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Feasibility of BRTS in Nagpur City

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ABSTRACT:

FEASIBILITY OF BRTS IN NAGPUR CITY.

Transport in Nagpur is important due to Nagpur's strategic location in central India. It is a fast growing metropolis and is the third most populous city in Maharashtra after Mumbai and Pune, and also one of the country's most industrialized cities.

Due to increase in population as well as transportation NMPL company formed which gives the contract to Vansh Nimay Infraprojects (VNIL) to run city buses but due to increase in transportation and increase in population in Nagpur city it found that there is a numerous problem face by city buses to gave safe and efficient facility to public due to these public in Nagpur city were diverting towards the private transportation. so there is extremely need to improve public transportation which can improve by bus rapid transit system which is new transportation system provide safety and mobility to road users.

In these project we shows the difference between existing public transportation system and bus rapid transit system and how the BRT is superior than other public transportation system .

For this various data of the existing public transportation (star bus) is collected such as accident data, Interview of people and driver for what problem they face, traffic data collection for how star bus face the problem and extra time taken to reach destiny.

KEYWORDS: NMPL, VNIL, BRTS.

I. INTRODUCTION

1.1 General :

Nagpur is one of the 11 administrative districts in the Vidarbha region of Maharashtra state. Nagpur district lies between 20.35 deg – 21.44 deg North latitude and 78.15 deg-79.40 deg East longitudes. It is almost triangular in shape.

Nagpur district stretches over an area of 9892 sq.kms Area under urban sector is 364.66 sq.kms while the area under rural sector is 9527.34 sq.kms In terms of area district Nagpur constitutes 3.21% of the total area of Maharashtra state.

The population of the district according to 1991 census was 3287139. The urban population was 2031000 and rural population was 1256139 which constituted 61.79% and 30.21% respectively of the total population of the district.

Whereas the figures of 2001 census reveal that the total population of the district has gone up to 4068 thousand persons. The urban population is 2614 thousands and rural population is 1454 thousands which constitutes of 64.35% and 35.64% respectively of the total population of the district. The male-female populations are 2105 thousands and 1962 thousands respectively.

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Due to increase in population as well as transportation NMPL company formed which gives the contract to Vansh Nimay Infraprojects (VNIL) to run city buses but due to increase in transportation and increase in population in Nagpur city it found that there is a numerous problem face by city buses to gave safe and efficient facility to public due to these they were diverting towards the private transportation. so there is extremely need to improve public transportation which can improve by bus rapid transit system which is new transportation system provide safety and mobility to road users



1.2 What is BRTS :

Bus rapid transit system (BRT), also called a busway or transitway, is a bus-based public transport system designed to have better capacity and reliability than a conventional bus system. BRT system includes roadways that are dedicated to buses, and gives priority to buses at intersections where buses may interact with other traffic; alongside design features to reduce delays caused by passengers boarding or leaving buses, or paying fares. BRT aims to combine the capacity and speed of a metro with the flexibility, lower cost and simplicity of a bus system.

In these project we are trying to explain difference between existing public transportation system and bus rapid transit system and how the BRT is superior than existing public transportation system.

For this, various data of the existing public transportation is collected such as accident data, Interview of people and drivers, and what type of problem that face by star bus and why existing public transportation takes extra time to reach destination point.

Public Transport is a mass transportation of people from one place to another place through Bus, Rail, and metro, BRT with efficient speed, punctuality, frequency, facilities, comfort, convenience, and reliability. Public transport or public transit is a shared passenger transport service which is available for use by the general public, as distinct from modes such as hired buses, metro rails, local trains which are not shared by strangers without private arrangement. Most public transport runs to a scheduled timetable with the most frequent services running to headway.

Private vehicle usage and vehicle ownership's are more in the Nagpur. Commuters are habituated to use Para-transit vehicles.

To ensure accessibility and live ability of our cities for future generations however, a substantial quality leap in public transport is necessary. This will facilitate a desired modal shift from car traffic towards public transport, which is safer, cleaner and produces less congestion.

1.4. Need of Study-

- Providing safety, mobility to road users
- For higher frequency of bus arrival time and improved reliability.
- For minimizing travel cost.
- Comparison of bus rapid transit system with convectional bus system & Motivating public to use public buses.

1.3 Aim and Objective :

- Providing safety , mobility to road users.
- To avoid mix traffic in the city.
- Motivating public to use public buses.
- To reduce the travel timing.
- Reducing greenhouse gas and local air pollutant emission.
- To increase physical activity.
- To provide quality stations for high capacity vehicles.

Objective:

BRT technologies are a collection of technologies that increase the efficiency and safety of public transportation systems and offer users greater access to information on system operations. The use of BRT technologies is transforming the way public transportation systems operate, and changing the nature of the transportation services that can be offered by public transportation systems. The goal is to provide public transportation decision-makers more information to make effective decisions on systems and operations and to increase travellers' convenience and ridership.

