

**Internal Assessment Test –II April 2018**  
**Solution**

**Sub:** Urban Transport Planning

**Code:** 10CV843

**Sem:** VIII

**Branch:** CIVIL

1. Explain in detail the various factors governing trip generation.

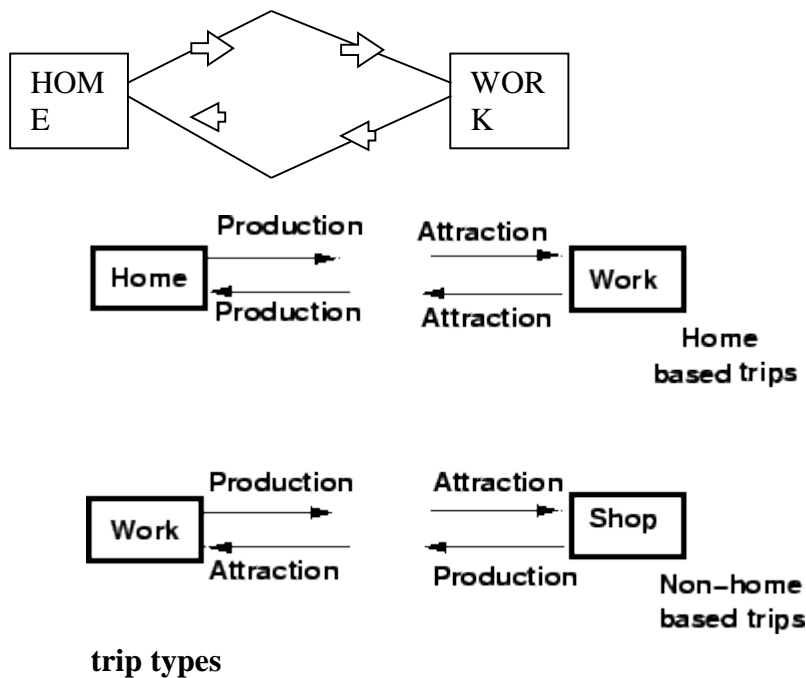
A number of factors govern the trip generation rates. These are discussed below:

1. **Income:** Obviously, family income which represents its ability to pay for a journey affects the number of trips generated by a household. A general trend is that the higher the income the higher is the trip generation rate.
2. **Car ownership:** A car represents easy mobility, and hence a car-owning household will generate more trips than a non- car-owning household. By the same reasoning, the more cars there are in a household, the more the number of trips generated. Of course, number of cars owned is itself related to the income of the family, which has been listed earlier as a factor.
3. **Family size and composition:** The bigger the family, the more trips there are likely to be generated. Apart from the size, the composition of the family itself is important. For instance, if both the husband and wife are employed, the trips generated will be more than when only the husband is employed. If there are many school-going children, the number of school-purpose trips will be large. If some of the children are grown up and are employed, the number of work-purpose trips will increase. The age structure of the family also governs the trip rates. Old persons are not expected to generate as many trips as younger ones. The occupation of the family is also known to influence the travel pattern.
4. **Land use characteristics:**  
Different land uses produce different trip rates. For eg- residential area with high density of dwellings produces more trips than low density dwellings. Also low density areas may represent dwellings of the affluent society, which may produce a large number of private car trips. Hence the rateable value of the dwelling and the type of the dwelling units also affect the trip generation rates. It is an important assumption in UTP that the amount of travel is dependent on land-use.
5. **Distance**  
Distance of zone from the town centre- determines the amount of travel people might like to make to the town centre. Farther the town centre, lesser the number of trips.
6. **Accessibility**  
Accessibility to a public transport system and its efficiency determines the desire of persons to make trips. Easily accessible and efficient public transport system generates more trips.
7. **Other factors**

Other factors like Employment opportunities, Office Space, Commercial Space, Number Of Employees, Type Of Employment (E.G., Government, Retail, Industrial) , Sales figure in the shops also determine the trip attraction rates.

2. (a) Write short notes on home-based and non-home based trips.

Considering a trip from home to work and return trip from work to home. Both these trips are home based, because one end of the trips is home. Both these trips are considered to have been generated at the home zone and attracted to the work zone. Thus have two work purpose trip ends generations in the home zone and two work purpose attractions in the work zone.



Considering another example of the trip from the place of work to shop and return to the place of work, as it is usual during the lunch recess. Both these trips are non-home based, because neither end of the trip is the home of the person making the trip. Both these trips are considered to have been generated at the work zone and attracted to the shop zone. Thus have two shopping purpose trip end generation (production) in the work zone and two shopping purpose attraction in the shopping zone. By the above definition, the total number of trip generations in any area should be equal to the total number of attractions.

(b) Explain the inventory of land-use and economic activities.

### Inventory of Land Use and Economic Activities

#### Inventory of land use:

Since travel characteristics are closely related to the land-use pattern, it is of utmost importance that an accurate inventory of land-use be prepared. The zones are classified into land use activity such as residential, industrial, commercial, recreational, open space and so on. For this purpose, the Town and Country Planning authorities need to be consulted. If any master plan has been prepared for the survey area, the same should

be given due consideration. Aerial photography has also been used as a source of land-use data.

**Inventory of economic activities:**

Data on economic activities should be collected to include the following:

1. Population of the survey area and the various zones
2. Age, sex and composition of the family
3. Employment Statistics
4. Housing Statistics
5. Income
6. Vehicle ownership

Some of the data pertaining to economic activities will be already available from periodic census. A careful analysis of the census data will indicate the gaps that need to be filled in by home-interview surveys or some other means. The limitations of the census data should be clearly recognised before they are put to use.

