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INTERNATIONAL JOURNAL OF PROGRESSIVE RESEARCH IN ENGINEERING MANAGEMENT AND SCIENCE (IJPREMS)
(Int Peer Reviewed Journal)
Vol. 05, Issue 02, February 2025, pp : 54-59

e-ISSN : 2583-1062
Impact Factor : 7.001

URBAN PUBLIC TRANSPORTATION A CASE STUDY OF BHOPAL

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DOI: https://www.doi.org/10.58257/IJPREMS38444

ABSTRACT

As urban landscapes continue to evolve, the growing dependency on private vehicles and the declining use of public transportation present significant challenges, particularly in mid-sized cities with populations ranging from one to two million. The strain on road infrastructure, worsening traffic congestion, and increasing travel times highlight the urgent need for efficient and accessible public transit systems. However, low ridership in public transport is often attributed to poor service quality, inadequate infrastructure, and inefficient operational frameworks. This study aims to examine Bhopal's rapid and non-rapid road transport networks, assessing their economic sustainability and service effectiveness. By analyzing financial performance—considering revenues, costs, profits, and losses—alongside commuter perceptions of service quality, the research seeks to uncover key areas for improvement and potential strategies for optimizing public transportation. In the face of increasing urbanization, addressing issues such as rising commuter traffic, high energy consumption, and transit inefficiencies is critical for achieving sustainable mobility. This study explores innovative approaches to enhance public transport accessibility, improve financial stability, and promote equitable urban mobility. A crucial aspect of this research is accurately estimating transport demand, ensuring that planning and policy decisions align with commuter needs. By bridging the gap between demand and service delivery, this study aspires to contribute to the development of a well-structured, future-ready transportation system that enhances urban connectivity, supports economic growth, and fosters environmental sustainability.

Key Words: Urban Transport, BRTS, Non-Rapid Transit, Bhopal, Traffic Congestion, Infrastructure, Economy, Service Quality, Commuter Perception, Sustainability, Policy, Financial Analysis, MP Nagar, Bhopal

1. INTRODUCTION

1.2 GENERAL

The Latin term "Transport are," from which the English word "transport" is derived, means "across or the other side" and "port are" means "to carry." Thus, to convey something is to carry the other side. "Transportation is the process of carrying goods and persons from one place to another," according to the definition given above. Transport has a role in the diffusion of development and the blending of cultures. I find it fascinating to quote the author's opinion about the importance of travel in the modern world as a whole. One of the most important and essential human institutions is transportation. It advances with humankind's pursuit of progress and regresses with the dissolution of societal hierarchy.

Without transportation, humans would not be able to interact with the outside world and would therefore lack the characteristics of civilization. In a real sense, the transporter is the one who created civilization. "In every stage of advanced civilization, one of the most important activities of men has been the transportation industry, which specialises in the simple movement of people and goods from one place to another." With fresh developments in the domains of ways, means, motive power, engineering techniques, organisations, legal enactments, and social, economic, and political considerations, the significance of transportation is growing daily. These days, the advancement of transport is linked to its commercial and socioeconomic significance. Transportation turns out to be a tool for cultural evolution. Thus, a civilization devoid of a sophisticated transportation infrastructure becomes archaic.

An excellent statement about the general significance of transport in the modern world may be found here, attributed to a well-known author. One of the most important basic human institutions is transportation. Its history begins from the beginning of written history and extends further. It advances with humankind's pursuit of progress and regresses with the dissolution of societal hierarchy. Individuals without access to transportation would be isolated from the outside world and, as a result, lack the characteristics of civilization.

1.2 MEANING OF TRANSPORT & TRANSPORTATION

Transport is simply the movement of people or goods from one place to another. Different people have given different definitions of transportation. A few of them are stated as under.

"Transportation is an indispensable part of a culture, as hall mark of civilization". "A vehicle or system such as buses and trains etc is the means of getting from one place to another."

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Impact Factor : 7.001

"The growth of the ability & need to transport large quantities of goods or number of people over long distances at high speeds in comfort and safety has been an index of civilization & in particular of technological progress".