1.5.Study Area:

Maharashtra is a state in the western region of India. It is the second most populous state after Uttar Pradesh and third largest state by area in India. Maharashtra is the wealthiest state in India, contributing 15% of the country's industrial output and 13.3% of its GDP (2006–07).According to the provisional results of the 2011 national census, Maharashtra is the second most populous state in India with a population of 112,374,333 (9.28% of India's population) of which male and female are 58,243,056 and 54,131,277 respectively. The total population growth in 2011 is 15.99 percent while in previous decade it was 22.57 percent.



II. LITRATURE SURVEY

Agarwal P K, Sharma Anupama and Singh A. P , “An Overview on Bus Rapid Transit System”, Journal of Engineering Research and Studies. Vol.10, April, 2010

One of the major thrusts of the new public bus transit system is to reduce commuter's overwhelming dependency on private vehicles to make the urban transportation system sustainable. India's cities have witnessed rapid urban growth and correspondingly travel demand in post-economic reforms.

Anuj Jaiswal, K. K. Dhote, R. Yadu Krishnan and Devansh Jain . Bus rapid transit system: A milestone For Sustainable Transport: A Case Study of Janmarg Brts, Ahmedabad, India, OIDA International Journal of Sustainable Development. Vol.12, July, 2012.

Bus Rapid Transit (BRT) system is the key technology of intelligence transportation Systems. This paper is about the research on a hierarchical BRT system based on multi-tier wireless sensor networks (WSN). It maps the features of WSN to BRT systems and provides solutions for BRT technologies, such as Transit Signal Priority.

Tuhin Subhra Maparu and Debapratim Pandit , “A Methodology for Selection of Bus Rapid Transit Corridors: A Case Study of Kolkata”, Institute of Town Planners, India Journal. Vol.11, June, 2012

Bus rapid transit (BRT) systems have gained prominence worldwide as a cost-effective alternative to urban rail investments. However, some question the city-shaping potential of BRT, in part due to a belief it delivers fewer regional accessibility benefits than rail, but also to the social stigma some assign to bus-based forms of mass mobility. Notwithstanding the successes of cities like Curitiba and Ottawa at integrating BRT and land development, doubt remains over BRTs ability to promote less car-dependent.

III. DATA COLLECTION

these are some questions asked to every age group peoples (age group 15-30, 31-50, 51-65) in Nagpur city who uses public transport system.

Q1) Which mode of transport you prefers most ?

- 1) Bus
- 2) car
- 3) Metro rail

Q2) Every age group peoples is comfortable with which public mode of transport ?

- 1) Car
- 2) Metro rail
- 3) BRTS

Q3) Do you satisfied with present mode of public transport system ?

- 1) No
- 2) Yes

Q4) In safety point of view are you happy with existing transport system ?

- 1) No
- 2) Yes

Q5) Is there a need to introduce some advanced technique to reduce uninterrupted transport issues or not ?

- 1) No
- 2) Yes

Q6) Which is better transport system for door to door system ?

- 1) Metro rail
- 2) BRTS

Q7) Which service is more flexible ?

- 1) Bus transport service.
- 2) Metro rail service.

Q8) According to your opinion which service is affordable in travel cost point of view?

- 1) Bus transport service.
- 2) Metro rail service.

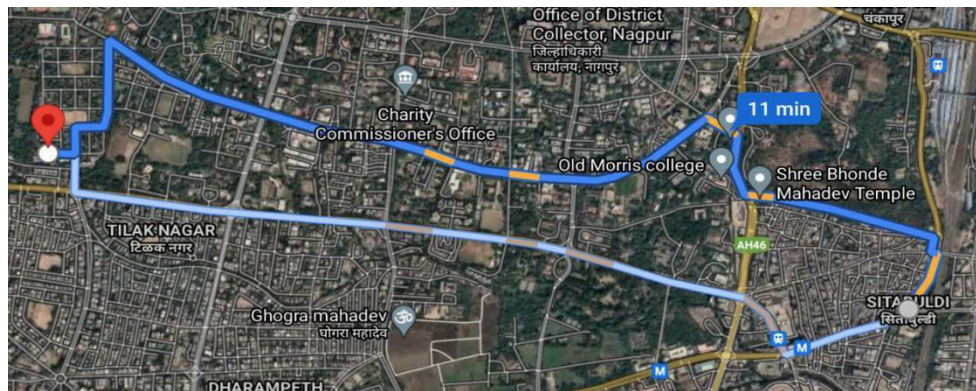


Fig.No1: Route to calculate Travel time for Existing public transportation



Travel time required for BRT to reach destination point

Calculating actual time – If there is no congestion

- For BRT (Bus moving at a speed of 40 km/hr)
The time taken by BRT to reach to Ravi nagar-

We know that, $V = \frac{D}{T}$ km/hr

Where D = distance in km, T = time in hr.

