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16. Abstract

The major conclusions of the Workshop on Attitudinal Surveys for Transportation Planning and Evaluation held at the Transportation Systems Center on January 30, 1975 are presented.

The Workshop participants, including transportation planners, transit system operators, market researchers, and social scientists, assessed the practical utility of attitudinal survey techniques for transportation planning and evaluation.

These proceedings summarize participants' opinions on the possible roles for attitudinal surveys in transportation planning and evaluation. The proceedings also evaluate attitudinal survey applications and attitude measurement issues in terms of their current usage in transportation contexts.

A list of Workshop participants is included in the report appendix.

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PREFACE

The Transportation Systems Center (TSC) Workshop, January 30, 1975, invited users of attitude survey techniques in the fields of transportation planning, transit system operations, market research and the social sciences to assess their utility for transportation planning and evaluation.

These proceedings summarize the major issues discussed during the TSC meeting. Participants' direct quotations from the Workshop transcript are incorporated in the narrative whenever possible; they appear in italics.

The TSC Workshop on Attitudinal Surveys for Transportation Planning and Evaluation and the subsequent proceedings were sponsored by the Urban Mass Transportation Administration, Service and Methods Demonstration Program, directed by Mr. Ronald J. Fisher.

A complete list of TSC Workshop participants is included in the appendix to this report. U.S. Department of Transportation staff present included Ronald J. Fisher, UMTA; Dr. Ricardo Dobson, FHWA; Nick Bade, UMTA; Dr. Peter Benjamin, UMTA; Donald Kendall, TSC; Joseph Lindsay, TSC; and Dr. Mary Donahue Stearns, TSC.

Dr. Bert Arrillaga, UMTA, and Dr. Peter Benjamin, UMTA, provided assistance in developing the report.

Robert Murphy, Raytheon Service Company, assisted in report editing. C. Segerstedt, RSC, provided technical typing.

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1. INTRODUCTION

A Transportation Systems Center (TSC) Workshop, composed of experts in the fields of transportation planning, transit system operation, market research, and the social sciences, was held on January 30, 1975, at the Transportation Systems Center, Cambridge, MA.

Workshop participants (see Appendix A) discussed the current status of attitudinal survey applications and recommended directions for future work to improve both the suitability of the techniques and the appropriateness of their applications.

Workshop discussion focused on three types of issues:

1. Delineation of possible roles for attitudinal surveys in transportation planning and evaluation;
2. Evaluation of current applications of attitudinal surveys; and
3. Issues in attitude measurement.

This report summarizes Workshop discussions as they developed around the three major issues. Chapter 2 presents the Workshop topics. Chapters 3-5 examine the three issue areas individually. Chapter 3 reviews attitudinal survey techniques. Chapter 4 focuses on current applications of attitudinal surveys. And Chapter 5 examines measurement issues. Participants' direct quotations have been noted in italics.

2. WORKSHOP TOPICS

2.1 INTRODUCTION

Attitudinal surveys have been widely used, frequently on an "ad hoc" basis, for a variety of transportation planning and evaluation purposes. Their casual use has been due to a widespread need to measure motivational and evaluative factors and to estimate potential responses to alternative transportation services. These applications have been made despite a lack of a unified methodology integrating available and suitable techniques from several disciplines.

The Workshop's purpose was to generate more systematic and efficient uses of attitudinal surveys in transportation planning and evaluation by defining the possible roles, suitable applications, and range of issues. Thus, the Workshop's goal was to define the major tasks to be carried out out to improve attitudinal survey techniques based on a variety of disciplinary insights.

2.2 POSSIBLE ROLES FOR ATTITUDINAL SURVEYS

Participants recommended three types of roles for attitudinal survey techniques. The first recommendation was a marketing role which would measure transportation system and service preferences, market knowledge, and experience with the service. The second role recommended was an evaluative role to measure qualitative responses to transportation system alterations. For example, this use would measure ridership satisfaction shifts which may not be synonymous with volume shifts.

The third role recommended was a planning role to measure local interests in order to better design transportation systems. Attitudinal surveys, used in a planning context, might also designate variables and collect data for integration with currently used planning models.

Overall the participants felt that the contributions of attitudinal survey techniques for the first two roles, marketing and evaluating transportation systems, were currently better understood and more useful. The present contribution of the third role, planning, is less established because of the current lack of knowledge about the stability of attitudes and behavior through time.

2.3 APPLICATIONS OF ATTITUDINAL SURVEYS

The second major area discussed covered current applications of attitudinal survey techniques. Promising applications include measuring responses to may types of service changes and locally generated understandings and evaluations of transit service; specifying user perceived service characteristics for translation into engineering and design criteria; and understanding the motivations influencing latent demand which distinguish the regular uses from occasional non-users.

