



Road Category wise Use of Modes in Guwahati, Assam

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Abstract

All types of modes are normally operated in the Indian urban roads more so in the small and medium sized cities. But the use of a particular mode varies within the category of roads in an urban area. The road networks in of the urban areas are normally irregular, unplanned, narrow and congested. Many a times, the conventional transit service- the city bus, can not operate through these narrow and irregular street. The small size paratransit vehicles and automobiles can easily operate through these street systems. The city buses are normally operated through the arterial roads and paratransit vehicles are used to serve the local streets.

An attempt has been made in this paper to find the differential use of various modes in different category of roads in Guwahati city. Guwahati, the nodal city of North Eastern region of India has been selected as a study area. The road network is divided into two broad categories – arterial and local. Modal split survey and vehicular occupancy survey have been conducted in different location of the city. The differential use of various modes available in different types of roads has been obtained. The findings may be utilised by urban planner, transportation planner and traffic engineers for the future urban transportation planning of the city or a similar city.

Key words: Paratransit, Modal Split, Vehicular Occupancy, Arterial Roads, Local Streets

1. Introduction

Most of the cities in Assam have an unplanned narrow street system with irregular road pattern. The population in these cities is rapidly increasing and in the absence of proper development plans the cities are expanding irregularly without any infrastructure. Even the newer parts on the fringes where the private developers sell unserviced plots with narrow access lanes, do not always have well planned street layouts. The unplanned development coupled with narrow and irregular street systems, limits the feasibility of conventional public transit systems, normally city bus, in most of the cities in Assam. The small size vehicles like paratransit and private automobiles can easily operate through these narrow and irregular street systems. The conventional transit system, the city bus, is normally operated through the major urban roads and paratransits are used in the local streets for door to door service.

Guwahati, the nodal city of north eastern region of India has been selected as a study area. All types of modes like city bus, paratransits and private are operating through the urban streets in mixed mode condition. The road network is divided into two broad categories – arterial road and local street to study the differential use of various modes through these roads. Two types of survey - modal split survey and vehicular occupancy survey have been conducted to obtain the modal split in terms of number of vehicles and number of passengers carried by them. The differential use of various modes in different categories of roads have been obtained from the survey data, which reflects that the city bus is normally operated through the arterial roads and the share of paratransits are maximum in the local streets.

2. Guwahati

Guwahati, the Capital of Assam and the district headquarters of Kamrup district is located at 26°10'45" N latitude and 91°45'0" E longitude and is 55 m above the mean sea level (MSL). It acts as the nodal centre for the seven states of the north eastern region of India. Guwahati is the largest and fast growing urban agglomeration in the region. It is the major centre for trade, commerce, education and culture of the region. The River Brahmaputra flows through the northern half of the city. Though the main city lies in the southern bank of the river Brahmaputra, the northern bank is also developing as an industrial belt. The north, south and eastern sides are surrounded by rows of wooded hillocks. The city was developed as a linear city along the southern bank of river Brahmaputra. Gradually, the city is being extending to the northern bank after the construction of Saraighat Bridge over the river. The longest stretch of the city is about 25 km from east to west and about 13 km in the north south direction. The population of the city in 2001 was 824,152 with an area of 224.79 sq. km. The population density is about 3666 persons per sq. km, which is comparatively low in Indian condition, due to the presence of large water bodies, hills, marshy lands etc. within the city limits.

2.1 Road Network Characteristics

Transport network characteristic of a particular area determine the modal accessibility of the area. The road network patterns, gradient, type of roads, width of the road, width of carriageway, surface conditions vary not only between cities but also within a city. An area may be accessible by bicycles, cycle rickshaw and two-wheelers but inaccessible by cars, buses and trucks due to narrow and irregular road pattern. Again, some areas are only accessible by automated vehicles and not by human energy driven vehicles (bicycle, cycle rickshaw etc.) because of its steep gradients.

There is complete lack of any pattern in the road network in Guwahati. The railway has played a significant role in the development of roads in Guwahati. The railway line passes through the heart of the city. The line acts as a barrier to the north south movement in the city. Three over bridges and thirteen level crossings provide connections between the northern and southern halves of the city. The National Highway - 37 bypasses the city in the south. The National Highway - 31 ends in Guwahati. They connect the city to the rest of the State and the Country. Intra urban traffic also operates through them. The major arterial roads in Guwahati are The Assam Trunk road, Guwahati Shillong road, Radha Govinda Barua road and Gopi Nath Bordaloi road. They connect most of the major land uses in the city. All the above roads are having four lanes with central divider. These roads are mainly used by fast moving vehicles like city buses, cars, auto rickshaws etc. The second order important roads in the city are Bharalomukh Gorchowk road, Paltanbazar Lokhara road, Dispur Basistha road, Ganeshguri Hatigoan road, Jalukbari Rudreshwar road, Ganeshguri Kalapahar road and Ulubari Kahilipara road. The above all-weather roads are two lanes wide. All types of vehicles use these roads including the slow-moving cycle rickshaws. City buses also operate on all these roads. The third order roads are local collector streets and they are narrow and congested. The National Highways and major roads are considered as arterial roads in this paper. The through and intra urban traffics used these arterial roads. The second and third order roads are considered as local streets in this study. The intra urban traffics are mainly operated through these local streets. The road network map of Guwahati is shown in fig1.

