Workshop 3

DEMAND FORECASTING FOR NEW OPTIONS AND TECHNOLOGY

OBJECTIVES

Identify, review, and evaluate current and proposed travel demand forecasting techniques and procedures for use in assessing new options and technology in urban transportation.

Recommend new and improved forecasting procedures that are responsive to requirements of using travel forecasts in assessing the options and technology.

Develop a recommended program of research that is responsive to the identified requirements.

OPTIONS

New options and technology include all innovative actions or projects, without regard to time required for implementation. The characteristics that distinguish these options from those of Workshops 1 and 2 are uncertainties in describing the new options and a lack of experience in observing traveler response to implementation of the new systems. In short, new options are those that are not yet in widespread use. Examples of hardware options are those that are flexible with respect to time, i.e., line-haul systems (such as moving sidewalks and conveyor belts, horizontal elevators, multiactivity pallet systems, and personal rapid transit systems); flexible with respect to space, i.e., distribution systems (such as charter bus service, group-riding in taxis, and demand-responsive transit); improved but not completely flexible (such as jitneys); and flexible with respect to time and space (such as public automobile systems, dual-mode systems, automatic highways, and communications). Examples of nonhardware options are free transit, flexible pricing policies, restructuring land use patterns, changing energy prices, and changing values with respect to polluting.

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Report

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The first section of this report of the discussions of Workshop 3 identifies options and major issues facing planners of new transportation systems. In the next 2 sections are given the information needs for planning and implementation of new systems. Conclusions and recommendations for research and implementation programs are given in the last section.

ISSUES AND OPTIONS

Workshop 3 accepted the example options and acknowledged that they include institutional as well as technological alternatives and that the time frame of implementation may be the same as that for options considered by Workshops 1 and 2.

In general, the issues discussed by Workshops 1 and 2 are also applicable to new options. This summary will be confined to those of special concern or unique to Workshop 3. It should be recognized at the outset that demand, as applied to new systems, means different things to each of the actors of interest: ridership to the planner, profitability to the operator, market to the manufacturer, and impacts (social, economic, or trade) to the government policy-maker.

An important set of issues pertains to supply-related uncertainties (cost, performance, unanticipated impacts). There was optimism regarding the use of parametric approaches for rough screening and in exploring sensitivity to demand-related costs, but there was considerable concern about availability of maintenance cost data in the absence of operating systems.

It was generally agreed that information needed for modeling is not readily available. Origin-destination survey data are of little value, and demonstrations, although potentially useful, have not been designed or monitored with the data needs of model builders in mind. Can a modeling-testing program be structured so that the modeler specifies the demonstration? How should demonstrations be designed? What data should be collected and when? Is an iterative process of model-demonstration refinement feasible?

New systems require special consideration with regard to forecasting latent demand, estimating the effect of interac-

tion with other modes, and comprehending transient effects (learning curves and "brand loyalty"). A major issue is concerned with transferability. To what extent can important new-system attributes be identified that are capable of being simulated on existing systems or by low-cost demonstrations?

Workshop 3 expressed a need for simple, responsive models, capable of interactive operation and structured to provide output in a form usable by policy-makers. The ability to operate in an iterative manner with experiments is desirable, and parametric capabilities are necessary. The use of models in sensitivity analysis was discussed, and questions of precision and cost were raised.

IMPACTS AND PREDICTIONS

Workshop 3 generally recognized that the process of urban transportation planning is no longer limited simply to the satisfaction of transportation needs. A large number of additional criteria have been and are being established by actors other than simply users of the transportation system in question. This trend impacts directly on the demand forecasting requirements, particularly those associated with implementation of new systems or with major departures from the standard operation of existing systems. To systematically identify and consider each of these actors, we considered 3 levels of interest groups (local, state, and national) as well as the manufacturing industry and then identified each of the impacted parties within those categories. The resulting list, which is given in Table 1, identifies many actors not generally considered decision-makers in the context of urban planning but who are in fact groups whose questions must now be answered. For each group, we identified more specifically the type of information required and a type of prediction or measurement that would assist in meeting that informational need.

Several general observations are in order regarding this list. First, the simple question of ridership, or link volumes, appears infrequently. It is understood that all transportation serves this need but that this is not sufficient. Of much greater interest are those predictions resulting from a disaggregated look at travel behavior: What specific user or nonuser groups are benefited or impacted? What specific land use changes result? How is the travel time for specific trips affected? How many jobs are created?

A casual inspection of this list suggests that few of the needs can be met by existing transportation planning tools. After more careful consideration, however, Workshop 3 concluded that many of the data and in fact many of the necessary tools are on hand if used judiciously and with appropriate minor modification. These observations are reflected in the conclusions and recommendations that follow.

