

Comparative Analysis of Service Quality Dimensions and Passenger Satisfaction for BRTS between Rajkot and Surat City

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Abstract

The objective of this paper is to examine and compare Passenger satisfaction between Rajkot and Surat through various service quality variables related to Bus Rapid Transit Service (BRTS). Satisfaction was measured through Tangible, Personnel, reliability and comfort. A questionnaire was given and view of 547 passengers was taken and evaluated which include 258 from Rajkot and 289 from Surat. The outcome of the paper suggests that Surat passengers are more satisfied compare to Rajkot passengers. Tangible service is only dimension where there is no significant difference between Surat passengers and Rajkot Passengers while for the remaining variables there are significant difference between Surat and Rajkot Passengers. Findings are discussed and presented along with its implications.

Key words: BRTS, Passenger Satisfaction, Rajkot, Surat



Introduction

“The transport system of India have several modes of transport which include railway, road, seaway and airway. Transport sector public as well as private transport. Public transport in India has witnessed a substantial growth and development in past 70 years in terms of increasing network from big cities to small villages and in terms of passengers travelling through different mode of transport. Public transport still remains the primary mode of transportation for most of the population and India's public transport systems are among the most heavily used in the world. India's rail network is one of the longest and the most heavily used system in the world. Buses provide the bulk of public transport services in many Indian cities” (Geetam Tiwari and Deepty Jain, 2010). Recent addition in the mode of public transport is Bus Rapid Transit System (BRTS) and metro rail which started in India in last decade only.

“Bus Rapid Transit (BRT) as a high-quality bus-based transit system that delivers fast, comfortable, and cost-effective services at metro-level capacities. It does this through the provision of dedicated lanes, with busways and iconic stations typically aligned to the center of the road, off-board fare collection, and fast and frequent operations” (Bonicelli, E. 2015).

“BRT can be defined as as a rubber-tyred rapid transit service that combines stations, vehicles, running ways, a flexible operating plan, and technology into a high quality, customer focused service that is frequent, fast, reliable, comfortable and cost efficient” (Canadian Urban Transit Association 2004).

“Bus Rapid Transit System (BRTS) is a flexible, high performance rapid transit mode that combines a variety of physical, operating and system elements into a permanently integrated system with a quality image and unique identity” (Adeaga and Omenai, 2014)

BRTS Globally

Worldwide more than 3,30,00,000 people are taking benefit of BRTS facilities in more than 170 cities. Latin America having 55 cities where BRTS are operational while in Europe 44 cities having BRT services available to the people. In Asian countries also BRTS are operational in 44 cities mainly in China and India.

As per Global BRT data “Latin America having highest passengers per day; 2,08,61,780 followed by Asia where 94,71,593 passengers travelled daily by BRTS. In Europe 16,13,580 and Africa having 4,91,578 passengers travelled by BRTS daily”.

BRTS in India

“The Central Government of India promoted high capacity transport systems being set up through the mechanism of Special Purpose Vehicles (SPV) and also provide monetary support either in the form of equity or onetime payment after studying important parameters” (V Kadia 2019).

BRTS was implemented in India through central government funding scheme. In 2006 Pune, Maharashtra become 1st in country to start BRTS. As per the Global BRT data BRT systems are fully working in 7 Indian Cities in 2019; while in other 12 cities plan are ready to start the project. Ahmedabad having maximum traveller everyday while Jaipur having lowermost among various BRTS in India (V. Kadia 2019).

Rajkot City & BRTS

Rajkot is one of the developing city of the Gujarat State and known as heart of the Saurashtra region of Gujarat. To give good services to the passengers of the city, Rajkot Rajpath Ltd was established which objective to provide fast, safe, environment friendly transport service. “Rajkot Rajpath Ltd is running on 10.7 km in the city which is between the 150ft Ring Road from Gondal Chowk to Madhapar Chowk with 19 stations” (source: website www.rajkotrajpath.com).

Surat City & BRTS

Surat is the second largest city in the State, after Ahmedabad and the eight largest in India. It is one of the fastest developing city of the country (Shah Shaishav D et. al.; 2015). Surat City had limited mass transit system and depend mainly on local informal and unorganised mode of Public Transport like auto & rickshaw upto 2014. Surat Municipal Corporation has formed its owned company Surat Sitalink Limited which is responsible for the administration and operations of public transport services including BRTS and City bus across the city. The first corridor of 10.3 km length of Surat BRTS was inaugurated in January 2014 and till date it has expanded operation to planned 102 km. Currently BRTS is operational on 10 routes with average daily ridership of 1,10,000 and 156 buses on road.

