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Impact Analysis of Transportation Project: A Case Study of Ahmedabad BRTS

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ABSTRACT

A sustainable transport system must provide mobility and accessibility to all urban residents in a safe and environment friendly mode of transport. The rapid growth in the number of motor vehicles has resulted in server traffic congestion and air pollution in many cities of the country. Bus rapid transit (BRT) is a term applied to a variety of public transportation systems using buses to provide faster, more efficient service then an ordinary bus line. The goal of these systems is to approach the service quality of rail transit while still enjoying the cost saving and flexibility of bus transit so the city can be self sustainable.

Ahmedabad has become the first city in South Asia receive awards for sustainable transport systems. It has bagged for successful implementation of bus Rapid Transit (BRT) systems. This paper examines the impact of BRT Systems on Ahmedabad's transport sector and the changes that can be brought about by introduction of BRT systems in other cities. BRTS Ahmedabad has improved access for local riders and advanced public transportation systems while reducing the environmental impacts of transportation. Moving people quickly, at a low cost with reduced greenhouse gases and air pollutions helps cities graphing with rapid growth, congestion and environmental concerns.

KEYWORDS: Bus Rapid Transit, Janmarg, Sustainable Transit

1. INTRODUCTION

Any settlement needs mobility within its boundaries to connect various places within the settlement and outside its boundaries to connect the settlement with other settlements. People tend to opt for personal modes of transport for mobility, unless there is a strong network of public transport systems. The system needs to fast, reliable and cheap. Here arises the need of a mass transit system. BRTS (Bus Rapid Transit System) is fast reliable and cheap.

Most of the million plus cities are faced with serious problem of congestion and pollution; they are looking for cost effective, efficient and sustainable means of public transport solutions. BRTS are increasingly being recognized as amongst most effective solution for providing a cost effective and high quality public transport service in urban areas for both the developed and the developing world.BRT involves coordinated improvement in a transit systems infrastructure, equipment, operations, and technology that give preferential treatment to buses on urban roadways. BRT encompasses a variety of approaches, including high capacity buses using exclusive bus ways with other vehicles, and improving bus services on city arterial streets. When public transit service is frequent and reliable, more people use it in place of their cars.

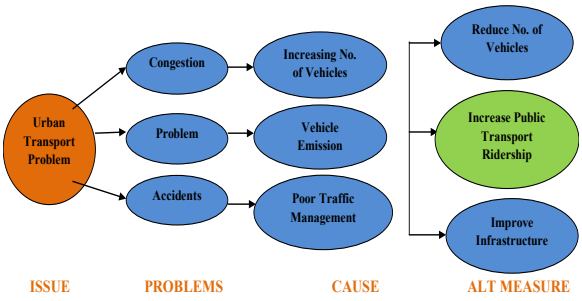


Figure 1: How good public transport system improve urban transport system

1.1 Characteristic of BRT Systems

As we look at the length, area and population of cities, as it increase the type of BRT and level of BRT changes from a basic bus service to a Full BRT service. The other factors that affect the type of BRT systems may include local preference and culture, population density, distribution of trips, climate, geography, topography, available financial resources, local technical capacity and knowledge, existing business and institutional structures, and, perhaps most importantly, the degree of existing political will to implement a high-quality system.

