

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).

India's urban population concentration in million plus cities has been steadily increasing. According to the census 2011, the total numbers of 468 cities is Class 1 urban

agglomerations / cities and are believed to constitute more than 70% of country's population are urban. Continuing population growth and urbanization accompanied challenges to urban transport.

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

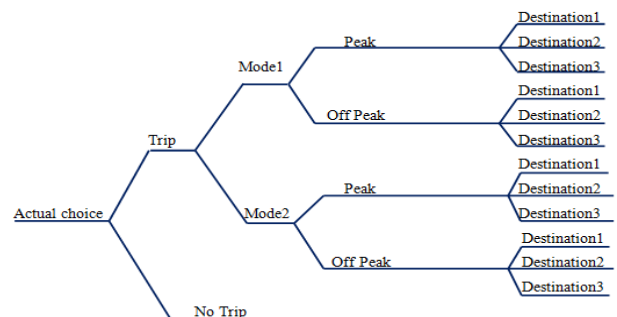


Figure 1: Mode Choice Process

Figure 1: Mode Choice process

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 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 Arravali 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. The fourth step of the study is collection of secondary and primary data for the study, the secondary data consists the population data, vehicle ownership data and existing public transport details collected from the government and private offices of Sabarkantha Region. The collection of primary data is done by conducting Personal interview survey of peripheral areas of Sabarkantha using revealed and stated

preference questionnaire by conducting Personal interview survey using random sampling technique the formats of Personal interview survey.

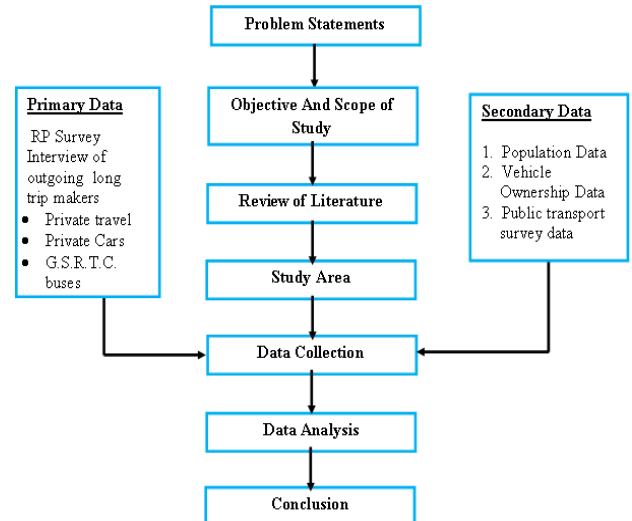


Fig.2: Methodology chart for study

A. Population of Gujarat (Dist. Wise)

TABLE 1
 POPULATION OF SABARKANTHA REGION

District Code	State/District	Population 2011			Sex Ratio 2011	Population density per sq. km. 2011
		Persons	Males	Females		
	Gujarat	60,383,6	31,482,282	28,901,346	918	308
01	Kachchh	2,090,31	1,096,343	993,970	907	46
02	Banaskantha	3,116,04	1,609,148	1,506,897	936	290
03	Patan	1,342,74	694,062	648,684	935	234
04	Mahesana	2,027,72	1,053,337	974,390	925	462
05	Sabarkantha	2,427,34	1,244,491	1,182,855	950	328
06	Gandhinagar	1,387,47	722,459	665,019	920	660
07	Ahmadabad	7,208,20	3,787,050	3,421,150	903	890
08	Surendranagar	1,755,87	910,266	845,607	929	167
09	Rajkot	3,799,77	1,975,131	1,824,639	924	339
10	Jamnagar	2,159,13	1,114,360	1,044,770	938	153
11	Porbandar	586,062	300,967	285,095	947	255
12	Junagadh	2,742,29	1,404,506	1,337,785	952	310
13	Amreli	1,513,61	770,651	742,963	964	205
14	Bhavnagar	2,877,96	1,490,465	1,387,496	931	288
15	Anand	2,090,27	1,088,253	1,002,023	921	711
16	Khe da	2,298,93	1,187,098	1,111,836	937	541
17	PanchMahals	2,388,26	1,227,805	1,160,462	945	458
18	Dohad	2,126,55	1,070,843	1,055,715	986	582
19	Vadodara	4,157,56	2,150,229	2,007,339	934	551
20	Narmada	590,379	301,270	289,109	960	214
21	Bharuch	1,550,82	805,945	744,877	924	238
22	The Dangs	226,769	112,976	113,793	1007	129
23	Navsari	1,330,71	678,423	652,288	961	602
24	Valsad	1,703,06	884,064	819,004	926	561
25	Surat	6,079,23	3,399,742	2,679,489	788	1376
26	Tapi	806,489	402398	404091	1004	249

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= 34605.80

$$\begin{aligned}
 \text{Current population} &= 2011 \text{ population} + (\text{1year population} * 5) \\
 &= 2428589 + (34605.80 * 5) \\
 &= 2428589 + 173029 \\
 &= 26,01,618 \text{ avg}
 \end{aligned}$$

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



Figure 3. Sabarkantha District Taluka map

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 as 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 .

