

TRAVEL BEHAVIOR

OBJECTIVES

Identify the current extent of theoretical and empirical knowledge of travel behavior and the travel decision process.

Identify gaps in current knowledge and specify steps that may be taken to fill them.

Identify the means by which an improved understanding of travel behavior may be used in the formulation of improved travel demand forecasting models.

Develop a recommended program of research in travel behavior.

EXAMPLES

Travel behavior relates to descriptions and understanding of how and in response to what travelers behave. A considerable body of theoretical and empirical knowledge or belief on the subject already exists. For example, one economic theory of travel behavior considers most travel to be an intermediate good that must be consumed at some monetary and psychological cost to the traveler in order to derive equal or greater benefits in kind from activities indulged in at the trip destination. The response of travelers to travel cost and destination opportunity "choices" (considered as a package) will vary depending on the characteristics of the behavioral units. Definition of the attributes of the choices in terms of appropriate transportation system costs and destination opportunities and a definition of appropriate behavioral units are yet to be made. Empirical descriptions of travel behavior are, of course, extensive. Current inductive empirical understanding of travel behavior derives from a varied set of sources. The sources range, for example, from observations on some sequence of the travel decision process to holistic models calibrated with relatively complete data sets describing travel behavior as a set of simultaneous decisions.

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Workshop 5 identified 11 major topics for future research: information dissemination; definition, measurement, and treatment of attributes of transportation service; behavior response to low-capital options; activity patterns and destination choice; comparison of attitudinal and conventional forecasting techniques; travel decision-making process; behavior of special user groups; monitoring travel behavior; simultaneous estimation of service and demand; evaluation of alternative marketing strategies; and problems of aggregation and scale in travel analysis.

Report

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THEMES OF PROPOSED RESEARCH

Considerable emphasis was placed on the need to develop a more coherent understanding of travel behavior from a variety of specialized perspectives. Emphasis was placed particularly on developing a better understanding of the potential impact of low-capital options, i.e., options involving relatively small levels of capital expenditure and dealing mainly with incremental changes in the service, supply, pricing, or marketing characteristics of existing transportation systems. Typical examples are the behavioral response to car-pool schemes, priority transit schemes, parking and gasoline taxes, enhanced security provisions, improved vehicle design, alternative marketing strategies, short-range scheduling and service modifications, and marginal pricing changes.

In a parallel vein, emphasis was also placed on the need to address more specifically the behavior and requirements of special user groups, whose needs differ significantly from the norm and who are either ignored in current demand forecasting analyses or simply lumped together with the rest of the population. Particular stress was placed on those segments of the population whose behavior and use of existing systems are subject to identifiable constraints. In both instances, the emphasis is on the analysis of behavior at a highly disaggregate, specialized rather than a generic level, at least in the early stages of investigation.

There was considerable debate concerning the role that attitudinal analysis techniques may usefully play in the devel-

opment of an improved understanding of travel behavior. The interest of the workshop members in this general topic is reflected primarily in 2 recommended research projects.

The first of these focuses on the need for a clearer identification of the salient attributes of transportation service including the methods to be used in characterizing and measuring them and the mechanisms whereby they may be incorporated in either attitudinal or conventional model structures. Particular concern was expressed in this regard with respect to the definition of system-specific and system-common attributes, the stability and transitivity of user perceptions and attitudes toward alternative attributes, and the problems of extrapolating attitudes concerning existing systems to the analysis of new systems.

The second focuses on a comparison of the efficacy of attitudinal versus conventional techniques when applied to a single (or several) common test cases. Emphasis was placed in this latter case on a careful, comparative analysis of the viability of attitudinal versus conventional techniques, on an analysis of their relative cost and utility, and on an identification of those areas where each may be most appropriately applied in an operational context.

The message in this case is simple: There is a well-developed body of analytical techniques derived mainly from the fields of market and consumer research that appear to be highly appropriate to certain forms of travel behavior research. To date, its use has been explored only to a limited degree. It appears worthy of much closer examination.

One of the most common pleas of the behavioral analyst is for more and better data. At the present time we are virtually ignoring one important source of such information, and that is the successive changes that are continually being implemented in transportation systems throughout the country. The problem is partly that we simply lack the appropriate mechanisms for collecting such data and partly that the necessary financial support is usually not forthcoming. It was proposed, therefore, that a systematic program be developed for monitoring the impact of both long- and short-run behavior of selected changes in transportation service, based on a sample of case studies of existing systems. The interest here was to capture information on operational changes in existing transportation services rather than to set up a set of explicit demonstration experiments. Particular emphasis was placed on the types of low-capital options discussed above.

