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A Case Study of Bus Rapid Transit System in Bhopal



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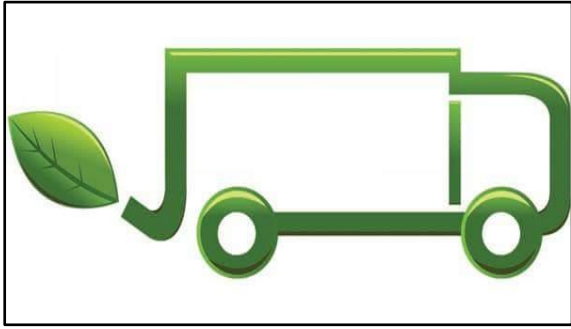
Abstract

Bus Rapid Transit (BRT) concept is now a day becoming increasingly utilized by the cities looking for cost effective transit solution. Bus Rapid Transit System (BRTS) attempts to address the deficiencies of the earlier public transport system by providing a rapid, high quality, safe and secure transit operations. However, in order to gather a large number of commuters to public transport, there is a need to offer good quality and comfortable service. Efficient mobility of people is one of the key factors for the progress and prosperity of a society. Effective public transport is the need of every urban area. For various cities that are growing at a rapid pace it becomes the most essential vehicle for sustaining growth. In Indian context, the available public transport modes typically offer poor levels of services marked by improperly maintained vehicles, poor design of buses for city transport, un-responsive staff and lack of proper systems oriented towards consumer satisfaction. The poor quality of services lead to higher use of personal vehicles for transport causing congestion on roads and rise in environmental and other problems. It is therefore imperative that effective and efficient public transport services are provided in order to increase the share of public transport. The traffic and transport situation in Bhopal city needed an urgent necessity for an efficient, reliable and cost effective public transport solution and the solution up to some extent was provided in city bus services and Bus Rapid Transit System. Along with strengthening of the fleet size, it is equally important to develop the supporting infrastructure to control the maintenance cost over the entire bus life for maintaining the environment of the city. While doing this, the focus of bus service improvement should also lead towards sustainable solution for green mobility and improving the public transport ridership. A case study has been carried out to critically examine functioning and effectiveness of BRTS in Bhopal. The study reveals a positive impact of BRTS on the social environment and urban infrastructures.

Keywords: Bus Rapid Transit System.

Introduction

Transportation is becoming a major cause of concern for the eternally expanding cities along with concerns like water and electricity. A dispersed population is spread over a far wider area than the same numbers residing in an urban concentration. At the same time the transport system to move people around this segmented city does pollutants to the atmosphere. The planners must find a balance in which public transport begins to dominate and the modes of transport are environment friendly. As the demand for transportation is increasing, the need for sustainable modes becomes more evident. The need for more plentiful and efficient public transport becomes very essential as a step to reduce traffic congestion which is mainly caused by public transport. For this to be achieved there is a need of well planned public transportation system which is affordable and attractive to all groups of people. Adding more highways is expensive and disruptive; and is not always an environmentally sound approach. Light rail rapid transit systems are of interest to many urban economies but it requires significant capital investment and may not be an effective solution for many transport problems. One innovative approach is the use of buses rather than light and/ or heavy rail, in an integrated, well defined system with design features similar to light rail rapid transit systems.



For Bhopal, the first step in this direction was the launch of 'My Bus,' the Bus Rapid Transit System (BRTS), a new form of public transport system in India. My Bus was carefully named to highlight a sense of public ownership of the new improved version of public transport in the city. Bhopal, capital city of Madhya Pradesh is located in the heart of India. My Bus, for the first time in India have added push button features for pedestrians to access the system and has special security measures to ensure women safety. Thus with a view to improve the public transport system in the city and encourage people to use it, Madhya Pradesh Govt. introduced the BRTS in Bhopal on September 27 ,2013 under its Integrated Mass Transit Plan. According to the 2011 Census, the city of Bhopal has a population of 18.43 lakhs and the municipal area is spread out in 285 Square kilometers, with 647 Km of urban roads. Bus Rapid Transit (BRT) can help to reduce oil consumption and associated emissions of air pollution and greenhouse gases. BRT also can help mitigate growing traffic congestion and encourage more sustainable urban development. Bhopal City has also been selected by World Bank to avail of a grant from the Global Environment Facility (GEF) to fund the incremental cost of activities aimed to enhance sustainability, energy efficiency and quality of the city bus services provided under its Efficient and Sustainable City bus Services Program (ESCSB). Of all cities in India and, perhaps of the world, Bhopal has a unique topographic configuration in which hills and lakes segment the city into sub-cities which, though linked to the core are self –sufficient in them. Bhopal is infamous for its old minibuses, which run in an erratic way and in a much disorganized fashion. Most of the minibuses are in decrepit condition. These buses run with no fixed route. To promote towards the sustainable development in urban transport, the system of Bus Rapid Transit System (BRTS) is implemented on the major corridors of Bhopal city, for providing an incentive to people toward the use of public transport use. The research aim is to study the overall Impact of Integration of city bus services with BRTS.

