Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 5, 1785-1792
2024
Publisher: Learning Gate
DOI: 10.55214/25768484.v8i5.1912

Bus rapid transport system for urban mobility in Ahmedabad: A people's perception of service quality and performance of BRTS

Venkat Ram Reddy Minampat[1], Sriram Divi[2*], Jyothi Singh Raghuvanshi[3]
[1,2]Department of Public Policy and Administration School of Liberal Studies Pandit Deendayal Energy University Gandhinagar, Gujarat; venkatram.reddy@sls.pdpu.ac.in (V.R.R.)
[2]Honorary Research Associate Faculty of Management Sciences Durban University of Technology Durban, South Africa; sriram_divi@yahoo.co.in (S.D.)
[3]Department of Public Policy and Administration School of Liberal Studies Pandit Deendayal Energy University Gandhinagar, Gujarat

Abstract: Around the world, bus rapid transit systems are gaining popularity as they are a low investment option compared to rail transport but have facilities that cater to rail transport Numerous Indian cities have chosen the concept under the Jawaharlal Nehru National Urban Renewal Mission Scheme. A quality and secure transportation system was one of the mission's key goals, therefore bus rapid transit systems were promoted. Everyone wants their commute to be a little faster, in fact wherever we are going is more comfortably than before. Jan Marg Bus Rapid Transit, India's first top-notch bus rapid system, was introduced in 2009 in Ahmedabad. The Jan Marg system set a benchmark for the country and had an impact upon systems all over India, including recently introduced Rainbow rapid-transit bus system in the twin cities of Pune and Pimpri-Chinchwad. Since May 2013, the Ahmedabad Bus Rapid Transit System has been successfully carrying bus passengers over a designated rapid corridor. With the introduction of Intelligent Transport Management Systems (ITMS), BRTS Transport services become more inclusive in nature. Services delivery became more efficient and qualitative in nature. This study's aim is to examine the performance of the system based on how users feel about BRTS integrated with ITMS under the improved services they have received under and where there may be even more room for improvement. A questionnaire was made, and passengers' perspectives were collected and evaluated. The majority of the inquiries revealed that the passengers were satisfied and largely approved of the system. The performance of the system will be enhanced if certain issues are properly addressed and fixed.

Keywords: *Brts, Janmarg, Tranportation, People's Perspective.*

1. Introduction

1.1. Challenges of Urban Transport

One of the biggest environmental issues of our day is the population expansion in Indian cities. The unrestricted movement of the rural people is the primary cause of the population expansion, not biological factors. India is concerned about the threat of overcrowded cities with insufficient services. Greater transportation demands exist in larger cities in terms of both traffic volume and trip distance. Either more public transportation facilities are provided, or there is a rise in the number of vehicles on the road as a result of increased private vehicle ownership. In India, the first paradigm is extremely popular. In metropolitan areas of India, this solves issues with traffic congestion, environmental pollution, and energy security. In India, owning a personal automobile is a sign of prestige, and a person's advancement is influenced by the size of the vehicle he or she possesses. The personal motoring movement has gained more attention as a result of the free market economy and cheap financing

* Correspondence: sriram_divi@yahoo.co.in

arrangements. This pattern cannot continue. It is generally acknowledged that efforts to address unsustainable travel habits necessitate a thorough understanding of travel patterns and the factors that influence a person's decision to use one form of transportation over another.

Total road fatalities per capita tend to decrease as the number of individuals using public transit in a town rises, making it a very safe mode of transportation. It is imperative to support policies that can lessen reliance on private transportation and enhance use of public transportation in the Indian setting. However, this is not an easy undertaking given the underlying reasons why people prefer private to public transit in most Level II cities.

The difference between rail and bus transportation is that rail has a defined corridor and unhindered movement, whereas buses typically share the road with other types of traffic. Modern railway transport is quick, but it demands significant upfront costs. When navigating city streets, public transportation vehicles, particularly buses, encounter significant obstructions. As a result, bus-operated public transport system becomes a sluggish mode of transportation, and an increasing number of people grow averse to using it. To overcome this urban challenges most of the states had preferred to coexist with multimode transport system like, BRT, Metro rail, Local Trains, Inland water transport and soon by adopting to the city conditions, topography and scope of future expansion. Ahmedabad city, Gujarat has chosen to go with BRTS as it was most convenient for the existing political, financial and infrastructural conditions in 2012.

