ISSN No. 2349-7165

A Study on Strategies Adopted by BRTS in Indore

Mr. Satyakam Dube
HOD, PGDM, Institute of Business Management & Research, IPS Academy, Indore
satyakamdube@ipsacademy.org

ABSTRACT

Indore, the largest metropolitan city of the state of Madhya Pradesh, is fast emerging as a centre of trade and commerce. It's a tier 2 city of India and is popularly known as commercial city of the state. Indore City Transport Service Corporation services in Indore has vastly distributed network of bus services. It connects almost every part of Indore with this network of buses. The Indore BRTS or Ahilya Path is the bus rapid transit system for the city of Indore, Madhya Pradesh by AICTSL also called i-Bus (Intelligent Bus), operational from 10 May 2013. The study analysed parameter of I-Bus facility avail by respondents in Indore city with 676 respondents based on demographic variables and factors of BRTS usage.

Keywords : BRTS, Users, I-Bus

INTRODUCTION

Bus rapid transit system (BRTS) is a high-quality, efficient mass transport mode, providing capacity and speed comparable with urban rail (light and heavy rail). Its insertion in urban transport systems is relatively recent and as a result there remains a need to introduce the concept to several audiences, particularly urban transport decision makers, and to better understand its cost, performance and impacts. To that end, this report provides a synthesis of existing literature and new data, and develops a detailed analysis on selected case studies to explore the strategies adopted by BRTS in Indore along with its customer perspective. BRTS flexibly combines stations, buses, exclusive and segregated bus ways, and intelligent transportation system elements into an integrated transit system with a strong brand that evokes a unique identity (Hidalgo and Carrigan 2010). BRT provides higher quality of service than traditional urban bus operations because of reduced travel and waiting times, increased service reliability and improved user experience (Diaz *et. al.* 2004).

Indore is the largest city and the commercial capital of the central Indian state of Madhya Pradesh. It is situated on the Malwa Plateau, just south of the Satpura Range. Indore is the administrative headquarters of the Indore District and the Indore Division, and formerly served as the capital of the former princely state of Indore and the summer capital of the erstwhile state of Central India. Though Indore has an airport since long, and is one of the few cities of India having both meter gauge and broad gauge railway line and is situated on the important Bombay-Agra NH-3, apart from other roads of regional and local importance, public transport is something which always had a room for improvement.

With growing population and heavy interstate immigration (Indore registered close to 100% increase in population in 1985-2001), head count for Indore is on a constant rise. The workforce is near 0.33 million which requires regular up and down to their workplaces.

As per Traffic Survey report by Indore Police, the vehicle population was 0.48 million in 2000. It jumped to 0.73 million in 2006 which implied one vehicle for every two persons in population.

That this was not voluntary could be ascertained from the fact that close to 30% people were below poverty line in last census and thus it was more a situation of helplessness which drove people to maintain private vehicles for almost everyone in family.

This created not only congestion on roads and pollution besides large number of accidents; it also meant that private operators-run public transport was not patronized by middle and upper middle class of society and

thus they could not charge beyond a limit to their customers who were essentially from last rung of society.This created a vicious cycle; no one from middle or upper class was willing to use these "Nagar Sewa" and consequently there was no improvement in their service quality and they fought fiercely for whatever little pie was available in market, resulting in rash driving and frequent clashes between operators.

NEEDS

There are many reasons for developing Bus Rapid Transit system:

• BRTS systems can often be implemented quickly and incrementally.

• For a given distance of dedicated running way, BRTS is generally less costly to build than rail transit. Moreover, where BRTS vehicles can reliably operate at high speeds on high-occupancy vehicle (HOV) lanes or general-purpose highways and streets over significant proportions of a given route, running way capital costs will be even lower compared to those for rail modes, which must be purpose-built over the entire distance covered.

• BRTS can be the most cost-effective means of serving a broad variety of urban and suburban environments. BRTS vehicles, whether they are driver-steered or electronically guided, can operate on streets, in freeway medians, on railroad rights-ofway, on aerial structures, and underground. BRTS systems can also provide a broad array of express, limited-stop, and local allstop services on a single facility without complex signal and guide-way switching systems.