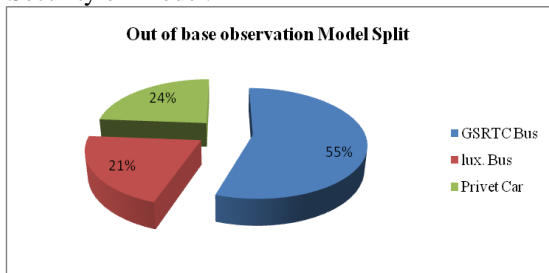


Figure.4: Model Split for Out of Total Trip base observation modes of Sabarkantha Region

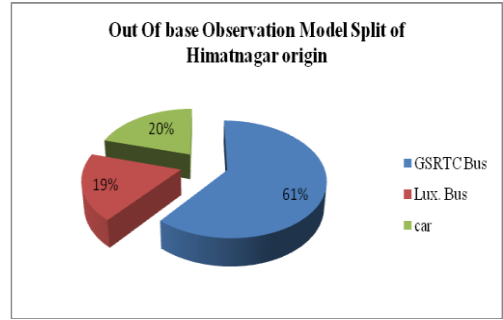


Figure.5: Model Split for Out of Total Trip base observation modes of Himatnagar

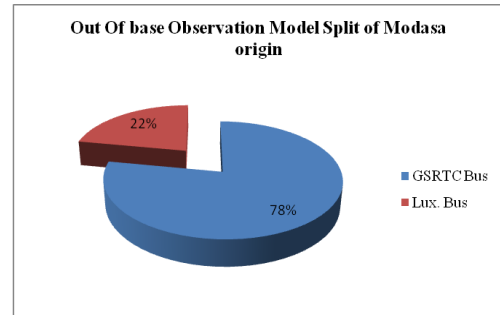


Figure.6: Model Split for Out of Total Trip base observation modes of Modasa.

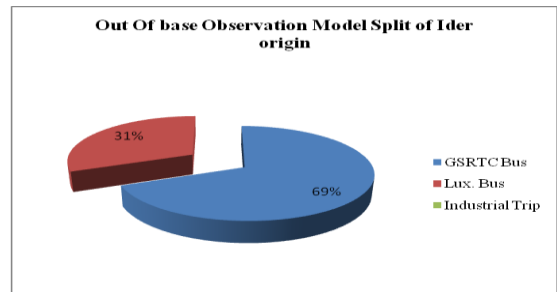


Figure.7: Model Split for Out of Total Trip base observation modes of Ider.

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.

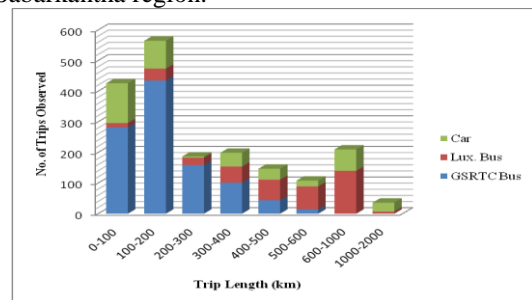


Figure.8: Trip length wise mode choice analysis for all over Sabarkantha Region.