2.4 ISSUES IN ATTITUDE MEASUREMENT

The final focus of the discussion compared the strengths and weaknesses of specific attitudinal survey measurement techniques.

For example, it was stated that the level of expected predictive validity has not been established for any use of attitudinal survey techniques in transportation planning and evaluation.

Participants also expressed an interest in developing better understandings of the evolutionary sequence of attitudes into behaviors. This might be accomplished by using various monitoring techniques.

Finally, it was recommended that research design and data collection requirements of alternative attitude measurement techniques be better understood to ensure the selection of the most suitable techniques.

3. ROLES FOR ATTITUDINAL SURVEY TECHNIQUES

3.1 OVERVIEW

Workshop participants stated that it was necessary to define appropriate roles for attitudinal surveys in transportation planning and evaluation, prior to critically reviewing their current applications.

One participant summarized the confusion surrounding the definition of appropriate roles for attitudinal surveys:

"If you are talking about building a new system, changing an existing one, or putting out express buses, it is relatively simple to find out from the consumer which of those things are preferable...But if you are talking about predicting how many people are going to use these, that is a more ambitious issue. We need to decide to what extent we are talking about using attitude measures to design systems and project the number of people who will use them, and to what extent we are talking about using attitudes to influence people to make use of this system."

Potential roles for attitudinal surveys range from measuring preferences and evaluating service to forecasting system volumes or ridership levels. These alternative roles may be termed marketing or evaluative roles, depending on the time sequence of the attitude measurement, and planning roles. While marketing and evaluative roles for attitudinal surveys were unanimously designated as effective uses of attitudinal surveys by the Workshop participants, planning roles for attitudinal surveys must be defined with caution.

Participants' opinions about the utility of the alternative roles for attitudinal surveys were expressed:

"From the system operator's point of view, there needs to be more use of evaluation because transit changes which improve the quality of service are best measured in the satisfaction of the people using the system rather than by large increases in ridership."

Correspondingly, another participant stated that *"...planning is done on such a different level and different scale that it is not clear how attitudinal surveys can be used effectively there."*

Many participants believed that there had been too much emphasis on trying to predict ridership volumes to the exclusion of a proper emphasis on trying to predict preferences and evaluate services which attitudinal survey techniques can easily assist.

The Workshop discussion, focusing on the role for attitudinal surveys in marketing, evaluations, and planning contexts follows.

3.2 MARKETING ROLES FOR ATTITUDINAL SURVEYS

There was general agreement that a marketing role for obtaining information about preferences among transportation alternatives is an appropriate attitudinal survey use. Typically, this is done by measuring reactions to system attributes.

A participant with market research experience recommended measurement of product preferences in public transportation because *"...there has been a tendency in transportation planning to deliver new products to the market on the basis of the engineer's speculation as to what people will accept. An approach should be developed to pin down the characteristics of the product before it is delivered to market. Too often, nobody bothers to go out, while the product is in the design stage, and ask people what they would like. There is good reason to believe that present transportation products, particularly the bus, fit nobody's preference."*

A transportation planner offered a 'caveat' about the potential worth of marketing or product preference research using attitudinal surveys. *"Past behavior is a better predictor of behavioral response than preference; but it is not possible to use this with innovations."*

In addition to gauging responses to the physical characteristics of a transportation alternative, market research experts suggested that attitudinal surveys should investigate people's

understandings of, and experience with, transportation alternatives. It is useful to know how much understanding the community, and, in particular, certain segments of the community, have of their current level of service. This data could be obtained by inquiring about knowledge of the level of service of and, prior experience with, transportation alternatives.

Frequently, poor communication is a major barrier to transportation system use. One participant mentioned Cleveland as an example of a community with a relatively good transit service but which had only 2-3% of the community using the service. An attitudinal survey revealed that the low usage level was due to a lack of information and inadequate understanding of the available service.

When a service change is made in a certain area, it should be made in such a way as to cause the least damage to current ridership or revenue levels. A marketing plan would be useful to determine how people can be influenced to like, or even prefer, the new service. A marketing plan requires measurement of people's service needs, perceptions and values, if possible relative to both the existing, and the proposed, types of service.

Marketing information can contribute to improved communication between system users and operators. Attitude change is very difficult, if not impossible, because attitudes are indicators of underlying values. Recognizing the difficulty of attitude change, a major contribution of a marketing use of attitudinal surveys is to measure preferences and understandings. Valid measurement would give a basis for potentially useful system changes.

3.3 EVALUATING ROLES FOR ATTITUDINAL SURVEYS

Transportation planners recognized the potential importance of the use of attitudinal survey techniques in evaluating UMTA demonstrations which are intended to improve the quality of service.