• BRTS can provide quality performance with sufficient transport capacity. For example, the Ottawa transit way system's link to the CBD carries more people in the peak hour than most LRT segments in North America. The Brisbane South East Bus way carries approximately the same number of maximum load point, peak-hour, and peak direction passengers about 10,000 per hour (Translink, 2008). Many BRTS lines in South American cities carry peak-hour passenger flows that equal or exceed those on many U.S. and Canadian fully grade grade separated rail rapid transit lines. For example, Bogota's Trans Milenio system serves more than 25,000 peak-hours (Trans Milenio, 2008), peak-direction maximum load point riders. The efficiency of the system and high capacity of the passengers depends on the system as a whole and not necessarily on the size of buses, though when necessary articulated buses could be used with ease.

REVIEW OF LITERATURE

Agarwal P, Sharma Anupama, Singh A. P, (2010). Bus Rapid Transit System (BRTS) is an innovative, high capacity, lower cost public transport solution that can significantly improve urban mobility. Public Transport System in most Indian cities is rapidly deteriorating because of the increasing travel demand and inefficient transportation system. There are various problems related with public transport such that tremendous increase in number of accidents, Environmental degradation, Congestion, Overcrowding due to inadequate system, Frequency of service and schedule is not strictly adhered. The problem of pollution, safety and inefficiency have reached at a alarming level in most of the major cities in India due to unabated growth of its population -both of people and motor vehicles, combined with inefficient public transport system and poor enforcement of environmental laws etc. Thus, there is a great need to ensure clean, efficient, affordable, effective and safe public transportation system and for this Bus Rapid Transit System could become an appropriate solution.

Kundan Meshram' and Dilip Singh Yadav (2016). The present work describes a case study of BRTS for Indore city. BRTS started from Niranjanpur to Rajeev Gandhi Square located on Agra-Bombay road (A. B. road) in Indore. The length of the corridor is 11.57 kms with 22 bus stops and 4 BRTS Interchange Stations are identifted along the corridor. The corridor is divided in to three stretches viz. stretch 1 from Niranjanpur to L IG Square, Stretch2 from LIG to Holkar College and Stretch 3 from Holkar to Rajiv Gandhi square. The study also calculates number of buses required for present traffic load and with increase traffic from 10% to 40% on feeder roads.

Anand Kumar Sharma, Anshul Gupta (2009) Public urban transport in our growing cities remains an issue of contention between planners, public, political class and existing operators. No city has been able to hit on one model system and "Metro" like system is viable only for large cities and that too with lot of land development rights for commercial usage. In tier-II cities, providing an efficient and affordable public transport without placing burden on financially weak urban local bodies and at the same time preventing inefficiencies of a government controlled system has been a herculean task. Indore City Bus and associated projects (City Van and Metro Taxi) present us with a model where judicious allocation of risk and rewards between private and public players has made the model a roaring success and similar models are being replicated across country with varying degree of success. This paper attempts to examine the factors that led to the creation of this model, and how it achieves its objective of affordable and fast public transport with regulatory oversight without depending on government grants or creating a monopoly and what are the possible weak or strong points of the model.

Roopali Srivastava (2016). The case study analyses the aspects of project management practices implemented in BRTS project. It maps four project phases namely: Inception, Planning and Design, Implementation and Post-Implementation with five project management process groups and ten project management knowledge areas as prescribed by PMI's A Guide to the Project Management Body of Knowledge (PMBOK® Guide (Fifth Edition)). Within each project phase, the performed activities are discussed, as appropriate. The case study is structured to allow an evaluation of the appropriate processes project management knowledge areas at the end.

Ankit Kathuria, Manoranjan Parida, Ch. Ravi Sekhar and Anshuman Sharma (2016). Between 2008 and 2015, bus rapid transit system (BRTS) in India increased its implementation from two cities to eight cities with a significant increase in total ridership. This paper attempts to give a detailed review of BRTS implementation in cities of India. This is a systematic effort that could inform readers about the current system and network characteristics of Indian BRTS. Different system and corridor characteristics including off board and on board ticketing systems are adopted in India. Gross cost revenue collection model is adopted by almost all special purpose vehicle (SPV) companies developed to manage BRT systems. A variety of carriageway concept designs for BRTS are implemented in these cities considering a right of way of 22, 24, 30, 32, 40, 45, 60 meters respectively. Out of the eight cities, Ahmedabad has almost 30% of the total fleet size. In terms of regulatory context, SPV companies are formed in almost all eight cities after observing Ahmedabad BRT success. Documentation of these operating systems shall provide a sound database to planners and decision makers actively involved with BRT system implementation in developing countries.

OBJECTIVES

1. To analyze factors, impact on BRTS users in Indore.
2. Study various strategies adopted by BRTS to increase use of BRTS in Indore.

