

Feasibility Studies and Performance Evaluation of Bus Rapid Transit System in Pune- A Review

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ABSTRACT: 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.

KEYWORDS: BRT, Ramp, corridors, LRT, Multimodal.

I. INTRODUCTION

Pune and Pimpri Chinchwad are linked Cities. From a traditional city with an agro-based economy, Pune has steadily metamorphosed into an industrial and educational centre, crowned with labels like the Detroit of India and the Oxford of the East. It is also emerging as one of India's top tech cities as well as a significant agro-business centre.

The recent growths in economic activity and average income have resulted in increased mobility and motorization in the metropolitan cities of India. To address increased need for transport infrastructure and services, the state Government of Maharashtra is planning to launch several infrastructure projects, including the construction of a metro system, new roads and flyovers. Since the road based Public transport systems is the lifeline for providing easy access and regress for various types of land uses, Government of Maharashtra approved for the improvement of existing road based PT system by recommending for the provision of the popular form of Bus Rapid Transit System (BRT) covering seven dedicated corridors in the city totalling 115.5 km. The [Jawaharlal Nehru National Urban Renewal Mission \(JnNURM\)](#) of the Government of India provided the financial support for this project. Basically, this endeavour also aimed at promoting multimodal transit to complement the extensive metro system which is being developed connecting various parts of the city and neighbouring regions. It is an established fact that Bus Rapid Transit (BRT) is one of the cost effective public transport services extensively deployed in various metropolitan cities around the world, due to its lesser investment cost compared with other forms of public transit like Light Rail Transport (LRT) and Mono Rail and Metro systems. Moreover, the basic advantage of this system over other forms of public transit is primarily due to its adaptability to run either on dedicated infrastructure, or in shared corridors with dedicated lanes coupled with exclusive signal phasing to regulate the traffic which plays a crucial role on the resultant performance of the system.

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II. COMPONENTS OF AN IDEAL BRTS

A. Ramp

- The ramp should have a slope of 1:15. It makes it convenient for differently-abled people.
- The ramp should have railing on at least one of the side walls.
- The ramp should have the tactile block for the people with optical disability.

B. Entry space & holding space

- It should be large enough to accommodate at least 15 persons.
- It should have the Route Map on one of the side walls.
- The Holding Space, at least on one side of FC Cabin, should allow for wheelchair access.

C. Fare collection

- For narrow station widths, it can be set in to make space for Entry and Exit Queues.
- The counter height should be at least 1.2m from the floor.
- The Cabin should have a minimum dimension of 1.1m x 1.45m.

D. Entry Queue & Exit Queue

- At least one of the Queue space should be 1m wide to allow for wheelchair access.
- The Entry/ Exit Queue should be long enough to hold at least 10 people in the queue.

E. Bus Station Doors

- Station doors should be at least 2.6m wide (wider than bus doors).
- The pitch between doors should be 15m to allow for 2 buses to dock on one side.
- For median stations, the doors on either side should stagger in their position to make sufficient collection space for people who want to enter/ exit the bus.
- The station doors should have the necessary signage.

F. Ledge

- The ledge would be typically 250mm projecting on the bus lane from the bus station door.
- The ledge should have a rubber lining on the edge to prevent damage to bus in case it docks too close.
- The ledge should be cast-in-monolith with the rest of the bus structure and never as an element joined form outside.

G. Station Walls

- Care should be taken that the gaps in the walls should be small enough to discourage animals and children to access the other side.
- An open station design may give a better aesthetic appeal even it being narrow.

H. Signage

- The signage shall be provided at key places, before ramps, entry space, entry queue, exit queue, LED panels hung from the ceiling and above the station doors.
- The signage on floor shall guide the person/ differently-able to the door and exit ramps.
- The signage should be in at least two languages (local and universal).
- The signage should be at appropriate height and brightness to be reader-friendly.

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III. LITERATURE REVIEW

A. Christoph Endresen Siedler (2014)

Can bus rapid transit be a sustainable means of public transport in fast growing cities? Empirical evidence in the case of Oslo, *transportation Research procedia 1 (2014) 109-120*

Christoph investigated under what conditions the bus rapid system would be regarded as the best solution to meet the challenges facing the oslo metropolitan area (route 31). He compared BRT and LRT with regard to several characteristics in order to emphasize similarities, and particularly to distinguish differences. The results from calculations show that none of the transport option is desirable and the LRT project is least desirable.