Objective

The main objectives are to identify the direct or indirect impacts of BRTS on the society, to investigate changing scenario of BRTS to bring about improvement to public transport levels particularly for the users of public transport, and also assess the effectiveness BRTS to handle the worsening traffic problem of Bhopal or become a perennial headache for the citizen. To this effect the research aimed to assess role that can be played by BRTS in improving public transport levels of services and to analysis whether the BRTS is a solution to a “problem” or a “problem” in itself.

Methodology

The study has been based on field research and it also includes a review of available secondary data on baseline information. The field research includes site visit, carrying out primary survey, discussion with local people and other officials and stakeholders to know the broad issues. The main objectives of assessment are to determine the magnitude and sensitivity of direct and indirect impacts likely to result from BRTS project.

Urban Transportation & Importance of Public Transport

Urban form comprises of different elements that determine its character and ongoing activities which is categorized by the integrated land use pattern and it's inter connection, established by the transportation links. Urban transport is organized in three broad categories of collective, individual, and freight transport. Urban productivity is highly dependent on the efficiency of a transport system to move labor, consumers and freight between multiple origins and destinations. Among the most notable urban transport problems are traffic congestion and parking, difficulties for pedestrians, public transport inadequacy, Loss of public space, accidents and safety, land consumption, environmental impact and energy consumption

As the demand for transport is increasing, the need for sustainable modes becomes more evident. The need of more plentiful and efficient public transport becomes very essential as a step to reduce traffic congestion which is mainly caused by private

modes. Despite the advantage of using public transport, there is an increasing trend in the use of private cars and motorcycles in both developed and developing world due to poor transit services. The private vehicle is winning the mode share in many nations as income rises in developing nation, private vehicle are gaining usage while public transport readership is almost universally declining.

Bus Rapid Transit System (BRTS) takes part of its name from "Rapid Transit", which describes a high-capacity transport system with its own right-of-way, implemented using buses through infrastructural and scheduling improvements, to provide a high level of service. The Bus Rapid Transit system is expected to revolutionize public transport with new buses, special lanes and new routes, all at a low cost. Bus Rapid Transit System, or 'High Capacity Bus System' as it is commonly referred to, is a flexible mass-transit mode that has the advantage of being the most economical amongst the mass-transit options. BRTS flexibility is both in terms of routes and areas of coverage as well as in terms of its amenability to features-up-gradation over time.

Bhopal Municipal Corporation has started the city bus operations successfully under Bhopal City Link Limited (BCLL) on Net-Cost Basis Contract through a private Bus operator. The Present Operational Bus services, through a special purpose vehicle (SPV) created i.e Bhopal City Link Limited headed under the Chairmanship of Mayor of Bhopal & Commissioner BMC as Managing Director of the company BCLL is successfully catering the demand of the public. There are currently 250 buses operating under BCLL through the private operator on 8 routes (Trunk and Standard routes) in the city catering to the needs of more than one lakh passengers every day by maintaining the required frequencies. BCLL has adopted a net-cost based Public-Private Partnership (PPP) operational model with the city providing the basic infrastructure and private partner being responsible for operation and maintenance of the buses.

