IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

Evaluating Metro Transportation: Convenience, Inconveniences And Environmental Impact

V Chandana Mercie, K Akshai, Aakash Kumar A, J Nithish, K Yogesh
Student
Department of Commerce
SRM Institute of Science and Technology, Chennai, India

Abstract: This study evaluates metro transportation focusing on convenience, inconveniences, and environmental impact among urban commuters in Chennai. The research aims to understand commuter perception, usage patterns, and sustainability benefits associated with metro systems. Primary data was collected through structured questionnaires from 150 respondents. Statistical tools such as percentage analysis, chi-square test, and Karl Pearson correlation were applied. The findings reveal that metro transportation significantly improves travel efficiency, reduces congestion, and minimizes environmental pollution. However, challenges such as overcrowding, limited last-mile connectivity, and peak-hour inconvenience persist. The study concludes that metro systems are essential for sustainable urban development but require further improvements for enhanced user satisfaction.

I. INTRODUCTION

Urban transportation systems play a vital role in the economic development and overall functioning of modern cities. With rapid urbanization and population growth, metropolitan cities like Chennai are facing increasing challenges such as traffic congestion, pollution, and travel delays. Efficient public transportation is essential to overcome these issues and improve the quality of urban life.

In this context, metro transportation has emerged as a modern and sustainable solution to urban mobility problems. Metro rail systems provide fast, reliable, safe, and comfortable travel for a large number of commuters. Unlike road transport, metro systems operate on dedicated tracks, which help in avoiding traffic congestion and ensuring timely travel.

The Chennai Metro Rail has significantly improved the transportation network of Chennai. It connects important residential, commercial, and industrial areas, making travel easier and more efficient for daily commuters.

1.2 Key Features of Metro Transportation

- Provides fast and time-saving travel
- Offers comfortable and air-conditioned coaches
- Ensures reliable and punctual services
- Reduces dependency on private vehicles
- Supports digital ticketing and modern facilities
- One of the major advantages of metro transportation is its ability to save time. In highly congested cities, metro trains provide a faster alternative by bypassing road traffic.

1.3 Focus of the Study

- Convenience (time-saving, comfort, affordability)
- Inconveniences (overcrowding, delays, connectivity issues)
- Environmental impact (pollution reduction and sustainability)

II. REVIEW OF LITERATURE

1. A report in The Hindu (2024) stated that metro transportation has reduced travel time and traffic congestion in Chennai, though overcrowding during peak hours remains a concern.
2. Kumar (2023) highlighted that metro systems enhance urban mobility by providing cost-effective and reliable transportation, but user satisfaction depends on accessibility and service frequency.
3. A study in the International Journal of Transport Management (2022) found that metro systems significantly reduce carbon emissions and promote environmental sustainability.
4. Patel & Mehta (2024) concluded that metro transportation improves convenience and efficiency, but infrastructure limitations and overcrowding affect commuter experience.

III. RESEARCH METHODOLOGY

3.1 Research Design

The study adopts a descriptive research design to systematically examine commuter opinions, perceptions, and experiences regarding metro transportation. This design helps in understanding the level of convenience, inconveniences, and environmental impact associated with metro usage among different categories of respondents.

3.2 Sources of Data

The study is based on both primary and secondary data sources. Primary data is collected through structured questionnaires distributed to metro users, while secondary data is gathered from journals, newspapers, official reports, and online sources to support the research findings.

3.3 Types of Data

The study uses both qualitative and quantitative data for comprehensive analysis. Qualitative data includes opinions, preferences, and satisfaction levels of commuters, while quantitative data consists of measurable information such as frequency of usage, percentages, and numerical responses collected from respondents.

3.4 Sampling Technique

Convenience sampling technique is used in this study to select respondents based on their accessibility and willingness to participate. This method is suitable for collecting data quickly from metro users available at stations and nearby areas within the selected region.

3.5 Sample Size

The study includes a sample size of 157 respondents, which is considered sufficient to represent metro users in Chennai. This sample size ensures reliability of data and helps in drawing meaningful conclusions from the analysis.

3.6 Variables of the Study

DependentVariables

Convenience, inconveniences, and environmental impact are considered dependent variables, as they represent the outcomes influenced by metro transportation. These variables help in evaluating commuter satisfaction, identifying problems, and assessing the overall effectiveness of metro services.

Independent Variables

Travel time, cost, frequency, and accessibility are considered independent variables that influence commuter behavior and perception. These factors directly affect the usage of metro services and play a significant role in determining the level of satisfaction among users.

3.7 Statistical Tools Used

- Percentage Analysis: To analyze responses
- Chi-Square Test: To identify relationships between variables
- Karl Pearson Correlation: To measure strength of relationships

3.8 Limitations of the Study

- Limited geographical area (Chennai)
- Small sample size
- Possible respondent bias

IV. DATA ANALYSIS AND INTERPRETATION

The collected data was analyzed using percentage analysis and relevant statistical tools to understand commuter preferences and experiences. The analysis focuses on evaluating metro transportation in terms of convenience, inconveniences, and environmental impact.