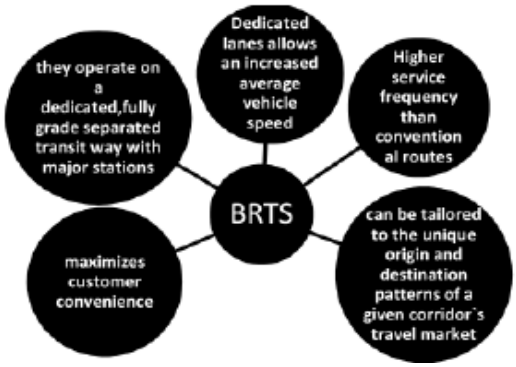


Figure 2: Characteristics of BRTS

1.2 Advantages of BRT over Transit Systems

- BRT having more flexibility than Light Rail, it can able to phase in service rather than having to wait for an entire systems to be built, and it can also be used as an interim system until Light Rail is built.
- Bus Rapid Transit routes can also be adjusted and rerouted over time to serve new developments and dispersed employment centers that may have because of development outside the city center, there are now eight employment centers that need to be considered in its transit analysis.
- Bus Rapid Transit can respond to changes in employment, land-use, and community patterns.
- On the other hand, Light Rail Transit lines are fixed and cannot easily change to adjust to new patterns of housing and employment.
- Compared to other mass transit alternatives the BRT is by far the most cost-effective means of proving rapid transit service-about 10-20 percent of the cost of light rail and 1-10 percent of the cost of light rail and 1-10 percent of Metro.
- Although Bus Rapid Transit sometimes uses rail-style park-and-ride lots, Bus Rapid Transit routes can also collect riders in neighborhoods and then provide rapid long distance service by entering a bus way or HOV (high occupancy vehicle) facility . Transit agencies have considerable flexibility to provide long distance service without requiring a transfer between vehicles. This is a significant.
- In performance of transit system, two elements are ridership and system two elements are ridership and system speed. While ridership varied considerably the largest ridership on Bus Rapid Transit and light Rail systems were quite similar. Speed varied but that Bus Rapid Transit Project were generally faster. This was likely due to the nature of the Bus Rapid Transit systems: express bus operations or operations with longer stop spacing have higher speeds.
- Ridership on Bus Rapid Transit and Light Rail systems varies widely

and depends, in part, on frequency of service, number of stops, hours of operation and customer demand. For example, ridership on 4 bus ways ranged from 7,000 riders per day to about 30,000 per day and average about 15,600 riders per day. For 13 bus lines on HOV lanes, ridership ranged from 1,000 to about 25,000 riders per day. With an average ridership of about 8,100. In addition the ridership on the two arterial street Bus Rapid Transit lines in Los Angeles was about 9,000 to 56,000 per day, with an average of 32,500 per day. In addition, ridership can vary greatly with vehicle sizes and passenger capacity between Light Rail and bus vehicles, which can affect vehicle based comparisons as mentioned in feasibility report by RITES and TRIP Delhi (2).

- Distance Speeds generally depends on the characteristics such as distance between stops, fare-collection methods, the degree to which the tracks or roadway are exclusive to transit vehicles or share right- of-way with cars and other vehicular traffic , type of the intersection and geometric design of the road.

3. Site Introductions and Data collection 'Janmarg' Phase-II

In Ahmedabad pilot project of 5 corridors on phase –II is selected for case study. Data collection comprises of primary data and secondary data. Primary data was collected from primary surveys and secondary data is collected from various sources such as libraries ,internet websites, and from some of the organizations concerned with BRTS such as RITES , CEPT and CRRI etc.

4. Data Analysis

Data analysis is a process of gathering, modeling and transforming data with the goal of highlighting useful information, suggesting conclusions, and supporting decision making.

Primary data was collected from various traffic and travel surveys along the proposed pilot BRT corridor and analyzed with traffic engineering parameters.

Traffic impact parameters were identified in broad such as traffic characteristics, speed, travel characteristics, etc and analyzed as per traffic engineering techniques and compared at different sections of the corridor with the present and past study. Traffic impact parameters were analyzed are,

Traffic Impact

a. Traffic composition
b. Peak hour traffic flow
c. Change in average speed in the corridor

Social Impacts

a. Impact on road safely
b. Accidents

Environmental Impacts

a. Impact on air quality in that area
b. Change in SPM, CO, NO levels

4.1 Study of traffic flow and congestion reduction along the Corridors

Traffic flow study is carried out to understand the efficiency level of the traffic system and to correlate with the proposed capacity. Here, traffic flow study was carried out for five corridors of phase-II. The surveys were conducted for 12 hours straight between 9.00am to 9.00pm and finally the numbers in peak hours are represented. Manual method of surveying was used, where a person sits at the site (as mentioned in the DPR of 'Janmarg) for 12 continuous hours and counts the number f vehicles passing through the particular road.

Table 2: Difference in PCU values – Pre BRTS and post BRT

Name of Corridor	Location		Pre BRTS (PCU)	Post BRTS (PCU)	Remark (reduction)
Corridor I	ONGC	Total Traffic	13890	15982	2092 PCU (15.06%)
		Peak hour	3705	4647	942 PCU (27.78%)
Corridor II	Ashram Rd.	Total Traffic	39688	46508	6840 PCU (17.25%)
		Peak hour	5485	5866	381 PCU (6.95%)
Corridor III	Sa-hajanand	Total Traffic	33340	36448	3108 PCU (9.32%)
		Peak hour	4204	4964	760 PCU (13.09%)
Corridor IV	Law Garden	Total Traffic	17269	18597	1328 PCU (7.70%)
		Peak hour	4405	5126	721 PCU (16.35%)
Corridor V	CMC Skylark	Total Traffic	30107	36309	6202 PCU (20.6%)
		Peak hour	4759	5344	585 PCU (11.52%)

Table 3: Difference in average speed – Pre BRTS – Post BRTS

This survey was conducted along the entire five corridor and compared to the data provided by the Detailed project Report to find out the change in the average speed along the corridor (if any) after the implementation of the BRT system.

