Appraisal Study Of Brts Surat-A Sustainable Urban Transport

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Abstract:*Urban transport system is the key issue in today's scenario due to incredible growth rate in urban areas and improper planning to accommodate incoming migrants. Surat city being the Diamond capital and Textile Hub becomes an epicenter for opportunities which in turn attracts a great number of man-power. This huge population and increasing requirements towards transportation challenges the existing service in the heart of the city. To face this challenge, BRTS turns out as a sustainable transit system looking towards the availability of space and existing network of roads. This paper deals with assessment of less preferred existing operational BRTS Phase-1: Corridor-1 i.e. UdhnaDarwaja-SachinGIDC which doubts its feasibility and requires thorough analysis to highlight its flaws. Also Congestion and Connectivity has been the concerned issue and needs to be resolved by re-planning to eliminate the flaws and sustain the tough three-wheeled competitor.*

Keywords: *Heterogeneous traffic, Mass Transit-system, Sustainable Planning.*

I.   Introduction

Indian traffic is heterogeneous in nature where variety of vehicle moves over a single lane. Also with insufficient transport facility within the city, it adds more usage of private vehicles and Intermediate Para-transit vehicles. All this together makes city roads very congested and time consuming journey with rapidly increase in pollution.

Surat city being the centre of opportunities for laborers as well as investors attracts large number of migrants from surrounding rural areas and lures investors to invest in huge diamond and textile industries. The network of roads in the city is incapable to accommodate the traffic induced as a result of huge population growth rate. South zone of Surat has more number of industries which develops a large need for transport facility, which is presently served by shared auto-rickshaw and leads to very heavy traffic and time consuming journey.

To solve this problem mass transit system was inevitable and so Bus Rapid Transit System was planned to meet the travel requirements over the entire city. But with the less preference given to the BRTS over the stretch Udhna Darwaja-Sachin GIDC raised questions against its feasibility.

In order to resolve the issue of less preferred BRTS, this paper presents the studies that were carried out to analyze the flaws of BRTS over the stretch and evaluating the deficiency between the planned and achieved objectives.

I.1   Need of Study

Surat is the one of the most dynamic city of India with one of the fastest growth rate due to immigration from various parts of Gujarat and other states of India. As there is no further scope for expansion of available physical infrastructure within the walled city of Surat, it is the need of today to manage the available resources and make potential use of it. Although BRTS is operating over the route, traffic, delay in journey, congestion and accidents have not changed significantly due to following reasons that developed the base of study.

1)   More preference to shared auto-rickshaw than BRTS over the route.
2)   Priority to Private vehicles than travelling into BRT buses.

I.2   Methodology

The Study was carried out in following steps:
1)   Literature review
2)   Inventory Survey
3)   Field survey
4)   Analysis
5)   Conclusion

II. Site Introduction And Data Collection

In order to evaluate the operational data of BRTS, the stretch of BRTS Phase1: Corridor 1: Udhna Darwaja-Sachin GIDC was selected as a study area which is 9.5 km long with 18 BRT Stations. This stretch is located in the south zone of Surat.
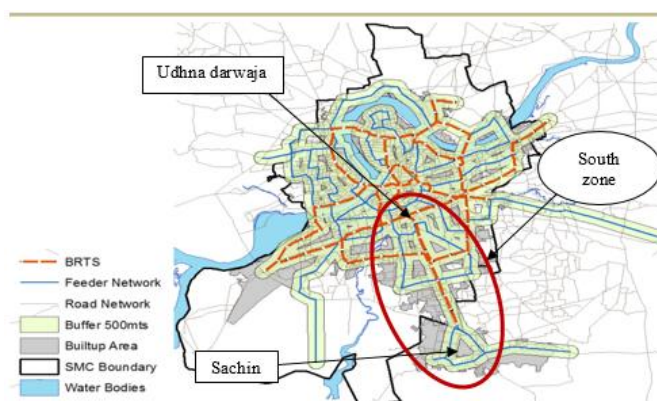