Regional Setting and Growth Pattern

Socio-economic linkages influence the developments taking place in the city. These linkages are changing and evolving continuously in secondary and tertiary settlement systems around the city

Urban Area and Its Population

Bhopal is the second largest city in the State with a population in 2001 of 14, 33,875. Upon reorganization of State's in 1956, Bhopal emerged as the capital of Madhya Pradesh, which was the starting point of the phenomenal change in its demographic trend. The current population of the Bhopal Planning Area is 23,68,145 which indicate the growth of Bhopal city. The developed area is also increasing as per draft development plan of 2012 (Table -1)

Table-1

Bhopal Planning Area

Source: Bhopal Development Plan 2021 (Draft)

S. No.	Area	Existing (2005) Area in ha.	Proposed (2021) Area in ha.
1	Developed area	17254.98	36567.11
2	Undeveloped area	64030.59	44718.46
	Total planning area	81285.57	81285.57

Transport Sector

Like all the major cities in India, Bhopal has also witnessed a very high vehicular growth in the last two decades, the total motor vehicles have grown more than three times, and this growth is driven by two wheelers which have grown by more than three times followed by the large vehicles (buses, trucks etc) that have grown more than five times during the period, of the total vehicles registered every year in Bhopal, two wheelers accounted for 79% in 1987-88 which increased to 94% in 2003-2004. However, since 2003-2004, with rising income and prosperity, the share of four wheelers plying on roads is growing rapidly. The transport infrastructure in Bhopal is being transform with widening of roads, over-bridges on railway crossings, fly over for fast transits, multistory parking at various locations, and pedestrians subways at major traffic point. BMC under Jawaharlal Nehru National Urban Renewal Mission (JNNURM) scheme has initiated BRTS plan for Bhopal in phased manner.

Access to Public Transport

To cater for the intra-city travel demand the public transport comprises of minibuses and tempos. In terms of capacity, road space utilization and environmental degradation, the tempos mainly operating from the urban fringes to city core, have been found to be quite insufficient. Moreover the quality of service provided by minibuses and tempos is poor with no arrival / departure schedules and request stops anywhere on the route. Even with this service quality, the minibuses and tempos cater nearly 31% and 12% of the intra-city travel demands by mechanical modes. Both minibuses and tempos do not have any organized terminal facilities. The intercity bus terminal at Nadra in the old city acts as a major node for the inter-city.

Population Vs Vehicles

Since 1981, the population of Bhopal has multiplied about 2.5 times and number of registered vehicles has increased 85 times. Of the 7.9 lakh registered vehicles in 2011, 92% are cars and two wheelers which accounts for only 28% of modal share.

Figure 1: Population Growth

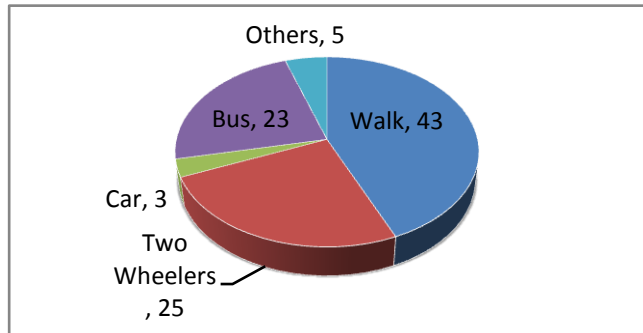
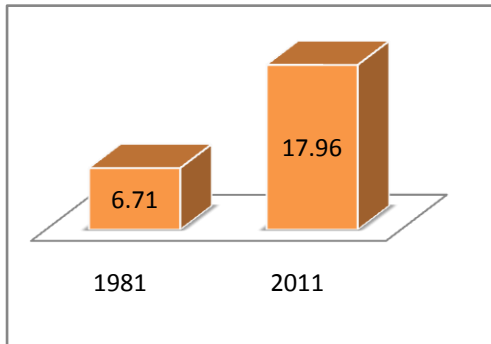
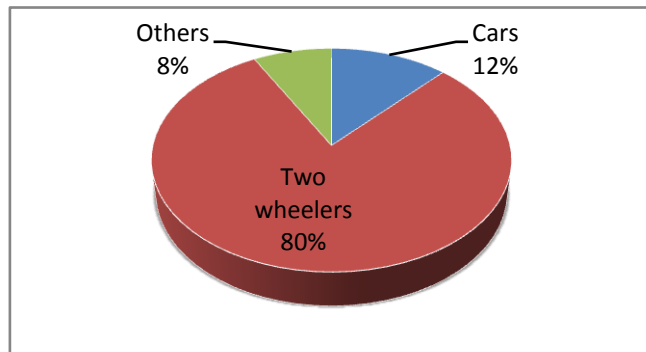
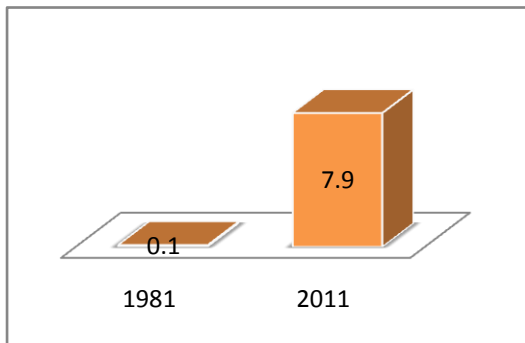