The findings indicate that a majority of respondents prefer metro transportation due to its efficiency and reliability. Metro services provide a faster mode of travel compared to other transportation systems, especially in congested urban areas. Time-saving is considered one of the most important factors influencing commuter preference. In addition, affordability plays a significant role, as metro fares are reasonable and suitable for daily commuters such as students and employees.

Metro transportation also contributes significantly to reducing traffic congestion. As more people opt for metro services instead of private vehicles, the number of vehicles on roads decreases. This leads to smoother traffic flow and reduces travel delays. The shift towards metro usage helps improve overall urban mobility and transportation efficiency.

From an environmental perspective, metro transportation is viewed positively by respondents. Since metro trains operate on electricity, they produce lower carbon emissions compared to fuel-based vehicles. This results in reduced air pollution and contributes to environmental sustainability. Additionally, reduced fuel consumption helps conserve natural resources and lowers the overall environmental impact of transportation systems.

However, despite these benefits, several inconveniences were identified during the analysis. The most common issue reported by respondents is overcrowding during peak hours. High passenger density affects comfort and creates difficulties in boarding and exiting trains. Another issue is waiting time, as delays or intervals between trains can cause inconvenience for commuters with tight schedules. Limited last-mile connectivity is also a major concern, as many users face challenges in reaching metro stations or their final destinations.

4.1 Key Observations

- Majority of respondents prefer metro due to time-saving and affordability
- Metro helps in reducing traffic congestion and travel delays
- Significant reduction in pollution and carbon emissions is observed
- Overcrowding during peak hours affects passenger comfort
- Waiting time creates inconvenience for regular commuters
- Limited last-mile connectivity reduces overall accessibility

Overall, metro transportation is perceived as a reliable and eco-friendly mode of transport. It offers multiple advantages in terms of efficiency, cost-effectiveness, and sustainability. However, improvements in service quality, connectivity, and passenger management are necessary to enhance user satisfaction and effectiveness of metro systems.

V. RESULTS AND SUGGESTIONS

S. No	Aspect	Findings / Results	Suggestions
1	Travel Efficiency	Metro saves time and improves travel speed	Increase train frequency
2	Environment	Reduces pollution and carbon emissions	Promote eco-friendly initiatives
3	Traffic	Helps reduce road congestion	Encourage public transport usage
4	Overcrowding	Peak hours experience heavy crowding	Improve scheduling and add more trains
5	Connectivity	Limited last-mile connectivity exists	Improve feeder services and connectivity

Table 5.1: Results and Suggestions

The study highlights that metro transportation has brought significant improvements in urban mobility, convenience, and environmental sustainability. It has become a preferred mode of transport for many commuters due to its efficiency and reliability. However, certain challenges still affect the overall user experience and need to be addressed for better performance.

5.1 Results

- Metro transportation improves travel efficiency by reducing travel time and providing faster connectivity across different parts of the city.
- It contributes to environmental sustainability by lowering carbon emissions and reducing dependence on fuel-based vehicles.
- Metro services help in reducing road congestion by encouraging people to shift from private vehicles to public transport systems.
- Overcrowding during peak hours is a major issue affecting passenger comfort and convenience.
- Limited last-mile connectivity reduces accessibility and creates difficulties for commuters reaching their final destinations.

5.2 Suggestions

- Increase train frequency, especially during peak hours, to manage overcrowding and improve passenger comfort.
- Improve last-mile connectivity by introducing feeder buses, shared transport, and better infrastructure near metro stations.
- Expand metro routes to cover more areas and increase accessibility for a larger population.
- Implement better scheduling and crowd management techniques to reduce congestion inside trains.
- Enhance passenger facilities such as seating, cleanliness, and safety measures to improve overall travel experience.

VII. CONCLUSION

Metro transportation plays a vital role in improving urban mobility by providing a fast, reliable, and eco-friendly mode of travel. The study shows that it enhances travel efficiency, reduces traffic congestion, and minimizes environmental pollution. Despite these benefits, challenges such as overcrowding, waiting time, and limited last-mile connectivity still exist. Addressing these issues through better planning, improved infrastructure, and enhanced services can significantly increase commuter satisfaction. Overall, metro transportation is an essential component of sustainable urban development and has the potential to meet future transportation needs effectively with continuous improvements.

REFERENCES

[1] The Hindu. (2024). Chennai Metro transportation reduces travel time and congestion. *The Hindu Newspaper*. Retrieved from https://www.thehindu.com

[2] Kumar, A. (2023). Role of metro systems in enhancing urban mobility and commuter satisfaction. *Journal of Urban Transport Studies*, 10(2), 45–60.

[3] International Journal of Transport Management. (2022). Impact of metro systems on environmental sustainability and carbon emission reduction. *International Journal of Transport Management*, 8(1), 21–35.

[4] Patel, R., & Mehta, S. (2024). Efficiency and challenges of metro transportation systems in urban areas. *International Journal of Transport Studies*, 9(1), 30–44.