Fig.1. Stretch Details

II.1 Inventory Survey

Population of Surat has been increasing at very fast rate and because of this, the rate at which vehicles have been registered is quite significant. According to 2011 census urban population of India has increased about almost at twice the rate of increase in total population over a decade.
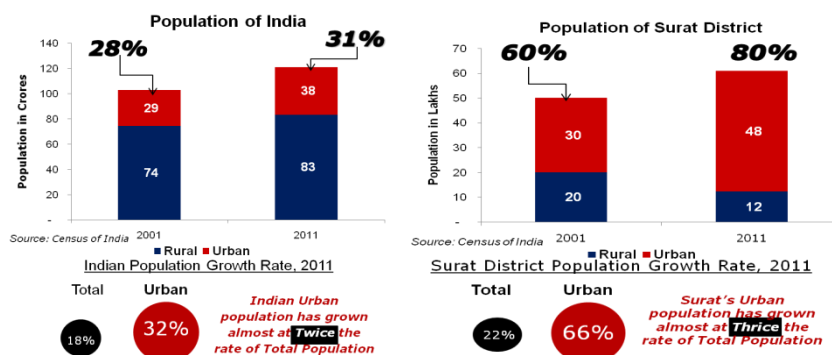

Fig.2. Population Growth rate

While the growth of urban population in Surat district is almost thrice the growth of total population in the city over the decade. This has lead to a serious demand in infrastructural facilities out of which Transport facility is one of the major concerned issues.

To cater the problems related to transport facility, National Urban Transport Policy had set certain guidelines to be followed while planning a transport facility. Those guidelines were,
1) Reduce the travel demand.
2) Encourage use of public Transit.

After that Comprehensive Mobility Plan of Suratcity was developed, it added strategies in order to execute the planning that contained the idea set forth by NUTP. Those Strategies were,
1) Structuring Land use.
2) Structuring Road Network.
3) Developing Transportation Systems.
4) Developing Parking Policy.

Proper structuring of land use and road network would decrease the trip requirement and eventually there will be decrease in the trip demand. So land-use also plays an important role to improve the conditions within the city. A result obtained from a survey reveals the travel speed in 2003 and projects the speed in 2020 where it indicates decrease in travel speed of vehicles to a great extent on a given road network if no proper transport system was planned. It is shown in Fig.3.
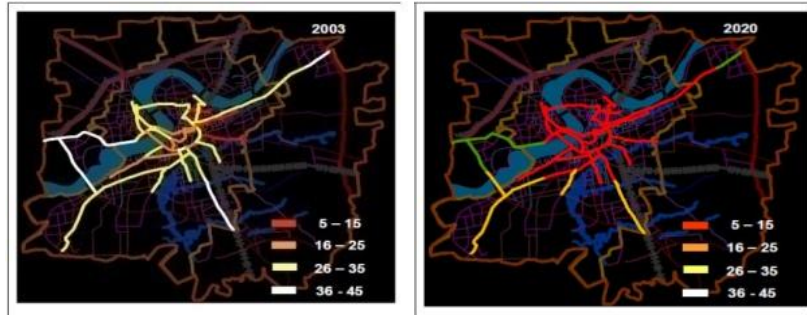
Fig.3 Travel speed Forecast

Hence it became very essential to plan an efficient transportation facility.But to promote the use of public transit, there appears the facility such as Light rail system, Metro systems, Mono-rails and Bus Rapid Transit System, out of which BRTS turns out to be viable enough to fulfill the demands. And so, BRTS plan was developed which divided the execution of construction into three phases. The routes are as shown in Fig.4.

Fig.4. BRTS proposed Routes

This BRTS plan had set certain objectives which were meant to be fulfilled to make this system feasible. These Objectives were,
1) Easy Access
2) Economical
3) Rapid service
4) Traffic Reduction
5) Eco-Friendly

Our paper deals with the assessment of the BRTS over the selected route which is the only working transit line out of these three planned phasein order to review its feasibility. Details regarding corridor identification and travel pattern were obtained from Detailed Project Report and CMP of Surat city and the surveys that were carried out to obtain operational data of BRTS are listed as below.