For many reasons, some participants felt that it is unlikely that improvements in the quality of transportation service will generate significant ridership increases. However, these

improvements will be recognized in user satisfaction, which is important data on a program. Therefore, participants emphasized that the use of attitudinal survey techniques to measure increased satisfaction with an improved service level, or with the introduction of amenities, is a very useful application of attitudinal surveys.

Conversely, attitudinal survey techniques can assist in formulating effective service improvement programs. One participant stated *"you can find out what 'bugs' people now about the systems they use, you can correct those things that 'bug' them. And without inducing any additional ridership perhaps or very little, you can find out whether or not they're more satisfied with the 'debugged' system than they were before."*

3.4 PLANNING ROLES FOR ATTITUDINAL SURVEYS

Participants had mixed reactions about the possibility of using attitudinal survey techniques to anticipate travel behavior and forecast ridership.

Many comments placed reservations on the utility of attitudinal surveys in planning significant system changes or in planning new systems. The maximum input of attitudinal survey results to planning might be a "course correction" or supplementary information to assist conventional planning techniques.

In planning transportation systems, the participants recommended attitudinal surveys for inputing conceptual and community attitudes data. Several participants recommended using attitudinal surveys additionally for conceptual inputs into system design and development. Advocating the use of conceptual input recognizes that transportation systems should not be designed in a vacuum because *"planners have to work in the direction of the orientation of the potential riders and to overlook this would be foolish."*

The essential restraint on using attitudinal survey techniques to forecast ridership is the length of the time interval between attitude measurement and new system implementation. The predictive

success of attitude measures is inversely related to the length of the time span between the measurement and the behavior. Because attitudinal stability and, even behavioral stability over time, is not understood, some transportation planners felt utilization of attitudinal survey techniques to plan systems might produce unstable demand estimates. For these reasons, there was a marked feeling among the participants that *'behavioral and attitudinal surveys do not give a large payoff for investment planning; they are primarily useful for short-term service and facility refinements."*

Subsequent correspondence with a transportation planner introduced some alternative recommendations.

"The observation that attitudes cannot be reliably forecast for the long term is not sufficient to end the case. It may be that attitudinal surveys and attitudinal measures, combined with a little decent research, can produce quantitative measures to fill some of the obvious voids in our current behavioral models. A quick survey of the behavioral model literature will show that the various investigators mention, but generally do not use, such measures as comfort, convenience, reliability and safety. Such efforts as have been made to use these variables have not been particularly successful. In part this is because the measures have been introduced as simple functions of linear scales (generally attribute ratings or relative attribute-satisfaction ratings). Aside from the problems of predictability, stability over time, semantic redundancy and intercorrelations among the measures, one might question whether the resulting measures are sufficiently "fundamental" to serve effectively as building blocks in behavioral models of transportation demand. On purely intuitive grounds I suspect they are not. However, and again on speculative grounds, I suggest that such need not remain the case. A promising program of low cost would be to try to develop fundamental and quantitative measures for at least some of the variables comfort, convenience, reliability and safety by the use of attitudinal surveys, psychometric methods and a little applied research. Here the attitudinal surveys and attitudinal measures would not be the product of the research but would rather be the tools used to produce and test the derived quantitative measures."

The participants debated the possibility of using attitudinal survey results for quantitative, technical system planning.

Some transportation planners saw attitudinal surveys as serving to identify important variables about which quantitative information should be collected to use with econometric models. However, another planner noted that demand estimation procedures, which have usually been based on time and cost factors, have been recently expanded to include Stopher and Spear's convenience index. This development suggests that there ought to be additional ways to incorporate other quantified attitudinal survey results.

Another transportation planner noted that econometric models make psychological assumptions, for example, about individual utility functions. The recommended integration of psychometric techniques in econometric models could be reversed so that econometric techniques are integrated into psychometric models. This reversal might isomorphically represent what are currently estimated behavioral and attitudinal responses. These assertions are based on a belief that the state of the art of psychometric models is currently parallel and conceptually integratable with, econometric models and that psychometric models only require more quantitative development.

Another participant warned that econometric aggregated planning models have not looked closely enough at the specifics of a given trip in order to develop a modal pool. These models also have not looked closely at perceptions of specific mode characteristics which differ from generalized value systems. This requires a distinction in research between broad attitudes and specific perceived performance.

Several participants, including system operators, recommended a novel application of attitudinal survey techniques to transportation planning to introduce community attitudes.

Attitudinal surveys could provide a vehicle to input the attitudes of a representative cross-section of the community into the development of the plans for a new system or level of service.