1.3 EVOLUTION OF TRANSPORTATION

Early humans relied on walking, jogging, and swimming as their primary means of transportation during their nomadic lifestyle. As civilization evolved, humans transitioned from foraging to domesticating animals, using them to move people and heavy objects more efficiently. The invention of the wheel marked a revolutionary step in transportation, enhancing animal-drawn mobility. Initially, water transport was the most effective way to move large loads over long distances, with early roadways following animal trails and later evolving into paved paths built by ancient civilizations like the Indus Valley, Mesopotamia, Persia, and Rome. The Industrial Revolution in the 19th century dramatically transformed transportation with inventions like the steam engine, which powered trains and ships, significantly increasing the speed and capacity of land and water travel. This era also saw the advent of the telegraph, which improved communication. The early 20th century introduced combustion engines and automobiles, leading to modern road systems paved with materials such as macadam, concrete, and tarmac. The Wright brothers' first successful airplane flight in 1903 paved the way for aviation, which became an efficient mode for long-distance travel after World War I. Post-World War II developments further shifted the balance, as automobiles and aircraft began to dominate short-haul passenger and freight transport. Containerization in the 1950s revolutionized freight efficiency, while the jet engine made international air travel more accessible in the 1960s. Although rail and water transport declined in relative importance, high-speed rail networks emerged in Asia and Europe. Initially, transportation infrastructure in places like America was privately managed, but much of it was later nationalized. Recent trends, however, have seen a renewed interest in privatizing this infrastructure.

2. LITERATURE REVIEW

This chapter reviews various studies on public transportation, focusing on rapid transit systems such as Bus Rapid Transit Systems (BRTS) in India and abroad. The literature emphasizes that investment decisions should be objective and transparent, with project evaluations considering both economic efficiency and social impact. Researchers argue that national transit schemes can catalyze urban mobility improvements, and proper evaluation methods are essential to determine which transit projects will best serve the public.

Several studies discuss the evolution and benefits of BRTS. For example, Agarwal et al. (2010) highlight the flexible nature of BRTS in Indian cities, noting that station placement and commuter-focused planning are crucial for success. Arora and Prashanth (2012) demonstrate how demand-responsive scheduling can optimize public transport operations, using a case study from Bhubaneswar to illustrate improved route efficiency. Comparative studies by Carrigan et al. (2002) and others have analyzed BRTS systems in cities such as Bogotá, Mexico City, Johannesburg, and Istanbul, underscoring the importance of local context and integrated planning.

Additional research addresses the broader implications of urban transport, including sustainability, economic development, and environmental protection. Studies by Bhattacharya et al. (2016) and Elif Can Cengiz (2017) show that BRTS not only supports efficient mobility but also contributes to reduced carbon emissions and energy consumption. Other analyses focus on operational challenges, such as traffic impacts, scheduling, and system integration, highlighting that effective planning and the use of technology can significantly enhance transit performance.

In summary, the literature indicates that well-planned and managed public transportation systems—especially BRTS—play a critical role in addressing urban mobility challenges. When designed with a focus on sustainability, efficiency, and social equity, these systems can drive economic growth and improve the overall quality of urban life.

3. RESEARCH METHODOLOGY

3.1 INTRODUCTION

Research methodology outlines the systematic approach used to investigate a research problem. It explains the type of study, the methods for collecting and analyzing data, and the logical steps followed to address the issue.

This study combines both exploratory and descriptive approaches. Exploratory research involves gathering existing literature, data, and historical records to develop an overall framework and guide the research direction. Although its findings might not directly inform decision-making, they help in shaping the study's objectives and formulating hypotheses. In contrast, descriptive research (often known as statistical research) focuses on detailing the characteristics of the subject through measures like averages, frequencies, and other statistical calculations.

The methodology further incorporates the library research approach—accessing journals, books, manuals, databases, and websites—to collect the necessary historical facts and related data. In addition to these, the text briefly mentions

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experimental research, a method where variables are manipulated and changes are observed, which is commonly applied in various scientific disciplines.

According to Kothari (2006), research methods are categorized into library research, field research (involving observations, surveys, interviews, etc.), and laboratory research. This classification aids in selecting the most appropriate technique based on the research problem.

Overall, the methodology section clarifies the study's design by describing how the literature review, data collection, and analysis are conducted to systematically address the research problem.

3.2 HIGHLIGHT OF THE INVESTIGATION KEY TARGETS

The objectives of the study are outlined below:

1. To investigate and contrast Bhopal's Urban Non-Rapid Transport and BRTS operational performance.
2. To research and contrast Bhopal's Urban Non-Rapid Transport and BRTS's financial results.
3. To investigate and contrast the revenue and expense processes of BRT and urban non-rapid transit in Bhopal. 4. To examine how government agencies and municipal businesses contributed to the growth of these cities' transport networks.
4. To comprehend the elements influencing how well the public road transport system performs. 6. To comprehend commuters' opinions regarding various public road transport options
5. To suggest actions to enhance the functionality of the public road transport system.

