Trip Generation: The Initial Stage of Urban Transportation Planning

Dhaval Dudakiya¹ Dhruv Shah² Dhvani Patel³ Shweta J Chauhan⁴

¹²³ Student ⁴ Assistant Professor
¹²³ Sardar Patel College of Engineering, Bakrol

Abstract—Urban transportation planning system depends on travel demand modeling. Travel demand modeling is a systematic process for developing regional transportation planning. In today’s era, Transportation is a basic need of every person. With Start of every day, every person generates “Trip” from one place to another using different mode of travel and having specified travel time. Transportation means transfer of person or goods from origin to destination points. There is tremendous increase in traffic on roads, which is the key reason behind increase in trip generation rate. In India, on every road there is a problem of conflicting movements and traffic at intersections as well as on major routes. The increase in personalized vehicles rate leads to generation of more trips. Trip generation rate depends on various factors like vehicle ownership, age, and income of person, education, purpose of trip and many more. Here, in this paper Authors had studied the case study of Anand region, to understand the types of trip generation rate, factors affecting trip generation and future forecasting of trip generation for studied area.

Key words: Trip, Travel Demand Modeling, Land use pattern

I. INTRODUCTION

In India, the problems of traffic, intersection chaos and accidents increasing every day. The metropolitan areas having dense population generate more number of trips. To minimize conflicting movement and accidents on road there is a need of regional or urban planning network.

Trip generation is a basic step of four stage travel demand modeling techniques. The transportation planning for urban, national or regional level requires this method. Trip generation consists of transportation forecasting process followed by Trip distribution, mode choice and route assignment as sequential steps. It predicts number of “Trips” originating in or destined for a particular traffic analysis zones. Every trip has two ends, origin and destination. The origin is a point from which trip is generated and destination is a point where trip is attracted. Typically, Trip generation analysis focuses on residences, and residential trip generation is a function of social and economic attributes of households. At the level of traffic Analysis Zones, residential land uses “produce” or “generates” trips. So, the trip generation aims at predicting total number of trips generated and attracted to each zone of study area.

II. TYPES OF TRIPS

The trips are classified based on trip purpose, trip time of the day, and by person type. There are basically two types of trips: Home based and non home based trips. The home based trips are those having either origin or destination as “Home”. Based on purpose trips are classified as trip for work, trip for education, trips for shopping, trips for recreation and other types. Among these the work and education trips are often referred as mandatory trips. The contribution of home based trips is normally 80 to 85 percent.

III. STUDY AREA PROFILE

Fig. 1: Four Stage Transportation Planning Process

IV. FACTORS AFFECTING TRIP GENERATION

The trip generation rate depends on number of different factors. It varies from person age to income level. A number of factors govern the trip generation rates:

1) Income: Family income which represents its ability to pay for a journey affects the number of trip generated by household. A general trend is that the higher the income the higher is the trip generation rate.

2) Vehicle ownership/ car ownership: The number of trips generated by person is depends on number of private vehicles. Now a days there is a scenario that in a household every individual is having its own two wheelers. So the number of trips generated is higher.

3) Family size, occupation and purpose of trip: The various types of trips are trips for work, education, job, shopping, recreational and miscellaneous. If there is more number of household there are more trips generation rate.

4) Land use characteristics: Different land use produces different trip rates. For example a residential area with a high density of dwellings can produce more trips than one with a low density of dwellings. On the other hand, low density areas may represent dwellings of the affluent society, which may produce a large number of private car trips. The rate able value of the dwelling unit and the type of dwelling unit affects trip generation rates. The most important assumptions made in transportation planning are that the amount of travel dependent on land use.

5) Distance of the zone from town centre: The distance of the zone from the town centre is an important determinant of the amount of travel that people might...
like to the town centre. The farther the town centre, the less number of trips occurs.

6) Accessibility to public transport system and its efficiency: The accessibility to a public transport system and its efficiency determine to some extent the desire of persons to make trips. An easily accessible and efficient public transport system generates more trips.

7) Employment opportunities: The employment potentiality of an industrial or shopping unit or an office establishment directly governs the trips attraction rates.

The following table indicates population data base as per census record of Anand district:

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Description</th>
<th>2011</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Actual Population</td>
<td>2,092,745</td>
<td>1,856,872</td>
</tr>
<tr>
<td>2</td>
<td>Male</td>
<td>1,087,224</td>
<td>972,000</td>
</tr>
<tr>
<td>3</td>
<td>Female</td>
<td>1,005,521</td>
<td>884,872</td>
</tr>
<tr>
<td>4</td>
<td>Population Growth</td>
<td>12.70%</td>
<td>13.04%</td>
</tr>
<tr>
<td>5</td>
<td>Area (In Unit Sq. Km)</td>
<td>3204</td>
<td>3204</td>
</tr>
<tr>
<td>6</td>
<td>Proportion To Gujarat Population</td>
<td>3.46%</td>
<td>3.66%</td>
</tr>
</tbody>
</table>

Table 1:

Source: Anand District, Census 2011 Data and record of Population (www.census2011.co.in)

As the population is increasing there are more chances of trip generation. The industrial sector located around the city requires more job trips. As major population is working with GIDC (major production and factories allocated area) and educational cities the daily job trips and work trips is higher.

V. METHOD TO COLLECT DATA OF TRIP GENERATION RATE

In the transportation planning process, the trip generation data can be collected by various types of transportation survey methods. Here, Authors are describing home interview survey technique in brief to collect data.

The first step in the formulation of transportation plan is to collect data on all factors that are likely to influence travel pattern. This work involves a number of surveys so as to have an inventory of existing travel pattern, an inventory of existing transport facilities and an inventory of existing land use and economic activities.

The home interview survey includes two types of data, travel pattern or trip related data and other is socio economic data. Home interview surveys are also known as household survey method. It is one of the most reliable type of surveys for collection of origin and destination data. The data of the travel pattern of residents of the household and the general characteristics of the household influencing trip making behavior is collected. The information on travel pattern includes number of trips made, their origin and destination, purpose of trips, travel mode, time of departure from origin and time of arrival at destination and so on. The information on household characteristics includes type of dwelling unit, number of residents, age, sex, vehicle ownership, number of drivers, family income and so on. Based on these data it is possible to relate the amount of travel to house hold and zonal characteristics and develop equations for trip generation rates.

The sample house hold surveys are carried out by students in Anand district. The personal interviews were conducted and trip generated data is collected:

The house hold interview includes home questionnaire method. The interviewer collects only details of the house hold characteristics. Leaving forms for house hold residents to complete in regard to travel information. The completed forms are collected by the interviewer after a day or two.

VI. CONCLUSION

From the available record of population in Anand city, there is notable increase in trip generation rate in next few years. The vacant plots and areas are converted into commercial hub, multiplex and shopping centers. Due to that the trip generation rate is increased which requires proper urban transport plan. And to prepare that plan, we require data base for trip generation and attraction rates. As a common method, house hold interview method is conducted as per format. The trip generation data base can be useful to develop mathematical modeling technique i.e Regression model for predicting future trips. This paper illustrates what is the trip generation as a prior step for Urban transportation planning process.

REFERENCES