Systems Operations

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Service operators of necessity focus on the present and the immediate future. For an operations manager, analysis of travel demand is made at the point of purchase and is not an abstract mathematical formula. Rather, transit and paratransit services are perishable commodities. If the resources expended to provide service are not consumed by riders, they are lost to the community. Transit is analogous to its major competitor, the automobile, and should not be viewed as equivalent to the highway.

Demand analysis methods, with few exceptions, predict transit travel by using models derived from the highway planning practice.

Highway and transit planning were done separately until the 1960s. However, in 1962 the Federal-Aid Highway Act gave birth to the 3C process of comprehensive, continuing, and coordinated planning of transportation. This mandate took effect July 1, 1965, with the hope that it would stimulate alternative travel modes. Transit was included in the highway planning process as a legitimate component of the network. Transit planning had been a private business activity, but with the decline of the private operator, the emergence of government-owned systems, and the infusion of federal planning dollars, it became a public-sector planning problem. Conventional wisdom suggested that the highway engineering discipline was most capable of leading the effort.

Traditional transportation planning is based on aggregate sequential demand models that deal with trip generation, trip distribution, modal split, and traffic assignments. The process forecasts the number of trips being produced or attracted to a particular location; the trips are then allocated to travel zone by mode and the logical travel route is predicted, thus providing a picture of a highway network.

The Urban Transportation Planning System (UTPS) and Integrated Transit Network (INET) provide the state of the art in demand forecasting with this method.

The aggregate direct demand approach operates with the same elements of travel demand but accomplishes the estimation in a different manner. This procedure allows for testing modal variables but still deals with trip generation, distribution, and modal split.

Disaggregate behavior models are the third type of forecasting method. Based on the utility function, they therefore offer an approach compatible with the system operator's perspective since travel is predicted based on individual or household data. These models are frequently employed to explore the relationships between transportation policy and demand (1,2).

Predicting transit travel demand with these models has resulted in an overemphasis on capital investment and underemphasis on service design (3).

Transit demand analysis should be based on the fact that transit is a commodity, a product to be packaged, priced, and sold. If the service is neither efficient nor effective in meeting a demand, it will not be purchased by the consumer. The tools and techniques to be employed in travel analysis must be able to identify market demand rather than potential demand (4).

Techniques for analyzing transit demand must be compatible with a systems management planning process, provide operating planning information for the short term, and supply guidance for the strategic planning process in the long run. Unlike the highway demand analysis methods, which require large data-collection efforts over a long period of time, transit systems have the potential to compile a complete data set daily, which could allow adjustments based on a trend.

The difficulty is that the equipment and techniques for accomplishing this are usually beyond the resources of the average transit system. Therefore, the challenge is not only to develop techniques but to employ methods that are affordable and technically within the ability of the average system to implement. Moreover, at the operations level, the transit product is perishable, so time is also a factor.

In the future, transit services will be competing in a more open and deregulated environment, and travel analysis methods must recognize that there are numerous transit products, including taxis, vans, and regular transit vehicles, that have unique service characteristics and markets. The techniques must be able to discern the individual markets and subtle service design features. Adopting a market orientation offers the opportunity to judge how well, if at all, transit meets social goals (4).

A major requirement for advancing travel analysis is that monitoring and evaluation instruments to gauge the level of success in predicting travel needs must be incorporated into the techniques (5).

Operations managers require a market-oriented approach to travel demand that postures alternatives in terms of service variables. The techniques must dovetail with the management planning process. Further, the approach should be cost-effective to implement and include a follow-up evaluation procedure.

REFERENCES

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4. R.B. Woodruff and others. Market Opportunity Analysis for Short-Range Public Transportation Planning. NCHRP, Rept. 212, 1981.
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Research Needs

1. Identification of major forecasting and behavioral-analysis methods and sites where they have been used

2. Comparison of predicted with observed behavior or predicted network variables with observed network variables

3. Explanation of variations in predictive capabilities and recommendation of appropriate uses for each forecasting or analytical method

4. Suggestion of means of improvement of methodologies

5. Preparation of separate technical and nontechnical reports