

Iqra National University, Peshawar

Department of Civil Engineering

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Course title: Transportation Planning and Management

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Q: 1 Answer

Planning

An activity or process that examines the potential of future actions to guide a situation toward a desired direction to meet the mobility needs of the population and to provide enhanced economic development opportunities.

Studies carried out in transportation planning strategies

There are four types of studies that carried out in planning strategies

1. Origin and Destination studies:

It shows the pattern and nature of daily trips made by the resident. Its main purpose is to plan the transportation in urban city especially the types of land use road, traffic network and public transportation system.

It determine the traffic flow .it also determine whether the existing road system is adequate or not. It also determines the suitable position to bridge or new transportation facility to be constructed. It is used to build a transportation models to make sure the transportation planning will be easier and also make a prediction about the pattern in the future.

(2) Traffic volume studies:

It is used to collect data on the number of vehicles and pedestrians that pass a point during a specified time period.

It is used to know whether the existing road can accommodate the vehicles that using a road. It ensures the smooth movement of vehicles and traffic safety. It is used to forecast traffic volumes study of traffic accidents and analysis of cost benefit for highway project.

(3) Travel time and delay studies:

It determines the amount of time required to travel from one point to another on a given route. Information may also be collect on the location, duration, and causes of delays.

It determines the efficiency of a route with respect to its ability to carry traffic performance of economic studies in the evaluation of traffic operation alternatives that reduce time travel. It also used to evaluate the change in efficiency and level of service with time.

(4) Parking studies:

The need of parking spaces is usually very great in area where land uses including business, residential and economical activities.

It is used for providing adequate parking space to meet the demand for parking. It is also used to know whether it is adequate parking or not.

Assumption made for transportation planning:

The initial input data to the urban planning policies including transit-oriented development, residential population, employed population and student population by income level are estimated by zone. These data are input to the trip generation and distribution models as road traffic and public transport are closely related these cross relationships are taken in urban planning policies.

Limitation in transportation planning:

- (1) Integrated land use and transportation model: one of the major drawbacks is the absence of any feedback from transportation models on land uses.
- (2) Input data issues: census data that frequently doesn't have sufficient data for developing and calibrating models of greater complexity requires for adequate modeling.
- (3) Environmental assessment: current models have limited capabilities for environmental impact assessment for air quality, noise, vibration, and cultural heritage etc.
- (4) Output data issues: this relates to inadequate plan evaluation criteria.
- (5) Mixed use benefits not considered.

Q: 2 Answer

Activities exercised in planning for a four step conventional transportation modeling:-

Four step conventional transportation modeling is;

1. **Trip Generation:** decision to travel for a specific purpose (eat lunch etc)
2. **Trip Distribution:** choice of destination (a particular restaurant?)
3. **Mode choice:** choice of travel mode (by bike/ by car/ by public transport)
4. **Network Assignment:** choice of route or path

Some general activities are carried out for conventional modeling like;

- a. Clearly define the area under consideration. It may be Country, Regional, Metropolitan area, or local.
- b. Divide this area under consideration into study zones , travel analysis zone

Now, for **Trip Generation** in travel analysis zones, following procedure is adopted.

1. Determine number of trips generated/produced in each zone.
2. Determine number of trips attracted by each zone
3. Number of trips that begin or End in travel analysis zone
4. Forecast number of trips produced or attracted by travel analysis zone for a typical day.
5. Number of trips is a function of these factors

a. Land-Use pattern, development in area:

- i. High and low density compared
- ii. Area allocated for shopping, manufacturing, services, wholesale, educational, recreational etc
- iii. Trips can be represented/person/acre/DU

B. Socio-economic characteristics of trip making population/home

- i. Population average income
- ii. Vehicle ownership
- iii. Family size

Generally, for Attraction, number and type of retail facilities, No. of employees and land use in each zone is determined while for Production, Car ownership, Income, population is determined.