RESEARCH METHODOLOGY

The study was based on experimental and exploratory research investigates the relationship between demographic variables and factors of BRTS parameters with BRTS users in Indore. Customer perceived services on BRTS analyzed on 18 variables on overall services provided by BRTS to passengers. Apart from that study included the following dimensions: gender, age group, income, occupation etc. A five point type scale, ranking from (5) Most Important (1) Least Important was used to developed questionnaire and rank was used to developed questionnaire. Tool for data collection was questionnaire and sample area was Indore, sample size was 676 users. A convenient random sampling involved for data collection.

VALIDITY AND RELIABILITY ANALYSIS

Reliability of data was necessary to purify before any supplementary analysis could be conducted. Scale decontamination process was conducted for testing reliability of the scale, internal consistency of the scale and validity of the data conducted. For the scale purification process, we have conducted Cronbach alpha reliability test by using SPSS.20. Cronbach's alpha statistic is widely used in the social sciences, business, etc. The theoretical value of alpha varies from zero to 1. However, depending on the estimation procedure used, estimates of alpha can take on any value less than or equal to 1, including negative values, although only positive values make sense. Higher values of alpha are more desirable. Some professionals, as a rule of thumb, require a reliability of 0.70 or higher (obtained on a substantial sample) before they will use an instrument.

Questionnaire was based on refinement of the 18-item instrument which was gathered from overall BRTS service separately with pilot sample of 60 customers. The respondents were distributed uniformly from customer based of respondents. Convenient sampling technique was applied.

Table 1: Reliability Statistics

Reliability Statistics		
Particulars	**Number of items**	**Cronbach Alpha**
Overall Items (BRTS Services)	18	.819

Table No 1 indicates that all 18 items used in schedule relating to challenges, opinion and feel appropriateness for during use of BRTS services have reliability alpha 0.819, overall that disclose cronbach alpha is stand in good status in terms of reliability of pilot survey result of overall BRTS Services.

EMPIRICAL FINDINGS

Table 2: Demographic Characteristics of the Respondents

	Number (General Public)
Age Group	
Up to 20 Years	58
20-25	332
25-30	124
30-35	56
35-40	36
40-45	24
45-50	14
50-55	6
55-60	22
Above 60 Years	4
Occupation	
Student	312
Service	244
Self Employed	82
Retired	14
Others	22

Contd...2

Gender Group	
Male	438
Female	234
Annual Income	
Up to 1 lakh	154
1-2	100
2-3	112
3-4	82
4-5	24
Above 5 lakhs	28

The data which was collected by different people is divided into different age group i.e. up to 20 years, between 20 to 25 years, 25 to 30 and so on. Another category is occupation which is divided into student, serviceman, self-employed, retired and others. Maximum respondents are from students. Questionnaire was also divided into annual income.

HYPOTHESIS

The hypothesis may be defined as an assumption about the relationship between different variables. The research hypothesis is an analytical statement which has been tested by scientific methods that reveal an independent variable to some dependent variable. A formalized hypothesis is used to get the result in an experiment. Parameters for objective and hypothesis for analysis are comfortable to ride, routes are safe, bus shelters are clean, shelters are disable friendly, Facilities, travel time, fare of bus is economical, frequency of buses, easy to board, staff are well behaved, ticketing process is comfortable, passengers feel, route pedestrian crossings are safe, Information inside the bus etc. The hypothesis to be tested for our study is stated as:

H_a1: There is significant impact of BRTS services on users.

Table 3: t Test Analysis

Items	Mean	SD	t	P value
The bus is very comfortable to ride	4.1834	.71518	61.200	.000
Bus shelters as well as BRTS routes are safe	4.0503	.63978	63.002	.000
The bus shelters are clean	4.0148	.69905	56.340	.000
The bus shelters are disable friendly	3.2692	.86152	23.215	.000
The Facilities at the bus shelters are good	3.1331	.93176	17.667	.000
The travel time by bus is less	3.6953	.82122	37.842	.000
The fare of bus is economical	3.7722	.81005	40.833	.000
The frequency of buses is adequate	3.6065	.78630	36.588	.000
The bus are easy to board	3.9290	.60196	61.721	.000
The bus staff are well behaved	3.5976	.83494	34.180	.000
The ticketing process is comfortable	4.0059	.74633	52.462	.000
The condition of buses are good	3.9852	.65076	59.339	.000
I bus routes are adequate	3.3550	.76089	29.217	.000
Passengers feel safe inside the bus	3.8994	.75539	48.167	.000
BRTS route pedestrian crossings are safe	3.1716	.97075	17.988	.000
Information inside the bus is readily available	3.9571	.81081	46.724	.000
Information about buses are readily available at the I bus shelters	3.0355	1.00896	13.799	.000

The mean value of all items is varying highest from 4.1834 to lowest 3.0355 on comfort followed by other parameters and complied on information. Alternate hypothesis calculated p value on all items is less than to 0.05 that's why alternate hypothesis is supported to f objective on factors impact on BRTS users in Indore.

