

A Feasibility Study on Bus Rapid Transit System in Belagavi City

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ABSTRACT- Belagavi city is a developing and has developed rapidly during recent years. Development can be related to increased urbanization. Belagavi city is lacking intercity transportation requirements in terms of physical expansion, growing population. Due to which many people are travelling on their own vehicle which is leading to increase in traffic, causing jams during peak hours leading to delay in travel times. Moreover, pollution created by these vehicles is a huge cause of concern for the public and local authorities alike. Mass transportation is an important factor for development. To check the performance of any system, performance analysis is a tool. Performance Evaluation can be defined as “To determine how effectively policies, program, project is executed with regard to its goal and Objectives”. User satisfaction is an important parameter of performance evaluation, satisfaction can be defined as expectations and perceived performance prior to efficient, affordable, effective and safe public transportation system and to achieve this Bus Rapid Transit System could be one of the solutions.

Key Words- Bus Rapid Transit, Corridor, Survey, System.

I. INTRODUCTION

BUS rapid transit (BRT) was defined in the BRT implementation guidelines as a flexible, high performance rapid transit mode that combines various physical, operational and system elements into a permanently integrated system with a quality image and unique identity. It is important to note that BRT is the latest “Buzz word” within the public transport community and has been promoted as an economical and practical solution to improve existing public transport systems. Moreover, it is increasingly becoming worldwide phenomenon synonymous with quality public transport. Currently, BRT has become a relevant global mass transit mode, especially in

developing countries. Those countries that cannot afford the funds to build rail tend to turn to bus rapid transit (BRT) system as a viable alternative. Compared to conventional bus transport, BRT has advantages such as regulated time table, high capacity and speed.

Compared to other common modes of transportation, such as light rail transit (LRT) or mass transit (BRT) is attractive to transportation authorities because it does not cost much to set up and operate, and it does not need any track. Once laid down, bus drivers typically require less training and a lower stipend compared to rail operators, and bus maintenance is less complex than railway maintenance. In addition, buses are more flexible than rolling stock and a bus route can be changed, either temporarily or permanently, to meet changing demand or cope with adverse road conditions with relatively little investment of resources. However, “Proper” BRT infrastructure, such as bus interchanges, is similarly expensive and cumbersome to build as a comparable rail infrastructure. Additionally, during the Belle époque, railroad units were able to build shift rail infrastructure within days or hours, much like it takes to build even the most basic infrastructure where none previously existed.

II. LITERATURE SURVEY

BRTS is a most cost efficient and effective system which can be implemented with minimum requirements and because of this the pre-existing buses, roads and stations can be utilized without major changes in the present running bus services and this system is very easy to maintain.

BRTS uses separate Right of way or lanes same as that of subway or metro but on the roads hence very cost efficient as compared to metro also the maintenance and implementation is very easy.

BRTS also provides smart bus stations, passenger friendly safe and reliable travel by providing fast and on time buses.

The only thing which is necessary to implement BRTS in required city is availability of enough Right of way.

III. WHY BRTS?? IN BELAGAVI CITY

NWKRTC is the sole public transport service provider in Belagavi city. In recent years, the services of NWKRTC have tremendously improved. The demand for the bus services are increasing everyday as more and more areas and localities are being developed into layouts especially on the outskirts of the City. In Belagavi city, there are several corridors where the demand for bus service is high. However, due to the influx of personalized vehicles, the space available for the buses to move with the required frequency and speed is minimal. It has therefore, become imperative to introduce a more sophisticated, technically and technologically sound public transport system in Belagavi city. Also, Metro and Monorail cannot be introduced throughout the City as the alignments of these systems are dependent on various factors which include availability of enough Row and travel demand pattern. The introduction of BRTS is the next available alternative.

Also travel time savings is improved and the safety of passengers as well as the traffic safety can be improvised, and Green House Gases and local air pollutant emissions will be significantly reduced.