$T = \frac{3.4}{40} = 0.085$ hr (5.1 min)

From above observation Means For BRT –For 3.4 Km BRT Bus took (5.1+1.65 min signal time = 6.75min) to reach ravinagar is a less time as compared to existing public transportation system.

Table No 3.5.3 Existing public transportation system (star-bus)

CORRIDOR	DISTANCE	TIME TAKEN
SITABULDI - CHATRAPATI	4 KM	23 MIN
SITABULDI –RBI SQ	2.5 KM	11 MIN

Table No 3.5.4 Bus Rapid Transit System (BRTS)

CORRIDOR	DISTANCE	TIME TAKEN
SITABULDI- CHATRAPATI	4 KM	6 MIN(with signal time)
SITABULDI –RBI SQ	2.5 KM	4.2 MIN(with signal time)

MNL (Multinomial logistic) Regression

- Multinomial logistic regression is a method that generalizes logistic regression to multiclass problems
- It is also tool that is used to predict the probabilities of different probable outcomes.
- This method of regression use when two or more choice of modes of travel are available for commuters.
- MNL Regression was to identify influence of various factors on switching behaviour of commuters from Bus(BRTS), rail, Car.
- BRTS was compared with Star Bus separately to understand factor of their influence.



IV. RESULTS

Table No1: .Analysis of MNL Regression model of BRTS in relation to city Bus

Factor considered	Categories	Coding pattern	N	Marginal percentage(%)
Mode of transport	Bus	1	13	10.90
	Metro rail	2	41	34.70
	BRTS	3	56	49.90
	Car	4	09	7.50
Safety	Star Bus	1	02	1.66
	Metro rail	2	53	44.16
	BRTS	3	58	48.35
	Car	4	07	5.83
Flexibility	Star Bus	1	36	30.00
	Metro rail	2	8	6.66
	BRTS	3	41	34.016
	Car	4	35	29.16
Door to door service	Metro rail	1	11	9.16
	BRTS	2	109	90.84
Trip cost	Metro rail	1	63	52.50
	BRTS	2	57	47.50
Travel time	Metro rail	1	89	74.16
	BRTS	2	31	25.84

Table No2: Significance of Like-hood Ratio test

	Model-fitting criteria	Like hood ratio test		
Parameter	-2 log like hood	Chi-square	Degree of freedom	Significance
Age group	348.281	42.365	6	0.000
Safety	392.631	17.273	5	0.003
Flexibility	376.210	29.514	5	0.002
Door to door service	523.481	523.241	5	0.001
Trip cost	315.640	35.274	2	0.004

Table No3: Parameter of mode of choice between BRTS and Star Bus

Response category	Predictor variable and their category	B	Exp B
BRTS	Age group=1.00	3.426	16.127
	Age group=2.00	3.795	33.116
	Age group=3.00	4.352	19.284
	Safety=1.00	0.950	3.021
	Safety=2.00	0.823	2.165
	Flexible=1.00	-0.655	0.395
	Flexible=2.00	-1.221	0.315
	Flexible=2.00	1.105	1.256
	D to D service=1.00	-5.371	0.003
	D to D service=1.00	0.486	1.516

V. CONCLUSION

1) Age group 15-30 revealed that there are 16.127 times much chances of using BRTS over existing star bus . Age group 31-50 revealed that there are 33.116 times much chances of using BRTS over existing star bus. and similarly Age group

51-65 revealed that they prefer BRTS 19.284 times over star bus. means middle age group shows high preference to BRTS

2) BRT should be rapid and reliable. Reliably high speeds can best be achieved when a large portion of the service can be provided on separate rights-of-way.

3) The time Required to reach to destination point with Bus Rapid Transit System as compared to existing public transportation system is less. So there is Need for implementation of Bus rapid Transit System.

4) BRT systems can attract new riders to transit and induce transit-oriented land use and economic development in a broad variety of environments. BRT systems is an innovative, high capacity, lower cost public transit solution. Integrated BRT with ITS improves the flow of transit system and extracts the efficiency from existing system.

VI. FUTURE SCOPE



Fig .No.2: Bus Rapid Transit System

BRT systems is an innovative, high capacity, lower cost public transit solution. this System also increases efficiency and safety of public transportation systems and offer users greater access to information on system operations.

BRTS motivating public to use public buses.

- As it improves safety it leads to increase physical activity.
- BRTS provides mobility to road users.
- Higher frequency of bus arrival times and improved reliability significantly decrease time spent waiting for the bus.
- It will help make city environmental livable.

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