1.2. Rapid growing Metropolitan city: Ahmedabad

Ahmedabad being a metropolitan and fast growing commercial capital of India placed as seventh largest, with an estimation of 9 Million plus population by 2025. Ahmedabad has a strong industrial base of, textile, chemicals, machinery and basic metals. It is fastest growing and contributes more than 60% of GDP to the Gujarat state. Ahmedabad is recognized as the UNESCO world heritage city. With the opportunities growing extensively after the then Chief Minister of Gujarat, becoming Prime Minister of India has also reflected on large scale internal migration in a large scale, which has led to congestion of city. Impact of congestion is much visible over the use of public amenities. According to latest available sources, 42% of population are dependent on Public transport and reaming on Private transport. Most of the challenge in the coming days would be convincing the public for use of public transport to avoid the environmental challenges and traffic congestions. Gujarat government has come forward by providing metro rail service to the commuters of twin cities. major findings on Ahmedabad public transport has concluded that, lack of last mile connectivity and bus stops at walkable distance as the major challenge in availing local public transport. This paper would assess the quality and performance of the public transport provided by the BRTS in Ahmedabad city in observation of the existing challenges.

1.3. Ahmedabad BRTS

Most of the Indian cities have preferred to construct a BRT system as part of the JNNURM scheme. A safe and high-quality transport network was one of JNNURM's key goals, and the BRT system was promoted. The UNEP report contains information on specific BRT system features in India (2013).How rapidly a BRT system can take over as the mainstay of a city's transportation system is demonstrated by the Jan Marg system in Ahmedabad. In 2009, a 12.5 km prototype corridor was constructed, and by 2013, it is anticipated to be extended to 88 km, giving connection throughout the city (ITDP, 2011).

The system is known as Jan Marg, which is Gujarati for "the way of the people". Starting in July 2009, the testing. On October 14, 2009, the first corridor from Pirana to the RTO junction was officially opened to the public by Narendra Modi, who was Gujarat's chief minister at the time. The BRTS's first phase's second half was officially inaugurated on December 25, 2009.Later, on September 15, 2012, it was extended from Shiv-ranjani to the Iskcon Temple, serving the eastern portion of the city, and to Kankaria Lake. It was extended from Soni ni Chali to Odhav on September 28, 2012. At a cost of $1,200 crore, the network was expanded to 89 km in December 2015.The project's third phase includes the

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 5: 1785-1792, 2024
DOI: 10.55214/25768484.v8i5.1912

Shivranjani-APMC and Jashodanagar- Hathijan, Sola-Science City, Narol-Aslali and Akhbarnagar-Gota Crossroads sections. It was approved in 2013. Female-only buses were introduced in January 2016. In the phased manner Ahmedabad Metro rail will eventually be linked with BRTS to integrate it with smart city mission. This intermodal combination of fast transit lines will provide connectivity to Gujarat International Finance Tec-City, which is also now under construction. The Ahmedabad model is being implemented in a number of cities, including Chennai, Bangalore, Mumbai, Amritsar, and Bhubaneswar. When considering system changes, evaluating the BRT system is crucial. At present BRTS provides services in 88 KM stretch, with 186 bus stops with 386 fleet size. Entire fleet of busses are outsourced which includes, vehicle, maintenance, fuel charges and driver expenses. They need to run 220 KM per day as per the financial agreement which will be renewed accordingly. At present more than 8000 staff work for BRTS services, all are out sourced. It is typically managed by 59 managers of AMC. State of Art Command and control center is the live monitoring center of BRTS, which is now integrated in Smart city mission. Intelligent Transport Management Systems helps tracking the movement of Buses, Revenue Tracking, connected with station, passenger footfall etc. vehicle scheduling and communication became live with ITMS. With the smart city

1.4. Research Objective

The service provider must make every effort to close the gap between the provided and perceived required, specified attributes. This is only possible if service providers are aware of consumers' demands and work to cater their services to those needs.

- The objective is to analyzing the service Quality of Ahmedabad BRTS service providers to the commuters.
- To analyze the BRTS performance form the commuter's perception.
- To enquire into, what the public transport users needed the most from the service providers.

2. Methodology

The service provider must make every effort to close the gap between the provided and perceived required, specified attributes. This is only achievable if service providers are aware of consumers' demands and work to accommodate their services to those needs. The objective is to provide advice on how operators can set up measurement procedures and choose precise metrics and goals. Providers of public transit need to be aware of what users need the most.

The participant's expectations for the quality of the bus service were obtained using SERVQUAL and SERVPREF instrument on ordinal scale and few open and close ended questions have been added to make the research more focused. The following definitions of the five service qualities are taken into account. Both the methods are used for assessing the level of service quality that takes into consideration each of the dimensions of service quality by evaluating the disparity between perceived performance levels of service quality and customer expectations. When a performance meets expectations, customers are thought to be satisfied; nevertheless, when a performance is below expectations, customers are said to be unhappy.