IV. METHODOLOGY AND DATA COLLECTION

It is proposed to first implement BRTS from Central Bus Stand to Chhatrapati Maharaj Circle covering a length of about 13 Km. This corridor has been selected as a pilot corridor based on the following criteria:

- Availability of enough Row for providing separate Bus Lanes
- Wide Bus Station spacing is possible
- Travel demand, Future growth & Economic growth
- Easy implementation

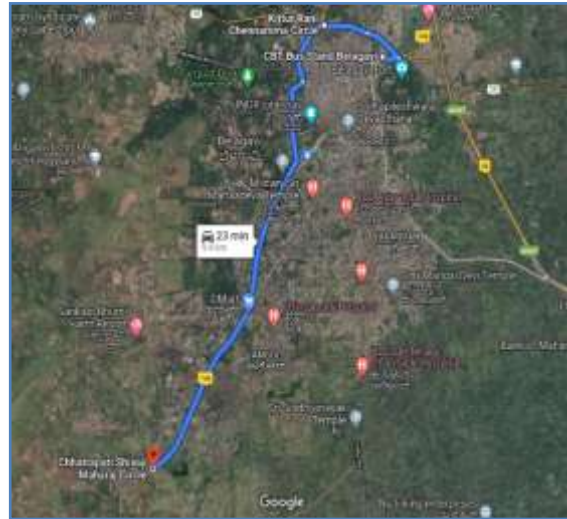


Fig.1 Belagavi city Study area (proposed corridor)

The problematic junctions which restrict smooth flow of traffic have been identified, bottlenecks encountered along the Pilot Corridor are listed in table below:

Sl. No.	Bottle neck	Type	Remarks
1	Ashoka circle	Junction	4 arms
2	RTO circle	Junction	4 arms
3	Rani Chennamma Circle	Junction	4 arms
4	Sardar Ground	Junction	3 arms
5	Dr. Rajendra circle	Junction	4 arms
6	Bogarvaes Circle	Roundabout	3arm
7	Gogte Circle	Junction	4 arms
8	Railway overbridge	Flyover	Operational
9	RPD circle	Junction	4 arms
10	3 rd railway overbridge	Flyover	Under construction
11	Udyambag	Junction	4 arms
12	Chhatrapati Maharaj circle	Junction	4 arms

Table 1

Willingness – To –Shift to BRTS:

The survey was conducted for sample basis from CBT – CM circle. Information was obtained by presenting a survey respondent with a series of situations/scenarios and asking what his/her preference on each. Three scenarios were considered with response scale varying from Not, to Will. The

analysis and results of this survey will be presented once the survey is completed.



Fig.2 Respondent details



Photographs of Passenger Opinion Surveys

BRTS Stations Recently in Belagavi city almost 21 numbers of Smart Bus shelters have been completed in phase 02 and 13 number of Smart Bus shelters have been completed in phase 03 of Smart City Project which is undergoing from past couple of years, hence There is no need of major changes in the implementation of BRT stations for the proposed corridor.



Fig.3 Smart bus station

Right of way the right of way details given below have been collected from Belgaum Urban Development Authority and Belagavi Smart City Limited. And, cross checked by us during our study on this proposed corridor.



Fig.4 Existing Right of way

Route Details	Available Row
CBT – Ashok Circle	18 mts
Ashok Circle - RTO	30 mts
RTO – Chennamma Circle	36 mts
Chennamma circle - Bogarvaes	24 mts
Bogarves – Gogte Circle	18 mts
Gogte Circle – 3 rd Gate	36 mts
3 rd Gate – CHM Circle	36 mts

Table 2

V. IMPLEMENTATION OF BRTS

BRT system There are two kinds of systems possible in BRT; one is an open system and the other a closed system. In closed system, generally developed as a Trunk and Feeder system, only BRTs buses operate in an exclusive bus way. This gives greater control over schedules. In this system the junction management is very simpler. In an open system, the operators run their buses, not only in the dedicated bus way but also in the mixed traffic. While this gives a greater coverage with minimal transfers, schedules are likely to get compromised. Hence, Closed System is suitable for the proposed BRT corridor.