Finally, it was argued that existing information on the travel decision process is extremely fragmentary, partly because of the diffuse and uncorrelated nature of much existing research. To overcome the problem and to provide an effective, concentrated nucleus of research that might then serve as an effective foundation for the development of improved, more responsive demand forecasting models, Workshop 5 recommended that a comprehensive program of basic research be undertaken in the mechanisms underlying the travel decision-making process. This program should focus particularly on issues such as

1. Examination of the basic structure of the travel-decision process and its relation to the established activity patterns and identification of characteristics of varying decision units;
2. Development of a coherent, compatible set of behavioral data bases to serve as input to a variety of subsequent forms of analysis;
3. Identification of the sensitivity of travel decision-making to varying service parameters and other "controllable" factors under situations of at least quasi-experimental control;
4. Examination of the interrelations between long- and short-run travel investment decisions and between long- and short-run behavior;
5. Analysis of the interrelations between destination choice and trip purpose on the one hand and route and mode choice and time of travel on the other; and
6. Consideration of potential short- and long-run substitution effects, involving the potential substitution of other forms of communication or interaction for current, physical movement.

The thrust of this recommendation is to guarantee (at least conceptually) that sufficient resources be made available in one time and one place to permit significant inroads to be made in the development of improved behavioral analyses.

The issues raised above flowed only from one of the several workshops at the conference. They serve, however, to illustrate rather well the combination of pragmatic and theoretical concerns that should desirably underlie any successful research program. Some of these former, pragmatic issues are pursued in the remainder of the paper.

APPLICATION OF TRAVEL ANALYSIS RESEARCH

The organization of this conference and the attendance are indicative of the importance attached to research in behavioral travel demand and evaluation of travel time. Yet, the absence of an appropriately funded and managed urban travel analysis research program in the United States suggests that the priority that the conference participants associate with research in this area is not shared by decision-makers who are in a position to implement such a program. In this context, it is perhaps useful to consider the justification for an urban travel analysis research program and the contribution that such a program could make to the achievement of national goals, as these are perceived by decision-makers.

During the past 10 years, the preponderance of the urban travel analysis research effort has been focused on regional planning analyses characterized by relatively coarse representations of the various urban transportation modes and relatively long forecast periods of 15 years and more. The focus of research activity on these types of problems is understandable in the context of the urban transportation planning process as it was evolved by the Federal Highway Administration.

National urban transportation policy for the 1970s is, however, clearly focused on the development of an effective urban public transportation program for American cities. This focus is based on the belief that the environmental, social, and economic benefits of such a program are such that the general community should contribute to its development and support. In other words, the rationale for developing an effective urban public transportation program stems from its contribution to the overall development of the community's objectives, not solely from a profit motive. Within this context, the issues of gross system patronage and revenues that are the principal focus of the regional type of analyses are of less interest, whereas other issues—particularly the marketing of public transportation to enhance its ability to penetrate the urban travel market as well as environmental concerns—become of paramount importance. Inasmuch as the focus of national interest has shifted from regional-scale analyses to issues associated with public transportation and the environment, there should be a corresponding refocusing of urban travel analysis research activities.

To identify the high-priority urban travel analysis research areas, one must appreciate the important elements of a public transportation marketing program. These include

1. Identification of target markets for public transportation (population segments that represent high potential sources of business;
2. Identification of the features and the stimuli most likely to influence the target markets; and
3. Assignment of priorities in the redesign of the public transportation service product.

Thus, the justification for conducting an urban travel analysis research program is based on the need to more effectively market public transportation. Unless we justify an urban travel analysis research program in this or similar terms, there is a strong danger that urban travel analysis research program proposals will be dismissed as being irrelevant to national goals and merely reflecting the desire of researchers to conduct research in an area that they enjoy. This perspective does provide, however, an

opportunity for an even broader urban travel analysis research program than was provided by the requirements of system-level planning analyses. Many urban travel analysis research projects could be defined within this framework of marketing public transportation. Some of the projects that we feel are particularly important at this time include transit station and bus route choice, access mode choice to line-haul systems, automobile car-pooling and increased automobile occupancy, vehicle equipment and terminal design, the passenger's perception of personal security and its role in influencing system patronage, the importance of schedule reliability, and the importance of the image projected by transit operating personnel. All of these research projects should be designed to assess not only the impact of the given factor on the use of public transportation but also the normative issues of what the design of public transportation service should be.

IMPLEMENTATION OF RESEARCH RESULTS

Although the focus of this conference was on the identification of priorities for future research, it is equally important to assess the results of the important research that has already been accomplished to date and the degree to which these research results have been implemented in operational practice. Even if a research program were clearly related to national priorities, the program would not be sustained if the research results were not implemented into operational practice. Nearly 5 years after the work of Lisco and Stopher, behavioral, stochastic, disaggregate models are (with few exceptions) not being employed in operational planning studies and are largely discussed in research rather than operational planning contexts. Although there are certainly aspects of behavioral, stochastic, disaggregate models that do require further research, there is no question that they can be safely used in modal-split and automobile occupancy analyses. The major advantage of using these models include

1. The significant savings in the data required to calibrate models (we estimate that the volume of data required to calibrate a disaggregate model is an order of magnitude smaller than the amount of data required to calibrate an aggregate model);
2. The ability to simultaneously analyze competition among more than 2 modes (which allows for a model that simultaneously considers automobile occupancy and modal choice, defines several alternative transit modes, and allows for several access modes); and
3. The ability to develop meaningful modal choice relations even when the volume of travel by a given mode (e.g., public transportation or intercity rail) is quite small.

