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15/ENG03/018

When a transportation Engineer is considering traffic flows, there are considerations such as principles of demand analysis, demand modelling, land use models, trip generation, trip distributions, modal split, and traffic assignment. Discuss these considerations and their effects when forecasting future traffic flows.

TRIP GENERATION

Trip generation from and attraction to specific origin-destination (or production attraction) traffic zones in which the study area is partitioned are based on the socioeconomic, demographic and land use characteristics of each zone. Most of the trip generation studies employ econometric and, at a lesser extent, time series analysis techniques. The econometric models use linear or log-linear regression analysis to estimate the relationship between transport demand and its determinants.

The factors of trip generation in the traditional approach are typically limited to zone or household attributes, and do not include attributes of travel modes (e.g., insensitivity to transit accessibility.

• Trip generation is usually performed using linear regression, and this statistics technique is primarily considered as a “descriptive” and not a “predictive” technique, thus limiting the capabilities of this forecasting step.

• A number of listed trip purposes is limited. Trip purposes are limited to only six to eight trips purposes causing for example all shopping trips to be treated as same (e.g., going to a grocery store, going to a mall, etc.).

• The trip distribution phase is performed separately for each origin zone, thus limiting the holistic perspective on transportation demand.

TRIP DISTRIBUTION

Trip distribution refers to the allocation of the trip demand among traffic origindestination pairs, according to the distance or some other trip cost (impedance) function designating the (time, monetary or generalised) cost between zone pairs. The result of this step is the construction of a complete origin-destination (O-D) table. A usual approach to trip distribution, using gravity models, although easy to understand and apply, suffers from serious drawbacks and limitations. One of the major issues is the assumption that average travel time would remain constant in the future as well as through the day (i.e. no consideration for peak hour congestion).

• Destination choice problem requires that spatial interaction models have a predefined set of alternative destinations to choose from. The behavioral dilemma results from the lack of knowledge of what the choice set actually is, or how is it different across individual travelers, and their different originating locations and trip purposes. The usual approach is to allow the access to all traffic zones (or all zones chosen by survey participants) to be in the choice set.

MODAL SPLIT

One of the great drawbacks of modal split step is the often focus on auto driver, auto passenger, or transit passenger. This limited focus neglects other travel modes that can have a significant share (e.g., walking or biking). Not including non-motorized travel modes neglects the fact that walking frequently has larger mode share than transit, in medium-sized urban regions [1]. The reasons for this situation could be found in the fact that, in practice, the main purpose of the model is to be used as a tool for capacity analysis of road network, analysis of the network development scenarios, or analysis of the public transport system, etc.

Modal split computations are made using empirical evidence or socioeconomic data. This frequently oversimplifies the decision making of travellers, relating the choice of mode to be only the function of household income, without consideration of other factors. Even if the model considers factors such as travel time and cost characteristics, there is still a range of unconsidered factors (e.g., security, attractiveness, etc.). Furthermore, there is a general neglect for access time and walkability in transit utility calculation.

TRAFFIC ASSIGNMENT

The traffic assignment process maps the predicted O-D trip demand per mode into the transport network paths and constituent links, based on the prevailing supply conditions. The solution of the capacity-restrained traffic assignment problem is equivalent with that of Nash equilibrium in game theory. Specifically, according to the first principle of Wardrop (1952), an equilibrium state is reached in the transport network when all users choose paths so that experience the least travel cost and no bilateral change of route can be further made to reduce path travel cost. Traditional traffic assignment models primarily represent urban networks with major streets and highways, without consideration for pedestrian areas or bike paths. Similar as in the case of modal split, focus is on modelling of motorized travel modes. The reason might be because models are usually used for analysis of investment impacts in the network or system with high investment costs.