

Enhancing Bus Rapid Transit System (BRTS) Passenger Satisfaction through Service Quality at Ahmedabad Janmarg Limited

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Received: 28-06-2023

Revised: 15-07-2023

Accepted: 31-07-2023

ABSTRACT

This research article investigates the relationship between service quality and passengers' satisfaction in the context of Bus Rapid Transit Systems (BRTS). As urbanization accelerates and the demand for efficient public transportation grows, understanding the factors that contribute to passengers' satisfaction becomes imperative for the successful implementation and sustainability of BRTS.

The study employs use of survey to gather comprehensive insights from BRTS passengers. The research framework integrates the SERVQUAL model and other relevant theories to assess the dimensions of service quality, including reliability, responsiveness, assurance, empathy and tangibility.

A structured survey was distributed to a representative sample of BRTS passengers. The analysis explores the relationship between perceived service quality and passengers' satisfaction levels identifying critical factors influencing the overall passenger experience.

This research article aims to contribute to the growing body of knowledge on public transportation management specifically focusing on BRTS. By identifying key factors influencing passengers' satisfaction, transit authorities can implement targeted improvements, ultimately leading to enhanced service quality and a more positive overall transit experience for BRTS users.

Findings from this research contribute to the theoretical understanding of service quality in BRTS and provide practical implications for transit authorities and policymakers. Recommendations for enhancing specific service quality dimensions are discussed to improve passenger satisfaction and encourage sustainable ridership.

Keywords: bus rapid transit system (brts), public transportation, service quality, passenger satisfaction, servqual

I. INTRODUCTION

Bus Rapid Transit System (BRTS) has emerged as a transformative and innovative approach to public transportation, designed to address the escalating challenges associated with urban mobility. With the rapid urbanization and increasing congestion in cities, there is a growing need for efficient, reliable, and sustainable public transportation systems. BRTS represents a contemporary solution that combines the flexibility of buses with the efficiency of rail-based systems, offering a cost-effective and scalable alternative to traditional transit modes.

BRTS is characterized by a dedicated lane or corridor exclusively for buses, strategically designed stations, priority traffic signals, and efficient boarding systems. The integration of modern technologies and well-planned infrastructure distinguishes BRTS from conventional bus services, providing a seamless, high-quality transit experience for passengers.

The success of BRTS lies in its ability to offer a fast, safe, and reliable mode of transportation, contributing to reduced travel times, decreased traffic congestion, and lower environmental impact. This transit system has gained popularity worldwide, with numerous cities adopting and adapting the BRTS model to meet the unique demands of their urban landscapes.

Ahmedabad Janmarg Ltd. (100% Subsidiary of Ahmedabad Municipal Corporation)

The Ahmedabad Janmarg BRTS (Bus Rapid Transit System) project is a pioneering public transportation initiative implemented in the city of Ahmedabad, Gujarat, India. Launched in October 2009, Janmarg has become a model for BRTS systems in India and has received recognition for its efficiency, sustainability, and impact on urban mobility.

Ahmedabad's Janmarg BRTS has been hailed as a success story in urban transportation, serving as a benchmark for other Indian cities exploring BRTS implementation. It has demonstrated the potential for improving the quality of public transport services, reducing traffic congestion, and enhancing overall urban mobility. The success of the Janmarg project has inspired similar initiatives in different cities across India, contributing to the on-going evolution of sustainable urban transportation infrastructure in the country.