CONCLUSIONS

1. Demand as applied to new systems includes dimensions not usually considered a part of the demand forecasting problem. There is a need not only to forecast ridership and local impacts but to consider and to attempt to quantify the extent to which a new system may find national acceptance. Such information is of obvious value to potential manufacturers for market forecasting purposes, but perhaps more important it is valuable to government policy-makers concerned with issues such as energy consumption, natural resource conservation, and capital funding planning.
2. There is a need for greatly improved information transfer from local users of new systems to higher level planning agencies and in turn for dissemination of such information to other potential users.
3. Existing disaggregate and behavioral methods of demand forecasting should be capable of producing useful results for new systems if an attempt is made to identify those attributes shared by existing and new systems and to use known responses to these attributes for calibration of models of new systems.

Table 1. Information needs and prediction characteristics.

Group	Information Needs	Prediction Characteristics (indicators)
Local		
Politicians	Financial considerations	Annual capital cost extimates, operating cost estimates, revenue (ridership), funding sources, funding ability
	Goal satisfaction (evaluation)	Transportation needs; community impacts including interest groups, economic viability, and environmental impacts; effective use of existing facilities; land use implications
	Other government interface	Relation to regional (or higher) plans, budgets, and the like
	Risk-confidence	Cost of "failure"; criterion of success or failure; ease of experimentation including financial, institutional, and technological flexibility and adaptability; lead time, staging, or other implementation problems
	Institutional factors	Labor union charter, legislation for new institutions, other transportation institutions or charters
	Awareness-differentiation of system availability	Attributes, taxonomy
Operators	Competitive impacts	Impact on competition, dependence on competition
	Operational requirements	Manpower, vehicle, and management needs; marketing information system; implication of new technology skill levels
	Financial considerations	Operating costs, risk with respect to reliability
	Institutional constraints	Labor input, productivity, regulatory constraints
Consumer[a]		Travel time, cost, convenience, comfort, safety, reliability, public image, perception
Resident[b]		Environmental intrusion, aesthetics, noise, nonuser safety, costs (taxes)
Developer	Land use implications	Land use changes, new large activity centers that can "design in" a new technology, land use controls
	Profit maximization	Increasing or decreasing property value
State		
Department of Transportation	Resource allocation	Geographical allocation of transportation, investment dollars, modal allocation
	Transferability	Use in other cities
Other	Financial requirements	Revenue alternatives
	Economic impacts	Employment
	Goals and priorities	Alternatives
Federal		
Department of Transportation	Funding requirements	National funding demand—capital intensive or noncapital intensive; system roles
	Transferability	Use in other cities and states, national potential benefit
	Development and implementation strategies	Research and development decisions, staging, and methodology; design of prototype development and demonstration projects, including site selection
	Technology assessment	Program decisions
	Distribution of funds	
Other	Resource requirements	Energy, raw materials, land
	Economic impacts	Employment, international trade, secondary effects
	National goals and priorities	Relationships and modification
Manufacturing	Profitability	Market forecasts, capital cost, staging alternatives, funding sources
	Risk assessment	Development funding, demonstrations

[a]Two types, including one who actually uses new system and one who uses competition that performs better or worse because of new system.
[b]One who is impacted by nontransportation characteristics of system.

4. A long-range program of fundamental research in travel behavior is necessary in order that emerging issues of response to alternatives to travel, land use interaction with transportation, and constrained supply situations can be properly dealt with.

RECOMMENDATIONS

1. Even though new systems present special problems of demand forecasting, there are 2 areas in which current methodology and practices can be applied: (a) use of existing simple models, calibrated with data from existing systems, to forecast a demand for new options on a small scale and (b) development of a system for immediate acquisition of appropriate data from existing and proposed demonstration projects.

2. Several projects can be implemented within 3 years: generation and dissemination of information regarding new system characteristics and applications; a program that addresses the unique requirement of demand forecasting for new systems to pro-

vide, on the national level, the economic, service, and resource implications of extensive implementation of new systems; a short-range applied research project aimed at the determination of attributes of existing and new systems and an experimental determination of user and nonuser perceptions of these attributes; and establishment of a product laboratory to assist in the implementation of this perceptual research.

3. Longer range and continuing basic research projects are also needed on travel behavior.

4. A large centralized time-sharing computer facility should be established to provide local planners with access not only to data files but also to a comprehensive software environment permitting the convenient building of models for specific purposes from an inventory of generalized models.

5. A system should be established for disseminating in a uniform way planning information to users at all levels.