

# Special-Purpose Travel Surveys

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Regional travel forecasting models often assume that trip-generation rates are stable over time. Though the validity of this assumption is confirmed with regard to overall trip rates per household, the assumption is less applicable to disaggregated trips. It is the contention of this paper that because of the demographic and labor-force transformations of the 1970s and 1980s, the composition of person trips has changed through a relative decline in the share of home-based/nonwork trips, as well as through an absolute drop in the average number of these trips per household. Paralleling this decline has been a rise in the shares and numbers of home-based work and non-home based trips. A comparison of the results with other metropolitan areas suggests that, in general, rates for special-purpose trips are more likely to be stable cross-sectionally than intertemporally. According to the 1984 Dallas-Fort Worth travel survey, an average household made 8.68 trips per day, a rate that has remained fairly stable since 1964. Person trips per person and vehicle trips per person, however, have had a pronounced increase since 1964 reflecting the smaller household size and lower automobile occupancy rates of the recent decade. The results of the 1984 travel survey also indicate that (a) the average trip length in the metropolitan area is about 7 mi, (b) the average trip duration is 17 to 19 min, (c) the automobile occupancy rate is 1.13 for work trips and 1.5 for nonwork trips, (d) the transit mode share is 1.7 percent, and (e) the peak-hour travel time is between 7-8 a.m. and 5-6 p.m.

The North Central Texas Council of Governments (NCTCOG) travel surveys were conducted in 1984 for the primary purpose of updating travel forecasting models to reflect changes in travel characteristics since 1964 when the Texas State Department of Highways and Public Transportation conducted a travel survey. Of special interest were changes in life-style and economic conditions that have occurred over the last 20 years. The primary concern was to identify changes in trip rates and trip lengths. Trip rate changes were of particular interest because the variability exhibited in data from the previous survey was a matter for concern and needed to be clarified or resolved.

Consequently the survey was designed to estimate the trip rates for the three trip purposes used in the NCTCOG models: home-based work, home-based nonwork, and nonhome based. The rates were estimated at the residential end of the trip using a home-interview survey. Trip rates at the destination end were estimated using workplace and special generator surveys.

Work trips to major employment centers were examined because of the tremendous employment growth in the Dallas-Fort Worth Metropolitan area in the last few years. It was considered necessary to obtain especially detailed information on trip attractions at employment centers and data about other trips made to and from activities at employment centers. A workplace survey was included in the survey program to

obtain information about trips by workers and nonworkers at each survey location.

Better information about the potential use of the transit system was the focus of a third survey. This interest was strongest on the part of the two transit authorities approved in Dallas and Fort Worth in 1983. Dallas Area Rapid Transit in particular wanted information for use in planning a light rail transit system that is scheduled to start operating in the early 1990s.

Before designing the survey, the NCTCOG data base and models were carefully reviewed to identify weaknesses and deficiencies. The principal areas of concern were related to work-trip attraction rates. Other areas considered in need of additional information were attraction rates for other purposes and changes in household characteristics that affect home-based trip production rates.

The survey was designed to address the areas of weakness and deficiency and to answer additional questions being raised about travel forecasting activities by the various clients of NCTCOG. Another consideration in the survey design was to compare results and update the 1980 Census Journey to Work information for the Houston Consolidated Metropolitan Statistical Area (CMSA).

The home-interview survey was conducted in the spring and summer of 1984; the workplace survey was conducted in the summer; and the transit on-board survey was conducted in the fall. The surveys were funded with special grants of UMTA Section 9A funds and FHWA Section 112 funds.

## HOME-INTERVIEW SURVEY

The principal objectives of the home-interview survey were to obtain information on trip generation and trip distribution, and to relate that to household characteristics, vehicle ownership, and vehicle occupancy. The Dallas-Fort Worth metropolitan area has grown rapidly in the preceding few years, and changes in traveler characteristics and travel conditions were believed to have influenced trip-making behavior. The area's population grew by 89 percent between 1964 and 1984, the year of the last survey, and by 16 percent in the period 1980-1984.

The survey was designed by the consulting firm that had reviewed and analyzed the NCTCOG travel models, therefore the firm was familiar with the needs for additional information relating to those models. The survey design was also based on information from the 1964 Texas Department of Highways and Public Transportation survey, the 1980 U.S. Census Bureau's journey-to-work data and several other data bases relating to travel characteristics. The design assumed that the trip-generation model would continue to be a cross-classification model using only the most robust independent variables, such as car ownership and household size. For reasons of available funding

and the need to obtain a satisfactory error of estimate, the total sample size chosen was 2,800 completed samples. Ultimately 2,500 surveys were completed out of 16,500 samples selected.

The sample units were selected randomly from telephone directories in the respective jurisdictions. The sample was distributed geographically by selecting samples in proportion to population in individual political jurisdictions across the region. Household members were asked to participate in the survey. If they agreed, they were questioned briefly about the characteristics of their household; in particular, their location, their household size, and the number of passenger vehicles they owned. If the responding household fit into one of the cross-classification categories that had not been filled, the selection process continued.

When a cell on the cross classification was filled, no further samples in that cell were selected. A number of backup samples were obtained over and above the quota, to accommodate refusals and other uncompleted interviews. For cells that were difficult to fill, locations where households were more likely to have the desired characteristics were identified, and reverse directories were used to obtain telephone numbers of households in those areas.

When a sample was selected, the household was sent a confirmation letter indicating that it would be contacted in the near future to set an appointment for a personal interview. The selected households were later contacted by telephone to establish a travel inventory day on which travel information on all household members would be recorded. The household was sent a travel diary for recording respective trips. The telephone call and the diary included instructions on procedures for recording travel information. On the day before the designated travel day, the household was contacted as a reminder of the survey and to set an appointment for picking up the diary. The remainder of the interview would be completed in person at that time. When the household was visited, the information on the travel diary was reviewed and clarified to be sure that it was as complete and accurate as possible.

