Improve walking paths, lighting, and safety around stations.
- Create multimodal hubs for easy transfer between transport modes.
- Keep last-mile travel affordable and convenient for daily commuters.
- Reduce congestion at station entry and exit points.
- Use integrated ticketing for smoother transfers.

VI. CONCLUSION

The study concludes that last-mile connectivity has a strong influence on metro ridership in Chennai. When passengers can easily reach and leave metro stations through feeder services, safe walking routes, and convenient transport options, they are more likely to choose the metro for their daily travel. Improving these access facilities can make the metro system more useful, comfortable, and attractive, which in turn supports higher ridership growth and better public transport usage overall.

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