These techniques could provide an extensive and representative measure of community desires to amplify the extreme positions usually voiced at legally required public hearings.

One participant noted that this technique has been utilized by a State of Washington planning agency.

Because no current planning tool can successfully forecast responses to system operation over an extended period, several participants felt use of community attitudes would avoid imposition of planners' value judgments.

"Granted attitudinal surveys can not accurately predict how people will respond in twenty years or even five years, but will a planner in an ivory tower do a better job?"

As an example of this process, one participant recommended the use of psychometric techniques as a communication tool, independently of their possible role in quantitative planning. This use would permit the community to input its needs and preferences into the policy-making to formulate a direction for planning.

4. CURRENT APPLICATIONS OF ATTITUDINAL SURVEYS

4.1 OVERVIEW

The Workshop participants evaluated current applications of attitudinal surveys for transportation planning and evaluation. They generally agreed that, although attitudinal survey techniques are fairly well defined, these techniques need testing in a variety of situations.

"The present psychometric techniques, both unidimensional and multidimensional, are now fairly well developed and understood, both mathematically and theoretically. The research and development investment should now be put into the testing and evaluation of these techniques in those classes for situations which are important to UMTA, as well as refining them and testing their predictive validity."

Several participants noted that there is ongoing work to test these techniques in a variety of situations. Most prominently, UMTA, Office of Transit Management, is sponsoring two projects to develop applications of attitudinal survey techniques. One is *"the Transit Marketing Project where the results of demonstrations in two cities will be compared in hopes of developing useful relationships, such as finding which sociodemographic groups will ride transit. If enough similarities are found, it should be possible to develop and translate prediction equations and models based on their responses to attitudinal surveys. The second effort is to produce a marketing handbook which would include a standardized instrument for short-term transit planning, with standards and criteria."*

Additionally, another participant noted that *"by fall 1975, information should be available on the validation of an attitudinally based model of express bus use in Minneapolis."*

Workshop participants evaluated the utility of the major applications of attitudinal surveys. These applications consider the situation specific characteristics of attitudinal surveys,

translation of attitudinal survey results into engineering data, and measurement of latent demand and non-user characteristics.

Overall, participants postulated a wide range of potential applications. They generally felt that *"attitudinal surveys should be equally useful in measuring responses to service improvements, innovations, and reallocations, but with the current state of the art, only sledgehammer results are obtainable."*

4.2 SITUATION SPECIFIC CHARACTERISTICS

In reviewing applications of attitudinal surveys, the market researchers emphasized that these techniques are very useful for measuring local community or neighborhood perceptions of, or responses to, transit service.

Locally defined data is important for understanding actual system implementation.

"While some issues can be studied on a national basis, like what shape buses should be, other surveys have to be fairly closely tailored to a particular community."

This is because *"reactions to transit changes consist of not only a response to the service change, but an emotional reaction to the perceived change to the community."*

4.3 ATTITUDINAL SURVEY RESULTS AND ENGINEERING DATA

Several participants emphasized that it is difficult to use attitudinal survey results to obtain engineering data.

"One major problem is the difficulty of translating the results of behavioral studies into useful engineering, planning, or management decisions. For example, if personal security is revealed as a priority attribute for users, what should be done about it? How can these intangibles be quantified?"

"We have a fairly diverse set of attitudinal or psychometric techniques for determining the priority attributes of the transport system, and they have given us a pretty good picture of the desired set of attributes. However, nobody has designed and tried

out a system containing those attributes in that priority order. Part of the problem is that the attributes are hard to translate into an engineering design. And, on the other hand, everyone is trying to make conventional systems (or modified conventional systems) work, even though they do not have the desired attributes necessary to make them appeal to a large segment of the travel market. Public transportation's performance is so far from the ideal set of attributes that is no wonder it collects such a small portion of the market. The closest approximation of this ideal set is highway transportation."

4.4 MEASUREMENT OF LATENT DEMAND AND NON-USER CHARACTERISTICS THROUGH ATTITUDINAL SURVEYS

Attitudinal survey techniques were viewed as important tools for understanding latent demand and the transit non-user.