II. LITERATURE REVIEW

Passenger Satisfaction

Passenger satisfaction towards Bus Rapid Transit Systems (BRTS) is a critical aspect that directly influences the success and sustainability of these transportation initiatives. As stated by Parahoo et al. (2014), the satisfaction of customers with public transport services mirrors their sentiments. Conversely, it is equally crucial to consider customer dissatisfaction, as it can influence negative perceptions regarding the provided product or service. Friman and Felleson (2009) conducted a study on customer satisfaction with public transport services across six European cities. Their findings revealed that customers express contentment with the design of buses and bus stops, as well as with factors related to safety and reliability. Beirao and Cabral (2007) examined the sources of dissatisfaction among public transport passengers. Passengers highlighted time wastage attributed to prolonged waiting periods, extended walking distances, overcrowding, and unreliability, along with a lack of comfort and uncertainty regarding travel times. Similarly, Gatersleben and Uzzell (2007) discovered that delays and waiting times in public transport contribute to a negative attitude among riders, inducing stress due to the inconsistency and unpredictability of the service, leading to significant time expenditure for passengers.

It is crucial to acknowledge that numerous variables can influence consumer satisfaction and dissatisfaction. Nevertheless, this study specifically concentrates on examining the impact of the service quality model (SERVQUAL) and pricing on passenger satisfaction with public transport.

Service Quality:

The assessment of service quality serves as a measure of the efficacy of rendered services. Recognized as pivotal, service quality plays a crucial role in shaping customer satisfaction and, consequently, fostering customer loyalty (Lovelock and Wirtz, 2011).

SERVQUAL, a widely used model for assessing service quality, can be applied to Bus Rapid Transit Systems (BRTS) to understand and improve the passenger experience. The SERVQUAL model, developed by Parasuraman, Zeithaml, and Berry, identifies five key dimensions of service quality: reliability, responsiveness, assurance, empathy, and tangibles. Here's how SERVQUAL can be adapted for BRTS:

1. Reliability:

- Original Dimension: Ability to perform the promised service dependably and accurately.
- BRTS Application: Punctuality, adherence to schedules, and consistency in providing reliable services are critical for BRTS. Passengers expect buses to run on time and the system to deliver services as scheduled.

2. Responsiveness:

- Original Dimension: Willingness to help customers and provide prompt service.
- BRTS Application: How quickly and effectively BRTS responds to passenger needs and queries. This includes timely communication about route changes, service disruptions, and addressing passenger inquiries promptly.

3. Assurance:

- Original Dimension: Knowledge and courtesy of employees and their ability to convey trust and confidence.
- BRTS Application: The competence and courtesy of BRTS staff, including drivers and customer service personnel. Passengers should feel confident in the competence of the system and its staff.

4. Empathy:

- Original Dimension: Caring, individualized attention provided to customers.
- BRTS Application: Understanding and addressing passengers' specific needs and concerns. This involves personalized assistance, especially for passengers with special requirements, and a customer-centric approach.

5. Tangibles:

- Original Dimension: The appearance of physical facilities, equipment, personnel, and communication materials.
- BRTS Application: The physical aspects of the BRTS system, including the cleanliness and maintenance of buses and stations, the quality of information displays, and the overall appearance of the transit infrastructure.

Applying the SERVQUAL model to BRTS involves assessing each dimension through passenger surveys, feedback mechanisms, and direct observations. By understanding passenger perceptions in these areas, transit authorities can identify areas for improvement, prioritize enhancements, and ultimately enhance the overall service quality of BRTS. Regular

evaluations using SERVQUAL can contribute to on-going improvements in BRTS services and increased passenger satisfaction.

Responsiveness in service provision involves delivering prompt service and demonstrating a willingness to assist customers (Budiono, 2009). Hoffman and Bateson (2006) elaborate that responsiveness signifies the commitment of service providers to consistently deliver services in a timely manner. This dimension primarily revolves around addressing customers' complaints, inquiries, problems, and questions. Studies conducted by Gronroos (1984), Zineldin (2005), and Zheng and Jiaqing (2007) have demonstrated that improving the responsiveness of services enhances customer satisfaction and contributes to the reputation and profitability of businesses. This underscores responsiveness as a crucial attribute of service quality influencing consumer satisfaction. However, Oyeobu et al. (2014) presented a contrary view, identifying a negative relationship between responsiveness and customer satisfaction. Despite the mixed results in previous studies regarding the relationship between responsiveness and satisfaction, maintaining and prioritizing this quality is crucial from the passengers' perspective. Staff willingness to assist and promptly respond to passengers' demands are identified as key attributes for customer satisfaction (Radam et al., 2014).

