

TRANSPORTATION PLANNING AND MANAGEMENT

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QUESTION NO. 1

PLANNING:

- Planning is a activity that examines the potential of future actions to guide a situation or system toward a desired direction” Occurs in present but is oriented towards the future Goals:
- In Transportation it relates the operation of the highway system, geometry of road and traffic operation facilities to achieve the desired goals: like
- To meet the mobility needs of the population
- To provide enhanced economic development opportunities

SCOPE OF TRANSPORTATION PLANNING:

- All man-made projects should start with a plan.
- The more significant the project, the more intensive and long term the planning
- For large transportation projects, planning starts 20 years before construction.

FUNDAMENTAL ASSUMPTIONS IN TRANSPORTATION PLANNING:

- 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 85th 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.

QUESTION NO. 2

BASIC ACTIVITIES IN TRANSPORTATION PLANNING:

- Collect travel information.
 - Identify existing system performance levels.
 - Estimate future travel demand.
 - Forecast future system performance levels.
 - Identify different alternative solutions.
- Main focus: meet existing and forecast travel demand.

STUDY AREA:

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

TRAVEL ANALYSIS ZONES:

- May be as small as one city block or as large as 10 sq. miles.
- Natural boundaries i-e major roads, rivers, airport boundaries.
- Sized so only 10-15% of trips are intrazonal.
- Links: sections of roadway (or railway).
- Nodes: intersection.
- Centroids: center of travel analysis zone.
- Centroid connectors: centroid to roadway network where trips load onto the network.

FOUR STEPS OF CONVENTIONAL TRANSPORTATION MODELING:

➤ **Trip Generation**

Decision to travel for a specific purpose (eat lunch etc.)

➤ **Trip Distribution**

Choice of destination (a particular restaurant, the nearest restaurant)

➤ **Mode Choice**

Choice of travel mode (bike/ by car/ by public transport)

➤ **Network Assignment**

Choice of route or path

TRIP GENERATION:

- Calculate number of trips generated/ produced in each zone.
- Calculate number of trips attracted to each zone.
- Number of trips that begin from or end in each travel analysis zone,
- Trips for a typical day.
- Trips are produced or attracted.
- number of trips is a function of:
 - TAZs land use activities
 - Socioeconomic characteristics of TAZ
 - Population
- **3 measurable variables influencing trip production and attraction**
 - Density of land use
 - Social and socioeconomic characters of users
 - Location
- **Trip purpose**
 - Zonal trip making estimated separately by trip purpose
 - School trips
 - Work trips
 - Shopping trips
 - Social/ Recreational trips
- **Travel behavior depends on trip purpose**
 - School & work – regular (time of day)
 - Recreational & shopping - highly irregular
 - Forecast # of trips that produced or attracted by each TAZ for a “typical” day

- Forecast – function of other variables
- **Attraction**
 - Number and types of retail facilities
 - Number of employees
 - Land use
- **Production**
 - Car ownership
 - Income
 - Population (employment characteristics)

TRIP PURPOSE:

- Trips are estimated by purpose (categories)
- Travel behavior of trip-makers depends somewhat 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.

HOUSEHOLD BASES:

- Trips based on “households” rather than individual.
- Individual too complex.
- Theory assumes households with similar characteristics have similar trip making characteristics.
- However Concept of what constitutes a “household”.
 - Changed dramatically outside Pakistan
 - What in Pakistan?

TRIP DISTRIBUTION:

- Predicts where trips go from each TAZ
- Determines trips between pairs of zones
 - trips from TAZ i going to TAZ j
- 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*
- Different methods but gravity model is most popular.

MODE CHOICE/SPLIT:

- In most situations, a traveler has a choice of modes.
 - Transit, walk, bike, carpool, motorcycle, drive alone.
- Mode choice determines # of trips between zones made by auto or other mode, usually transit.

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.