Figure 2: Vehicular Growth



The mobility of the traffic is also retarded due to the numerous junctions with high traffic intensity, Heavy vehicle turning movements and lack of channelization of traffic. Parking is a major issue in the city of Bhopal because of high demand of parking due to concentrated commercial activities in the central area. On street parking reduces the effective road width available for the movement of traffic Regional transport network has the bus terminals in the densely developed areas causing traffic congestion. The transport terminals lack in the facilities. There is no organized truck terminal facility in the city area. Generally trucks are parked in Bairagarh, Gandhi Nagar, Khaji Khara, Subhash Nagar, Nishatpura besides the old city areas.

Vehicle Composition

Bhopal depends mainly on public transport with 48% share of passenger trips; this includes standard buses, mini buses and tempos (magic). There are about 3,00,000 two wheelers and 50,000 cars that make the private mode contribute 37.4% of passenger trips to the transportation system of the city. Intermediate public transport has autos and taxis and share about 5.7% of the passenger trips and non motorized vehicle such as cycles share 8.3% of the same. On an average the route length is about 27 km. The average journey time is 1 hour 35 minutes for boarding and alighting, with an average travel speed of 45km/hr. And the net travel time comes out to be 40 minutes. The number of passenger per trip is about 46, there are frequent request stops and most

of the routes pass through the old city area, primarily because of the demand.

Bus Rapid Transit System

Bus Rapid Transit System (BRTS) is being operated by Bhopal Municipal Corporation through Bhopal City Link Limited under centrally sponsored JNNURM scheme in major 4 corridors mainly as the open and close system to cover main residential and commercial areas as explained below:

1. **Exclusive BRTS Service– Closed System:** BRTS system lane is restricted only for BRT buses. BRT operators remain the only beneficiaries' ad hence responsible for efficiency and maintenance.
2. **BRTS Mixed Service (Other Corridors) – Open System:** BRT system is kept open for all existing bus operators. The benefit of dedicated infrastructure is distributed to all operators.
3. BRT Routes can operate both inside & outside the BRT Corridor.
4. Removing the needs of interchange, transfer terminals and exclusive feeder buses.
5. Greatly reducing the number of passenger transfers in the system.
6. Enabling the use of both existing buses and special BRT buses
7. Lowering construction and operation cost

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“BRTS Bhopal:-A Flexible Integrated Operation”

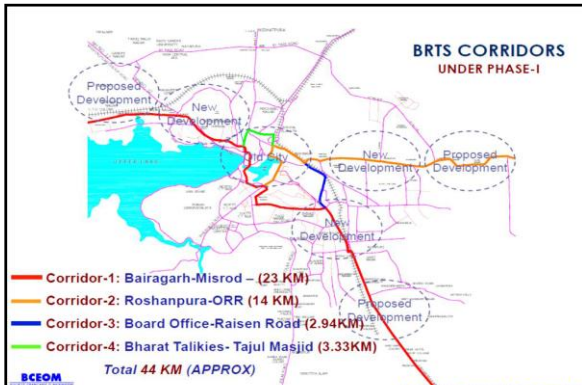


Figure 3: BRTS Route Map

In the light of the current problem and with the objective to promote and enhance regional mobility and serve the public by providing quality transit service and solution that improves the overall quality of life of the residents of Bhopal, the government implemented BRTS service at various corridors. This is over and above the ongoing effort on road improvement, traffic management, procuring CNG busses by BMC and BCLL at various levels. Under Phase 1 the corridor-1 Bairagarh - Misrod has been prioritized for the implementation and to enhance the core connectivity of core of the city with

all other areas through an integrated transportation network of rails and bus corridors.