- Reliability: service reliability, availability of information.
- Assurance: drivers driving quality, security and safety issues.
- Tangibility: services availability, fares, route connectivity, comfort-on board, at bus stops.
- Empathy & Responsiveness: the professionalism of the administrative team, the behavior of field workers.
- The sample questionnaire was prepared and was consider in the present study.

2.1. Sampling and Data Collection

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 5: 1785-1792, 2024
DOI: 10.55214/25768484.v8i5.1912

Present data is based on a survey carried out among the users of Ahmedabad BRT to gain a feedback of the system and its operation form the commuter's perception. In all 104 commuters were surveyed, the feedback was collected through questioner prepared over google form. Questions were prepare based on the services which are existing/ provided by BRTS to its commuters. The survey has tried to explore the expectations of commuter's as well.

Table1.
Commuter satisfaction values based on service quality and service performance.

Service dimension	Service quality	Sub- questions	Highly satisfied	Satisfied	Dissatisfied
Tangibles	Service availability	Frequency of the bus	23.6%	67.4%	9%
		Difficulty in purchasing ticket during peak hours	52.8%	22.5%	24.7%
		Tickets purchasing mode	12.4% Online ticketing	79.8% Offline ticketing	7.8%
		Internet	Not Available	NA	NA
		Ladies reserved seats	18.2%	78.6%	3.2%
	fares	Ticket charges	39.3%	57.3%	3.4%
	Route connectivity	Route connectivity	10%	86%	4%
	Comfort-on-board, at bus stops and stations	Seating, AC facility	15.7%	70.8%	13.5%
		Cleanliness	23.6%	64%	12.4%
		Overloading	20.1% (never)	36.5% (frequently)	43.4%(very frequently)
		Onboard ticketing	NA	NA	NA
	Buses accessibility	Types of accessibility to BRTS	36.2% Public transport	18.9% Non-motorized transport	44.9% Private transport
		Flat boarding, wheel chair service, service to PH, slide doors, both side doors.	18.2%	65.3%	16.5%
Reliability	Service reliability	speed	25.8%	64%	10.2%
		time	10%	61.8%	28.2%
		Non BRTS vehicles in BRTS lanes	3.4% (NOT AT ALL)	52.8% (RARELY)	43.8% (MOST OF THE TIME)

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 5: 1785-1792, 2024
DOI: 10.55214/25768484.v8i5.1912

	Availability of information	Display boards and announcements Inside bus	64%	31.5%	4.5%
		Display boards and announcements Inside station	83.1% (Yes)	0%	16.9% (no)
Responsiveness and empathy	The professionalism of the administrative team	Back to back busses in same route	10.1%	39.3%	50.6%
		Waiting time	11.9%	80.2%	7.9%
		Breakdown repair time	NA	NA	NA
		Grievance redressal	0%	94.4% (Never complained)	5.6%
	The behavior of field workers	Ticketing staff and security guards	39.4%	46.3%	14.3%
Assurance	Driver's driving quality	Driving quality	9%	80.5%	10.5%
		overspending	11.3%	82.3%	6.4%
		Harsh breaking	20.1% not at all	60.9% some times	19% most of the times
		Signal stopping	9.6%	70.1%	20.3%
	Security and safety	Security inside bus	9.5%	81.5%	9%
		Inside station	11.6%	79.3%	9.1%
		Pedestrian Crossing	0%	28.3%	71.7%

Figure 1.
Integrated Service dimensional values.

3. Results and Discussions

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 5: 1785-1792, 2024
DOI: 10.55214/25768484.v8i5.1912

Tangible service Dimension: Major services like, services available, fares, rote connectivity and comforts on the bus route and bus accessibility parameters were considered. From the above five Major Service parameters, further 12 sub-questions were identified to enquire. For which, 58.81 respondents have replied satisfactorily, 24.55 have responded highly satisfactory and remaining 16.61 has responded as dissatisfied. From the above finding it has been a positive outcome, that more than 83% of the commuter have shown satisfaction and higher satisfaction in the tangible service dimension. Our findings revealed that, fares have been most attractive point for the commuters to travel by BRT followed by woman provided with seats reserved(is same with all public transport) is highly appreciated. Internet service is totally unavailable in BRTS busser. Over loading of the busses is a common issue highlighted by maximum number of commuters. And accessibility to the BRT stations is mostly available through private mode of transport like Auto rickshaws or own vehicle. This has discouraged most of the commuters from taking the BRTS services constantly. Based on the feedback for the commuters, more number of BRT fleet need to be increased in certain pockets which are highly crowded or starting points of educational institutions and connectivity to the stations with public transport facility will increase in the number of users significantly. In our survey, Maximum number of respondents being student community or young generation between 18 to 30 age group prefer to travel by BRT. Facilitating them with free or cheaper internet service might attract more number of youngsters.