Fig.5 Closed system

Bus lanes recently after the smart city construction, Bus stations have developed and modernized on the curb side of the Row on either side of both lanes hence choosing the bus lane on curb side reduces the cost of making new bus station on the center or median side which will significantly reduce the cost of overall BRTS implementation.

The main reason to choose this lane is because there is no space for center transitway. And, if the median side lane is chosen then bus stations at center will bulge the road which leads to narrowing of road causing traffic congestion.

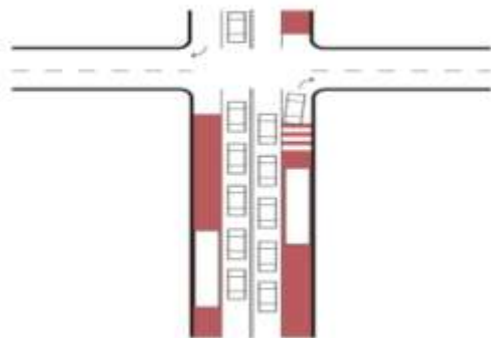


Fig.6 Curb side lane

Bus stops as the preferred lane is curb side, the bus stop location should also be placed on the curb end and because of smart city projects in Belagavi city, smart bus stations have already been implemented and there is no need for new BRT stations as these stations can be modified and installed with necessary BRT features. This configuration also enables straight flow without bulging for the bus lanes and mixed lane traffic.

Bus type Electric buses or hybrid buses must be implemented so that the harmful gases being released to atmosphere by currently running buses is causing air pollution as well as noise pollution hence if we use electric buses the pollution from buses will be reduced to zero also the noise pollution will be significantly reduced.

Footbridges A footbridge is very much necessary in case of implementing BRTS in Belagavi city because after smart city development the medians are taller and fitted with metal barricades because of which crossing the median has become difficult hence if we provide footbridges it is easier for people to cross the road easily from one side to another above the road level at enough height.

A separate button is provided at the intersections and junction signals at zebra crossing so that when public or passengers/commuters gather at a crossing, By pressing this push button signal makes the major vehicle passing to stop for a few seconds or minute so that people can cross the road, And people getting hit by vehicle is reduced.



Fig.7



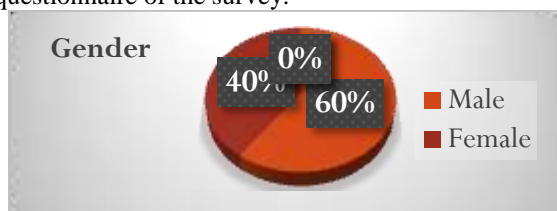
Fig.8

PISA passenger information system, is a system which shows the status, time of departure and arrival on screen, these screens must be provided on the bus stations as well as inside the buses so that passengers or commuters can see the information related to buses, this system is connected to automatic vehicle location system hence showing real time information.

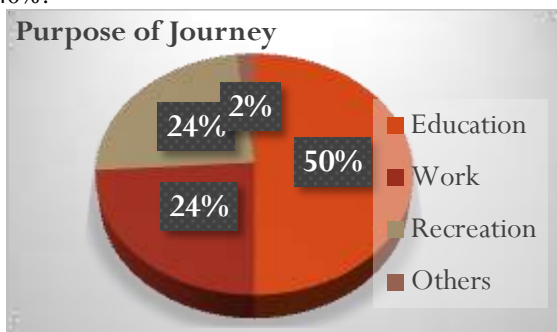
AVLS Automatic Vehicle Location Systems (AVL(S)) is the system which gives the exact location of buses, speed of buses and time at which the bus is arriving or departing from a particular bus stations, this system uses GPS hence very accurate and reliable the information system attached to the bus sends signals to the passenger information system which says the current status of particular bus this helps the passenger to decide whether to board the upcoming bus or next bus also this system tells if any bus has faced some technical issues.