For **Trip Distribution**, following activities are exercised

1. Prediction of trips i.e. where trips go from each travel analysis zone
2. Determine trips between pairs of zones
3. Distribution is a function of attractiveness of travel analysis zone i.e. Size of TAZ and Distance to Mall like if two malls are similar, travelers will tend to go to closest one

For **MODE choice** activities are;

Mode choice determines No. of trips between zones made by auto or other mode, usually transit

Activities are carried out to determine;

1. Availability of parking
2. Income
3. Availability of transit
4. Auto ownership
5. Type of trip
6. Stage in life
7. Cost
8. Safety
9. Time
10. Image

For **Trip Assignment** activities are;

To determine

1. Trip maker's choice of path between origin and destination
2. Path: streets selected
3. Transit: usually set by route
4. Estimate of traffic volumes on each roadway in the network

The intersections (called nodes) on the network map are identified, so that the sections between them (called links) can be identified. After the links are identified by nodes, the length, type of facility, location in the area, number of lanes, speed, and travel time are identified for each link. If transit is available, additional information, which identifies fares, headways (time between vehicles), and route descriptions, is included on a separate network

Q:3 Solution

| Land Use Category | | Area(ha) | | | | | | |
|----------------------|----------------|-----------------------|------------------------|-------------------------|-----------------------|-------------------------|------------------------|----------------------|
| | | Zone1 | Zone2 | zone3 | zone4 | zone5 | Zone6 | Zone7 |
| Residential | | 7740*128 = 990720 | 24900*108 = 2689200 | 17064*93 =1586952 | 40204*75 = 3015300 | 29317*55 =1612435 | 576416*45= 25938720 | 53445*38= 2030910 |
| Commer cial | Retai l | 6972*850 = 5926200 | 5688*423= 2406024 | 26220*563 = 14761860 | 6172*670= 4135240 | 126091*463= 58380133 | 15270*485= 7405950 | 1290*380= 490200 |
| | Whol e-sale | 14940*13 = 2016900 | 10744*90= 966960 | 20976*115 = 2412240 | 7715*73= 563195 | 90065*60= 5403900 | 7635*48=3664 80 | 1935*40= 77400 |
| | servi ces | 5976*445 =2659320 | 2528*258= 652224 | 1748*505= 882740 | 6172*385= 2376220 | 162117*365= 59172705 | 10180*338= 3440840 | 1720*328= 564160 |
| Manufacturing | | 1290*353 =455370 | 4980*183= 911340 | 1264*83= 104912 | 1748*73= 127604 | 4629*55= 254595 | 36026*53= 1909378 | 12725*35= 445375 |
| Transportation | | 1935*73 =141255 | 8964*25= 224100 | 5688*35= 199080 | 5244*25= 131100 | 4629*13=60177 | 90065*18= 1621170 | 10180*15= 152700 |
| Public Buildings | | 2580*595 =1535100 | 9960*265= 2639400 | 4424*375= 1659000 | 6992*245= 1713040 | 3086*90= 277740 | 252182*48= 12104736 | 30540*10= 305400 |
| Public open space | | 3010*5 =15050 | 22908*3 =68724 | 15800*10 = 158000 | 71668*5 = 358340 | 92580*5 = 462900 | 468338*3 = 1405014 | 114525*3= 343575 |

Calculations:

Using table-2 as reference;

Zone 1:

Total trips generated=13739915

Productions=990720

Attractions=12749195

Zone 2:

Total trips generated=10557972

Productions=2689200

Attractions=7868772

Zone 3:

Total trips generated=21764784

Productions=1586952

Attractions=20177832

Zone 4:

Total trips generated=12420039

Productions=3015300

Attractions=9404739

Zone 5:

Total trips generated= 125624585

Productions=1612435

Attractions= 124012150

Zone 6:

Total trips generated= 54192288

Productions= 25938720

Attractions= 28253568

Zone 7:

Total trips generated= 4409720

Productions= 2030910

Attractions=2378810

Grand Total trips generated in all 7-zones=242709303

Grand Total productions in all 7-zones=37864237

Grand Total attractions in all 7-zones=204845066

Comments:

Trip rate is estimated on characteristics of the trip generations within the zone.

Production rates are determined using the characteristics of the land-use and Attraction rates using the characteristics of the non-residential land-uses.
