Performance Evaluation of Bus rapid transit system (BRTS)

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Abstract: BRTS can be effectively providing efficient and door to door service for the daily needs of the citizens. However, the performance evaluation of BRTS is essentially required to measure its effectiveness and thus monitor its efficiency. The Quantitative perspective mainly considers engineering parameters like speed, travel time, delay and capacity. Speed and delay data was collected using GPS based velocity box apparatus for bus modes. The parameters of buses mobility are based on real data acquired, filtered, and analysed for two express routs from raw data provided by the agency that controls public transportation. The Peoples are facing the problem of delay in travel time due to many numbers of junctions and stops during the journey in public transport in terms of comfort and convenience leads to the traffic issue. The study area covered for the above problem is Chandkheda to Nehrunagar of Ahmadabad city. The main objective of the study is performance evaluation of BRTS for existing BRTS. The study is to be done to access the improve the transport facility with express way facility on BRTS route without delay in travel time. For primary data photography with Public opinion and Average waiting time survey is to be carried out.

***Index Terms*–Public Transportation, Performance Evaluation, BRTS, GPS, vehicle mode.**

I. INTRODUCTION

BRTS is bus based public transport. It is like "Metro service running on roads". The idea was to re brand bus based public transport system in cities. Prioritize public transport users with advanced features like easy & step-less boarding system, smart ticketing system, allocating dedicated space for buses on the roads. Also, creating a nice experience for bus passengers than usual running pathetic city bus service with better bus service and quality manpower.

1.1 About Ahmedabad BRTS

Janmarg, also known as Ahmedabad BRTS, is a bus rapid transit system in Ahmedabad, Gujarat, India. It is operated by Ahmedabad Janmarg Limited, a subsidiary of Ahmedabad Municipal Corporation and others. It is designed by CEPT University. It was inaugurated in October 2009. The network expanded to 89 kilometres (55 mi) by December 2017 with daily ridership of 3, 49,000 passengers. BRTS won several nation and international awards for design, implementation and operation. It was rated Silver on BRT Standard in 2013.

1.2 Performance Evaluation of BRTS

Bus mass rapid transit System (BRTS) is an innovative, high capability, lower price transport solution which will considerably improve urban quality, transport System in most Indian cities is rapidly deteriorating due to the increasing travel demand and inefficient transportation. There square measure numerous issues connected with transport such tremendous increase in range of accidents, Environmental degradation, Congestion, Overcrowding as a result of inadequate system, Frequency of service and schedule isn't strictly adhered. the matter of pollution, safety and unskillfulness have reached at a awful level in most of the key cities in Bharat as a result of intense growth of its population -both of individuals and motorcars, combined with inefficient transport system and poor social control of environmental laws etc.

1.3 Operation

The system runs on Integrated Transportation Management System (IMTS) which includes Advanced Vehicle Tracking System (AVLS), Fleet Management System (FMS), Automatic Fare Collection System (AFCS), Passenger Information System (PIS), Passenger announcement (PA), and Vehicle Scheduling and Dispatching (VSD). These technologies are provided by the consortium of Vayam Technologies and GMV Innovating Solutions since 2010. As a part of Intelligent Transit Management System (ITMS), an app based and QR code powered ticketing system will be introduced by June 2017.

1.4 Criticism

BRTS failed to increase the number of public transport users in Ahmedabad. Before launch of BRTS, in 2009, the number of public transport users (users of AMTS) was 8 to 8.5 lakh. After six years of operation, in January 2016, it is found that the number of public transport users

1.5 Basic needs of study:

The main basic needs of the study are Performance evaluation of Bus rapid transit system (BRTS) for Ahmadabad city (Chandkheda to Nehru Nagar).

1.6 Objectives

1. To encourage people to opt for public transportation for the welfare of government.
2. To develop analytical hierarchical structure for performance evaluation of BRT system.
3. The objectives of this study is to evaluate the existing BRT network by means of bus stop accessibility, travel time, line route network coverage, number of passenger transfers, passenger transfer waiting time, number of service trips and line route evaluation of network in the planning area of Ahmedabad.
4. Travel demand.
5. Ease of implementation.

II. LITERATURE BASE

Vivek Panchore, Naresh Khushwaha "Performance Evaluation of BRTS'' at IJSTE-International Journal of Science Technology & Engineering and Information Technology, Volume 2, Issue 11, May 2016. In this Study Passenger satisfaction is directly related to the expectations of service quality and the actual level of service. Therefore, measuring the satisfaction and the importance of measures and combining them is essential for monitoring the performance of transportation systems. The performance of BRTS in India and hence will be helpful for researchers to improve environment in Indian cities by shifting mobility from private mode of transport towards more efficient and safe public transport system.

Mariana Teixeira Sebastiani, Ricardo Luders, and Keiko Veronica Ono Fonseca "Evaluating Electric Bus Operation for a Real-World BRT Public Transportation Using Simulation Optimization

This paper presents a discrete event simulation that evaluates bus energy consumption using a mathematical model that takes into account different load and friction forces. The parameters of buses mobility are based on real data acquired, filtered, and analyzed for six express routes from raw data provided by the agency that controls public transportation and urban development.

Prof. Rohit Galande, Dipti Patil, Aishwarya Gaikwad, Pramod Borchate, Mahesh Nikrad, Yogesh Alhat "Feasibility Studies and Performance Evaluation of Bus Rapid Transit System

As per the recent trends, the number of private vehicles on the streets of Pune city is increasing rapidly. Thus, the traffic in the city is prone to frequent congestion during peak hours; leading to jams causing huge delays in travel times. Also, the increasing pollution levels are a cause of concern. A shift from private transport to public transport will help to deal this situation effectively. As a solution, the Pune Municipal Corporation came up with a plan to implement the BRTS on some of its corridors. But this system did not prove efficient in dealing with the situation. The objective of this study is to evaluate the performance of a BRT corridor in the city which may help to measure the efficiency of the proposed BRT corridor.