The population data helps in the estimation of the future trip-making behaviour. Population maps indicating the density, school enrolment, institutional population and sociological factors will facilitate presentation of results and a better understanding of the travel pattern.

3. Explain the difficulties in transport planning for small and medium cities.

Small and medium-sized communities face a variety of transportation planning challenges around the country. Four issues that nearly all small and medium-sized communities share are

- Lack of resources to meet planning requirements;
- Education for staff and stakeholders;
- Communications and information overload; and
- Technology, both in-house and applications.

4. (a) Write short notes on “Trip purpose”.

The trip purpose is classified based on the following

- Homebased (HB)
  - Work (HBW)
  - School (HBS)
  - Shopping (HBSH)
  - Social and recreation (HBR)
  - Other (HBO)
- Non-homebased (NHB)→not classified into categories

It is important because travel behavior of trip-makers depends on trip purpose.

- Work trips
  - regular
  - Often during peak periods
  - Usually same origin/destination
- School trips
  - Regular
  - Same origin/destination
- Shopping recreational
  - Highly variable by origin and destination, number, and time of day

(b) Write short notes on “Expansion Factor”. Give two examples.

**Expansion of Data from Samples**

In order to derive the travel characteristics of the whole population from the data derived from sampling, certain expansion factors have to be used. For the home-interview surveys, the expansion factor is calculated on a zonal basis as follows:

Expansion factor

$$= \frac{A - \left(C + \frac{C}{B} * D\right) \frac{A}{B}}{B - C - D}$$

- Where, A = Total number of addresses in the original list.
- B = Total number of addresses selected as original sample.
- C = Number of sample addresses that are ineligible.
- D = Number of sample addresses where no response is obtained.

5. Explain the method of conducting “Home interview Survey”.

**Home-Interview Surveys:**

Home-Interview survey is one of the most reliable type of surveys for collection of origin and destination data.

The survey is essentially intended to yield data on the travel pattern of the residents of the household and the general characteristics of the house-hold influencing trip-making. The information on travel pattern includes number of trips made, their origin and destination, purpose of trip, 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, race, vehicle ownership, number of drivers, family income and so on. Based on these data it is possible to relate the amount of travel to household and zonal characteristics and develop equations for trip generation rates.

It is impractical and unnecessary to interview all the residents of the study area. Since travel patterns tend to be uniform in a particular zone, it is sufficient if a sampling procedure is employed. The size of the sample is usually determined on the basis of the population of the study area.

**B.P.R.(Bureau of Public Roads) standards for Sampling Size for Home Interview Survey**

Population of Study Area	Sample Size
Under 50,000	1 in 5 households
50,000 – 150,000	1 in 8 households
150,000 – 300,000	1 in 10 households
300,000 – 500,000	1 in 15 households
500,000 – 1,000,000	1 in 20 households
Over 1,000,000	1 in 25 households

The above standards are perhaps too costly to practice. In any case, the sample size should not be less than given in table

**Minimum Sampling Size for Home Interview Survey**

Population of Study Area	Minimum sample size
Under 50,000	1 in 10 households
50,000 to 150,000	1 in 20 households
150,000 to 300,000	1 in 35 households

300,000 to 500,000	1 in 50 households
500,000 to 1,000,000	1 in 70 households
Over 1,000,000	1 in 100 households

A number of techniques are available for the home-interview survey. The full-interview technique involves interviewing as many members of the household as possible and directly recording all the information. In the home questionnaire technique, the interviewer collects only details of the household characteristics, leaving forms for household residents to complete in regard to travel information. The completed forms are collected by the interviewer after a day or two.

The information to be collected from the home-interview survey can broadly be classified under two groups: household information and journey data. The household information contains information such as address, size of household, age and sex structure of household, earning members, occupation, place of work, number of motor vehicles owned, and household income and so on.

The journey data contains information on all journeys made during the previous 24 hour period, including the origin and destination of journeys, purpose of trip, mode of travel etc. The survey forms are generally standardised for this purpose and the questions are structured carefully to avoid ambiguity. The usual practice is to have the household information in the front of the form and the trip information on the back of the form. The form should be designed so that the data can be easily coded.

6. Explain the method of conducting “Road Side interview Survey”.

**Roadside Interview Survey:**

Roadside interview survey is one of the methods of carrying out a screen-line or cordon survey. The road side interview survey can be done either by directly interviewing drivers of the vehicles at selected survey points or by issuing prepaid post cards containing the questionnaire to all or sample of the drivers.

The survey points are selected along the junction of the cordon-line with the roads. The cordons may be in the form of circular rings, radial lines or rectangular grids. For small towns (population less than 5000), single circular cordon at the periphery of the town should suffice. The internal travel being light, the external cordon survey in that case will give the origin-destination data. In the case of medium sized cities, say with a population in the range 5,000 to 75,000 two cordon lines are necessary, the external cordon at the urban development and the internal cordon at the limits of the central business district. Road side interviews at the intersection of roads with these two cordon lines should be able to fairly assess the patterns of travel in such cities. For large cities, the cordon-lines and screen lines may be a population in the range 5,000 to 75,000 two cordon lines are necessary, the external cordon at edge of urban development and the internal cordon at the limits of central business districts.