Strategies Adopted by BRTS

Second objective of the study is strategies adopted by BRTS to increase use of BRTS in Indore fulfilled by given below strategies which applied to enhance users satisfaction by various mode.

- Reduction of local pollution and greenhouse gases by substituting old pollutant buses. Reduction of noise.
- Passengers' satisfaction in general, Time saved.
- Reserved space for women.
- Segregated lanes of the bus
- High performance
- Full electronic fare collection. Good fare system.
- Project infrastructure costs were relatively low.
- Generation of carbon revenues.

People would prefer the cheapest, safest and most convenient modes of mobility. In case if the government fails in providing such a desirable public transport, people would turn to private vehicles. This causes several problems, like constant rise in pressure on road network, traffic accidents, pollution, congestion, increased commute time, and loss of man-hours. Moreover, the long-term indirect social impact is much higher and often, irreversible. For example, the rich can afford luxury of private transport but it reduces the mobility and thereby competitiveness of poorer people. It further increases the rich-poor divide in the society. Therefore, a robust public transport system is necessary for an economically and socially sustainable society. The full impact of the BRTS would be realized only after some gestation period as it is imperative for the city dwellers to change their behavior and shift to public transport. Therefore, a non-interventionist free-hands period must be provided to the BRTS before further stock-taking.

DISCUSSION & SUGGESTIONS

BRT system performance can vary significantly depending on design characteristics and level of integration with other transport modes based on economic and environmental usage. For instance, corridors with exclusive, segregated bus lanes will be able to move more passengers in an hour than a corridor where buses operate in bus-priority lanes, which also permit access to mixed traffic. Bypassing lanes at stations enable express routes to skip certain stations and reduce travel times for some passengers. Bus speeds will be higher on corridors with fewer intersections. Fisher (2011) suggested that national and local investment decisions should be predicated on objective and transparent evaluation of alternatives including an assessment of costs and benefits to determine whether proposed projects represent a good use of limited resources. National transit investment schemes can help catalyse widespread adoption of BRT as an urban transport solution.

CONCLUSION

The aims of this research are to analyze impact of BRTS on commuters, non-commuters and other non-agencies in Indore. The conceptual framework of impact of BRTS is proposed by researcher is only the roadmap; it is not tested or implemented. This traces the history of the emergence of the idea of the BRT in the context of the existing transit problems in different cities of developing countries. The challenge for the exclusive model is its integration with the existing and regular bus or other transit services in a city.

REFERENCES

- Anand Kumar Sharma, Anshul Gupta (2009). "Indore City Bus : A Novel Experiment in Urban Transport" Great Lakes Herald Vol 3, No 2, September 2009
- Ankit Kathuria, Manoranjan Parida, Ch. Ravi Sekhar and Anshuman Sharma (2016). "A review of bus rapid transit implementation in India" Kathuria et al., Cogent Engineering (2016), 3: 1241168. **http://dx.doi.org/10.1080/23311916.2016.1241168**
- Diaz, R.B. (editor), M. Chang, G. Darido, E. Kim, D. Schneck, M. Hardy, J.Bunch, M.R. Baltes, D. Hinebaugh, L. Wnuk, F. Silver, and S. Zimmerman. 2004. "Characteristics of BRT for Decision Makers." Publication FTAVA-26-7222-2004.1, FTA, US Department of Transportation.
- Hidalgo, D. and Carrigan, A. 2010. "Modernizing Public Transportation: Lessons learned from major bus improvements in Latin America and Asia." World Resources Institute. Washington, D.C. October 2010.
- Kundan Meshram' and Dilip Singh Yadav (2016). "Bus Rapid Transit System for Indore City." NICMAR-Journal of Construction Management, Vol. XXXI, No. I & 2, January- March & April - June,2016
- Roopali Srivastava (2016). "Bus Rapid Transport System (BRTS) Case Study". Project Management Institute. June 2016