Reliability Service Dimension: The major services parameters like, Service reliability and Availability of Information to the commuters have been considered under reliability dimension. Under both services, five sub-questions were asked, which includes, time, speed, non-interception, display boards and announcement at the station and inside the busses. 37.26% have replied highly satisfactory, 42.02 have responded as satisfactory and 20.72 are dissatisfied. From the two major services, availability of information scores more than 79% as satisfied and highly satisfied. Accuracy of busses as per the display time is highly appreciated. Speed limit of the bus is satisfactory. The major dissatisfaction is visible, where the vehicles other than BRT passes into those reserved lanes and hinder the movement of BRT busses. When the researcher approached the AMC to reply on major complains of non-BRT buses in those reserved lanes, they stated, that few measures have been taken by hiring personnel and placing barricades at feeder routes and junctions/ circles, despite not much results are satisfactory. AMC strongly convinced that, much awareness has been spread, which started avoiding private vehicles use those reserved lanes. Researcher had observed malfunctioning of display boards and announcement systems in most of the busses, which can be improvised to international standers to make serve more qualitative.

Responsiveness and Empathy Dimension: Major Service parameters like professionalism of administrative team and behavior of the field workers has been enquired. Further five sub-questions have been asked where, 15.35% of the commuters have responded highly satisfied, 65.05 has responded satisfied and 19.6 are dissatisfied. More than 80% of users are Satisfied and highly satisfied for not as much of waiting period in the bus stations. To our surprises grievances are resolved at highest precession pertaining to recovery of stolen items. When researcher enquired with AMC about their reasons for highly satisfactory grievance resolution results, they explained and credited ITMS service available in BRTs. With ITMS live monitoring (CCTV cameras at station and inside the busses are available) and real time governance is possible for which passengers moment can be monitored and stolen or misplaced items can be easily tracked(max number of grievances are misplaced items). But at the same time computers have complained of back to back busses on the same route which again point finger to the shortfall in ITMS. Ground level staff has been kind and supportive most of the times. Commuters have mentioned about security breach in certain pockets, where passengers walkout without scanning the return tickets. When approached AMC, they told, it might be due to non-functioning of tungsten machine in very few station.

Assurance Dimension: major service qualities like drivers driving quality and security and safety of the passengers were enquired through 7 different sub-question. Driving quality, over speeding, harsh

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 5: 1785-1792, 2024
DOI: 10.55214/25768484.v8i5.1912

breaking and stopping at signal were questioned under deriving quality whereas safety and security inside bus and station, pedestrian crossing to approach station, separate busses to Male and Female and reporting of stolen items were enquired. 79 % of respondents are satisfied and highly satisfied and 20.85 are dissatisfied. This clearly reveals, under assurance dimension, BRTS performed well. This is very much associated to ITMS and initiatives of AMC like, more than 300 different list of penalty can be imposed on the drives for harsh driving, overspending, use of mobile while driving, etc. To be mentioned that, the busses and staff are out sourced as per the quotation floated by the AMC. AMC is currently monitoring more than 8000 outsourced staff with limited 59 managers of AMC. We could find hardly few respondent, who had raised a grievance, who so ever has raised were not satisfied with the complaint taken or they were not aware of the complaint mechanism at all. 30.3 presents of respondents have shown interest towards special busses for woman. Maximum number of respondents has shown dissatisfaction in the case of universal accessibility /pedestrian crossing towards station and coming out of station. Which, BRTS and AMC should review their station accessibility plan.

3.1. Further Scope for Improvement to meet People Expectations

As we have enquired with open ended questions, most of the responses have been clubbed and placed under further scope of improvement. This questions were asked, what more you are expecting from BRT services. Most of the respondent's suggestions are as follows;

Commuters were expecting to connect BRTS between the twin cities i.e. Gandhinagar and Ahmedabad. To overcome overcrowding on busses, suggested for more buses in that routes by maintaining frequency, fleet size should be increased and replaced by e- busses and more seating capacity buses like double decks can be introduced. Waiting space inside the bus station can be increased to accommodate increasing number of commuters. Limited passengers should be allowed in one bus. Few of them were dissatisfied with Speed and connectivity has suggested more accuracy on the lines of Metro rail. There should be improvement in the quality of seats in BRTS. On the lines of Pink busses of Indore BRTS, special woman buses should be brought in. quality of services like cleanliness in the busses, effective Air conditioning during summers should be maintained. There can be vending machines and portable drinking water facility inside the station. Student passes should be more popularized and connected with cash back options at the time of purchasing online products. Commuters were expecting security guard inside the bus to avoid incidents (molestation during peak hours and rush hours) and for increasing job opportunity as well.