The assessment of reliability within public transport systems encompasses various factors, including travel time (Li et al., 2010), service frequency (Phoebe, 2017), punctuality (Murambi and Bwisa, 2014), and the provision of information regarding service delays (Friman, 2004). All of these elements play a crucial role in influencing customer satisfaction. Research by Oyeobu et al. (2014) discovered a robust correlation between the reliability dimension and customer satisfaction in the context of Nigeria's public transport. Barabino et al. (2012) similarly identified on-board safety, bus reliability, cleanliness, and frequency as the most significant attributes for measuring the service quality of urban bus transport. In a study conducted by Friman and Edvardsson (2003), attributes contributing to the service quality of public transportation included reliability, simplicity, design, and employee behavior. Additionally, several researchers have emphasized the importance of dimensions such as reliability, frequency, comfort, information availability, driver behavior, and cleanliness as key factors influencing passenger satisfaction in public transport (Bates et al., 2001; Beirao and Cabral, 2007; Hensher et al., 2003).

Assurance is characterized by the knowledge, courteousness, and the establishment of trust and confidence in employees (Nutsugbodo, 2013). This dimension includes four determinants: safety, efficiency, credibility, and courtesy (Azani et al., 2017). Korale et al. (2015) further elaborate that assurance encompasses the firm's competence, operational security, and courtesy extended to customers. Additionally, the knowledge and communication skills of workers are considered elements of the assurance dimension, influencing consumer satisfaction with a service (Wijaya, 2009). Friman et al. (2019) underscore the safety factor as a crucial dimension in assessing customer satisfaction with a service. In research conducted by Rajeswari and Kumari (2014), the assurance dimension is found to have a significant impact on customer satisfaction. Providing assurance influences customers to remain loyal and continue using the service in the future. Furthermore, when a bus assures cleanliness, punctuality, roadworthiness, and regular maintenance, it motivates customers to use the bus service repeatedly (Mudenda and Guga, 2017). The assurance dimension significantly affects service quality in India's railway services (Prasad and Shekar, 2010), Spain's local bus service (Perez et al., 2007), and airline passengers (Abdullah et al., 2012).

Empathy is characterized by providing individualized attention to customers, incorporating effective communication and a deep understanding of their needs (Etgar and Fuchs, 2009). Within public transportation services, empathy is identified as one of the essential attributes of service quality (Vanniarajan and Stephen, 2008). Contrarily, Oyeobu et al. (2014) conducted research that revealed a modest correlation between empathy and customer satisfaction, accounting for only 40% of the total success of the service. Similarly, Mudenda and Guga (2017) also observed that empathy demonstrated a less significant impact on customer satisfaction. The findings suggest a divergence in results concerning the relationship between empathy and customer satisfaction. Nonetheless, as highlighted by Zeithaml and Bitner (2006), customers consistently seek their needs to be fulfilled. To meet customer satisfaction, service providers must comprehend the significance of customers, understand their needs, and actively engage in empathetic interactions with passengers.

Tangibility refers to the physical aspects such as facilities, equipment, and the presence of employees in a facility. It encompasses two types: physical goods and supports. Physical support pertains to the helpfulness of employees in service production, while physical products denote goods used during the process and production of services (Nor, 2013). Berry et al. (1990) assert that the tangibility dimension creates the initial impression on passengers and is typically assessed first, preceding other dimensions of service quality. Jun (2012) and Mudenda and Guga (2017) concluded that tangibility is a dominant and crucial attribute when evaluating customer satisfaction in public transportation. However, Nkyami (2016) presented a contrasting view, reporting that the tangibility variable does not impact customer service in intercity public transports. Given that tangibility represents visible aspects of services that can be observed and sensed by customers, its presence is likely to significantly influence the overall service quality perception of a provider.