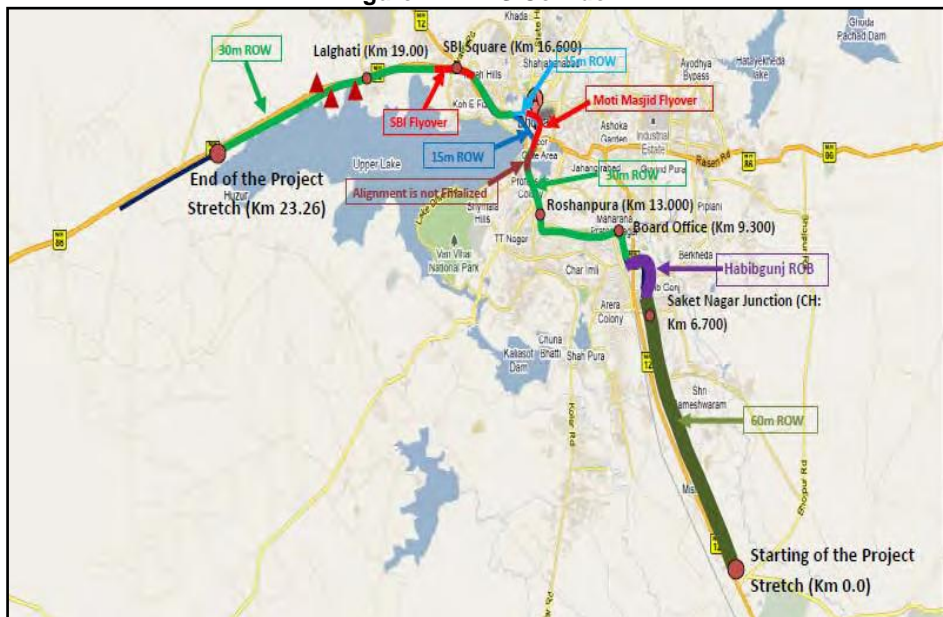
Planning Stage

Corridor Identification

1. Mostly single corridor sanctioned by MoUD for all JnNURM cities in India.
2. Need for a networked corridor approach in million/ billion plus cities.
3. Proper planning & Route Rationalization carried out by BMC.
4. Selected corridor passes through the core city having length of 24 K.M.
5. Start point – Misrod.
6. End point – Bairagarh, which are suburban cities of Bhopal.
7. Connects two Railway Station & two Bus stands.
8. As a modern model of transport - An attraction for commuters

Identified BRTS Corridors Developed under Phase-I are: Corridor 1-Bairagarh to Misrod (23 km), Corridor 2- Roshapura to ORR (14km), Corridor 3- Board Office to Raisen Road (2.94 km), Bharat Talkies to Tajul Masajid (3.33 km) All Corridors put together account for a total length of 44kms. Corridor 3 and 4 are only road links to connect Corridors 1 and 2. For operational purpose, it can be safely assumed to have only two Corridors i.e.: Corridor 1 Length (23.5 + 2.9) 26.4kms say 27kms, Corridor 2 Length (14.6 + 2.9) 17.5 kms say 18 kms.

Figure 4: BRTS Corridor



Source- Bhopal Municipal Corporation

BRT Cities in India

1. MoUD sanctioned BRT corridors for cities under JnNURM.
2. Ahmadabad, Delhi, Jaipur, Pune, Indore, Bhopal, Hubli-dharwad, Surat, Rajkot, Raipur, Amritsar, Ludhiana etc are the other BRTS cities.
3. Majority of the cities initiated BRTS construction work inspired by Delhi.
4. After failure of Delhi BRTS, Maximum cities shifted to Ahmadabad Model.

5. Not a case of “One size fit for all”. Hence the need for adaptation.
6. In M.P. Indore shifted to Ahmedabad Model from Delhi.
7. Learning from many BRT systems & experiences Bhopal makes its own Model.
8. Ahmadabad BRT was a source of inspiration for Bhopal BRT, but Bhopal BRT evolved uniquely.

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9. Since 2006-2012, BRT was mostly discussed about its design, but less about sustainability & operational aspects.

