

Multi Modal Public Transportation System-Indore Case Study

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Abstract: Multi modal transportation refers to a system which utilizes the various means of transport to effectively transfer people and freight from one place to another. It plays an indisputable role in strengthening the transit operations of a country. The paper presents a scrupulous review of the transportation system of Indore city while focusing on the present condition of the paratransit facilities. We take predefined routes to study the characteristic situation of the city and attempt to provide some valuable recommendations.

Keywords: BRTS, Mobility, Multi modal transport, Paratransit

1. Introduction

The transport system in India is dependent on the old model of transportation planning and development established during the colonial era. Being the second most populous country in the world today, it is expected to take over the title from China in the upcoming future. The economy of a country is influenced by its people. The work which they perform everyday add up to the benefit of the country as a whole. Transportation in its very essence has been developed over the years to reflect the changing nature of the needs of people. It is transportation which facilitates for the easy and convenient movement of both- the people and goods-effectively.

This calls for the need to have a well developed and efficient transportation system which can cater to the needs of its growing population with much ease. An efficient system is characterized by its ability to perform even under adverse circumstances. It comprises of not only one but a complete network of well devised subsidiary systems. Multi modal transportation provides a framework of transportation facilities to meet the demands of the public which consist of- a primary transportation and paratransit system. Primary transportation comprises of the major transit facilities including Bus Rapid Transport (BRTS), Light Rail Transport (LRT), Metro Rail Transit (MRT), etc. Paratransit system is the intermediary network of transportation which serves as a feeder to the main system. In Indore, maruti vans and tata magic serve as an important part of the paratransit system.

Present research paper shows the characteristics of the multi modal network of transportation of Indore city. The system is analyzed for its share of the different modes of transport. The importance will be laid on assessing the role of paratransit to supplement the primary mode of transport.

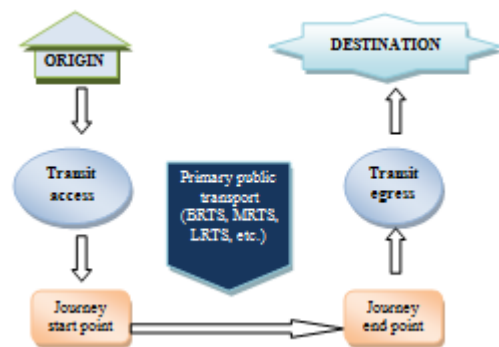


Figure 1: Multi modal network

2. Literature Review

Public transportation is characterized by its efficiency, dependency and an effective mobility. The term mobility, from the perspective of transportation geography, refers to the ability to move between different activity sites (Hanson 1995). According to Liu (2011), the human mobility within an urban area actually always happens in a multimodal transportation network. In addition, problems encountered in a single mode network can be solved by considering the benefits of a multi modal one. While commuting in a dense area having traffic congestion and inadequate lanes to carry private vehicles at peak hours, a person faces a problem to reach his destination without much hassle. The solution lies in an outreach to the services of multi modal transportation which includes car sharing, taxi pools, minibuses and others collectively referred to as the paratransit system. Robert Cervero (1997) viewed paratransit as having the potential to produce substantial mobility and environmental benefits by attracting large numbers of urban trips that otherwise would be made by private automobile. The role

which it plays in providing an effective alternative to private modes along with its ability to mitigate traffic congestion is remarkable in the context of transportation. The dependency of this system, however, is influenced by a range of factors including its fare, timely availability and the ease of access and egress. A systematic monitoring of these factors is a prerequisite to provide a robust framework. To tackle the problem of public transportation, we need to lay emphasis on the better implementation of the services of paratransit system along with proper operation and maintenance.

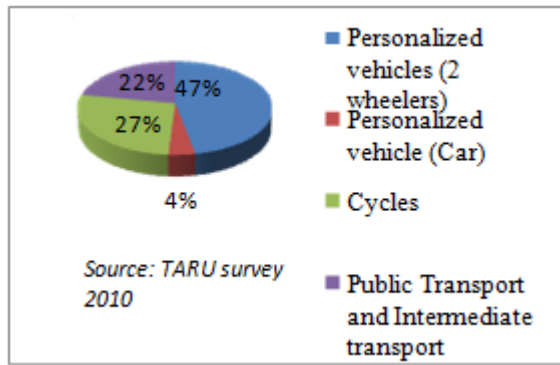


Figure 2: Percentage composition of different modes

3.Objectives

To study the transportation system of Indore by taking a case study of predefined routes. The multi modal network of BRTS and paratransit facilities of maruti vans and TATA magic are considered. Parameters of journey like time, distance, fare and type of commute are studied. The data is collected by an onboard transit survey.

4.Study Area

Indore is one of the major cities of Madhya Pradesh spread across an area of more than 3,500 sq. km. It is regarded as the commercial capital of the state and accounts for more than 4.5% of the population of the state. As per Census 2011, the population of Indore was around 3 million with a growth rate of 32.88 percent.

The city of Indore is well connected to the rest of the country by road, rail and air. Travel needs in the city are catered to by a variety of transport modes. They include city buses and BRTS operated by Atal Indore City Transport Services Limited (*AICTSL*), mini buses run by private operators, auto-rickshaws, and in the form of Intermediate Public Transport and personalized modes such as cars, two-wheelers and cycles.