III. RESEARCH METHODOLOGY

The study was conducted with the sample size of 250 respondents. Convenient sampling method was used to collect the responses through structured questionnaire. Secondary data were collected from Research papers, Websites and other online sources.

3.1. Hypothesis

H₀1: There is no significant relationship between Responsiveness and Passenger Satisfaction with Bus Rapid Transit System Ahmedabad.

H₀2: There is no significant relationship between Reliability and Passenger Satisfaction with Bus Rapid Transit System Ahmedabad.

H₀3: There is no significant relationship between Assurance and Passenger Satisfaction with Bus Rapid Transit System Ahmedabad.

H₀4: There is no significant relationship between Empathy and Passenger Satisfaction with Bus Rapid Transit System Ahmedabad.

H₀5: There is no significant relationship between Tangibility and Passenger Satisfaction with Bus Rapid Transit System Ahmedabad.

IV. ANALYSIS & DISCUSSION

Out of the 250 questionnaires collected, 235 were found to be valid. The data collected was summarized and it was found that out of valid 235 questionnaires, 160 (68%) were Male respondents and 75 (32%) were Female respondents. Majority (176/ 75%) was from the age-group of 21-40 years. Out of the total 235 respondents, 132 (56%) were having Graduation degree.

4.1 Reliability Analysis

Reliability refers to the extent to which a scale produces consistent results, if the measurements are repeated a number of times. Reliability Analysis is performed. Cronbach's Alpha is used as estimate of the reliability. If Cronbach's Alpha is found between 0.7 and 1, the internal consistency is said to be acceptable.

Factors	Mean	Standard Deviation	Cronbach's Alpha
Responsiveness	3.459	0.76	0.879
Reliability	3.784	0.89	0.902
Assurance	3.899	0.82	0.931
Empathy	3.642	0.79	0.894
Tangibility	3.916	0.83	0.918
Passenger Satisfaction	3.468	0.91	0.856

It can be inferred that for all the factors under study i.e. Responsiveness, Reliability, Assurance, Empathy, Tangibility and Passenger Satisfaction, the Cronbach's Alpha is >0.7 which means that items under factors are consistent.

4.2 Multiple Regression Analysis

The relationship among variables was analyzed using Multiple Regression Analysis.

Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.681	.495	.476	1.4058		
Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.765	1.108	-	2.249	0.007
	Responsiveness	0.205	0.068	0.159	2.472	0.004
	Reliability	0.214	0.052	0.268	1.936	0.025
	Assurance	0.104	0.066	0.135	1.253	0.010
	Empathy	0.149	0.057	0.127	1.344	0.309
	Tangibility	0.146	0.051	0.141	2.364	0.230

The value of R is 0.681. It represents the multiple correlation coefficients, indicating the strength and direction of the linear relationship between the predictors and the dependent variable. R Square is 0.495. It signifies the proportion of the variance in the dependent variable that can be explained by the independent variables in the model. In this case, the model explains 49.5% of the variability. Adjusted R Square is 0.476. It is a modification of R Square that accounts for the number of predictors in the model. The adjusted value provides a more conservative estimate of the model's explanatory power. The standard error of the estimate is 1.4058. This value represents the average distance between the observed values and the values predicted by the model. A lower value indicates a better fit of the model to the data.

The R value of 0.681 indicates a moderate positive correlation between the predictors and the dependent variable. The R Square value of 0.495 suggests that the model accounts for 49.5% of the variability in the dependent variable. The Adjusted R Square of 0.476 considers the number of predictors in the model, providing a more conservative estimate of the model's explanatory power. The standard error of the estimate (1.4058) represents the average variability of the actual data points around the predicted values. A lower standard error is generally desirable.

This model explains a moderate amount of the variance in the dependent variable.