Literature Review:

Service Quality is an abstract and elusive construct because of three features unique to services; intangibility, heterogeneity and inseparability of production and consumption (Parasuraman et al. 1985). Another things agreed by various authors (LeBlance & Nguyen 1997) and (Nagata et al. 2004) that service quality should be assessed by using customer perspective.

According to Zeithaml (1988), service quality is “the consumer’s judgment about a service’s overall excellence or superiority.”

P-TRANSQUAL model invented by Sik Sumaedi et al. (2016) found that service quality consists of four dimensions, i.e. comfort, tangible, personnel, and reliability. Prasad and Shekar (2010), Perez et al. (2007) & Hu and Jen (2006) included tangible service as quality dimension. Prasad and Shekar (2010) and Randheer et al. (2011) used reliability as service quality variable in their research studies. So, it can be concluded that service quality is one of the most important dimension affecting customer satisfaction.

In many research papers authors have analysed the relation between service quality and passenger satisfaction for BRT in various countries like South Africa (Ugo P.D. 2014), Nigeria (Somuyiwa Adebambo), Tehran (Seyed Mohmoudi et al. 2010), Malaysia (Rozmil Ismail, 2014), New York (Den wen,2016) in past. Very few researches has been carried out for measuring passenger satisfaction through service quality dimension for Surat, while study of BRT system in Rajkot is also not done by many researcher. To fill this gap researcher has started this study to understand and compare BRTS system of Rajkot and Surat from passenger satisfaction point of view.

Objective of the Study:

The prime objective of this research paper is to understand Bus Rapid Transit System for two cities of the Gujrat namely Rajkot and Surat and comparing their passenger satisfaction level through few service quality variables.

Research Methodology:

To study and comparing level of satisfaction between two cities namely Rajkot and Surat data were collected from primary source and some of the information about BRTS and about two cities were taken from secondary source. Questionnaire was prepared after referring various literature and keeping in mind various objects of the study. Questionnaire was divided into two part out of which first part include demographic information and in other part 21 questions were asked to measure quality of service. Each sentence has to rate on the scale of 1 to 5.

Scope of the Study

The scope of this research is to measure passenger satisfaction of Surat and Rajkot people who are travelling through BRTS only. These cities also have other options of the transport which are not taken in this research.

ypothesis:

To find the relationship between the independent variables and dependent variable, five hypotheses were developed.

- H₁: There is significant difference in tangible services between Surat BRTS and Rajkot BRTS.
 H₂: There is significant difference in personnel services between Surat BRTS and Rajkot BRTS.
 H₃: There is significant difference in reliability between Surat BRTS and Rajkot BRTS.
 H₄: There is significant difference in comfort between Surat BRTS and Rajkot BRTS.
 H₅: There is significant difference in passenger satisfaction between Surat BRTS and Rajkot BRTS.

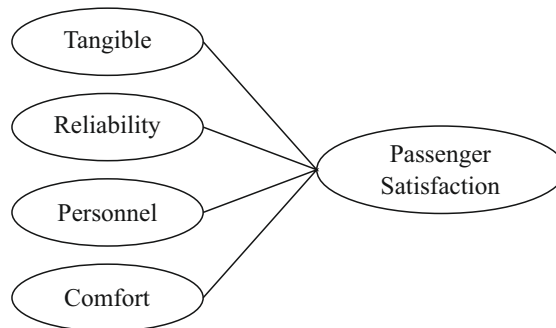
Respondent’s Profile:

The information was collected from 258 people who use BRTS in Rajkot and 289 people who use by BRTS in Surat. Male and Female ratio of travelling in Rajkot is equal while in Surat 55% respondents are male and 45% are female.

In Rajkot 57% respondents are between age of 18 and 25 years while for Surat in the same age group only 28% belongs. Senior citizen travelling through BRTS found same percentage (17%) for both the cities. Less than 10% of the total respondents were uneducated for both the cities. 39% respondents in Rajkot having postgraduate degree while in Surat that percentage is only 12%.

57% of the total respondents in Surat are daily travellers which is only 27% in Rajkot. Annual Family Income wise 24% respondents of the Rajkot having less than 1,00,000 annual income which percentage are 22% for Surat respondents. Very few percentage (4% for Rajkot and 3%fo Surat) respondents having annual family income more than 10,00,000.

