The 1977 Census of Transportation: An Update

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This paper reports on the status of the 1977 Census of Transportation, which consists of four surveys: National Travel Survey, Commodity Transportation Survey, Truck Inventory and Use Survey, and Survey of Nonregulated Motor Carriers and Public Warehousing. It deals with the methodology used in these surveys compared with that followed in the 1972 census. This report also examines the problems and benefits realized from the 1977 approach. Finally, it suggests additional improvements and alternatives possible for future transportation census taking, particularly for the 1982 census.

The Census of Transportation was initially conducted for the year 1963 and has been repeated for 1967, 1972, and 1977. The census was established to cover the major data gaps that already existed. In 1966, Donald E. Church, chief of the Transportation Division, U.S. Bureau of the Census, observed that "prior to the 1963 census, nearly all of the available transportation statistics were by-products of regulatory and promotional activities. Statistics were adequate for some aspects but poor or completely missing for others...[and] there were critical gaps." The most critical data gaps were identified in the areas of commodity flow, personal travel, trucking resources, and nonregulated motor carriage. The objective was to close these gaps without duplicating data already available from other government or private sources. This led to the adoption of a program consisting of a series of individual surveys: National Travel Survey (NTS), Commodity Transportation Survey (CTS), Truck Inventory and Use Survey (TIUS), and Survey of Nonregulated Motor Carriers (SNMC).

The 1977 Census of Transportation has been substantially modified and improved since the previous census was taken covering the year 1972. The methodology of each survey that is part of the Census of Transportation has undergone a critical review and evaluation between census years and, within limitations imposed by budgetary and employment-ceiling restraints, has been revised with the aim of improving the usefulness of these statistics. Unfortunately, some changes have had an adverse impact on timely release of these data.

Each survey will be discussed here in terms of changes in methodology, the reasons for those changes, and their consequences. Potential modifications for the 1982 Census of Transportation will also be examined.

1977 NATIONAL TRAVEL SURVEY

The purpose of the 1977 NTS was to provide statistical data on the volume and characteristics of nonlocal travel by the civilian noninstitutional population in 1977. For the survey, nonlocal travel was defined as any trip extending 100 miles or more from origin to destination. Specifically excluded from the survey were (a) travel taken as part of an operating crew on a train, plane, bus, truck, or ship; (b) commuting to a place of work; (c) travel by students between home and school; and (d) travel by members of the Armed Forces while on active duty.

The survey was based on a sample of households selected from each of the 50 states and the District of Columbia. Interviews were conducted with the sample households to obtain information on the number of trips taken by members of the household and on certain trip-related characteristics. Selected social and economic characteristics of household members were also collected. The survey was planned and jointly sponsored by the U.S. Department of Transportation, the U.S. Travel Service, and the Bureau of the Census.

Methodology

The 1977 NTS is based on information obtained primarily by personal interview from a national probability sample of approximately 25 000 housing units representing the total civilian noninstitutional population of the United States. Each sample household was designated to be interviewed at approximately three-month intervals over the survey period to develop a record of all nonlocal trips taken by household members during calendar year 1977.

Interviewing was accomplished primarily through a personal visit to the household. Each member 14 years of age or older was asked to report all the trips he or she took during the reference period. Household members not present at the time of the initial visit were later telephoned and asked to report their trips. Trips of persons 13 years of age or younger were reported by a knowledgeable adult member who was present at the time of the visit.

The 1977 NTS was based on a sample of households. Persons whose usual place of residence was located at the sample addresses during the first (April) enumeration formed the basic sample of households interviewed in subsequent visits.

As previously mentioned, several interviews were conducted with the sample household throughout the survey period. In all interviews subsequent to the initial one, households were asked to report trips taken since the last interview. A "bounding" technique was designed to prevent reporting of trips in a current reference period that actually were taken and reported in a previous reference period.

Comparison with Previous Surveys

Previous travel surveys were conducted as parts of the 1963, 1967, and 1972 Censuses of Transportation. The 1963 survey involved approximately 6000 sample households, interviewed by personal visit at quarterly intervals to obtain trips taken during 1963. In 1967 and 1972, questionnaires were mailed to a sample 12 000 and 24 000 households, respectively, at approximately quarterly intervals to obtain data on trips taken during the respective calendar years. Telephone interviews or personal visits were made only when it was necessary to clarify certain information reported, or to follow up nonresponses to the mail inquiry.