II.2   List of surveys
1) Questionnaire survey
2) On Board BRTS survey
3) Para-Transit survey

III.   Data Analysis
As the objectives were set looking towards the need of travel along the route, it becomes essential to study the deficiency between the planned and achieved objectives.

III.1   Trip details
Being an area where large number of laborers work in various industries located over short distances it is necessary to understand the purpose of trips that are generated over the route which forms the base of providing any transport facility. Use of two-wheelers and shared auto-rickshaw is the most over the route and when surveyed regarding the purpose of their trip, over 60% trips belonged to job or work oriented while study based & social trips were found to be second most over the route. The job or work oriented trips were carried by the Two-wheelers and laborers in shared auto-rickshaw which according to them turned out to be the most convenient mode of transport for short distances. Hence travel need for short distances is predominant on this

stretch and BRTS must cater this basic requirement when planned on this route. The details of trip generated by purpose is shown in Fig.5
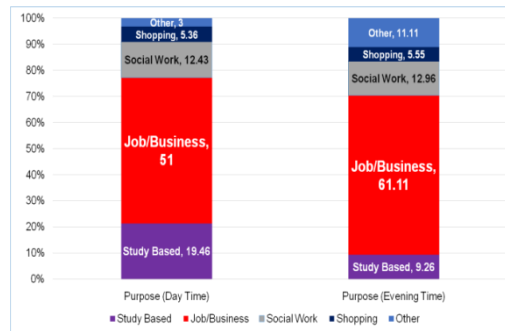

Fig.5 Purpose of Trip

III.2   Need for Public Transport

The stretch has been observed with congestions at many locations and with the development of BRTS lane it seems to have increased the road user problems like traffic and accidents. When it was surveyed regarding the need of an efficient transport facility despite of the available BRTS over the stretch, it was found that time effective journey was needed much more than cost effective journey. Passengers have perception to spend more money but to have a fast and rapid journey. The results of this survey are shown in the Fig.6 where almost 70% people seek a better facility to avoid time consuming journey.
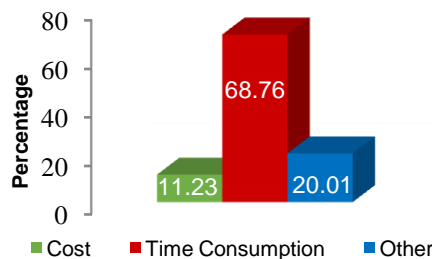

Fig. 6 Factors demanding need for transportation

III.3   BRTS usage and Journey Preference

As it was found that majority of the trips were oriented towards short distances in auto-rickshaw, it affected the usage of BRTS to a large extent. Results of this survey showthat around 60% passengers were not willing to use BRTS in morning as well as evening peak hours and were shifted more towards auto-rickshaw and private vehicles. The details of the usage is shown in Fig.7
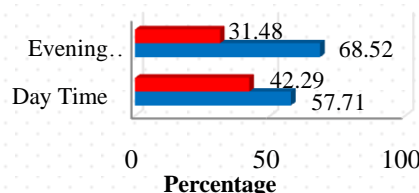

Fig.7BRTS Usage

Despite of the provision of connectivity with City bus at the two terminals i.e. SachinGIDC and Udhna Darwaja, preference for the BRT buses is still not upto the mark. Survey results for the first preference out of the available modes of transport over the route were again quite inclined towards private vehicles and auto-rickshaw rather than BRTS and city-bus in morning as well as in evening. The preference of passengers in percentage vs. different modes of transport is shown in Fig.8.
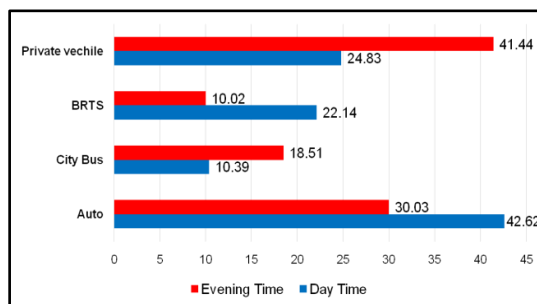
Fig.8. Journey Preference