A transportation planner recognized *"latent demand is not a simple modal choice problem; it is very complicated. Some basic research is needed; for example, the mobility patterns of the transit dependent which requires an understanding of trip generation, as well as, type of service. You can get a crude first order prediction if you ask three questions; (1) What activities do you wish to participate in? (2) How many of these activities do you participate in in a given time period? (3) Is transportation the limiting factor in your participation? Results have shown that people's answers to these correspond pretty well to reality and they give you an estimate of latent demand. This technique also gives you an estimate of latent demand. This technique also gives you a nice discrimination as a function of physical handicap."*

Another suggestion for measuring latent demand emphasized that *"attitudinal survey techniques can be used to predict how many more trips (formerly suppressed) will be made if a given system is installed. This type of analysis would need to begin with a switch from modal attributes to destination attributes."*

Alternatively, *"to find out why non-users, who might use transit, do not, you can directly ask them why, or psychometric techniques can be used to compare their perceptions with those of users."*

Attitudinal survey techniques make understanding of the non-user and his behavioral motivation possible. *"Attitude measurement and measurement of perceptions of separate attributes can be very useful in determining what you would do to attract non-users. When you can determine the divergence between the user and the non-user, you can look at various ways of remedying the problem and put a price tag on each. Also you can make a first-order estimate of the effectiveness of each change in increasing ridership."*

In summary, the Workshop participants did not restrict the scope for applications of attitudinal survey techniques. However, some applications currently are clearly more suitable than others. There were no restrictions established because *"urban transit use is hard to predict because options are available and preferences, as measured by attitudinal surveys, thus become important."*

5. MEASUREMENT ISSUES

5.1 OVERVIEW

There are many unresolved questions in the area of attitudinal measurement. These questions include determining the possibility of achieving predictive validity, defining strategies for improving measurement and selecting research techniques appropriate to collect specific types of data.

More effective measurement will occur when advances made by other disciplines in establishing predictive validity are translated into transportation research. While predictive validity is difficult to establish, review of other research and use of improved time stage research designs will advance understanding of it.

Similarly, better isomorphic modeling of the research setting will improve the quality of the resultant data. This can be achieved by recognizing and striving to measure the complexity of the actual environment by including contextual variables, research designs incorporating shifts over time and improved data collection techniques.

Although psychometric techniques represent the most advanced development of attitude measures, there is need to consider contextual influences. These recommendations may require revisions in current psychometric techniques, as well as adoption of attitude measurement strategies used in other disciplines.

5.2 PREDICTIVE VALIDITY

The predictive validity of attitudinal survey techniques has been demonstrated in applications in other fields.

A sociologist itemized the considerations used by researchers in other fields to maximize the predictive validity of attitudinal surveys. These considerations include:

1. Recognizing the influence of social desirability, which is accomplished by denuding the attitude measure of

social expectations as much as possible through anonymity, etc.;

2. Using attitudes which are as concrete and specific as possible, while simultaneously including multiple attitudes toward the topic;

3. Incorporating social support, because, in carrying out public behavior, people are very concerned with what others will think about them when they act. This information can be obtained by asking the respondent to indicate how they think their friends or neighbors will behave in a certain area, instead of, or in addition to, a similar question about their reactions;

4. Neutralization to eliminate respondents who do not act on their attitudes due, either to a lack of opportunity, or a lack of personal integration of statements and behavior.

A market researcher emphasized that determining the predictive validity of attitudinal survey techniques will not be an easy task.

"Simple-minded techniques for predicting behavior on the basis of expressed preference data require a long time to produce dependable results because they require calibration. It is necessary to run a 'concept' test a number of times to discover the relation between predicted and actual results. There is even some further question whether people can articulate changes in behavior at the level of detail planners want. A study done on London Transport riders indicated that the degree of correspondence between observed and claimed changes in behavior, relative to a fare change, was minimal."

5.3 STRATEGIES TO IMPROVE ATTITUDINAL SURVEY MEASUREMENT

Because attitudinal surveys obtain responses about intended, previous, or subsequent behavior at one point in time, the accuracy of the match between the attitude measurement and the response are contingent upon many exogeneous real world influences.

Workshop participants suggested various strategies to increase the accuracy of the match between attitudinal survey measurements and subsequent behavior.

A transportation planner suggested that there is a great need to *"do more before and after studies. Attitudinal research conducted at a one point in time is useful only for correlating attitudes about the attributes of transportation services and socioeconomic characteristics, but not for prediction. Control groups should be used. Time series data is also good, provided it is designed so that data collection will not be inordinately expensive. Inexpensive tracking studies also show how behavior changes with respect to your predictions."*

Using attitudinal surveys to predict transportation preferences and behavior has a unique problem from the market research perspective. Selection of a transportation mode is not a one-time or infrequent event. For most people it is at least a daily behavior. Therefore, there must be clarification of whether attitudinal surveys can predict the respondent's likelihood of trying out a mode, or of becoming a repeated user, or both.