SELECTED CITY: BHOPAL

Bhopal was the chosen city to examine the financial performance of India's rapid-transit and non-rapid transit systems. The selection of Bhopal for research was based on two primary criteria.

i. The city needs to provide both non-rapid and quick public road transit. ii. The city's public transport system, both rapid and non-rapid, has been operating for a while and has provided good services.

4. DATA COLLECTION

Comparing the financial performance of two distinct categories of public road transport service providers in a few Indian cities was the primary goal of the study. In essence, this called for the secondary information from these transit networks' financial statements.

To get the necessary data on sales, expenses, earnings, and losses, Bhopal City Buses and Bhopal-BRTS's financial statements and annual reports were heavily consulted. In addition to these service providers' annual budgets, balance sheets, profit and loss statements, and cash flows, a great deal of qualitative data was gathered via interactions with commuters and authorities.

To gather primary data, a structured questionnaire was distributed to commuters to determine their perceptions of the public bus services they utilise.

400 USERS OF BHOPAL'S QUICK ROAD TRANSIT SYSTEM PROVIDED RESPONSES, WHICH WERE COMPARED TO 400 USERS OF THE NON-RAPID ROAD TRANSIT SYSTEM. AS A RESULT, 800 RESPONDENTS IN ALL WERE QUESTIONED.

5. RESULT AND DISCUSSION

A COMPARATIVE ANALYSIS OF RAPID AND NON-RAPID TRANSPORT SYSTEM IN BHOPAL

The goal of the current study is to compare the rapid road transit system's (measured by revenues, expenses, profits, and losses) and non-rapid road transit system's (measured by commuter perceptions of service quality) economic and service quality performances in Bhopal.

This chapter's first section analyses the financial performance of the rapid and non-rapid road transport systems in the chosen cities, and its second section compares the two road transit systems' service quality.

BHOPAL

In Bhopal, there are two primary intra-city bus services: the rapid road transit services and the non-rapid city buses operated by BCLL. The yearly costs, earnings, and profit/loss for the two types of bus services are shown in the tables that follow.

Table 1 Perception about Timeliness-Bhopal

RATING	NON-RAPID ROAD PUBLIC TRANSPORT	RAPID ROAD TRANSIT SYSTEM
GOOD	48	87

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AVERAGE	19	9
POOR	33	4

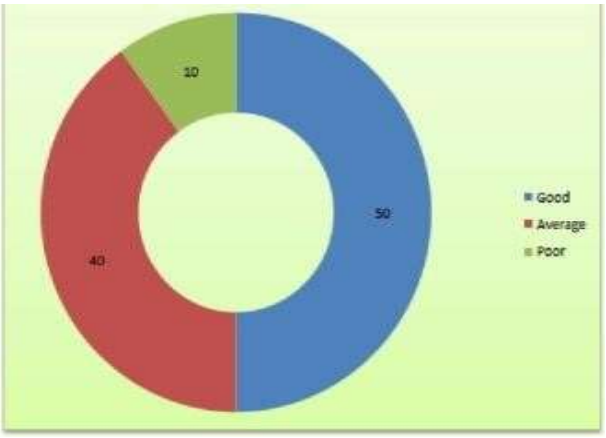

Figure 1 Perceptions about the Quality of Buses- Bhopal (Non-Rapid)

Table 2 Perception about the Conduct of Bus-Crew-Bhopal

RATING	NON-RAPID ROAD PUBLIC TRANSPORT	RAPID ROAD TRANSIT SYSTEM
GOOD	81	92
AVERAGE	14	6
POOR	05	2

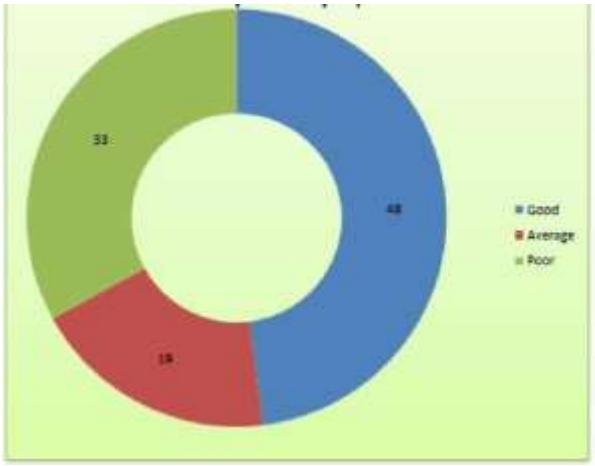

Figure 2 Perception about Timeliness-Bhopal (Non-Rapid)