4. Conclusion

From the above conducted research, BRTS in Ahmedabad has shown a strong satisfaction among the commuters. Exception too few as discussed and The survey got its own limitations, as it was collected online that too in English language that means only few are literate could respond to that. Offline interaction with the commuter was missing. Apart from the limitations, satisfactory levels are majorly reflected based on the qualitative service of BRTS. Commuters are satisfied to the BRT standards compared to the preexisting level of public transport services. BRTS when compared to the global standards need to upgrade on few fronts like, Bicycle –sharing integration, Bicycle parking, universal access (including those who are physically, visually, and/or hearing-impaired, as well as those with temporary disabilities, the elderly, children, parents with strollers, and other load-carrying passengers), integration with other transport modes(fare payment and physical integration) pedestrian Access and safety, safe and comfortable stations(weather protected , safe and attractive), docking bays and sub stops, Stations are spaced, on average, between 0.3 km and 0.8 km apart, Minimum Bus emissions(converting busses into e- busses), passing lanes at stations to maintain higher speed, both late night and weekend services and etc. from the findings BRTS is moving in the right direction by satisfying and standing to the bench mark of the global parameters. For which commuters are satisfied. With the smart city mission, Ahmedabad BRTS would achieve the intended objective to make the urban transport integrated, environmental friendly, secure and reliable mode of transport to its citizens. If

Edelweiss Applied Science and Technology
ISSN: 2576-8484
Vol. 8, No. 5: 1785-1792, 2024
DOI: 10.55214/25768484.v8i5.1912

some of these recommendations are looked upon effectively and worked upon then BRTS can deliver much higher satisfaction level of road transport for the public and can increase the people's perception towards public transport in a more positive way which will have a great impact in our society.

References

[1] Ahmedabad Municipal Corporation. (2007). Detailed Project Report for Ahmedabad Bus Rapid Transit System.
[2] Times of India Article (9/11/22), BEST inks Rs 3,675 crore deal, India's biggest, to get 2,100 e-buses in 12 months.
[3] Shalini sinha. (2019, April). BRT Governance and Challenges – A Case of Indian Cities
[4] Centre of Excellence in Urban Transport, CEPT University. (2016). Retrieved October 20, 2016, from Service Level Benchmark in Urban Transport: http:// utbenchmark.in
[5] Miss. Monicaba Mahendrasinh Vala (2022, July). Enhancing the Public Transportation Service in Rajkot City. A Thesis Submitted to Gujarat Technological University.
[6] Sudhanshu Dube, Sandeep Narulkar. (March 2017). Evaluation of Indore BRT: Passengers' Perception of Services and Improvement Opportunities. International Journal of IT, Engineering and Applied Sciences Research (IJIEASR)
[7] Karim Zehmed, Fouad Jawab (May 8, 2020). A Combined Approach Based on Fuzzy SERVPERF and DEA for Measuring and Benchmarking the Quality of Urban Bus Transport Service at the Route Level. Industrial Engineering & Management Systems.
[8] Times of India Article (Feb, 2021). Why BRT in Ahmedabad a stunted public transport system?
[9] Times of India Article (Sept, 2022). Why battery recycling is key to India's green goals.
[10] Times of India Article (Nov, 2019). In four years, 22 fatal BRTS accidents in Ahmedabad.
[11] CES. (2006). Integrated Public Transport System for Surat. GIDB.
[12] Ajitesh Bansal and Deepu Asheibam(Nov 2014) Mapping Ahmedabad's BRTS Users.
[13] Shambhavi Kumari (2022) Service Operations Management - BRTS
[14] Monika Gupta(2021) Adoption strategies to increase ridership
[15] Shivangi(2021) Fare collection and Ticketing, BRTS Ahmedabad
[16] Shravan Satyen Engineer(2021) Integration of Feeder systems for BRTS of Ahmedabad
[17] Lokre, A. (2017). Impact of Decision Making on BRTS Implementation: Comparing Experiences in Ahmedabad and Indore. CEPT University. Ahmedabad: CEPT University.