A market researcher noted that *there seems to be some question whether attitudinal models are supposed to be predicting behavior or trials. They are quite different and present questionnaire techniques really can predict only the latter. That may be a reasonable goal."*

Another market research emphasized *"there must be a relationship between trial and repeated usage and we have to do more homework until we find it. Once the trial has been made, you can get another survey and get responses from trier/acceptors, triers/rejectors, and aware non-triers."*

The need to recognize the distinction between attitudinal survey's ability to predict trial and repeated usage suggests the necessity of recognizing and monitoring the sequence of the attitude-behavioral evolution throughout time to capture the

translation of trial into repeated behavior and the effects of exogenous influences. The market research "tracking" technique is a way to monitor this evolution.

There are other reasons to do monitoring or tracking studies.

"One should not assume that attitudes are unchangeable. Over a period of time, or given something like the energy crisis, the transit-resistant may change their values."

It is important to recognize that *"you can not expect things ever to turn out the way a market survey predicts. In such a dynamic situation, you have to keep tabs on attitudes toward the product before and after its introduction, if possible, with the same respondents or sample."* Tracking is a technique that can do this.

To improve the results of attitudinal surveys, a transit system operator recommended considering respondent selection and sample design in implementing attitudinal surveys of transportation issues.

"The local character of public transportation is more pronounced than it was ten years ago and should be kept in mind when making surveys. On commuter lines you may find that, at the outer end, almost no one uses it, whereas, in the dense middle income areas in the city, 60% use it."

5.4 RESEARCH AND DESIGN ISSUES

Respondents evaluated the appropriateness of alternative research designs which could be used in administering attitudinal surveys of transportation. Considerations such as the daily character of travel decisions, the use of transportation as a means to achieve a desired end, and ambiguities surrounding attitude definition, all constrain the designations of appropriate and inappropriate methodologies.

Because travel is repetitive and routine and requires social contacts in terms of the selecting people to travel with, or to, a sociologist recommended measurement of situational, contextual, or environmental variables.

"Context variables should be more closely examined...we should pay more attention to salience, or how important attitudes are to the respondent because it can vary considerably. Consistency...may not be quite the same thing, and should also be examined."

A psychologist emphasized the need to empirically define attitudes. Future research should be planned to carefully examine the attitude-behavior relationship because *"it may be that attitudes are more sensitive to environmental factors than behavior. Attitudes may map these factors and, in fact, change before behavior changes. They can change even when behavior cannot change because of certain environmental and social restraints."*

Alternatively, carefully defining the meaning of attitudes, prior to developing measurements, would encourage the formulation of more precise measurement techniques. A transportation planner warned that the term attitude is often used loosely to represent any of the following dimensions which range from *"general to specific; beliefs, values, attitudes, preferences, choices,"*

Most transportation studies have unintentionally used preference measures as attitude proxies.

Other participants stated it is necessary to carefully analyze the process in which attitudes appear in order to decide which facet ought to be measured with the survey techniques.

One participant characterized *"the process...(as beginning) with perceived needs. The second step is selection of the activity site or destination. Third, is the selection of a mediating system. Fourth, is the choice of a network path. Each of these can be examined independently applying psychometric techniques. In this travel context, you want to look at what kinds of psychometric techniques can be used for predictive purposes and how to model the travel-behavior process."*

It must be determined whether respondents have behavioral opportunities to act on their attitudes. Several market research-oriented participants mentioned their experience with a population subset which does little traveling or is constrained from acting on its preferences.

Researchers need to consider *...procedures for dropping out of surveys people who do not act on their attitudes. Pollsters routinely do this. In transit, this would mean dropping those who virtually never go out, those who walk to work. In one study, the percentage of these people was between 5 and 10%, which is significant."*

As a practical matter, another market researcher recommended determining if a respondent has had any prior experience with the subject matter being attitudinally measured. It is important to ask if the respondent had ever ridden the travel mode inquired about because it is easier to encourage recall of former habits than to try to measure hypothetical attitudes.

Participants discussed strategies to improve the utility of attitudinal survey results. Because attitudinal stability is unknown, even a before and after research design does not necessarily document the predictive validity of attitudinal survey techniques. A study by Fishbein was mentioned which indicated that the correlation coefficient between attitudes and behavior over a three to four week interval is .4 or .5; and, over a two to three month interval, is .2 or .3. However, it is also likely some attitudes are more unstable than others.

To reduce uncertainty about attitudinal stability and to simultaneously monitor possible exogeneous influences, the market researchers suggested transportation research make greater use of "tracking" techniques. "Tracking" can be used *"...to build flexibility into the system, to keep track of changing attitudes, and ...(to incorporate) community forces."*

For example, *"in test marketing an average tangible commercial product, new test markets are opened up continually until it has been established whether or not the product will sell. Highly*

sophisticated marketers form a consumer diary panel whose frequency of use can be projected for the national market. This type of study first goes out and looks for people willing to try the product and then goes back to the triers a little later to find out whether they feel the product fulfilled the concept promise."