The reasons behind the choice of these modes and their preference were then segregated in three parametersi.e. fare, frequency and accessibility of BRTS and were analyzed separately. The results of the analysis stated that 70% people rated the fare as good on the scale of five while over 60% rated frequency as good.
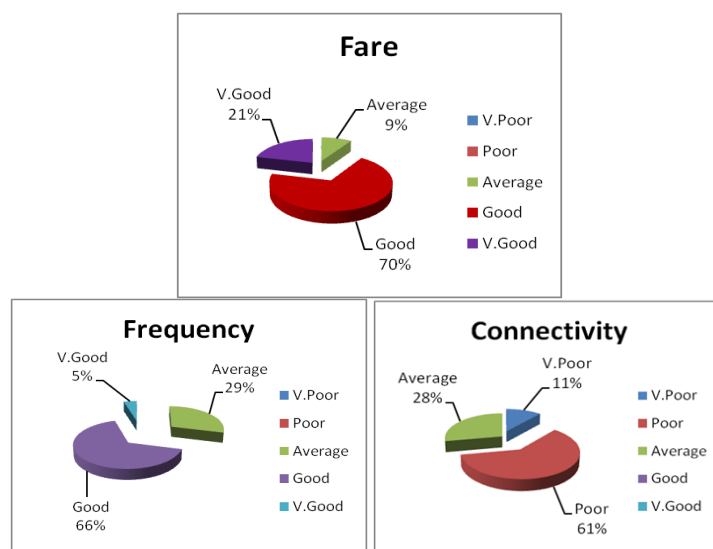

Fig.9 Factors

When the problems of connectivity of city bus with BRTS and accessibility of BRT stations was surveyed, About 65% people rated accessibility and connectivity of BRTS poor and around 25% rated as average. Hence, this has lead to more preference to auto-rickshaw as BRTS stations are not accessible enough and to private vehicles as there no efficient connectivity which could make the journey less time consuming.

III.4   On Board survey details
This analysis produces a detailed idea regarding the behavior of passengers in terms of priority towards BRTS and auto-rickshaw, by direct comparison of various parameters between BRTS and shared auto-rickshawwhich governs the feasibility of BRTS.

III.4.1   Fare and Journey details
The results of this survey show that Fare of Shared auto-rickshaw is higher than BRTS between each stops.Fig.10 shows the comparison between two modes of Transport between all the 18 stations.
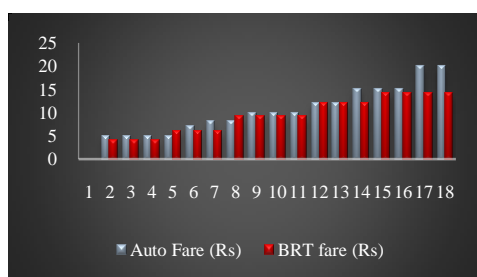

Fig.10 Fare analysis

Rapid service also plays a vital role and so a speed survey was carried out between each BRTS stop of BRT buses and shared auto-rickshaw. The Results of the survey show that the speed of both the modes is almost same between every stop with speed of BRT bus leading by marginal amount between certain stops. This results in greater average speed of BRT buses over the route in both the directions as compared to average speed of shared auto-rickshaw. Fig 11 represents the details of speed analysis From U-S i.e. Udhna Darwaja to Sachin GIDC and in morning and evening.
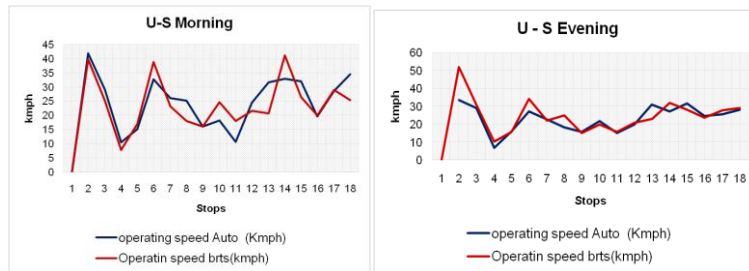
Fig.11 Speed analysis