III. STUDY AREA

3.1Study Area location, Ahmedabad

Ahmedabad is the commercial capital of the State and is also known as the textile capital of India. It lies in the cotton belt of Gujarat, 23 km south of Capital Gandhinagar, 552 km north of Mumbai and 96 km from the Gulf of Cambay. It has excellent connectivity through air, road and rail links with Mumbai and Delhi.

Historically Ahmedabad has been one of the most important centres of trade and commerce in western India. The city has a great architectural tradition reflected in many exquisite monuments, temples and modern buildings. The city is facing problems of traffic, parking, and pedestrian safety on certain stretches of road in the city.

The study area taken is corridor from Prahladnagar to Sola in the New West Zone of Ahmedabad city as shown in the figure. The study area is selected on the basis of composition of traffic, types of intersection control. It is approximately 8.5 km in length. The selected route should be of great importance both for public and private transport modes.

Figure: 1 Study Stretch (Source: Google INC.)

3.2 Demographic Trends

The total population of Ahmedabad is7, 214,225 as per Gujarat census, 2011. The population within the Ahmedabad Municipal Corporation (AMC) area is growing at 2.5% per year and that at Ahmedabad Urban Development Authority (AUDA) area is growing at 3.62% per year. The increase in population within a given area/region results in denser settlements which in turn lead to generation of higher number of trips using various modes.

Table 1 Year wise population in Ahmedabad(Source by AMC)

Year	Population	Growth rate	Growth
1990	32,55,000	14.90%	400000
1995	37,90,000	16.80%	535000
2000	44,27,000	18.20%	637000
2005	52,38,000	18.60%	811000
2010	62,10,000	18.20%	972000
2015	73,43,000	6.30%	1133000
2020	84,52,000	8.40%	656000
2025	94,90,000	12.30%	1038000

3.3 Registered motor vehicles

Table: 2 Registered Motor Vehicles in Ahmedabad 2009 till 2012 (Source: RTO Ahmedabad)

Vehicle Type	Volume	2009-2010	2010-2011	2011-2012
Two Wheelers	Total	17,28,522	18,75,658	20,22,424
	Growth (%)	-	8.51%	7.82%
Three Wheelers	Total	1,47,136	1,60,852	1,74,173
	Growth (%)	-	9.32%	8.28%
Four Wheelers	Total	3,52,064	3,96,597	4,45,290
	Growth (%)	-	12.65%	12.28%
Buses	Total	23,739	24,142	24,831
	Growth (%)	-	1.70%	2.85%
All Vehicles	**Total**	**23,81,453**	**26,00,572**	**28,23,022**
	Growth (%)	**-**	**9.20%**	**8.55%**

3.4 Modal Share

In Ahmedabad, the number of trips by walk accounts for 32% of the person trips made daily. Twowheeler has a share of 26% followed by public transport (11%) and car (8%) respectively. It is clearly seen that two-wheelers are the predominant mode of transportation in Ahmedabad. Public transport share is less than walk, cycle and two-wheeler based mode of transportation, whereas the Intermediate Public Transport (IPT) in the form of auto rickshaws has the lowest share among all the modes of transportation in Ahmedabad. The modal share of Ahmedabad has been presented in the Table.

Table-3 Mode share in Ahmedabad

Mode share	Share%
Walk	32
Cycle	15
Two Wheeler	26
Public Transport	11
Car	8
Auto	7

3.5Statistics of Road Network

The greater Ahmedabad Road length 3780 Kms. which maintains National Highways and the all this roads and ways are maintained by the City Municipal Authorities and Urban Development.

Table 4 (Total Lane and its Length, Source: AMC)

Road Width		
Lanes	**Total Length**	**% Total Length**
1 Lane	2206	62%
1.5 Lane	588	16%
2 Lane	425	11%
2.5 Lane	14	0.25%
3 Lane	48	1.10%
4 Lane	298	7.75%
6 Lane	47	1.10%
8 Lane	35	0.9
GRAND TOTAL	3780	100%

IV.METHODOLOGY

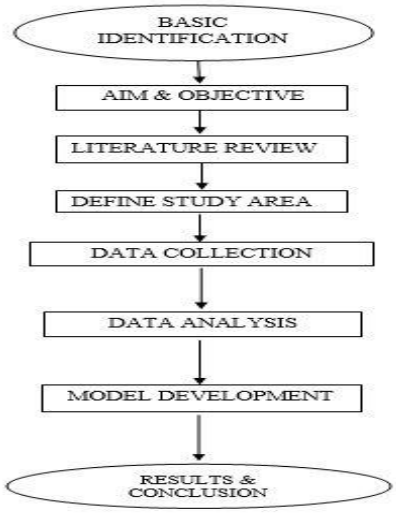

Figure: 2 Flow chart of methodology

V. FINDINGS FROM THE STUDY:-

- Operational cost of running BRTS is generally lower than other modes.
- The typical bus engine causes noticeable level of pollution, noise and vibration. On other hand it is environmentally beneficial than private cars.
- Daily ridership of BRTS is 1,32,000 passengers per day
- The total cost of construction of two phases is 1200 crore
- Before launch of BRTS in 2009 public transport users were 8 to 8.5 lakh(AMTS).In January,2016 number of public transport users were dropped to 7.5 lakh(AMTS and BRTS combined) Only 18% of total population of city is using public transport

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