An alternative to marketing research techniques would be recognition of "intervening events" in the development of a research design and in data collection.

A participant noted that *"Professor Sheth, at the University of Illinois, examined satisfaction with a product, satisfaction with the attitudes relating to satisfaction with the product, satisfaction with the product relating to behavioral intentions towards that product, and finally, behavioral intentions toward that product leading to behavior. In each step, there are intervening events which modify the relationship between attitude and satisfaction, between satisfaction and behavioral intentions, and, finally, between behavioral intentions and behavior. Attitudes do not have to come out perfectly and evenly in a straight forward way to behavior; they form one component of the several factors that jointly can forecast behavior and, as such, they should not be ignored but they should not be relied upon exclusively either."*

Workshop participants were also interested in techniques which might allow transferability of attitudinal survey techniques and results.

"Transfer of techniques has been done. Studies, done with different techniques in different parts of the country, show a fairly consistent ordering of desired attributes for certain types of trips. What varies is how well people perceive different modes as performing on these attributes."

However, factors fostering the transferability extrapolation of results are less certain. Basically, the participants felt that

"to some degree attitudinal survey research results can be extrapolated from one city to another, but the same techniques must have been used on both populations."

Participants recognized that transferability is an important facet of attitudinal survey techniques - but it will not be easily obtained.

In subsequent correspondence, a transportation planner noted that *"from the evidence to date, it seems unlikely that calibrated behavioral demand models can be transferred from urban area to urban area without some fairly subtle understanding of the relationship between the "matching" market segments. The notion of getting a handle on these relationships without some use of attitudinal surveys eludes me."*

5.5 DATA COLLECTION ISSUES

A variety of data collection methodologies have been used in travel behavior studies. Workshop participants commented on alternative data collection strategies; measurement of techniques; sampling procedures; sources of error; and the likelihood of developing standardized procedures.

A market researcher emphasized that transportation planners, in developing studies, should realize and adjust for the reality that some citizens and, particularly transit users, may have difficulties in self-expression; may have difficulty reading; or may encounter language barriers. Questions must be carefully devised and pretested so that they will not simply restate the issue as vocalized by the planner. Planners should design their studies recognizing the *"problems inherent in using recall of behavior"* and *"the differences in attitudes due to experience and due to hearsay."*

A transportation planner warned Workshop participants that respondents do not always have perfect knowledge of all the transportation services offered in their environment or community. Many attitude survey results have revealed that many respondents lack such information.

For example, the Tobin Bridge survey in Boston indicated that people were more likely to change their destination, than adjust their mode, when a former mode is removed. Respondents, who used the Tobin Bridge prior to its collapse, reported that they redirected their shopping trips to a new destination, rather than change the mode used for shopping trips. This result suggests that many people have a limited knowledge of their community and of alternative modes. This is the type of background information that an attitudinal survey could report.

Various widely used data collection techniques possess varying strengths and weaknesses in measuring attitudes. When a study needs a representative sample of a heterogeneous population, telephone survey techniques are preferable to mail and on-board surveys. However, the latter two techniques are more appropriate when the sample required is from a relatively homogeneous population. Studies requiring modal split data need to use data collection techniques which provided good probability samples.

When data collection techniques are evaluated by their suitability for particular purposes, on-board surveys are preferred to measure attitudinal responses to service improvements because the respondent is immediately perceiving the change. However, for transit planning, a telephone survey is preferable to a mail survey because the former's non-response is unbiased and overrepresentation of the opinion poles is minimized. Finally, when the content of a survey is complicated and the desired sample highly motivated or well educated, a mail survey collects good data.

A market researcher noted that the lack of privacy in administering an on-board survey severely inhibits respondents. This can occur even though the on-board survey should be simple and should collect factual information. Frequently, respondents significantly misrepresent even factual data. As an alternative, he suggested merely obtaining the riders' names in an on-board setting and conducting a telephone survey in private at a later time.

While a home interview is the most expensive data collection technique, it collects approximately twice as much information as a telephone interview per unit of time. It also offers privacy and allows the use of visual data collection techniques. Using prototypes and other visual aides can be very useful because they evoke total perceptions and stimulate better attitudinal responses.

In summary, respondent characteristics and the nature of the collection situation must be weighed in deciding on a collection technique to implement an attitudinal survey.