The principal problem encountered with the home-interview survey was the quality and turnover of the personnel conducting the interviews. At the time of the survey, the Dallas-Fort Worth Metropolitan area was experiencing a tremendous economic boom and was attracting new residents from economically depressed areas elsewhere in the country. The survey contractor used a temporary personnel agency to obtain interviewers. At the outset the agency sent many unqualified interviewers; when the agency screened applicants more rigorously, the number of interviewers provided decreased to less than adequate. Therefore the contractor had to resort to newspaper advertisements to obtain personnel. Not unexpectedly, the quality of the various interviewers was questionable at best, and they required very stringent training and supervision. Also, there was considerable difficulty keeping the personnel who were trained, partly because they did not like dealing with the home-interview situation, but also because they often found better-paying jobs after they were in the area a few days. The decision to use a temporary personnel agency rather than a survey firm with experienced and stable staff was a mistake.

The decision to conduct personal, in-home interviews was the cause of some of the personnel turn-over problems. This interview approach was chosen because it would replicate the

procedure used in 1964 by the Texas State Department of Highways and Public Transportation. One reason for the in-home interview was that it was believed to provide better, more accurate information. Considering the personnel problems encountered, it is questionable whether this goal was achieved.

The result of this situation was that it caused a major cost overrun and extended the time of the survey beyond the end of May 1984 when it was supposed to have been completed. Because the survey was not finished until July, when school was not in session, the results had to be adjusted to account for differences in travel patterns when school trips were not being made.

## WORKPLACE SURVEY

The workplace survey was probably the most important and interesting of the three surveys. It provided unique and useful information about off-peak travel to and from attraction activities. The workplace survey provided information about characteristics of the respective attraction activities and about generation rates, trip distribution, mode of arrival, vehicle occupancy, midday travel, parking usage, and transit accessibility. The principal reason for this survey was the tremendous amount of interest of local governments in the trip-generating potential of various kinds of activities. This interest was due to the amount of new and changing development in the metropolitan area, numerous requests for rezoning, and related consideration for traffic impact. Finally, the attraction-generation information would prove useful because the greatest amount of congestion occurs at locations of concentrated attraction activities.

The workplace survey was also designed to fill a cross-classification matrix. The factors for cross classifying activities were location and type of activity. For example, activities in central business districts, outer business districts, and suburban areas were cross classified by retail, basic, and service activities. A quota for each cell was established, and sample units were selected from a listing of employers by location. The survey design called for 400 sampled establishments; 366 successful samples were obtained.

The sample activity establishments received a letter from the chamber of commerce in their area, and another from the chairman of the metropolitan planning organization policy board. The letters were followed by a telephone call from a key person on the survey staff. If the owner of the selected establishment did not wish to participate in the survey, another sample unit was selected for that particular cell. The establishment owner was asked to identify a key contact person who would serve as a liaison for the survey activity. The contact person was then visited and briefed on the purpose and procedures for the survey.

The survey procedure called for a maximum of 300 workers at each of the 400 sampled establishments. The employees were given forms by the liaison person for their establishment; a survey staff person distributed forms at the smaller establishments where a liaison could not be provided. The employees were asked to fill out the survey form and leave it at their workplace or return it by mail if it was not possible to complete the form and leave it at the workplace.

Visitors to each sampled establishment were asked to fill out a survey form that differed from that completed by employees. The visitor forms were usually distributed by survey staff unless the number of visitors was so small that the task was not too burdensome for establishment employees. Delivery vehicles arriving at the sampled establishments were also surveyed in a similar manner.

Among the workplace survey samples were seven major generators at Dallas–Fort Worth Airport, a university, a high school, a truck terminal, a shopping center, a hospital, and an amusement park (Six Flags Over Texas). These generators were chosen for broader reasons than the remainder of the survey. Their unique and important nature represented special generators that had particular characteristics applicable in similar situations throughout the region.

Before administering the survey, nine pretests were conducted on a representative group of establishments to identify problems that might be expected to occur with either the survey forms or the procedures. The process of this survey was more successful than the home-interview survey. The generally accepted reason for this was that most of the personnel problems had been resolved by the time the home interview was completed. At the start of the workplace survey there was a smaller and more reliable cadre of interviewers, and the interview process was considerably less stressful than the home-interview survey.

#### ON-BOARD TRANSIT SURVEY

The on-board transit survey used is the traditional survey that has been conducted throughout the country for some time now.

The purpose was to estimate current mode split for the transit operators and to identify any particular characteristics that could be useful in identifying the ridership potential for improved transit services in the future. The survey required a quota of runs of the major transit operators in Fort Worth and Dallas. The private bus operator, Texas Bus Lines, and airport bus operators were also included in the sample. However, the return rate was quite disappointing at only 22 percent; the reason for this lower-than-expected return has not been found.

#### CONCLUSIONS

The entire survey program cost approximately \$750,000, which was 25 percent more than was originally intended. As discussed, this is attributed primarily to personnel turnover problems. Results were generally satisfactory; however, some of the procedures would be changed if the survey were conducted again. The main change would be to have a survey firm take full responsibility for the interviewing process. In the same situation an in-home interview would still be conducted, but it would be done by telephone. The home-interview should not have begun so late in the spring; it should have been postponed until the next year and begun earlier in the spring. Conducting the survey in the fall would not have allowed enough time to complete the survey before the Christmas shopping season. In general, the results and the procedures of the workplace survey were pleasing. Some of the coding for the on-board survey was disappointing. This seems to be attributable to the survey supervisor not being resident, and, therefore, being able only to spot check the coding process.