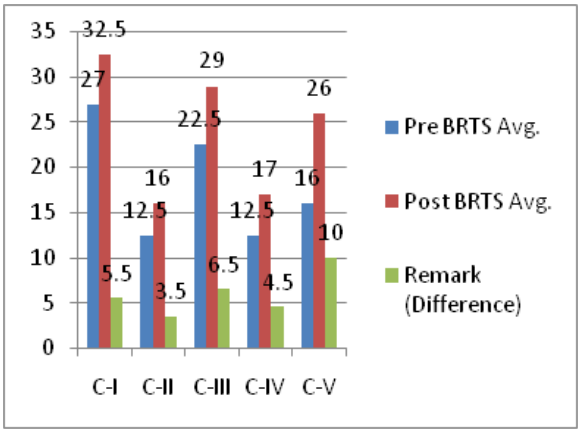


Figure 11: Showing increase in Speed Pre BRT and Post BRT

The above increase in speed is remarkable for the cities like Ahmedabad. The increase in speed can be said to be because of the reduction in the number of vehicles moving along the corridor and because of the segregation of the traffic lanes. The traffic experiences a free flow which causes an increase in the average speed along the corridor.

4.3 Study of accidents along the corridors

It is observed, that there has been a rise in the number of accidents in the past three years. This study aims at checking the impact of BRT on the road safely. This study would give a brief on whether the BRT system installed has helped in reducing the road accidents which is improving day by day. The data required for this study is collected from the detailed project Report of 'Janmarg' for the pre-BRT situation and the Current record is provided by the police and traffic department. The comparison of both the data would give an idea on whether the accidents have reduced considerably.

User's Rating Analysis

The user rating analysis shows that, the citizen who use the system are very much satisfied with the system and the general compliments of the public are as below:

- JANMARG's service is much more satisfactory than AMTS.
- JANMARG is an excellent service and a Service like this is a necessity for making Ahmedabad a metro. It is a simply great service for people.
- It is very good facility for the people
- Bus and bus-stops are very clean.
- Very good work
- This system is wonderful. This bus system is very good.
- Bus system is really good please continuing this service it is like services in Europe-America.
- This Janmarg system is good and comfortable
- Thank you for BRTS
- Buses come on time and the frequency is very good, it makes the systems special
- Janmarg makes the people reach their work and homes on time Thank you so much.
- Janmarg, Ahmedabad is a very sustainable system as the route

selection is takes the passengers to a very close proximity to their work place or home. This is shown with the help of the following graph.

4. CONCLUSIONS

Bus Rapid Transit Plan for Ahmedabad is a multifaceted project which integrates landaus and transport, various forms of public transport services as well as other motorized and non-motorized modes through various physical, operational and policy interventions to achieve the objective of making Ahmedabad an accessible, competitive and sustainable city. Given this multi–dimensional nature. Significant benefits to road users are anticipated due to improvements as mentioned below.

The BRT project in Ahmedabad includes up- gradation of 217 kms of road network from the present partially developed divided / undivided carriageway, open for mixed traffic to a fully designed street with:

- Physically segregated road space for buses, bicycles, pedestrians and for mixed traffic.
- Adequate lighting and other roadway operational infrastructure
- Road user amenities such as toilets, kiosks, and also the parking facilities.

The benefits are in the form of savings in vehicle operating costs and travel time savings. In addition, following benefits are also expected.

Increased public Transit Patronage:

Under the 'Regular bus operations' the quality of bus services tends to deteriorate after certain level of operations. The operating costs tend to increase and with deterioration in quality the patronage dwindles. As a result only the 'Capacity' riders are likely to continue using buses. Low levels of patronage also mean high losses which discourages investment in procurement of buses pushing the whole system into a low level equilibrium trap. Only way out to make urban transport sustainable is to make the services to match the technology advancements in the personalized mode. Possible improvements without BRT treatment would be limited and less likely to yield any significant benefit in the long run. The BRT , a rapid safe, reliable , flexible, quality service with its own identity would have the ability to provide quality service which is close to (in the long run better than) the services offered by the personalized modes at a much lower cost. Hence achieving higher transit patronage is feasible under BRT condition.

Efficient Mixed Personalized Transit Operations:

BRTS will also improve operating conditions for personalized vehicles. The various contributing factors towards this are: segregated traffic improved road surface quality better lighting, junction improvements and shifting a part of heavy traffic to outer ring road.

Reduction in Accidents:

Some of the BRT corridors are presently highly accident prone. With traffic segregation, exclusive pedestrian and bicycle facilities, better illumination effective regulation training and public education accidents on these roads are likely to come down by 75 to 90%

Improved Air Quality:

BRT benefits in terms of air quality improvements are more anticipated due to shift from personalized and more polluting three wheelers to buses, cleaner fuel choice and promotion of non- motorized mobility with facility integration for bicycles and development intensification around BRT corridors.

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