10. Hence, Because of these experience Bhopal could invest in the thought processes of operational sustainability at the time of planning

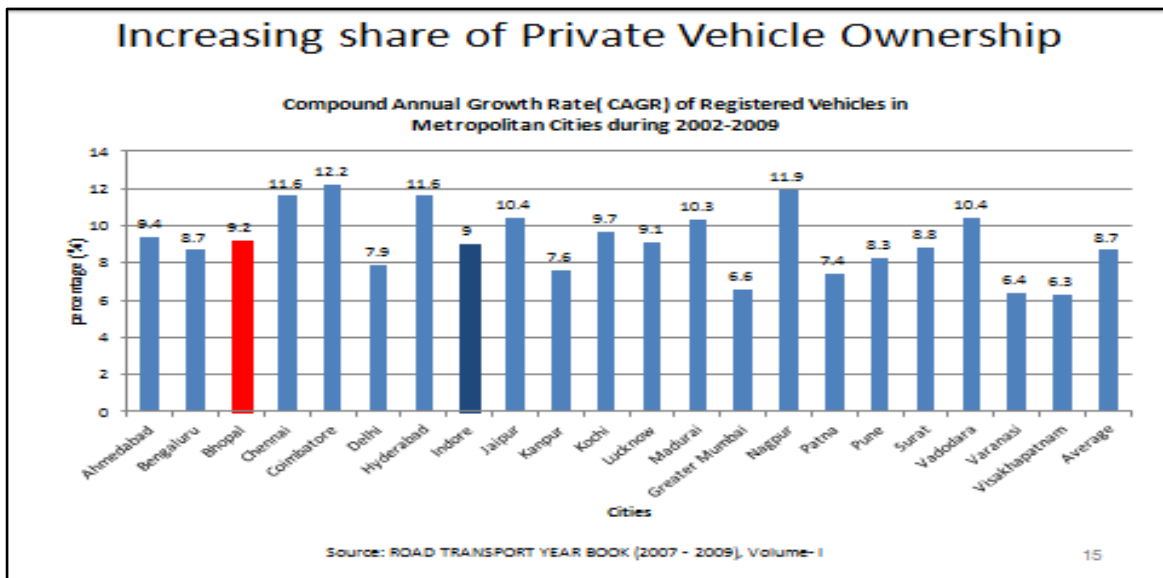
Major Elements of Bus Rapid Transit System

The major elements of bus rapid transit are running ways- drive travel speeds, reliability and identity. Options range from general traffic lanes fully grad separated BRT transit ways. Stations –Stations, as the entry point to the system, are the single most important customer interfaces, affecting accessibility reliability, comfort, safety and security, as well as

dwell times, and system image. BRT station options vary from simple stops with basic shelter to complex intermodal terminals with many amenities.

The comparative chart shows that the private vehicle ownership has shown 9.2% growth rate for Bhopal city as compared to average. This is how public transport can reduce urban transport problem in Indian cities. These cities cannot afford to cater only to private cars and two-wheelers. There must be a general recognition that without public transport cities would be even less viable. There is a need to encourage public transport instead of personal vehicles.

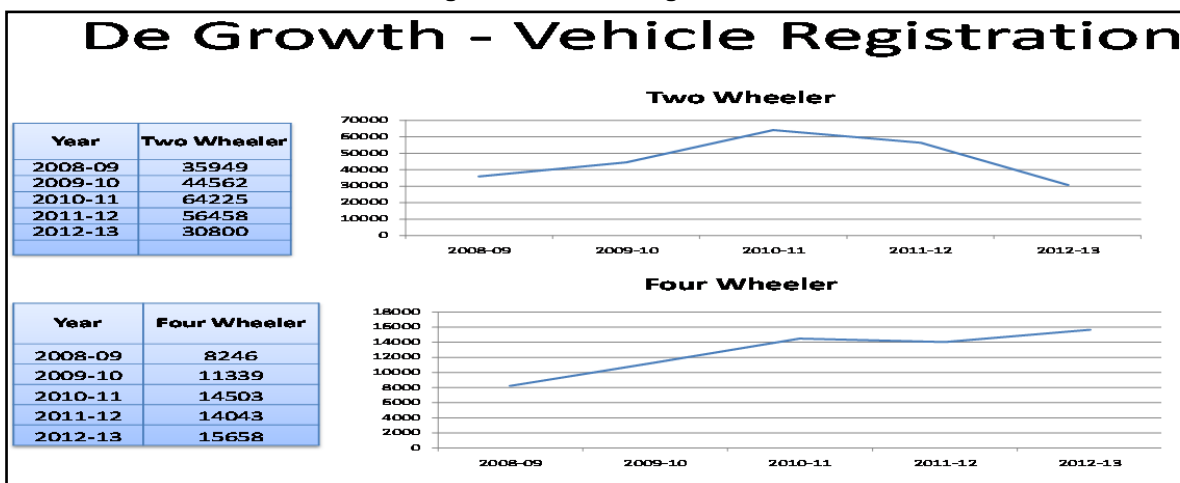
Figure 5: Comparative Chart of Cities



This requires both an increase in quantity as well as quality of public transport and effective use of demand as well as supply-side management measures. It has been seen that from the year 2012 there is a declination in two wheeler registration which shows that mass movement of traffic is towards

BRTS. The year wise list of Registered Vehicles in Bhopal given below in Figure – 6 clearly shows the down fall of 2 wheelers /4 wheelers registration from 2010-11 to 2012-13 which indicates success of BCLL Bus Operations.

