Transportation Planning & Managment

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QUESTION NO. 1

PLANNING:

- Planning an activity or process that examines the potential of future actions to guide a situation or system toward a desired direction" it exists in present but is geared towards the future Goals:
- In Transportation it is the process of defining future goal, policies, investment and design to prepare for future needs to move people and goods to their destinations. Transportation planning involve different agencies for successful transportation planning like legislative activities and transport policies etc.

SCOPE OF TRANSPORTATION PLANNING:

- Basic aim of the transport planner are efficient movement of people and goods. It also covers different aspects of life which involves economics development, health of public, quality of life along supporting long term ecological balance.
- Intensive and long term planning are made twenty year before construction.

FUNDAMENTAL ASSUMPTIONS IN TRANSPORTATION PLANNING:

- Transport planning follow model of defining goals and objectives, identifying problems and generating alternatives and developing plane. Like with rising demand for transportation infrastructure, but limited space to build more.
- Travel patterns are tangible, stable and predictable.
- Movement demands are directly related to the distribution, and intensity of land use, which is capable of being accurately determined for some future date.

ADDITIONAL ASSUMPTIONS:

- Decisive relationship exists between all modes of transport and that the future role of a particular mode cannot be determined without giving consideration to all other modes.
- The transportation system influences the development of an area, as well as serving that area.
- Area of continuous urbanization require a region-wide consideration of transport situation.
- The transportation study is an integral part of the overall planning process, and cannot adequately be considered in isolation.
- The planning process is continuous, and require continuous updating, validating and amendment.

SHORT & MEDIUM TERM TRANSPORTATION PLANNING (S&M):

- Making existing system efficient.
- Short range transportation needs.
- To increase efficiency:
- Efficient use of existing road space.
- Reduce vehicle use in congested area.

- Improve transit service.
- Improve internal management service.
- Planning with short range objectives based upon studies with limited scope and local orientation.
- Evaluation Criteria can be accidents, travel time etc.

STRATEGIC TRANSPORTATION PLANNING:

- Capital intensive improvement
- Major S&M synonymous to small strategic plan
- Recycling of S&M during long time possible
- New facilities.
- Major changes in existing facilities.
- Long range policy actions.
- Future land development policies, adding highway link, bus transit system.
- Travel demand forecasting play an important role

TRAFFIC VOLUME COUNTS:

- Number of vehicles passing a point.
- May be comprehensive counts covering the entire main road system in an area.
- Counts on all roads intersecting a cordon line which encircles a particular area.
- Counts on screen line(s) which divide a city into two or more parts.
- Counts at specific points.
- The information sought
- Traffic volume and the direction.
- Volume of turning traffic at intersections.
- Hourly, daily, and seasonal variations of traffic
- Proportion of cars, trucks and buses.

ORIGIN & DESTINATION SURVEYS:

- Traffic counts give the amount of traffic passing specified points on the road but they do not indicate where traffic desires to travel, i.e. Its origin and its destination.
- The survey is primarily for transportation planning, particularly the location, design, and programming of new or improved highways, public transport, and parking facilities.
- An origin and destination survey may range from a relatively simple study to determine the amount of traffic that would by-pass a town to a comprehensive transportation survey for planning and design of the transportation system in a large metropolitan area.

Methods include:

- Recording registration numbers
- Handing postcards to drivers
- Roadside interviews
- Tag-on-vehicle surveys

- Home interview surveys

SPEED STUDIES:

- Using a radar meter, which gives a direct reading of speed.
- Taking photographs of a section of road at a predetermined time interval and measuring the distance
- Results may be presented in tables, graphs and diagrams.
- These may include
- Speed distribution and cumulative frequency distribution curves.
- The mean speed (TMS & SMS)
- The 85^{th} percentile Speed

TRAVEL TIME AND DELAY STUDIES:

- Travel time measures the average journey time and journey speed on sections
- Used in traffic assignment
- Quality of the traffic route
- Before and after effect of traffic engineering techniques

Delay study

- By analyzing the delays, the location and cause of the congestion can be identified and remedied.

PARKING STUDIES:

Carried out to

- Assist in cordon counts
- the number and location of existing parking spaces, both kerbside and off-street
- existing parking practices, including usage of available spaces, parking duration, illegal parking
- the need to impose or vary parking time limits or to install parking meters
- The adequacy of existing enforcement measures.
- For larger cities, a comprehensive parking demand study is required
- It includes the determination of parking usage, parking habits as well as the origin, destination and purpose of trip of drivers parking in the area.
- It is used primarily in determining the demand for parking space by evaluating the individual parker's desires.
- The actual survey is carried out in the form of questionnaire cards or direct interviews.

OTHER TRAFFIC STUDIES:

- Turning movement counts
- Vehicle delay studies
- Saturation flow rate
- Queue lengths
- Gap study
- Vehicle occupancy study
- Commercial vehicle survey
- Trip generation study

Recommendation:

We should

- Improve human health, safety and economy.
- Use technology and collect data of all type of hazard transport system.
- Implement the plans with in less time.
- Consider the mental level of the peoples in planning process.

QUESTION NO. 2

BASIC ACTIVITIES EXERCISED IN TRANSPORTATION PLANNING

(1) Transportation survey, data collection and analysis.
(2) Use of transportation model.
(3) Future land use forecasts and alternative policy strategies.
(4) Policy evaluation
(5) Collect travel information
(6) Identify existing system performance levels
(7) Estimate future travel demand
(8) Forecast future system performance levels
(9) Identify different alternative solutions

STUDY AREA:

(1) Clearly define the area under consideration May be country, May be regional, Metropolitan area, Overall impact to major street/highway network, Local.
(2) Divide study area into study zones, TAZs (Travel Analysis Zones) ,Homogenous urban activities (generate same types of trips), Residential , Commercial , Industrial.