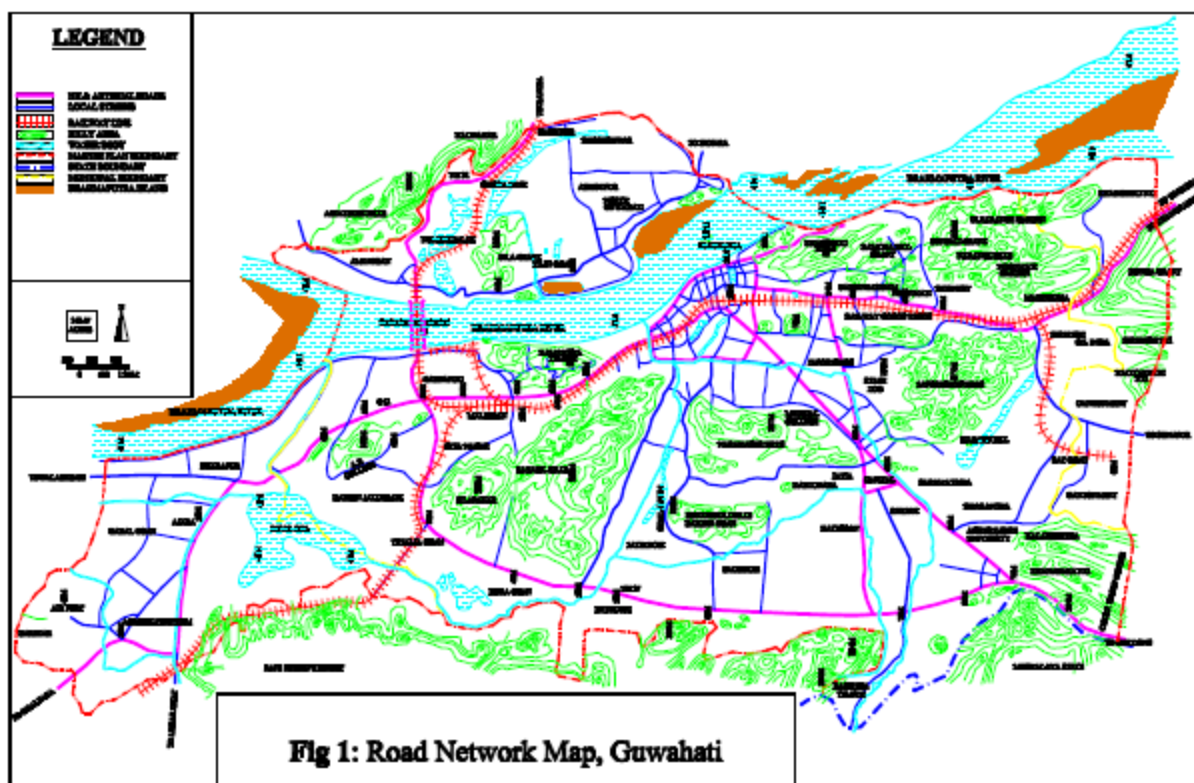


Fig1: Road Network Map, Guwahati

Modes		No. of Vehicles
Transit Vehicle (City Bus)	Omni Bus	955
	Mini Bus	1,454
	Deluxe Bus	133
	ASTC Bus	78
Paratransit Vehicle	Taxi	*2,196
	Auto Rickshaw	*10,352
	Cycle Rickshaw	16,900
Private Vehicle	Car	*38,215
	Two-Wheeler	*129,669
	Bicycle	20,000
Grand Total		219,952

Sources: District Transport Office, Municipality Office, Guwahati

* Respective District data including the urban area

Table 1: Number of Vehicles on Road as on 31st March 2001

2.2 Vehicular Modes in Guwahati

All types of conventional modes of urban passenger transportation starting from bicycle to city bus are available in Guwahati city. They are operated in mixed mode condition through the urban streets depending upon the type of road and their carriageway width as discussed in section 2.1. The mode wise number of vehicles on road in Guwahati is indicated in table 1. The modes are grouped into transit, paratransit and private for better representation. It is observed from the table that the number of small size vehicles such as two wheelers and paratransits are considerably high compare to the large size vehicles.

3. Survey and Data Collection

Two types of primary surveys - vehicular occupancy survey and modal split survey have been conducted at different locations of Guwahati city. Modal split survey has been conducted in 51 locations distributed over the city under each category of roads considered. In vehicular occupancy survey about 130 vehicles in each mode have been surveyed. Owing to resource and time limitation, it has been necessary to restrict the sample size of the primary surveys. However, efforts have been made to collect representative samples as far as practicable.