H₀₁: Unstandardized Coefficient (B) is 0.205 which represents the change in the dependent variable for a one-unit change in Responsiveness. Standardized Coefficient (Beta) is 0.159. This indicates the standardized effect size of Responsiveness, facilitating comparison of the relative importance of predictors. The t-value is 2.472 and the p-value (Sig) is 0.004<0.05. That is null hypothesis that there is no significant relationship between Responsiveness and Passenger Satisfaction with Bus Rapid Transit System Ahmedabad is rejected and there exists statistically significant relationship between Responsiveness and Passenger Satisfaction with Bus Rapid Transit System Ahmedabad.

H₀₂: It can be observed that Unstandardized Coefficient (B) is 0.214. Standardized Coefficient (Beta) is 0.268. The t-value is 1.936 and the p-value (Sig) is 0.025<0.05. That is null hypothesis that there is no significant relationship between Reliability and Passenger Satisfaction with Bus Rapid Transit System Ahmedabad is rejected and there exists statistically significant relationship between Reliability and Passenger Satisfaction with Bus Rapid Transit System Ahmedabad.

H₀₃: It can be observed that Unstandardized Coefficient (B) is 0.104. Standardized Coefficient (Beta) is 0.135. The t-value is 1.253, and the p-value (Sig) is 0.010<0.05. That is null hypothesis that there is no significant relationship between Assurance and Passenger Satisfaction with Bus Rapid Transit System Ahmedabad is rejected and there exists statistically significant relationship between Assurance and Passenger Satisfaction with Bus Rapid Transit System Ahmedabad.

H₀₄: It can be observed that Unstandardized Coefficient (B) is 0.149. Standardized Coefficient (Beta) is 0.127. The t-value is 1.344, and the p-value (Sig) is 0.309>0.05. That is null hypothesis that there is no significant relationship between Empathy and Passenger Satisfaction with Bus Rapid Transit System Ahmedabad is accepted. Further, while the standardized coefficient suggests a positive impact, Empathy is not statistically significant at the conventional significance level of 0.05.

H₀₅: It can be observed that Unstandardized Coefficient (B) is 0.146. Standardized Coefficient (Beta) is 0.141. The t-value is 2.364, and the p-value (Sig) is 0.230>0.05. That is null hypothesis that there is no significant relationship between Tangibility and Passenger Satisfaction with Bus Rapid Transit System Ahmedabad is accepted. Further, Tangibility has a positive impact but it is not statistically significant at the conventional significance level of 0.05.

Overall, Responsiveness, Reliability and Assurance have statistically significant positive impacts on the dependent variable. Empathy and Tangibility while positively impacting the dependent variable are not statistically significant.

V. CONCLUSION

Findings of the study reveal that Responsiveness has a statistically significant positive impact on passenger satisfaction; efforts should be made to enhance and improve responsiveness in BRTS operations. Suggested actions may include improving communication channels, addressing passenger concerns promptly, and ensuring timely responses to service-related issues. Since Reliability is identified as a significant positive predictor, focus on maintaining a reliable and consistent BRTS service. Regular maintenance of buses, adherence to schedules and efficient service delivery can contribute to enhancing reliability and consequently, passenger satisfaction. Assurance has been found to have a statistically significant positive impact on passenger satisfaction. Therefore, strategies to boost passenger confidence in BRTS services should be implemented. This might involve ensuring safety measures, providing clear and accurate information to passengers, and showcasing a commitment to service quality.

Although Empathy has a positive impact, it is not statistically significant in this analysis. However, it is still worth considering ways to enhance empathy in customer interactions. Training staff to understand and address passenger needs and concerns with empathy can contribute to an improved overall experience. Tangibility, while having a positive impact, is not statistically significant. Nevertheless, it is essential to maintain the physical aspects of the service. Keeping BRTS infrastructure clean, well-maintained, and aesthetically pleasing can contribute to a positive perception among passengers. Overall, a comprehensive approach that addresses the significant factors influencing passenger satisfaction can contribute to an enhanced BRTS experience. Regular monitoring of these factors, soliciting feedback from passengers and continuous improvement efforts can be crucial in ensuring high levels of satisfaction and fostering positive perceptions of BRTS services.

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