VI. ANALYSIS AND DISCUSSION

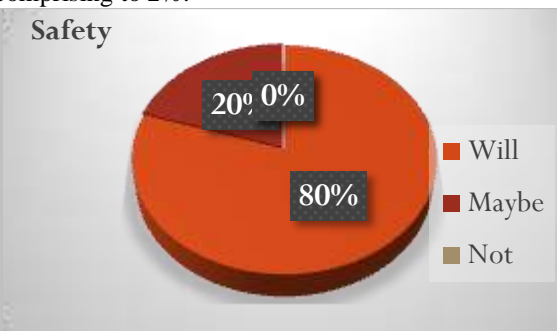
Based on the survey data collected, analysis was carried out considering each parameter included in the questionnaire of the survey.



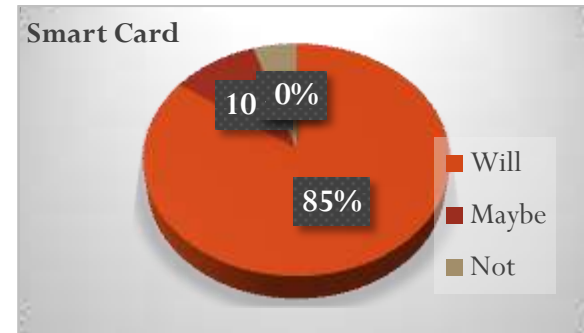
The survey revealed that 60% of the respondents were males while the females comprised of the remaining 40%.



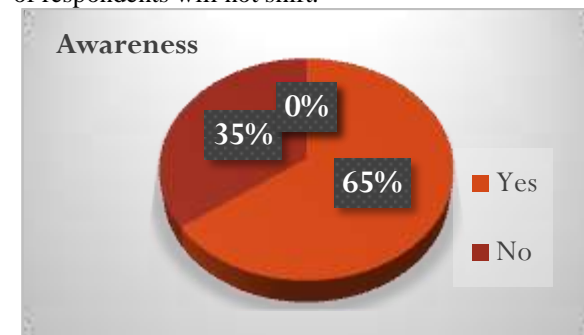
For the transfer passengers, work-based trips were prominent at 24% while the education trips 50%. Recreation based trips 24%, and other trips are comprising to 2%.



Preferring Safety, majority of respondents were preferred the BRTS to the present mode of travel 80%.



If we are providing smart cards for weekly, monthly, yearly users will you like to Shift: 85% of respondents will shift, while 10% respondents may shift, and 5% of respondents will not shift.



Around 65% of commuters are aware about BRTS, were as 35% of people are unaware about it. Most of the people have seen and experienced BRTS in other cities but are not familiar with the name Bus Rapid Transit System.

VII. MODEL SHOWING PROPOSED BRT CORRIDOR

Based on the available right of way, a model showing segregated lanes for BRTS has been done the Row used in model is 36 meter and 3.75 meter of bus lane is provided on either side of the roads the footpath width is around 2 meter and median width is 2 meters.

Photographs of model are shown in fig 9,10 and 11.



Fig.9



Fig.10



Fig.11

VIII. CONCLUSION

Based on the present study, the following conclusions can be drawn

1. From opinion survey it is found that more than 85% of respondents are willing to shift to BRTS provided with Safety, frequency, On time buses and Smart Cards facilities.
2. To Implement BRT corridor in Belagavi City (CBT – CHM Circle) we have to take necessary information from the current bus service providers and ask them to help us understand and design sophisticated BRT system in Belagavi
3. BRT is an excellent transit system ultimately subsidizing sustainable urban development.
4. Travel time.savings dominate the BRT benefits as a result of segregated bus. lanes and other design features which minimize waiting and in-vehicle times.
5. Shifting from. informal/unregulated service with smaller vehicles operating in mixed traffic, to newer, buses operating at higher.speeds results in significant reductions in vehicle operating costs with BRTS.
6. As the roads, curbs, bus stations have recently been updated the budget for implementing BRTS in proposed corridor will be significantly less.
7. Noise and Air pollution will be significantly reduced.

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