3.1 Vehicular Occupancy Survey

The objective of the survey is to find the average number of passengers carried by different modes. It was observed that occasionally the paratransit vehicles run empty particularly in the return trip. On the other hand, sometimes they are overloaded with passengers (particularly in case of shared travel mode during peak hours). It was also observed that the city buses are overloaded with passengers during the peak hours and run partially full during the off peak hours.

The survey was conducted during the day times on all types of roads distributed all over the city. Each type of mode was observed independently on a road section and the number of passengers carried by the mode type was recorded. The surveyor went into the city bus to count the number of passengers on board. The number of passengers carried by paratransit and private vehicles was counted from the roadside. The crews of the vehicle (driver, conductor and helper) were considered as part of the vehicle and not as passenger while computing the average vehicular occupancy. Table 2 shows the average vehicular occupancy (passenger per vehicle) of different modes in Guwahati. It is observed from the table that the city buses are normally overcrowded.

Modes	Capacity	Average Vehicular Occupancy
City Bus	27-30	35.86
Auto Rickshaw	3	1.66
Cycle Rickshaw	2	1.16
Private Car	3-4	2.03
Two-wheeler	2	1.20
Bicycle	1	1.07

Table 2: Average Vehicular Occupancy of Different Modes in Guwahati

3.2 Modal Split Survey

The survey was aimed to find the types of travel modes and their number on a road. Vehicles were counted for each mode separately on all the roads. The survey was repeated for 2 to 3 times at the same place on different days and at different hours of the day to obtain an average traffic flow. The survey was also conducted at specific places like market area, railway station, bus terminal, airport, important public places and local roads through residential areas to study the differences in the usage of different modes with respect to land use variations. Modal share of passengers for a particular mode was obtained by multiplying the number of vehicles and the average vehicular occupancy of the mode. Modal split was subsequently obtained as percentage share of passengers among all the modes available. The over all modal split for Guwahati city obtained from the traffic

survey is indicated in table 3. All the private modes like car, two wheeler and bicycle are put together as private for simplicity.

Modes	Number of Vehicle (%)	Passenger Carried (%)
City Bus	5	57
Auto Rickshaw	17	10
Cycle Rickshaw	15	5
Private	63	28
Total	100	100

Table 3: Modal Split by Mode Category in Guwahati

4. Road Category wise Use of Modes

The road network of Guwahati city has been divided into two broad categories – arterial roads (pink colour) catering to through traffic and local streets (blue colour) serving intra urban traffic as shown in fig 1 and discussed in section 2.1. The variations in levels of utility of different modes in different categories of roads in Guwahati are indicated in table 4.

Modes	Arterial Roads		Local Streets	
	% by Vehicle Number	% by passenger Carried	% by Vehicle Number	% by passenger Carried
City Bus	7	64	1	12
Auto Rickshaw	18	9	13	15
Cycle Rickshaw	9	3	29	21
Private	66	24	57	52
Total	100	100	100	100

Table 4: Road Category wise Use of Modes in Guwahati

It is evident from table 4 that the city buses run mainly in the arterial roads in Guwahati. The passengers carried by city buses on arterial roads (64%) are significantly more than the local streets (12%). The passengers carried by auto rickshaws are more in local streets (15%) compared to the

arterial roads (9%). There is a sharp increase in the percentage passengers carried by cycle rickshaws in local roads (21%) compared to that of arterial roads (3%). Similarly, the use of private modes also increases sharply in the local street (52%) in comparison to the arterial roads (24%).

This indicates that the smaller vehicles (paratransit and private modes) are widely used through the narrow and irregular local streets, while the city buses are mainly operating through the arterial roads. It is also observed from the survey that the paratransit vehicles are extensively used near the local markets, bus terminals, railway station, airports, tourist spots, hospitals, entertainment centres, hotel industries etc.

5. Conclusions

Transport network characteristic of a particular area determine the modal accessibility of the area. The road network patterns, gradient, type of roads, width of the road, width of carriageway, surface conditions vary not only between cities but also within a city. Guwahati is organically grown as a linear city and there is no specific road pattern in the city. The railway line passes through the heart of the city. The National Highways and major roads are considered as arterial roads. The through and intra urban traffics use these arterial roads. The other roads are considered as local streets where mainly intra urban traffics are operating. The local streets are narrow and irregular which limits the feasibility city bus operation. The small size vehicles like paratransit and private automobiles can easily operate through these narrow and irregular street systems. The conventional transit system, the city bus, is normally operated through the arterial roads and paratransits are used in the local street for door to door service. It is also observed from the survey that the paratransit vehicles are extensively used near the local markets, bus terminals, railway station, airports, tourist spots, hospitals, entertainment centres, hotel industries etc. The same pattern of traffic movements is observed in most of the cities in Assam. This is also visually observed during the traffic survey that the presence of slow moving vehicles (cycle rickshaw and bicycle) reduce the speed of the traffic flow substantially. As such, these vehicles should be discouraged to operate through the arterial roads so that the vehicles in such roads can move at higher speed. This will also increase the level of service (LOS) of the roads.

The findings may be utilised by urban planner, transportation planner and traffic engineers for the future urban transportation planning of the city or a similar city in the north eastern region of India.

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