Of the 100 commuters in the sample that took the BCLL-CITY BUSES, a nonrapid road transport system in Bhopal, 81 thought the bus crew's behaviour was good, 14 thought it was average, and 5 thought it was terrible. However, of the 100 sample commuters who used Bhopal's rapid road transport system (BRTS-MY BUS), 92 thought the bus crew's behaviour was excellent, 6 thought it was mediocre, and 2 thought it was bad.

Of the 100 sample commuters that used Bhopal's non-rapid road transport system (BCLL-CITY BUSES), 65 thought the frequency of the buses was good, 22 thought it was average, and 13 thought it was poor. However, of the 100 sample commuters who used Bhopal's rapid road transport system (BRTS-MY BUS), 85 thought the frequency of the buses was good, 09 thought it was average, and 06 thought it was poor.

ASSOCIATION BETWEEN THE TYPE OF PUBLIC ROAD TRANSPORT AND COMMUTERS' PERCEPTION

This section looks into whether commuter perceptions of the quality of bus service are influenced by the type of public transport available.

The relationship between the kind of public road transport and commuter perceptions of the general calibre of bus services has been examined using the chi-square test.

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Analysis has been done on how commuters see the following aspects of bus services.

1. Bus (vehicle) quality;
2. timeliness;
3. safety
4. Sufficient Routes
5. Bus Tickets
6. Bus Crew Conduct
7. Bus Frequency
8. Technology Use

Research has been done on the relationship between commuter perceptions and the kind of public road transport available in Bhopal.

6. CONCLUSIONS AND FINDINGS

This research attempts to make a comparative analysis of the rapid road transit system and non-rapid road transit system in Bhopal. The economic performance is measured by revenues, expenses, profits and losses and service quality performance as measured through the commuter's perception about the quality of bus services.

BHOPAL AS A CITY

Bhopal is one of the cities which has both; rapid as well as non- rapid road transit systems run by the state. Bhopal City Bus is the non-rapid road transport service whereas Bhopal-BRTS (My Bus) is the rapid road transit system. Both are managed by Bhopal Municipal Corporation. Following are the main findings regarding the public road transportation in Bhopal.

5.1 FINDINGS ABOUT THE ECONOMIC PERFORMANCE

1. Both non-rapid (Bhopal City Bus) and rapid (Bhopal-BRTS) road transport systems in Bhopal are making considerable losses.
2. However, the total losses of Bhopal City Buses were greater than the losses of BRTS.
3. The total loss of Bhopal City Buses during 2018, 2019 and 2020 was around Rs. 43 crores per annum on average.
4. The total expenses of city buses for the selected three years were around Rs. 94 crores on average.
5. The total revenue of Bhopal City Buses for the selected three years was around Rs. 50 crores on average.
6. The total loss of Bhopal-BRTS for the same period was around Rs. 21crores per annum on average.
7. The total expenses of Bhopal-BRTS for the selected three years were around Rs. 61 crores on average.
8. The total revenue of Bhopal BRTS for the selected three years was around Rs. 41 crores on average.
9. The main reasons for higher losses to Bhopal City Buses as compared to the BRTS are limited number of passengers, competition from local auto rickshaws and lower bus fares.
10. The main reasons for losses to BRTS are stagnant passenger traffic and competition from Shared Rickshaw Services (Shuttle). Lot of people prefer these Shuttles as compared to BRTS buses as their frequency is very high, waiting time is very less and they are more hassle free.

5.2 FINDINGS ABOUT THE SERVICE QUALITY

The association between the type of public transport and the commuters' perception about the quality of bus service in Bhopal was determined by using the statistical tool of chi-square. Following are the findings related to the city of Bhopal.

1 The 'quality of rapid transit (Bhopal-BRTS) buses' is significantly better as compared to the 'quality of non-rapid transit (Bhopal City Buses) buses' as per the commuter's perception. Thus, the null hypothesis (Ho) that there is no association between the type of public transport and quality of buses stands rejected.