Figure – 6 Vehicle Registration



Comparisons – Other BRT Operations

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Table-2
Comparison of different BRTS

Description	Bhopal	Ahmedabad	Indore	Pune	Surat
Type of operation	Flexible	Closed	Closed	Hybrid	Closed
Revenue model	Net cost	Gross cost	Gross cost	Gross cost	Gross cost
Profit/subsidy	Profit	VGf	VGf	VGf	VGf
Bus stop design	Kerb side staggered	Median side central	Median side central	Median side central	Median side central
Sustainability	Self sustainable system	No	No	No	No

Advantages of Flexible/Integrated Operations

Table-3
Flexible BRTS

Advantages	BRTS without integration	BRTS with integration
Connectivity of sub urban	Misrod and Bairagarh	Misrod, Bairagarh, BHEL, kolar
Connectivity of industrial area	No	Mandideep, Govindpura
Connectivity of railway station	Bhopal main & Habibganj Railway Station	Bhopal, Habibganj, Misrod, Bairagarh, & Mandideep Railway Station
Connectivity of bus stand	Halalpur Bus stand	Nadra, halalpur, ISBT, Putlighar, Jawahar chowk
Connectivity of CBD	New market, M.P.Nagar	New market, M.P Nagar, 10 No, Bus stop

Assessment of Potential Impacts

The impact of this project can be seen on three stages i.e design stage, construction stage and

operational stage. However, post operational impacts are summarized here.

Positive Impacts	Negative impacts	Social Impacts	Environmental Impacts
Time saving benefits to transit users, Fuel Savings from public transport operations, Reduction in air pollution, Reduction in traffic congestion, Noise and vibration reduction, etc.	on components of environment: Design Stage: Removal of Structures, Removal of trees and vegetation, Land Acquisition	Impact on road safety and Accidents	Impact on air quality in that area Change in SPM, CO, NO levels

Operational Characteristics of Existing Public Transport System in Bhopal

The average route length of the public transport system in Bhopal is about 27 km. The average number of stops on any route is around 23. Out of the total stops around one forth are request stops. The below phenomenon leads to one stop after every two minute & as such, it lacks a dedicated exclusive schematic system for itself. Most of the routes pass through the Old City Area, because of the high passenger demand directing towards this area of the city. The average number of passengers per trip comes out to be 46 per mode, whereas passengers on board at any time come out to be 14. Also, about 3 passengers either board or alight at a stop, whereas the average number of passengers waiting at a stop comes out to be 14. The most crucial data, i.e., the journey time ranges from 1 hr 5 min to 2 hr 15 min. & hence, the average journey time is calculated to be approximately 1 Hr 25 min.'s, where 50% of the time is spent either in boarding or alighting. Thus, the net travel time comes out to be 40 min.'s & the average travel speed is about 40 km's per hour.

Observation

Bhopal city can be divided into two distinct areas, the Old City and the comparatively recently developed parts. The old city has narrow roads while New Bhopal has relatively broad roads, most of which are flanked by landscaping. The road infrastructure has not expanded at a commensurate pace with the ever increasing number of vehicles. Since 1971, the population of Bhopal has multiplied about 4.5 times and number of registered vehicles has increased 87 times, but the increase in road length has been nominal. As a result, Bhopal has been experiencing acute traffic congestion and associated problems. The road density is high in Old Bhopal (3.24 km/sq. km). Areas outside the Municipal Corporation have the least road density of 0.31 km/sq. km. BRTS is supposed to be complete solution to achieve smooth traffic flow at Misrod to Bairagarh. And will be avoiding major signalized junctions with proposed flyovers in congested area such as ROB at Habibganj Naka, Flyover at Mata Mandir will avoid one-way traffic, fly over at SBI Junction. Increasing traffic in Bhopal City is causing multifaceted problems. Besides this, parking of vehicles especially in business area is

another major issue now a day in Bhopal. There is also need to overcome with these issues. Some of the observations based on survey are as follows:

1. 81% users of BRT state that the width of corridor is not sufficient for crossing the buses and chances of accidents are much higher.
2. 74% surveyed local residents believe that the BRTS dedicated corridors are not properly planned and designed looking to huge difference of traffic load in common lanes and dedicated BRTS corridors during peak office hours.
3. 78% persons driving vehicles in common lane consider widening of roads is better option to control traffic load and jam instead of constructing separate corridors for BRTS.
4. 61% BRT users express that people are usually not following the signals installed on all the major crossing/junction of BRTS corridors which causes the accidental and traffic jam condition on road.
5. 69% lower income group users delineate economical, time saving and safe journey in BRTS but number of trips are less hence frequency and number of buses should be increased to resolve the transportation problem in the city.
6. 48% surveyed persons suggested to allow vehicles of emergency services such as ambulance, fire brigade, police vehicles and School/College buses in BRTS corridor to reduce the traffic load in common lane.
7. 56% persons point out the problem of driving the vehicle in common lane during night as no entry of heavy vehicles are opened in night while BRTS corridors on highway part are closed and unused therefore traffic load of heavy vehicle increased in night and narrow common lanes are difficult to cater the traffic load.

The BRTS project has positive impacts on the social environment and urban infrastructures. Conflict between Non Motorized Traffic (NMT), motor vehicles and pedestrian are minimized Traffic bottlenecks and numbers of road accident are observed to be reduced. BRTS is economical and convenient mean of transport for the lower and middle income group of people. The BRT has its own identity with ability to providing a rapid, safe, reliable, flexible and quality service which is close to the services offered by the personalized modes at a much lower cost and even batter in the long run. Hence achieving higher transit patronage is feasible under BRT conditions.

Efficient Public Transit Operations

1. Efficiency improvements in bus operations under BRTS arise due to time savings and rationalized operations.
2. Increased vehicle utilization (Increase in speed, rapid boarding & alighting, reduced turnaround time)
3. Reduced manpower cost (Off-board ticketing and improved manpower efficiency because of fast service/speed)
4. Reduced operating costs (Fuel efficiency, less wear and tear, longer Life of bus.

5. 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%.
6. Due to BRT being implemented congestion decreased on the BRT corridor as private vehicles are shifting towards the public transport mode.
7. There has been primarily a shift of people using 2 wheelers to BRT.
8. The Fatal as well as the other accident statistics have gone down.
9. The number of deaths due to these accidents has also gone down.
10. There is a slight decrease in composition of the pollutants along all corridors.
11. The above conclusions states application of BRT Corridor on this Phase has been Successful.

Therefore, the changed mindset and exposure to better facilities could lead to a better way of living which in turn could help in the improvement of quality of life and city's scenario. Some other benefits of BRTS are increased revenue, job creation, improved economic opportunity, reduced congestion, economic productivity and quality of life

Conclusion and Discussion

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 severe 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 system using buses to provide faster, more efficient service than an ordinary bus line. The goal of these systems is to approach the service quality of rail transit while still enjoying the cost savings and flexibility of bus transit so the city can be self sustainable. BRTS Bhopal 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 pollutants helps cities grappling with rapid growth, congestion and environmental concerns.

Analyzing the characteristics of the city in terms of climate, socio economic activities, land use, network and connectivity, it was easily seen that the city enjoys a moderate climate, being centrally located it is well connected to all the regions, and being a state capital a large number of people are engaged in administrative activities, about 47% of the total land-use belongs to residential area, and that of transportation is 15%.

Talking about the BRTS, as 48% of the trips depend on public transportation, the BRTS is divided among 4 different corridors; all the corridors put together account for a total length of 44kms. All in all, the BRTS is time saving, fuel saving, but also reduces traffic congestion and noise pollution. But as every job

has its pros and cons, the BRTS project comes up with problems like, land acquisition and removal of green cover. The suggested measures from our side are that plans should be made such that minimum vegetation is removed, for every amount of removed vegetation, new green belt should be proposed, avoiding excavation during monsoon and noise prone activities during night will be of great relief to the city dwellers. Lastly, restriction of speed should also be imposed to reduce emission rate. Regular maintenance of the vehicle should be made mandatory. Possibilities are to be explored to allow other important transport services in dedicated BRTS corridors to reduce pressure common transport corridor.

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