Proposed Model



Reliability Test:

“Construct reliability is operationalized as internal consistency that refers to degree of inter correlations among the items that constitute a scale” (Nunnally, 1988). Cronbach alpha- reliability coefficient was taken into consideration to measure internal consistency of minimum 0.7 (Cronbach, 1951). Cronbach alpha of all variables mentioned in the following listed table are more than prescribed value of 0.7 (Kline, 2005). So from reliability of the all constructs point of view, it can be conclude that all the variables taken in the study are reliable.

Table 1: Scale reliabilities

Constructs	No. of Items	Cronbach’s Alpha
Tangible	4	.775
Personnel	4	.742

Table 1: Scale reliabilities

Reliability	4	.769
Comfort	5	.806
Passenger satisfaction	4	.857

Independent Samples Test:

“Independent samples t-test is used to compare two groups whose means are not dependent on one another. An independent sample t-test tells the researcher whether there is a statistically significant difference in the mean scores for the two groups or not” (Gerald 2018).

In this paper, to compare the service quality dimensions and passenger satisfaction for BRTS between two cities; Rajkot and Surat, this test has been carried out and the result of the test is presented in the following table.

Table 2: Independent Samples Test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Passenger Satisfaction	.039	.844	6.312	545	.000	.4606	.0730	.3173	.6040
Tangible	2.016	.156	-.403	545	.687	-.02859	.07091	-.16788	.11070
Personnel	.256	.613	3.301	545	.001	.25949	.07861	.10507	.41390
Reliability	8.426	.004	5.833	545	.000	.38146	.06540	.25300	.50993
Comfort	12.800	.000	6.259	545	.000	.41635	.06652	.28569	.54701

Support of the hypothesis 2, 3, 4 and 5 proves that there is significant difference between Surat BRTS and Rajkot BRTS for Personnel Services, Reliability, Comfort and Passenger Satisfaction. Rejection of the hypothesis 1 suggest that there is no significant difference between Surat BRTS and Rajkot BRTS for Tangible Services.

Mean of the passenger satisfaction of Surat is 4.04 which is higher than Rajkot of 3.58 which suggests that passengers of the Surat are more satisfied with BRTS compare to the passengers of the Rajkot. Mean of the Personnel Services, Reliability and Comfort for Surat are 3.70, 3.79 and 3.91 respectively which is higher than Rajkot of 3.45, 3.42 and 3.50 respectively. So for these three variable we can interpret that Surat BRTS are better than Rajkot BRTS. Mean of tangible services for Surat is 3.37 and Rajkot 3.40 which is more or less similar suggest that tangible service provided by both the BRTS are nearer to similar.

Limitation of the Study

- Study was carried out only for two cities, Rajkot and Surat.
- Questionnaires were filled up during certain period only.

- Study was restricted only for passenger travelling through BRTS only.

Conclusion & Suggestion to the Service Providers of the BRTS

Almost 11,000 passengers use BRTS facilities in the Rajkot city on day-to-day basis. Demographic profile of the Rajkot respondents suggest that BRTS facilities are equally use by both the gender but more used by young people including students. In Rajkot BRTS available only on a small part of the city while respondents want expansion of the services to the other part of the city also with more number of buses and more facilities at station.

Almost 1,10,000 passengers use BRTS facilities in the Surat city on day-to-day basis which is next after Janmarg. Demographic profile of the Surat respondents suggest that BRTS facilities are use more by men than by women passengers. By checking how many times they are using BRTS services, it can be conclude that more passengers are using this service on daily basis. Respondents are not satisfied with seating space available in the BRTS buses. Some of the suggestions made by passengers are route, punctuality, better cleanliness.

By comparing passenger travelled by BRTS per day, Surat is 10 time more than Rajkot. From route point of view also Surat BRTS having 102km operational route which is only 11km at Rajkot. So from operational side it can be concluded that Surat BRTS having more reach and depth compare to Rajkot BRTS. Surat BRTS was started 2 years after Rajkot BRTS was started, still Surat BRTS passenger satisfaction is better than Rajkot BRTS is notable thing.

As per the Independent Samples Test, it can be conclude that passenger satisfaction at Surat BRTS is higher than passenger satisfaction at Rajkot BRTS. Except tangible service, all other service quality dimensions there is significant difference between two cities.

Tangible services for both the cities taken for the research has same satisfaction level, so it can be suggested that improvement in tangible services will not affect passenger satisfaction too much. Tangible services mainly include internal and external gate up of the bus. Many time bus are purchased from the same vendor by both BRT service providers and therefore there are not much difference in passenger satisfaction for both the cities.

For Rajkot BRT service provider, outcome of the study suggest that they should give more focus on improving comfort, reliability and personnel services to increase passenger satisfaction. They have to increase frequency of the buses, increase the route, staff behaviour with the passenger and also accuracy of the arrival and departure of the buses time.