Thus, some of the research into behavioral, stochastic, disaggregate models has been completed and is available for implementation in operational planning projects, and there are distinct economic and technical justifications for using these techniques. Why then has the introduction of these techniques into operational planning practice been so limited, and what can be done in the future to encourage more rapid dissemination and implementation of research results? These are difficult issues, and they are not easily analyzed or resolved. Certainly 2 factors that contributed to the slowness with which these techniques have been implemented are (a) the unavailability of a well-documented and efficient computer system and (b) the general unavailability of well-qualified personnel.

If the urban travel analysis research program that has been synthesized in this conference is to have any opportunity to be funded at an appropriate level, it should clearly include major elements relating to the implementation of research results. Projects that we believe would contribute significantly to increasing the probability that these research results would be implemented include

1. A well-documented and efficient computer system for use in conjunction with behavioral, stochastic, disaggregate models (this computer system should include a calibration program, programs to assist in the preparation of a calibration data set, and

programs to effectively apply the calibrated models);

2. Training programs to develop qualified personnel (these should include short courses oriented to current practitioners as well as treatment within the graduate program of universities);

3. A program of demonstration planning projects specifically designed to field test the latest planning techniques—including new urban travel analysis approaches—within an operational planning environment and to demonstrate that these techniques can be effectively used to increase the quality of the transportation planning product; and

4. Effective techniques for applying behavioral, stochastic, disaggregate models (the advantages of using these models are to some extent being diluted because of the manner in which these models are being applied, and new approaches for applying these models are needed that will exploit their advantages during the alternatives evaluation phase of a planning effort).

INSTITUTIONAL CONSIDERATIONS

Implementation of a national urban travel analysis research program and use of advanced travel analysis techniques at the local level require institutional changes at both the federal and the local levels. To argue that the problem of implementing a research program would be solved if only the appropriate funding were available overlooks what may well be a most important aspect of the problem, namely, that the federal government is not currently well organized to manage an urban travel analysis research program.

The urban travel analysis research effort of the U.S. Department of Transportation is fragmented among various groups within the department (Federal Highway Administration, Urban Mass Transportation Administration, and Office of the Secretary) and the National Cooperative Highway Research Program. Further, many of the issues that should be addressed within such a program are of major concern to a number of agencies outside the department, particularly the Environmental Protection Agency and the Department of Housing and Urban Development. Although a significant amount of coordination with respect to urban travel research does take place among these groups, the organization of an effective urban travel analysis research program requires a more developed institutional structure.

Thus, we see a need within the federal structure for an institution that funds and manages a multimodal urban travel analysis research effort. This institution should clearly be designed to avoid even the suspicion of having a modal bias and, for this reason, should not be lodged in either the Federal Highway Administration or the Urban Mass Transportation Administration. Although multimodal research and policy studies related to urban travel analysis might be directly funded and managed by this new institution, this would not preclude the conduct of more mission-oriented urban travel analysis research efforts within the modal agencies. For example, the Urban Mass Transportation Administration might continue research projects specifically oriented to the problems of the transit industry such as the impact of the traveler's perceived security on his attitude toward public transit. For those projects continued within the operating administrations, this new institution would serve as a formal coordinating point rather than as the program manager. Given the very applied nature of an urban travel analysis research program, it would appear desirable that the institution be placed within an operating department—probably the Department of Transportation—and not lodged in a more research-oriented environment where the perspective of the application of the research may be lost.

A different type of institutional problem is currently evident at the local level. Inasmuch as anyone can call himself or herself a transportation planner, there is considerable variance in the quality of transportation planning activity throughout the country. One consequence of the relatively small amount of poor-quality work is to cast an aspersion on all work conducted in this area because of the analyses conducted by a relatively few. As other professions have matured, they have recognized the requirement to establish standards of practice regarding the methodology of their profession and how this methodology is applied in specific instances. Further, they have recognized the

need to license or certify professionals in their areas of practice and to maintain the structure to enforce a high standard of practice with the ultimate sanction being withdrawal of certification. Lawyers, doctors, certified public accountants, architects, and structural engineers have recognized the need to establish a professional level of practice. It is interesting to note that the Operations Research Society of America has also begun to explore how it can establish a professional standard of practice for that profession. Given the difficulties associated with establishing a professional standard of practice for the transportation planning profession, perhaps the time has arrived when the first steps in this direction should be initiated.