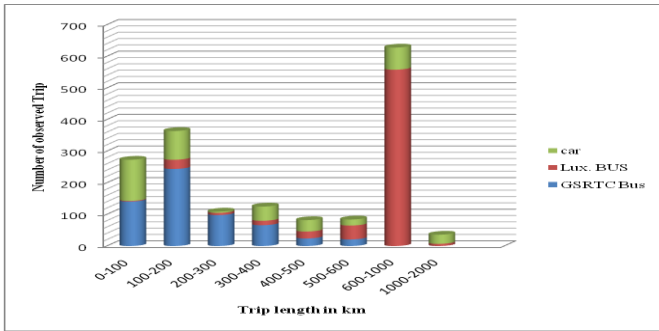


Figure.9: Trip length wise mode choice analysis for Himmatnagar

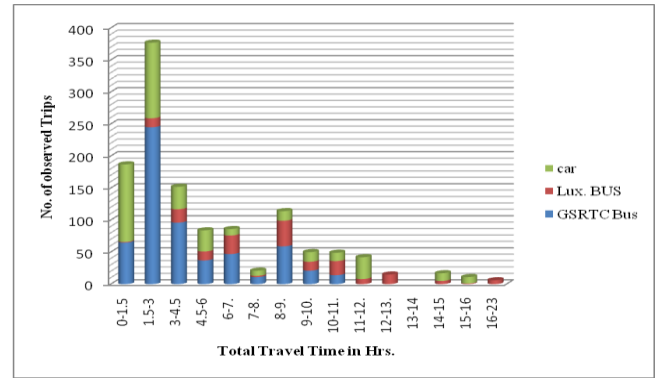


Figure.13: Total Travel Time Frequency Distribution for Himmatnagar Origin

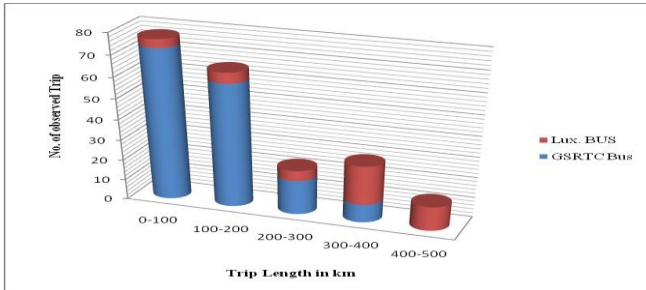


Figure.10: Trip length wise mode choice analysis for Modasa

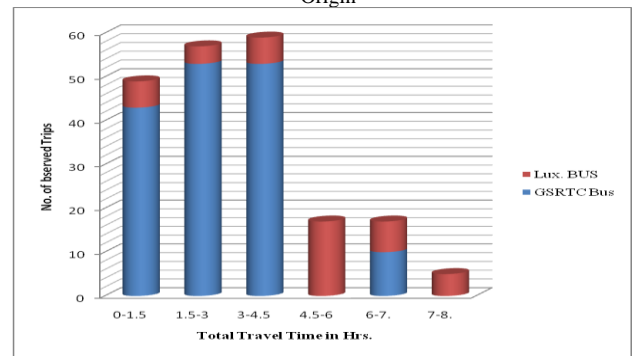


Figure.14: Total Travel Time Frequency Distribution for Modasa Origin

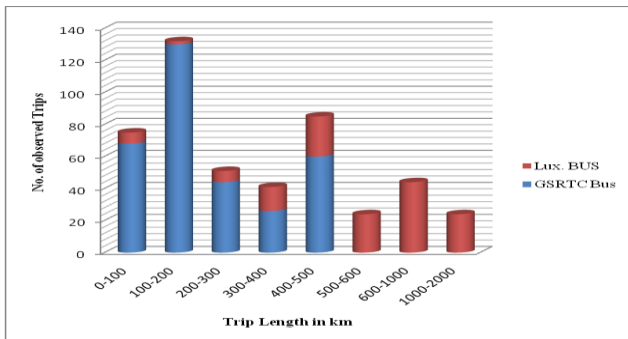


Figure. 11: Trip length wise mode choice analysis for Ider

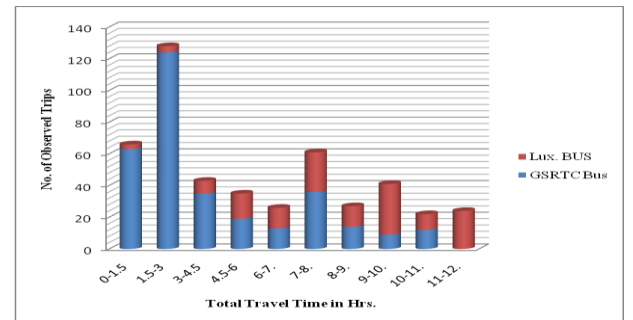


Figure.15: Total Travel Time Frequency Distribution for Ider Origin

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

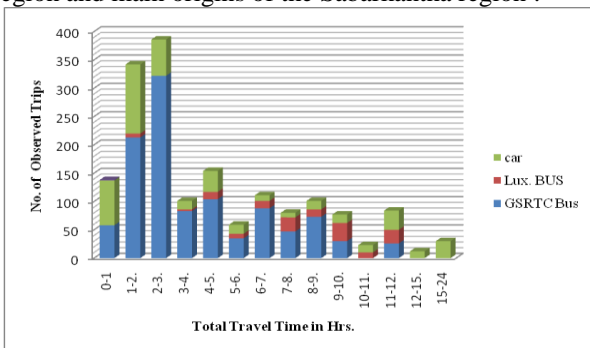


Figure.12: Total Travel Time Frequency Distribution for all over Sabarkantha Region