References

- Adeaga, O and Omenai, J (2014). Access to Intra-Urban Public Transport Across Varied Socio-Economic Groups: A Case of Lagos Bus Rapid Transit (BRT): *Asian Journal of Humanities and Social Sciences*.
- Allen, J., Muñoz, J. C., & de Dios Ortúzar, J. (2019). Understanding Public Transport Satisfaction: Using Maslow's Hierarchy of (Transit) Needs. *Transport Policy*.
- Banda Gerald (2018). A Brief Review of Independent, Dependent and One Sample t-test. *International Journal of Applied Mathematics and Theoretical Physics*, 4 (2), 50-54.
- Bonicelli, E. (2015). Social sustainability and mobility in Curitiba: bus rapid transit in the "green city" of Brazil (Doctoral dissertation).
- Canadian Urban Transit Association (2004). *Bus Rapid Transit: A Canadian perspective*, Issues Paper #10. CUTA, Toronto
- Chan, R.Y. and Lau, L.B. (2001). Explaining green purchasing behavior: a cross-cultural study on American and Chinese consumers. *Journal of International Consumer Marketing*, 14(2/3), 9-40.
- Cronbach, L.J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16, (297–334).
- Cronin, J.J., Brady, M.K. and Hult, G.T.M. (2000). Assessing the effects of quality, value, and customer satisfaction on consumer behavioral intentions in service environments, *Journal of Retailing*, 76(2), 193-218.
- Currie G, Wallis I (2008). Effective ways to grow urban bus market—a synthesis of evidence. *J Transp Geogr*, 16, 419–429
- Dang, T. and Nelson, J.D. (2010) *The Impact of Bus Rapid Transit on Land Development: A Case Study of Beijing, China*. *World Academy of Science, Engineering and Technology*, 66, 1196-1206.
- Dan Wan, C. K. (2015). Rider perception of a “light” Bus Rapid Transit system - The New York City Select Bus Service. *Transport Policy*, 41-55.
- David Martín-Consuegra, A. M. (2007). An integrated model of price, satisfaction and loyalty: an empirical analysis in the service sector. *Journal of Product & Brand Management*, 16(7), 459-468.
- Deng, Z., Lu, Y, Wei, K. K., Zhang, J. (2009). Understanding customer satisfaction and loyalty: An empirical study of mobile instant messages in China, *International Journal of Information Management*, 30, 289–300.
- Eboli, Laura & Mazzulla, Gabriella (2007). Service Quality Attributes Affecting Customer Satisfaction for Bus Transit. *Journal of Public Transportation*, 10 (3), 21-34.
- Gustafsson, A., Johnson, M.D., and Roos, I. (2005). The Effects of Customer Satisfaction, Relationship Commitment Dimensions, and Triggers on Customer Retention, *Journal of Marketing*, 69, 210–218.
- Hanif, Muzammil & Hafeez, Sehrish & Riaz, Adnan. (2010). Factors Affecting Customer Satisfaction, *International Research Journal of Finance and Economics*, 60, 45-52
- Hennig-Thurau, T., and Klee, A. (1997). The Impact of Customer Satisfaction and Relationship Quality on Customer Retention: A Critical Reassessment and Model Development, *Psychology & Marketing*, 14(8), 737–764.