Whether the project is desirable is heavily dependent on the investment costs applied. The gross present value of both projects can increase if chance variable in the proportion of those using public transport is taken into account as discussed in the previous section. This may lead to both the BRT and the LRT project being desirable, even under the assumption of high investment costs for the roadway. Even if we completely ignore the fact that BRT may induce less traffic and a higher mode share of public transport, BRT along route 31 are more desirable than both regular buses and trams given the lower investment cost figures found.[1]

B. Chetan K., Harshal S., Trushik P., Xitij Sakhalkar, A Anuradha Pansare (2016)

Effective learning from Delhi BRTS-A case study of pune BRTS, *International Journal of Research in engineering and technology*[2]

Chetan Kumavat, et. al. had given an overall outlook of Delhi and Pune BRT systems and observed some common problems in operating both the system, and some recommendations were mentioned so that could help improving the Pune BRTS. They stated that BRTS in Pune city is at a very young stage there are a large scope of improvements and Pune should take initiative to improve the system and pedestrian safety as their major priority. They suggested that BRT systems not to be treated as an exclusive system. Integrating existing systems with the new systems in terms of physical access, ticketing and governance mechanisms is the need of the hour. Promoting local connectivity to BRTS Bus Stops needs improvement. Shared Auto service (similar to outside Mumbai Railway Stations on per seat basis) should be encouraged to-from the BRTS Bus Stops so that commuters can reach the nearest bus stop easily. They stated that critical and correct management and implementation of the BRT system is necessary from the point of view of safety and disaster management.[2]

C. Vimal Gahlot , B.L. Swami , M. Parida , Pawan Kalla (2012)

User oriented planning of bus rapid transit corridor in GIS environment, *International journal of sustainable built environment, Volume 1, Issue 1, June 2012, Pages 102-109* [3]

They suggested a model for, user oriented selection of bus rapid transit (BRT) corridor for Jaipur city in GIS environment. In that the model was to select the BRT corridor based on spatial distribution of transit trips in the city for horizon year. They suggested methodology which comprises two models, first model deals with BRT transit demand forecasting and second model was responsible for selection of the BRT corridor based on some predefined conditions and the model generates graphical GIS based maps as output for the better understanding of the transit demand pattern and policy making, for the urban planners. In that paper, they collect primary and secondary data that is present study, the complete Traffic and travel characteristics of study area have been acquired through exhaustive data collection.

They develop a GIS based BRT alignment selection model (G-BASM) in that model is unique in its application as it uses the GIS platform to capture the transit flows over the city using spatial analysis with the different spatial maps developed in database management stage. The G-BASM was developed to select the BRT alignment while satisfying the users and operators requirements.

The requirement of user which makes him to choose any mode was the minimum travel time in terms of shortest travel path and for any mass rapid transit system to be viable, it should satisfy the operator's requirement of generating

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revenue by maximum ridership with desired level of service. They concluded that the ridership estimate of BRT demand model for horizon year with the standard capacities of different MRTS suggests that BRT was the most suitable mass transit technology for the study area undertaken.[3]

D. Gautam Raj, Ch. Ravi sekar, S. velmurugan(2013)

Micro simulation based performance evaluation of Delhi bus rapid transit, *Social and behavioural science 104(2013)825-834* [4]

BRTS is the Bus-Based mass transit system that delivers Fast, Comfortable, and Cost effective Urban Mobility. For simplification and better understanding BRTS system was further classified into three types,

- a) Open system: In this type of system All type of bus fleet in the city are allowed to travel through the BRTS channel
- b) Closed system: In this type, only special type of bus fleet is allow through specified channel and not the other type of buses
- c) Hybrid system: In this type, a special fleet which is allowed for BRTs can be opened for mixed traffic under special cases.

According to Literature, system was based on ITDP parameters which gives rating out of 100 points on depend on that points it is classified as Gold, Silver, Bronze. The parameters consider for rating are: a) Service Planning, b) Infrastructure, c) Station Design, d) Station Bus interface, e) Quality of service and Passenger information.[4]

E. P. Phani Kumar, Dr. Manoj Rajan parida, Manisha Swami(2013)

Performance evaluation of multimodal transportation system, *Social and behavioural science 104(2013) 795-804*. [5]

Transport is critical element which creates huge pressure on travel demand. Hence MRTS required effective mode which is depend on: a) Various mode at city and regional level. b) Location and Design of nodes, c) Pedestrian flow at transfer station, d) Network Structure , e) Line density, f) Frequency of service

Measuring customer's satisfaction for public transport service and its frequency of use is important. But satisfaction level of service and its frequency of use NOT correlated for multipolitan traveller. Example: Satisfaction level is high for smaller town and low for metropolitan cities.[5]

IV. CONCLUSION

- On studying the Bus Rapid Transit System in Pune city, it was found that the system has a number of drawbacks
- It is not used to its full efficiency.
- Due to the flaws, reliability of the people on public transport is reducing day by day.
- As there is scope for improvement, Pune can avoid the mistakes done in the planning and implementation of Delhi Bus Rapid Transit System
- One major factor in its failure can be the lack of proper planning and survey before the implementation of Bus Rapid Transit System.

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