While Fig.12 represents the speed between S-U i.e. Sachin GIDC to Udhna Darwaja.
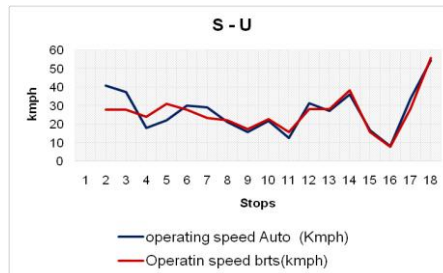
Fig.12 Speed Analysis

The Peak of red line can be easily seen of BRT buses at various stops which eventually results into higher average speed over the route.

When the journey time were analyzed from, it was found that at every stop BRT buses takes less time to travel than auto-rickshaw and which makes the entire journey faster over the route. BRT buses complete its one cycle earlier than rickshaw. The travel time between every stop is represented in Fig.13 by bus and rickshaw.
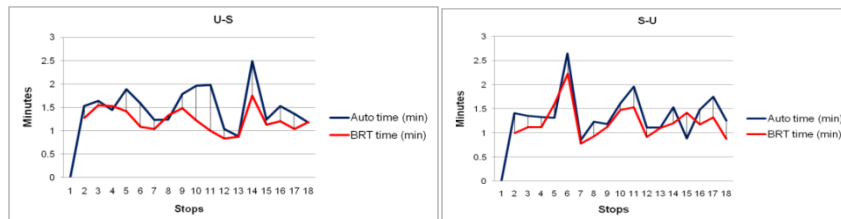
Fig.13 Journey time

Thus provision of separate lane on the route has resulted in faster movement of bus and thereby less travel time.

The frequency was found to be sufficient enough to cater the passenger load which is shown in Table.1. The total cycle time is represented in Fig.14 where BRT bus can be seen completing its cycle earlier than auto-rickshaw.
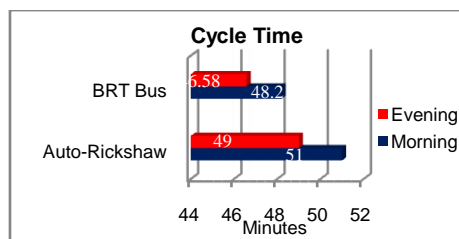
Fig.14 Cycle time

Table.1

time	frequency	headway (mins)
9.30 to 10.30	8	8
10.30 to11.30	7	8.5
Evening		
4.30 to 5.30	8	7.8
5.30 to 6.30	8	8.3

Thereby, BRTS turns out as a rapid service over the route.

III.4.2 *Boarding & Alighting details*
This survey analyzes the boarding and alighting pattern of passengers at every stop. This helps to understand the usage of every stop and its preference. Fig.15 shows the details of this survey.
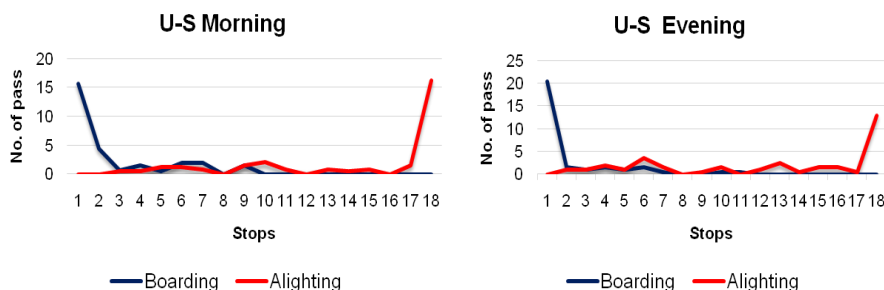