Figure 3: Indore City

5.Research Methodology

The research studies consist of the data obtained from the onboard transit field survey. The survey was done on two selected busy routes at noon which comprised of the two extremities of the BRTS corridor from the centre location to study the diverse characteristics of the system. The journey comprised of four phases, each with a different mode of transport.

ROUTE 1: Gangwal Bus stand to Niranjanpur

ROUTE 2: Marimata Square to Rajiv Gandhi square

Table 1: Travel survey for Route 1

Route	Type of commute	Distance covered(km)	Time taken (min)	Fare (Rs.)	Wait Time
Phase 1	Walking	0.25	3	-	-
Phase 2	Maruti van	4	11	10	8
Phase 3	Tata magic	4.9	15	12	5
Phase 4	I bus	2.8	5	5	4

Table 2: Survey data for Route 2

Route	Type of commute	Distance covered(km)	Time taken(min)	Fare (Rs.)	Wait Time
Phase 1	Maruti van	2	8	10	5
Phase2	Walking	0.55	16	-	-
Phase 3	Tata magic	2.9	8	10	6
Phase 4	I Bus	5.5	12	10	5

6.Study Analysis

6.1 Distance Composition

On analyzing the two routes, we found that the percentage of distance covered by paratransit system was more than 60% of the total distance. The graphical representation of the analysis is shown below:

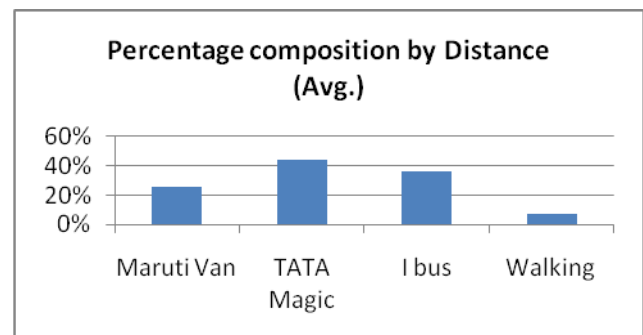


Figure 4: Percentage composition by distance

6.2 Waiting time comparison

The waiting time in the different phases of the journey is presented as a representative of the individual mode of transport for route 1 and route 2.

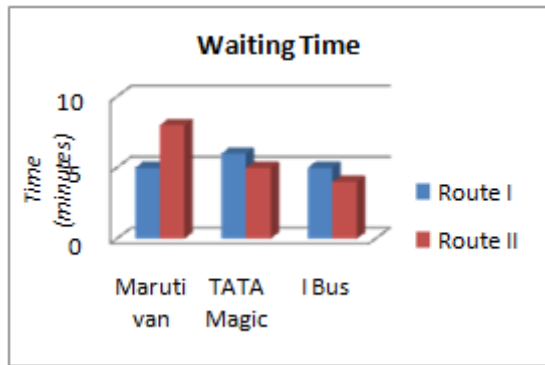


Figure 5: Waiting time comparison

6.3 Interchange during the transfers

In the transfers made during the journey, the provision for interchanges were lacking in case of paratransit system. BRTS system had proper stations with facilities for seating and transfers.

Table 3: Interchange facility

Mode of transport	Interchange facility
Maruti van	No facility
TATA magic	No facility
I bus	Stations with boarding and prepayment facilities

6.4 Fares

From table 4, it can be seen that the fare values for maruti van and TATA magic were inconsistent whereas those corresponding to the I-bus were consistent and regulated. On some occasions, it was also seen that the fare charged by the paratransit operators were influenced by their greed and the ignorance of the commuters which caused discomfort to the people.

Table 4: Fare per km

Type of transport	Fare/km	
	Route I	Route II
Maruti van	5	2.5
TATA Magic	3.45	2.45
I bus	1.8	1.8

7. Summary

- The multi modal network of Indore consists of paratransit system- maruti vans and TATA magic supplementing the primary system- BRTS.
- The system has a majority stake in the paratransit system with more than 60% of the travel taking place in the same.
- The waiting time considered in both the routes is found to be more than the BRTS due to the irregularity in the process of boarding undertaken by the operators which causes further delays.
- The fare per km in case of paratransit is unregulated and demands for further revision.
- The provision for interchanges is found to be wanting. Only BRTS has proper stations for boarding and alighting.

8. Recommendations

• Route Realignment

The routes of the paratransit system can be re-aligned to facilitate a better feeder network to the BRTS system. This can be achieved by decreasing the volume of paratransit on the routes parallel to the primary system.

• Interchange Facility

The transfers made during the journey serves as nodes of the system and therefore should be made an integral part of the transportation network. Infrastructure consisting of seating facilities, real time information system and connectivity should be constructed.

• Fare Integration

The fares of the system can be integrated as a whole, thus serving a easy and convenient way to solve the problem of high demands from the individual operators within the system from time to time.

• Feedback System

As the needs and demands of people change with the passage of time, the system also needs to be upgraded simultaneously. A well devised system of feedback can be effective to assess the changes necessary for further improvement.

9. Conclusion

The multi modal transportation system of Indore city is studied by taking two busy routes covering the AB road corridor in the Indore city. The study is carried out by doing an onboard transit survey in peak hours on the given modes of transportation. The analysis is done on the basis of percentage composition by distance, waiting time, interchange facility and fare per km. It is found that the use of paratransit facilities is more than the BRTS. Furthermore, it is found that the condition of para transportation is poor in terms of the considered parameters and methods are recommended for improvement.

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