Behavioural Analysis of Out Going Trip Makers of Sabarkantha Region, Gujarat, India

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Abstract— Sabarkantha is the northeast region of Gujarat having low industrialization. The people of region moves out in search of better jobs and due to social and other reason they become frequent travellers. In absence of proper facility of comfortable and fast mode of transportation they choose to use private mode. So, knowledge of fundamental behavioural of out going trip makers of sabarkantha region is necessary for proper planning. The paper analyses impact of different mode selection parameters like travel time, travel cost, comfort, security for selecting particular mode of transport. Out of the analyzed 1205 observed samples impact of travel time is predominantly impacting factor for mode choice. The analysis shows around 60% traveler of long distance is adopting GSRTC bus for the travel choice.

Keywords— Behavioral Analysis, Modal Split, Trip Generation, Trip Distribution, Trip Assignment.

I. INTRODUCTION

In developing country like India, road traffic in general & urban roads traffic in particular, a variety of socio-demographic factors also influence travel patterns and behaviors. The factors such as household composition, age, gender, car ownership, and income all influence the choice of travel mode and the length and duration of the journey. All of these factors are significant but gender and household composition appear to be of particular significance in influencing travel behaviors. The occurrence of rapid urbanization in the world has created the migration of people from rural area to metropolitan cities. This has resulted in more people and goods making trips in urban areas, often over the long distances. Globally, people lives in urban areas are more compared to the people lives in rural areas. In 1950, there was about 30% of the world’s population was urban which increased to 54% in year 2014 and it is forecasted to increase about 66% of the world’s population is projected to be urban by the year 2050 and just three countries - India, China and Nigeria together are expected to account for 37% of the projected growth of the world’s urban population between 2014 and 2050 (World Urbanization Prospect, 2014).

II. BASIC FORM OF BEHAVIORAL ANALYSIS, MODAL SPLIT, TRIP GENERATION, TRIP DISTRIBUTION, TRIP ASSIGNMENT.

A. Behavioral analysis

Behavioural analysis has taken significance as more and more policy initiatives are examined in regional areas to ease out the situation. Population being the end consumer, analysis of human behaviour and its inclusion in the modeling aspect has become essential. The case of transportation is one such sector. The commuters or users of facilities have to make various decisions like travel model to be used, the route selected, the time at which the trip should be made as per the purpose of trip, etc. It is difficult to forecast the decision of human being accurately; therefore, modeling the behaviour as accurately as possible is the key issue.

B. Modal split

Mode choice predicts the use of mode of transportation for number of trips from each origin to destination. Modal split has considerable implications for transportation policies, particularly in large metropolitan areas. The selection of the most appropriate travelling mode has always been a critical issue in mode choice modeling, since an individual have choice of modes available

Figure 1: Mode Choice process

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C. Trip generation
The trip generation is the first stage of classical transport model that aims to predict the total number of trips generated in and attracted towards each zone of the study area. After the trip generation analysis the transportation planner comes up with the vital figures about the total number of trips generated and attracted by each zone, purposes of these trips, and the travelling modes generally used for these trips.

D. Trip distribution
The trip distribution stage of the four-step model tends to provide a standard pattern of trip making by linking the trip ends with the origins. The trip distribution is essentially a table of trip generation and trip distribution, this trip table is commonly known as Origin-Destination Matrix (O-D Matrix), provides a comprehensive illustration of the number of trips generated between different zones of the study area.

E. Trip assignment
Trip assignment is the last stage of the four-step model, dealing with the allocation of a given set of trip interchanges to a specific transport network. Its main to objective is estimate the traffic volumes and the corresponding travel times or costs on each link of the transportation system by the help of inter-zonal or intra-zonal trip movements (determined by trip generation and distribution) and the travel behavior of the individuals (determined by modal split). The proportion of vehicles using each route between a particular origin-destination pair depends upon a number of attributes and the alternative routes including travel time, distance, number of stops / signals, aesthetic appeal etc. But travel time is the attribute most commonly considered in network assignment models.