Fig.15 Boarding and Alighting details

The graph represents no. of passengers boarding and alighting at every stop where it is observed that maximum no. of passengers board at 1st stop i.e. Udhna Darwaja and maximum passengers alight at last stop i.e. Sachin GIDC. At intermediate stops hardly any movement of passengers is seen and so this route is utilized by only those passengers who need to travel from origin stop to the other terminal. The result becomes clearer when we analyze the load factor over the route which is shown in Fig.16.
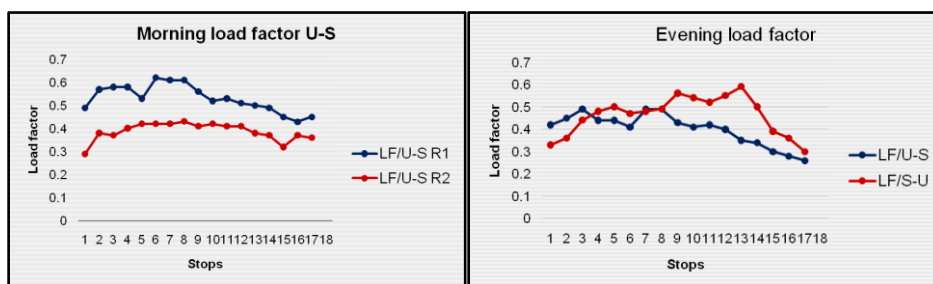

Fig.16 Load Factor

The load factor over the intermediate stops hardly varies by 0.2, while average load factor turns out to between 0.4 to 0.5. These details make it very clear that the passengers are not preferring the intermediate stops, but they utilize the route just to travel from one terminal to another.

IV.   Conclusion
Hence the objectives that were set for the BRTS are Rapid, Economical, Accessible, Smooth mobility and Eco-Friendly. BRTS over the Phase1: Corridor1: UDHNA DARWAJA-SACHIN GIDC is planned in such a way that it is economical, rapid and less time consuming as compared to auto-rickshaw but still it is not being preferred just because it lacks the proper accessibility for the passengers who wants to board from the intermediate stops.

The survey of passenger details that was carried out shows the boarding and alighting details of the passengers, where hardly any passenger board or alight along the intermediate stops. Passengers who want to travel from Udhna to Sachin are the only ones who prefer to travel in BRTS. According to the survey, 65 to 70 percent of passengers travelling in BRTS travel from end to end i.e. Udhna Darwaja to Sachin GIDC or vice-versa. In order to make this system sustainable, proper access is required. The other major concerns are as listed below.
1) This corridor has large number of laborers and workers who seek for the best convenient access for transport which is satisfied by shared auto-rickshaw along Intermediate Stops.

2) BRTS stops fails to cover certain major access locations over the route where large passenger traffic is observed.
3) Private vehicle holders seek for parking facility and quick connectivity at the stops to ease their modal shift.
4) Perception of people to spend money rather than walking even 200 m.

V.   Suggestions

1) Operation of all phases of BRTS in the city could result in more number of passengers having their origins from farther locations and destinations over the selected route and certainly could increase the Bus occupancy.
2) Re-locating BRT stops at certain major access points where large passenger traffic is observed or by shifting of some stops towards the junction by marginal distance as by decreasing even 100 m walking distance might attract more passengers than before.
3) Provision for the passenger in the bus such that passenger can indicate to the driver for his alighting station as it will avoid unnecessary stoppage time and consumption of energy at intermediate stops where no passengers are likely to board or alight.
4) Strict enforcement of law encouraging metered rickshaw once the project starts operating in the entire city.
5) Provision of Digital Indicators outside the BRT stop which could guide them regarding the arrival and departure of bus, might attract more passengers than before as per the perception found during the survey.

Acknowledgement

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