TRAVEL ANALYSIS ZONES-TAZs

(1) May be as small as one city block or as large as 10 sq. miles
(2) Natural boundaries - major roads, rivers, airport boundaries
(3) Sized so only 10-15% of trips are intrazonal
(4) Links: sections of roadway (or railway)
(5) Nodes: intersection
(6) Centroids: center of TAZs
(7) Centroid connectors: centroid to roadway network where trips load onto the network

FOUR STEPS OF CONVENTIONAL TRANSPORTATION MODELING

- **Trip Generation**

The first stage of model building process is that of trip generation. Trips are made for a variety of purposes and for various land uses. For convenience, trips are often split into two groups

(1) Home based trips (2) Non home based trips

(1) Calculate number of trips generated/ produced in each zone
(2) Calculate number of trips attracted to each zone
(3) Number of trips that begin from or end in each TAZ
(4) Trips for a “typical” day
(5) Trips are produced or attracted

3 measurable variables influencing trip production and attraction

(1)Density of land use
(2)Social and socioeconomic characters of users
(3)Location

Trip purpose

(1) Zonal trip making estimated separately by trip purpose
(2) School trips
(3) Work trips
(4) Shopping trips
(5) Social/ Recreational trips

- **Trip Distribution**

  This is the next stage in the transportation model, it involves on analysis of trips between zones. Lane (1971) states the function of this stage of the model:

  It is the function of trip distribution to calculate the number of trips between one zone and another, given the previously determined numbers of trip ends in each zone together with further information on the transport facilities available between these zones.

  For example, given that in zone I, g_i trip ends are generated and that in zone j, a_i trip ends are attracted, it is the purpose of the trip distribution model to determine the number of trips (t_{ij}) which would go from zone i to zone j. That is, the trip distribution model calculates the proportion of trip ends generated in zone i which would travel between i and j and so take up a certain proportion of the available attractions in zone j.

  Such that

(1) Predicts where trips go from each TAZ
(2) Determines trips between pairs of zones
    - T_{ij}*:* trips from TAZ *i* going to TAZ *j*
(3) Function of attractiveness of TAZ *j*
    - Size of TAZ *j*
    - Distance to TAZ *j*

      If 2 malls are similar (in the same trip purpose), travelers will tend to go to closest
(4) Different methods but gravity model is most popular

- **Mode Choice**

  This term is used by transport planners to describe the phase where the choice of travel mode is incorporated into the model. The positioning of this stage is neither fixed nor singularly definable since elements of model split are part of the other stages. Its position within the transportation model differs between studies. It is either used at the trip generation stage by stratifying the total trips or at the assignment stage of the model. The main purpose of the model-split stage is to determine the trip shares of public, as against private, transport. Choice of travel mode (by bike/ by car/ by public transport). In most situations, a traveler has a choice of modes

  - Transit, walk, bike, carpool, motorcycle, drive alone

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

- **Network Assignment**

The fourth stage of the modelling process is that of traffic assignment, its aim being to stimulate route choice through a defined transport network. Traffic assignment may be considered in two parts. Choice of route or path.

(1) Attraction
(1) Number and types of retail facilities
(2) Number of employees
(3) Land use

(2) Production
(1) Car ownership
(2) Income
(3) Population

According to different zonal production and attractions attribute. We can take question 3 as a reference.

In question 3 we have given different zonal areas and we have calculated their total trip generation, trip production, trip attraction.
After calculation we came to know that maximum trip were generated to sawabi zone 5. Maximum trip production to Abbottabad zone 6. Maximum trip attraction to sawabi zone 5.

Zone 5:

Maximum trips generated= 125624585

Maximum trips Attractions= 124012150

Zone 6:

Maximum trips Productions= 25938720

Zone 7:

Minimum trip Attractions=2378810

Zone 1:

Minimum trip Productions=990720

Total generated trips of zone 5 is more then the remaining zone. So maximum trips are to sawabi and total generated trips of zone 2 is less then the remaining zone. So minimum trips are to Charsadda.

1) **Trip generation** of zone 5 > zone 6 > zone 7 > zone 3 > zone 1 > zone 4 > zone 2.

2) **Trip production** of zone 6 (Abbottabad) is more. Zone 6 > zone 4 > zone 2 > zone 7 > zone 5 > zone 3 > zone 1.

3) **Trip attraction** of zone 5 (sawabi) is more. Zone 5 > zone 6 > zone 3 > zone 1 > zone 4 > zone 2 > zone 7.

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
Commercial	Retail	6972*850 = 5926200	5688*423= 2406024	26220*563 = 14761860	6172*670= 4135240	126091*463= 58380133	15270*485= 7405950	1290*380= 490200
	Whole-sale	14940*13 = 2016900	10744*90= 966960	20976*115 = 2412240	7715*73= 563195	90065*60= 5403900	7635*48=366480	1935*40= 77400
	services	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;

- We have area given in question of each zone.

By using table 2 as a reference such that multiply area of zones with respective data given in table as above

- 7740*128 = 990720 (7740 from question and 128 from table)

- By this way we have calculated trip generation of each zone given above.

Now to calculate trip production and trip attraction we came to know that

- Trip production can be define as a trip end connected with a residential land use in a zone.
- Trip attraction can be define as a trip end connected to a nonresidential land use in a zone.

  According to the above definition we can calculate trip production and trip attraction give below

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

COMMENT:

According to the given zonal date I came to know that

Total generated trips of zone 5 is more then the remaining zone. So maximum trips are to sawabi and total generated trips of zone 2 is less then the remaining zone. So minimum trips are to Charsadda.

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