"Origin-Destination Studies"-A Case Study of Junction Improvements in Delhi City

Mr. Abhishek Chaudhary[1]
Student of civil dept.
Mangalmay institute of engineering & technology
Greater Noida

Mr. Amit Kumar[2],
Student of civil dept.
Mangalmay institute of engineering & technology
Greater Noida

Mr. Sajid[3]
Student of civil dept.
Mangalmay institute of engineering & technology
Greater Noida

***Abstract*: Delhi being the centre for industrial development, real estate, health, education, is witnessing rapid growth in the population which has resulted in rapid growth of 'floating population'. This has resulted in high traffic congestion.**

Origin-Destination (O-D) trip tables represent the demand-supply information of each directed zonal-pair in a given region during a given period of time. The effort of this research is to develop a linear programming methodology for estimating O-D trip tables based on observed link volumes. In order to emphasize the nature of uncertainty in the data and in the problem, the developed model permits the user's knowledge of path travel time to vary within a band-width of values, and accordingly modifies the user-optimality principle. Some test results on the related models are presented and compared, and different sensitivity analyses are performed based on different scenarios. Finally, several research topics are recommended for future research.

As the part of O-D survey, I have been selected Ashok Nagar, Delhi for the origin and destination studies.

1.0 INTRODUCTION

1.1 General:

In a transportation study, it is often necessary to know the exact origin and destination of the trips. It is not only necessary to know how many trips are made, but also group these trips with reference of the zones of their origin and destination. Other information yielded by O-D survey includes land-use of the zones of origin and destination, household characteristics of the trip making family, time of the day when journeys are made, trip purpose and mode of travel. Origin is defined as the place where the trip begins and destination is defined as the place where the trip ends. The specific uses to which O-D survey data are;

- To determine the amount of by passable traffic that enters a town and thus establishes the need for bypass.
- To develop trip generation and trip distribution models in transport planning process
- To determine the extent to which the present highway system is adequate and plan for new facilities.

To assess the adequacy of parking facilities and plan for future.

1.1.1 Traffic studies

The two traffic studies were conducted are;

- Traffic volume count
- Origin and destination study

1.1.2 *Traffic volume*

It is defined as the number of vehicles moving in a specified direction on a given lane or roadway, that pass a given point or cross section during specified unit of time. It is expressed as vehicles per hour or vehicles per day.

Methods of volume counting

- Manual method
- Mechanical method

Manual method: involves one or more person to count and classify traffic flowing pass a fixed point.

Mechanical counter method: involves mechanical counters are used to count the traffic flowing.

Different types of mechanical counters are;

- Pneumatic road tube
- Electric contact
- Photo electric
- Radar
- Video photography

1.1.3 *ORIGIN AND DESTINATION STUDY*

The purpose of which an O-D survey is required determines the extent of preliminary preparations for organizing the survey. For instance, if the survey is needed as part of an urban transportation planning process for a large town, it will be necessary to define the study area and sub-divide it into zones. In the study of transportation problems of town, big or small, it is usually necessary to define external cordon lines , which are imaginary lines at the boundary of study area. In big towns, it may also be necessary to select some internal cordon lines, which may be concentric rings. For checking the accuracy of survey data, it may be necessary to have screen-lines which are imaginary lines dividing the area into parts.

The pm is responsible for the installation traffic circulation plan. In order that may flow as smoothly and safety as possible, it may become necessary to collect data as to where the traffic came from and where it is going. That is the purpose of this type of study. The information gathered

may be used to modify the circulation pattern or assist in other long range planning activities. These studies are time consuming and rather complex. They also require the cooperation and assistance of the public. There are 5 different methods of conducting origin and destination studies.

- Road-side interview method
- License plate method
- Return post card method
- Tag on-car method
- Home interview method

2. OBJECTIVE OF THE PRESENT STUDY

- To judge the adequacy of existing routes and to use in planning new network of roads.
- To plan transport system and mass transit facilities in cities including routes and schedules of operation.
- To locate terminals and to plan terminal facilities.
- To locate new bridges as per traffic demands.

3.SCOPE OF THE PRESENT STUDY

The scope of the traffic studies done can be summed up as below;

To carry out traffic volume studies for the given stretch To conduct O_D studies and collect data regarding to number of trips generated, attracted and distributed.

4. LITERATURE REVIEW

General

The problem of origin/destination demand estimation is vital to all aspects of ATMIS (Advanced Transportation Management and Information Systems) research. An origin/destination demand matrix is a vector with components that denote the average number of trips going from an origin to a destination. Traditionally, the method for obtaining an origin/destination matrix for large scale networks is to employ the use of household surveys coupled with roadside surveys. However, this method is expensive and also not feasible for real-time applications. Therefore, there has been research in the static origin/destination demand matrix estimation using network-wide link traffic counts and combining these with other available information. One source of information that we have already mentioned is household activity surveys, another source is the knowledge of the a priori probability distribution of the origin/destination matrix. Yet another is the use of previously estimated origin/destination matrices.

When a research area is considered, it is divided into several zones or centroids. The static origin/destination demand matrix consists of all the trips from all the origin zones to all the destination zones. In general, the numbers of origin/destination pairs are greater than the total number of links. This means that by just using traffic counts, the estimation problem is underspecified and there is no unique solution. For this reason additional information is needed to determine a unique origin/destination demand matrix. There are several methods for formulating estimators for an unique matrix. In transportation and regional planning, the most popular approach is the maximum entropy model (Van Zuylen and Willumsen, 1980). The assumption of this approach is that all of the combinations of individual travel decisions, so called states, are equally likely to occur. The set of origin/destination flows with the highest likelihood of occurring is therefore the set with the maximum number of states. The conventional method uses this maximum entropy consideration to obtain a doubly-constrained gravity model.