- Hensher, David, Golob, Thomas. (2008). *Bus Rapid Transit Systems: A Comparative Assessment*. *Transportation: Planning, Policy, Research, Practice*, 35(4), 501-518.
- Herrmann, Andreas & Monroe, Kent & Huber, Frank & Xia, Lan. (2007). *The Influence of Price Fairness on Customer Satisfaction: an Empirical Test in the Context of Automobile Purchases*. University of St.Gallen.
- Iseki H, Taylor BD (2010), *Style versus service? An analysis of user perceptions of transit stops and station*, *Journal of Public Transport*, 13(3), 39–63.
- Juan de oña, R. O. (2013). *Perceived service quality in bus transit service : A structural equation approach*. *Transport Policy*, 219-226.
- Kadia V. and Patel H. (2019). *An empirical study of Service Quality Dimensions and Passenger Satisfaction for BRTS in the city of Rajkot*, *IUP Journal of Supply Chain Management*. XIV (3), 7-23.
- Kain JF, Liu Z (1999). *Secrets of success: assessing the large increases in transit ridership achieved by Houston and San Diego transit providers*. *Transport Research Part A*, 33, 601–624.
- Kim, M.K., Park, M.C., and Jeong, D.H. (2004). *The effects of customer satisfaction and switching barrier on customer loyalty in Korean mobile telecommunication services*, *Electronics and Telecommunications Research Institute, School of Business, Information and Communications University, Yusong-gu, Hwaam-dong*, Taejon 305-348.
- Kukar-Kinney, M., Xia, L, Monroe, L.B., (2007). *Consumers’ perceptions of the fairness of price-matching refund policies*, *Journal of Retailing*, 83, 325–337.
- Lai, W.-T. and Chen, C.-F. (2011). *Behavioral intention of public transit passenger – the role of service quality, perceived value, satisfaction and involvement*, *Transport Policy*, 18, 318-325.
- Laura Eboli, G. M. (2012). *Structural Equation Modelling for Analysing Passengers’ Perceptions about Railway Services*. *Procedia - Social and Behavioral Sciences*, 96 – 106.
- Levinson, H., Zimmerman, S., Clinger, J., Rutherford, S., Smith, R.L., Cracknell, J., & Soberman, R. (2003). *Bus Rapid Transit, Volume 1: Case Studies in Bus Rapid Transit*. Transit Cooperative Research Program (TCRP) Report 90, published by the Transportation Research Board, Washington.
- Martin-Consuegra, D., Molina, A. and Esteban, A., (2007). *An Integrated Model of Price, Satisfaction and Loyalty: an Empirical Analysis in the Service Sector*, *Journal of Product & Brand Management*, 16(7), 459–468.
- McDonnell S, Zellner M (2011). *Exploring the effectiveness of bus rapid transit a prototype agent-based model of commuting behaviour*, *Transport Policy*, 18, 825–835.
- Nunnally, J. C. (1988). *Psychometric Theory*. McGraw-Hill Book Company, Englewood-Cliffs, NJ.
- Oliver, R.L. (1999). *Whence Consumer Loyalty*, *The Journal of Marketing, Fundamental Issues and Directions for Marketing*, 63, 33-44.
- Parasuraman, V. A. (1988). *SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality*, *Journal of Retailing*, 64(1), 12-40.
- Prasad, M.D. and Shekhar, B.R. (2010). *Development of railqual: a service quality scale for measuring Indian railway passenger services*, *Management Science and Engineering*, 4(3), 87-94.

Panchore, V. and Khushwaha, N. (2016). Performance Evaluation of BRTS. *IJSTE - International Journal of Science Technology & Engineering*, 2(11), 509-512.

Shah Shaishav D, P. R. (2015). Appraisal Study of Brts Surat-A Sustainable Urban Transport, *IOSR Journal of Mechanical and Civil Engineering*, 12(4), 29-37.

Shiau, W., & Luo, M.M. (2012). Factors affecting online group buying intention and satisfaction: A social exchange theory perspective. *Computers In Human Behavior*, 28(6).

Sik Sumaedi, G. M. (2016). Factors influencing public transport passengers' satisfaction: a new model. *Management of Environmental Quality: An International Journal*, 585-597.

Sik Sumaedi, G. M. (2016). P-TRANSQUAL: a service quality model of public land transport services, *International Journal of Quality & Reliability Management*, 32(6), 534-558.

Tisa V. Agarbattiwala, B. V. (2016). Performance Analysis of BRT System Surat. *International Journal of Engineering Research*, 5, 519-523.

Tiwari, G and Jain, D. (2010). BRTS Projects in Indian Cities. TRIPP Report, TRIPP-RP10-02, New Delhi; Transportation Research and Injury Prevention Programme, Indian Institute of Technology Delhi.

Tse, D. K., and Wilton, P. C. (1988). Models of Consumer Satisfaction Formation: An Extension, *Journal of Marketing Research*, 25 204-212.

Ugo, P. D. (2014). The bus rapid transit system: A service quality dimension of commuter uptake in Cape Town, South Africa. *Journal of Transport and Supply Chain Management*, 10.

Wan, D., Kamga, C., Hao, W. et al. (2016). Customer satisfaction with bus rapid transit: a study of New York City select bus service applying structural equation modelling. *Public Transport*. 8(497–520).

Wen, C.-H., Lan, L.W. and Cheng, H.-L. (2005). Structural equation modelling to determine passenger loyalty toward intercity bus services, *Journal of the Transportation Research Board*, 1927, 249-255.

Wright, L., Hook, W.(2007). *Bus Rapid Transit Planning Guide*, Institute for Transportation and Development Policy, New York

Zeithaml, V.A.(1988). Consumer perceptions of price, quality and value: a means and mode land synthesis of evidence, *Journal of Marketing*, 52(3), 2-22.

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