A transportation planner summarized the utility of existing attitude measurement techniques. *"Half a dozen scaling techniques are available. We need to know where they are applicable, whether they predict, and how valid they are. So far, we have said:*

1. *We do not know how valid they are because there has been no experimentation in the transportation area;*
2. *They are useful for prediction, depending on the nature of the problem; and*
3. *They are applicable only for a well-defined problem.*

To make relative or comparative decisions on the basis of attitudinal techniques, there must be wide differences in the results. Most of these techniques are quite crude and require a sledgehammer approach. For example, revealed preferences are useful in closed, constrained situations. In dynamic ones, which is what UMTA is producing, there is a need for attitudinal measurements to predict behavior. Revealed preferences cannot measure or predict satisfaction with the system."

In selecting respondents, market segmentation is an alternative to, or an addition to, random sampling procedures which have been used in many fields.

A transportation planner offered the following warnings in using this technique. *"The methods for segmenting a market are available and have been for ten years, but in transportation, the*

answers are not so clear-cut. There is need to consider additional issues such as:

1. *Will the market actually segment this way?*
2. *Will it stay segmented this way?*
3. *After people use a system, their perceptions, and hence, relative preferences, may change."*

Based on their experience in staffing transportation studies, several systems operators and market researchers recommended selecting people who are familiar with the local neighborhoods to collect data. They are better able to record information and answer questions for respondents meaningfully. Subsequent data analysis which recognizes local geographic characteristics may be very important because transportation is usually perceived by the respondent as a local attribute and in a local context.

Participants made suggestions regarding the appropriate level of effort to expend on callbacks to reach respondents designated by the sample design.

Several participants thought that callbacks are an area of particular concern in transportation studies because of the possible bias in the unreached respondent's travel and/or life activity patterns.

A market researcher noted completion rates drop markedly after two callbacks and recommended pooling the unreached respondents and checking their known characteristics versus the data obtained. This can be done easily if all respondents contacted have been asked: "Are you normally home at this time?"

Discussion of callbacks also emphasized the need to separate conceptually whether the respondent can be anyone in the household or a designated individual. The former would provide an underrepresentation of individuals living alone among the respondents not reached.

Participants did not think that the halo effect is an important bias in transportation studies, but to further reduce its contamination, the following recommendations were made:

1. Use home interview techniques or personalize the data collection site to reduce the halo effect;
2. Use convergent measurement techniques to increase the data collection instrument's validity and thereby decrease the halo effect;
3. Ask the respondent to reply in terms of what his neighbor thinks reduces the halo effect; and
4. Use "blind" sponsorship to reduce distortion.

6. WORKSHOP SUMMARY AND CONCLUSIONS

The participants' varied experiences offered a range of understandings about the meaning and utility of attitudinal survey techniques. Market research representatives, having used attitudinal survey techniques extensively to anticipate and understand consumer reactions to products, generally felt that their established attitude measurement techniques would be useful in transportation studies because transportation services are "another type of consumer product."

Most participants agreed that transportation services can be viewed from the consumer's perspective. However, transportation planners and transit operators stressed the added complexity of measuring response to transportation services due to the need to differentiate between trial, infrequent, and frequent system users in order to plan systems and services to be most cost-effective at a future time. Market research, in contrast, tends to focus on generating consumer interest rather than predicting continued use.

The social scientists argued that attitude measurement techniques have demonstrated their predictive validity in applications to other subject areas. Transfer of these methodologies to transportation, which would generally require consideration of the respondent's personal situation and response context, ought to produce more accurate attitudinal measures.

Although the participants' areas of expertise influenced their opinions about attitudinal surveys, the Workshop discussion revealed five general areas of consensus:

1. Currently, attitudinal survey techniques are best suited for marketing and evaluative transportation studies; their potential use for initial planning stages is not clear at present;

2. The predictive validity of attitudinal surveys has not been established; it must be better understood in order to consider potential planning uses for attitudinal survey methodologies;

3. The current level of attitudinal survey technique development is only able to provide a rudimentary understanding of the respondent's transportation preferences and behavior.

4. Although attitude measurement instruments have been well developed in many disciplines, there is a need to define a broader range of types of transportation applications to fully test the utility of the methodology;

5. Attitudinal surveys are particularly useful in measuring perceptions of transportation service which are influenced by one's neighborhood or community.

Workshop participants also made specific recommendations for further studies to improve the utility of attitudinal surveys for transportation planning and evaluation. Their recommendations suggest:

1. Integrating available attitude measurement methodologies to make use of advanced techniques from a variety of disciplines;

2. Increasing the use of attitudinal surveys for transportation marketing and evaluation.

3. Determining the utility of attitudinal surveys for the planning stages;

4. Using "before and after" research designs and market research "tracking" techniques to study and improve the accuracy of attitudinal surveys; and

5. Recognizing and developing the unique facility of attitudinal surveys to deal with areas such as latent demand, non-user motivations, and the reasons for various levels of frequency of public transportation usage. These areas require the measurement of motivation to provide full understanding.

APPENDIX

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