Another method is classical statistical inference techniques. The two main estimators are the maximum likelihood and the generalized least-squares. The maximum likelihood estimator maximizes the likelihood of observing the experimental data condition on the true trip matrix. For this method, distributional assumptions need to be made for the sample and traffic counts. On the other hand, no distributional assumptions need to be made for the generalized least squares approach. The last method is the Bayesian one, which uses a priori probabilities on the trip demands. By combining these probabilities with the conditional probability on the traffic counts, one can obtain the posterior probability of the demand conditioned on the traffic count. The arguments of this probability can then be maximized by different methods.

One critical reference, Van der Zijpp (1997), added partial origin/destination information by using Automatic Vehicle Identification (AVI) technology. An example of an AVI technology is license plate recognition based on image processing. They proposed a method to track time-varying traffic patterns from a combination of link volume counts and trajectory observations obtained from induction loops and AVI equipment at arbitrary (but fixed) locations. They applied the approach to a sing motor-way corridor with no route choice alternative and proposed the Bayesian updating scheme that used multivariate normal and truncated multivariate normal assumptions for the subjective probability distributions. The advantage of this new procedure is that it deals with the inequality constraints in an appropriate statistical manner.

The fundamental difference between density and flow is that density is measured over a length of space at a particular instant in time, while flow is measured over a period of time at a particular point in space. In dynamic frameworks, density should clearly be the traffic variable of choice and not flow.

Jayakrishnan et al. (1994) developed DYNASMART (DYnamic Network Assignment Simulation Model for Advanced Road Telematics), an evaluation model that incorporated the driver response to information, the traffic flow behavior, and the resulting changes in the characteristics of network paths, into an integrated simulation.

5. METHODOLOGY

***ROAD SIDE INTERVIEW METHOD*:**

The vehicles are stopped at previously decided interview stations by a group of persons and the answers to prescribed questionnaire are collected on the spot. The information collected include the place and time of origin and destination, route, locations of stoppages, the purpose of the trip, type of vehicle and number of passengers in each vehicle. The traffic may be filtered through a

prescribed lane by previous warnings sighs and with the help of police so that each driver of the selected sample of vehicles is interviewed. The percentage also is noted from appropriate traffic volume study taken simultaneously.

The advantage of this method the data is collected quickly in short duration and the field organization is simple and the team can be trained quickly. The main drawback of this method is that the vehicles are stopped for interview, and there is delay to the vehicular movement. Also resentment is likely from the road user. Further, unless there is enough space, undue congestion may result due to stopped vehicles.

A roadside origin/destination survey of drivers traveling through the Ashok Nagar area was conducted to further expand the base information on existing travel patterns. The data collected includes origin, destination, and purpose of vehicle trips, vehicle occupancy and classification of vehicle type. This data will assisin the distribution and assignment of future travel demands generated in the study area. A ROAD SIDE INTERVIEW METHOD was selected for the survey; the instrument was developed with assistance from the town.

Survey Questionnaire:

Location:

Date:

STANDARD FORMAT

Origin-Destination Survey

Questions

Please take a moment to answer a few questions about your trip. Your responses will help determine the need for improvements in this area. Where did your trip begin?

City/Town _____

State _____

Zip _____

- What type of place is your trip start point?

❒ Primary Residence ❒ Workplace ❒ Store ❒ School (I am a student) ❒ Recreation Area ❒Other _____

- Where did your trip end?

City/Town _____ State _____

Zip _____

- What type of place is your trip end point?

❒ Primary Residence ❒ Workplace ❒ Store

❒ School (I am a student) ❒ Recreation Area

❒Other _____

- What was the purpose of your trip?

❒ Work Commute ❒ Business Related

❒ Shopping ❒ School (attend class)

❒Recreation ❒Other _____

- How many people were in the vehicle, including the driver?

❒ 1 ❒ 2 ❒ 3 ❒ 4 ❒ 5 or more

- What type of vehicle were you in?

❒ Passenger vehicle (car, motorcycle, SUV, pick-up truck, minivan)

❒ Commercial vehicle

❒Other _____

- Do you regularly use this route ?

❒ Yes

❒ No

- Please add any comments on transportation you may have.

Comments _____

_____

_____

_____

Thank you very much for your cooperation!

8. CONCLUSION

Noida sector 15 intersection is one of the busiest junctions in delhi. The following measures are taken to reduce traffic congestion

Short term measures:

- Alter the timings of the junction traffic signals and review the traffic and pedestrian phases to ease congestion at certain times of the day.
- Alteration of signal timings during off peak hour period.
- Movement of heavy commercial vehicles should be avoid at day time and allow at night time.

Long term measures:

- Channelization of junction like providing free left on both sides of the junction.
- Extra widening of carriage width by reducing the footpath.
- Underpass should be provided.

9. REFRENCES

1. Khanna.s.k,justo.c.e.g“Highway engineering” http//www.trb.in
2. Khadiyali-“Traffic Engineering”
3. Ashok, K. and Ben-Akiva, M. (1993) Dynamic O±D

matrix estimation and prediction
for real time traffic systems
Transportation &Traffic Theory, ed.
C. F. Daganzo, pp.

4. Bell, M. G. H. (1991) The estimation of origin destination matrices by constrained generalized least squares. Transportation
Research B 25, 13±22.
5. William H. K. Lam[1]& H. P. Lo[2] Lecturer, Department of Civil and Structural Engineering ,Hong Kong PolytechnicEstimation of origin-destination

matrix from traffic counts: a
comparison of entropy maximizing
and information minimizing models