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

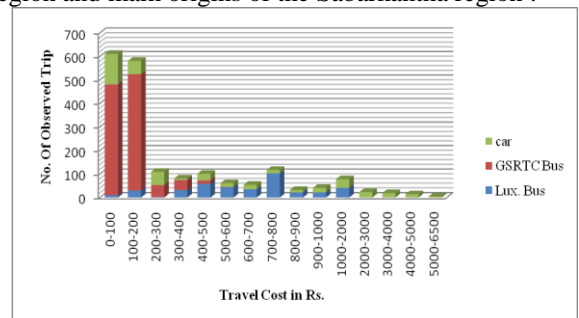


Figure.16: Total Travel Cost Frequency Distribution for All over Sabarkantha Region

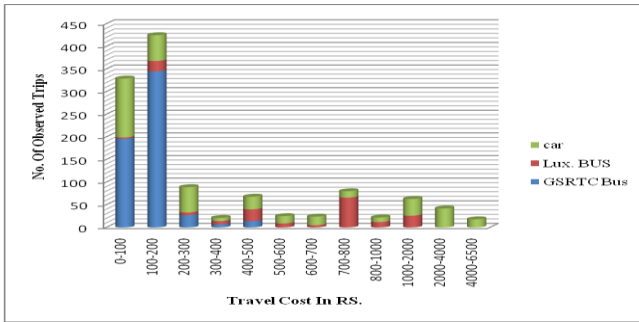


Figure.17: Total Travel Cost Frequency Distribution for Himatnagar origin

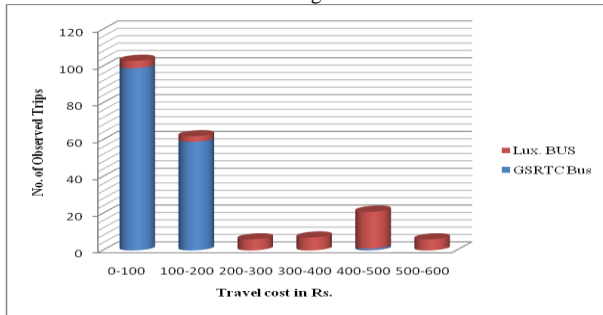


Figure.18: Total Travel Cost Frequency Distribution for Modasa origin

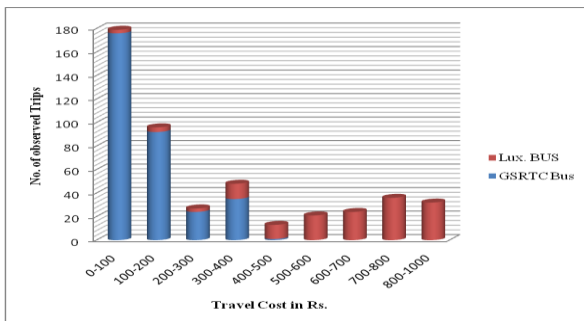


Figure.19: Total Travel Cost Frequency Distribution for Ider origin

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 buses(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.

REFERENCES

- [1] Adhvaryu (2010), Enhancing urban planning using simplified models: Simplan for Ahmedabad, India.
- [2] Ashalatha et al. (2013), "Mode Choice Behavior of Commuters in Thiruvananthapuram City". Journal of Transportation Engineering, Vol. 139, No.5, May 1, 2013. © ASCE, ISSN 0733-947X/ 2013/5-494-502
- [3] Chidambaram B., Janssen A., Rommel J., Dimitrios Z, (2014), Commuters' mode choice as a coordination problem: A framed field experiment on traffic policy in Hyderabad, India.
- [4] Deb K. and Filippin M. (2011), Estimating welfare changes from efficient pricing in public bus transit in India.
- [5] Dhingra S. L. et al. (1998) Another insight into artificial neural Networks through behavioural analysis of Access mode choice. Comput., Environ. and Urban Systems, Vol. 22, No. 5, pp. 485±496, 1998.
- [6] Forward s.,(2014), Exploring people's willingness to bike using a combination of the theory of planned behavioural and the trans theoretical model.
- [7] Lila et al. (2013), Modeling the Choice of Tele-work and its Effects on Travel Behaviour in Indian context.
- [8] Menon G, Mahanty B.(2016), Modeling Indian four-wheeler commuters' travel behavior concerning fuel efficiency improvement policy.
- [9] Parthan and Srinivasan, (2013) Investigation of alternate behavioural frameworks for mode choice decisions of workers in Chennai city. Procedia - Social and Behavioral Sciences 104 (2013) 573 – 582.
- [10] Verma et al. (2015), Activity-travel behaviour of non-workers belonging to different income group households in Bangalore, India.
- [11] Verma M, M. Manoj , Verma A.(2016), Analysis of the influences of attitudinal factors on car ownership decisions among urban young adults in a developing country like India. Transportation Research Part F (2016).

Book References

- Gundaliya P.J. and Varia H.R. (2014), "Urban Transportation system", 3rd edition, Mahajan Publishing House.