III. METHODOLOGY & DATA COLLECTION
The study has been conducted by the Department of Civil Engineering, Tatva Institute of Technological Studies, Modasa. The study area and data collection was carried out from Sabarkantha (Old Sabarkantha including Arraval dist.) and find out the current population of the Sabarkantha region by the average growth factor method. The first step in the methodology is to identify the problem; it covers the subject of work. The next is review of literature, in this step the terms related to mode choice along with the previous case studies on mode choice are collected and has been studied carefully. The third step is to select the study area for implementing through of work and it should be suitable for objective for the present study the data is collected from the Sabarkantha region by the average growth factor method.

A. Population of Gujarat (Dist. Wise)

<table>
<thead>
<tr>
<th>District Code</th>
<th>State/District</th>
<th>Population 2011</th>
<th>Sex Ratio</th>
<th>Population density per sq. km.</th>
</tr>
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<tr>
<td>01</td>
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<td>31,16,54,982</td>
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<td>347</td>
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<td>105</td>
<td>347</td>
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<td>Ahmedabad</td>
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</table>

Sabarkantha region current population
Yearly Population Increase Between to 2001 to 2011 =2428589-2082531=346058
10 year population Increase = 346058
Avg. 1 year population Increase= 346058.80
Current population = 2011 population + (1 year population * 5)
= 2428589 + (34605.80 * 5)
= 2428589 + 173029
= 26,01,618 avg

So Current(2016) Population of Sabarkantha Region (Old Sabarkantha District) = 26,01,618 average

B. DATA COLLECTION

Data collection is carried out at Sabarkantha region of Gujarat state. For the outgoing long trip makers of Sabarkantha region various higher demanded talukas like Himatnagar, Modasa, Idar, Vadali, Bhiloda, Khedbrahma are our main locations for data collection. For each long trip makers of Sabarkantha Region the following data field should be included as,

- Mode Choice
- Origin of outgoing Long trip makers
- Destination of outgoing Long makers
- Frequency of modes
- Travel Time (Min.)
- Travel Cost (Rs.)
- Traveling Distance (Km.)
- Comfort level
- Security of mode

C. CATEGORY ANALYSIS

(a) Trip length Frequency Distribution

Trip length frequency distribution wise mode choice category analysis for all over region and main origins of the Sabarkantha region.
Figure 9: Trip length wise mode choice analysis for Himmatnagar

Figure 10: Trip length wise mode choice analysis for Modasa

Figure 11: Trip length wise mode choice analysis for Ider

(b) Travel Time Frequency Distribution
Travel Time frequency distribution analysis for all over region and main origins of the Sabarkantha region.

Figure 12: Total Travel Time Frequency Distribution for all over Sabarkantha Region

Figure 13: Total Travel Time Frequency Distribution for Himmatnagar Origin

Figure 14: Total Travel Time Frequency Distribution for Modasa Origin

Figure 15: Total Travel Time Frequency Distribution for Ider Origin

(c) Travel Cost Frequency Distribution
Travel Cost frequency distribution analysis for all over region and main origins of the Sabarkantha region.

Figure 16: Total Travel Cost Frequency Distribution for All over Sabarkantha Region
CONCLUSION

From the survey we find out that Sabarkantha region is the top ten developing district of the Gujarat. Hence, there are frequently long trip makers but at the Sabarkantha region level there is no fastest transportation modes for the frequent long trip makers. From the survey analysed that there is G.S.R.T.C. buses service, Luxury bus(travels ) services, and private cars are use to catch fastest mode like air line or railway for long trip makers. We can solve by the providing that fastest mode at the Sabarkantha region. There is no air transport facility at the Sabarkantha District, but the nearest airport in Ahmedabad is 80 km away from Himatnagar (District headquarter). We can establish the Air port and also connect the fastest rail network to the Sabarkantha region.

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