2 The 'timeliness of rapid transit (Bhopal-BRTS) buses' is significantly better as compared to the 'timeliness of non-rapid transit (Bhopal City Buses) buses as per the commuter's perception. Thus, the null hypothesis (Ho) that there is no association between the type of public transport and timeliness of buses stands rejected.

3 The 'safety in rapid transit (Bhopal-BRTS) buses' is significantly better as compared to the 'safety in non-rapid transit (Bhopal City Buses) buses as per the commuter's perception. Thus, the null hypothesis (Ho) that there is no association between the type of public transport and safety in buses stands rejected.

The 'adequacy of routes of non-rapid transit (Bhopal City Buses) buses' is significantly better as compared to the

'quality of rapid transit (Bhopal-BRTS) bus as per the commuter's perception. Thus, the null hypothesis (Ho) that there is no association between the type of public transport and adequacy of routes of buses stands rejected.

4 The 'Bus-Fare of rapid transit (Bhopal-BRTS) buses' is significantly higher as compared to the 'bus-fare of nonrapid transit (Bhopal City Buses) buses as per the commuter's perception. Thus, the null hypothesis (Ho) that there is no association between the type of public transport and bus-fare stands rejected.

5 The conduct of bus-crew in rapid transit (Bhopal-BRTS) buses' is not significantly better as compared to the 'conduct of bus-crew of non-rapid transit (Bhopal City Buses) buses as per the commuter's perception. Thus, the null hypothesis (Ho) that there is no association between the type of public transport and quality of buses stands accepted.

The 'Use Of Technology In Rapid Transit (Bhopal-Brts) Buses' Is Significantly Higher As Compared To The Use Of Technology In Non- Rapid Transit (Bhopal City Bus) Buses

As Per The Commuter's Perception. Thus, The Null Hypothesis (Ho) That There Is No Association Between The Type Of Public Transport And Use Of Technology In Buses Stands Rejected.

7. REFERNECES

[1] Agarwal PK, Sharma Anupama, Singh AP, An Overview on Bus Rapid Transit System, Journal of Engineering Research and Studies Vol. I Issue: II, 2010.

[2] Arora Sameep and Prashanth proceedings of umi 2012, JRB, 2012.

[3] Bhattacharya Shrimoyee, Sonali, Anushree Patro, Sujaya Rathi Creating Inclusive Cities: A Review of Indicators for Measuring Sustainability for Urban Infrastructure in India, Environment and Urbanization ASIA , Vol. 7 Issue: 2, 2016.

[4] Chaudhari Dron and Prof N.D. Haziani, Traffic Impact Analysis of BRTS- A case study of Ahmedabad BRTS, IJEDR, Vol. 2 Issue 2, 2014.

[5] Dr. Harish M Urban Transport and Traffic Management-For Sustainable Transport Development in Mysore City ', ITJC Journal, Vol.: Issue: 2013.

[6] Dr. Verma Ashish, V. Harsha, Mehvish Shah Urban Transport Policies in India in context to Climate Change: An International Perspective' 10th Annual Conference of Knowledge Forum Venue: National Institute of Advanced Studies (NIAS), Bangalore 27-28, November, 2015

[7] Electricwala Fatima, Rakesh Kumar Framework of public bus transit in Indian cities ', International Journal of Sustainable Environment, 2013.

[8] Elif Can Cengiz Bus rapid transit: An environmental friendly transport solution for Istanbul'The International Journal of Transport, Development and Integration, Volume 1-Issue 1, 2017.

[9] Gaurkar Vaibhav Systematic Organization of Para-transit System in Context of Public Transport System: A Case Study of Surat City'Journal of Engineering Research and Applications Vol. 3, Issue 6, 2013.

[10] Getachew Legese, Pablo Evia, Daniel Tutu Benefoh, Comparative assessment of success and failure factors for implementation of bus rapid transit system in Accra & Bogota, Interdisciplinary term paper, ZEF Bonn, 2014

[11] Gupta Kanika and Ved Vyas Jayprakash Dwidedi BRTS: An Effective Mode of Public Transport, International Journal of Innovative Engineering Research (IJIER) Vol. 1 Issue 1, 2014.

[12] Jishnu Gohel, A Comparative Review of BRT System Introduced in Ahmedabad, IJEDR, Vol. 3 Issue 1