Probably the most significant change in the 1977 survey from the previous two travel surveys was the method of data collection. In 1977, the initial contact with the sample household in each interview period was made by a personal visit preceded by a letter. Household members who were not available at the time of the visit were interviewed later by telephone. In the two previous travel surveys, information was obtained primarily by mailing the questionnaire to the sample household, with the request to complete the form and return it by mail to the Bureau of the Census. It is not possible to measure the impact of this methodological change exactly, but tests conducted prior to the 1977 survey clearly indicated that the personal visit interview technique elicited the reporting of more trips

and more accurate and complete information relating to the trips reported.

Other methodological aspects of the 1977 survey that differ from previous travel surveys included a change in the technique used to report trips of 100 miles or more and refinement of the adjustment factor used to convert straight-line distance to route miles. The 1963 and 1967 surveys included as a trip "each time a person goes to a place at least 100 miles away from home or is out-of-town one or more nights." For the 1972 survey, the definition of a trip was changed to "each time a person goes to a place at least 100 miles away from home and returns," thus omitting all travel under 100 miles regardless of whether one or more nights were spent away from home.

The 1977 survey used the 1972 trip definition although the technique for collecting information on such trips was modified. Respondents were asked to report all trips of 75 miles or more (one-way), and those calculated through the computerized system to be less than 100 miles in distance were excluded from the estimates of trips derived from the survey. This change in questionnaire wording was instituted in an effort to minimize the failure of respondents to report trips of 100 miles or more due to the possible misconception of actual distances traveled.

Another important revision in the 1977 survey involved the adjustment factors used in determining route miles for a trip. In 1963 and 1967, surveys used the one-way straight-line miles in presenting data on distances traveled. The 1972 and 1977 surveys present distances traveled in terms of route miles. Route miles are round-trip, straight-line miles adjusted upward for the general circuitous nature of the route traveled and are considered a more accurate measurement of actual miles traveled on a trip. The size and type of the adjustment was based on the mode of transportation. In 1972, a standard upward adjustment (circuity factor) was applied to all trips taken by a particular mode of transportation. Research conducted for automobile and truck trips prior to the 1977 survey resulted in separate circuity factors for trips taken by these modes between any two states, as well as for trips taken entirely within a state.

In addition to the circuity factor, automobile and truck trips were adjusted upward by 25 percent of the straight-line mileage in 1972 to account for a general tendency to take side trips and to travel along the most interesting or fastest, rather than shortest, routes. In 1977, after applying the circuity and the 25 percent side-trip factors for automobile and truck trips, the actual route miles for a trip were reduced by 14 percent. This adjustment was based on results from a study conducted in conjunction with the survey that clerically measured the length of trips by using actual route and side-trip information supplied by respondents. The study was based on a representative sample of the trips reported in the first and fourth quarters of the survey. There has also been a substantial increase in the amount of trip-related information obtained in the 1977 survey compared with previous surveys (1).

Difficulties and Problems Encountered

The major problem in the 1977 NTS was the sample methodology used. The 1977 NTS used a sample of households and stayed with the same household throughout the interview period. The main purpose of this methodology was to indicate the dispersion of travel among households and persons. If one or more trips were taken by any members of a household during the year, the household was classified as a traveling household for the year. Likewise, if a person took one or more trips during the year, the person was counted as a traveler for the year. Although the results of the 1977 NTS were not adversely affected by the methodology used, the time required to prepare the file and calculate the inflation or weighting factors was much longer than first anticipated. This was a major factor in the delay in the publication of the final report.

Looking Ahead to 1982

The major concern is one of providing timely data on travel volume and also providing information on the characteristics of traveling and nontraveling households and persons. As was mentioned earlier, providing the traveling and nontraveling characteristics added greatly to the delay in publishing the final 1977 NTS report. Obviously, alternative methodologies will be reviewed to determine which would be best for the NTS. One alternative, however, which will likely be seriously considered, is a split sample with a small national sample set aside and used to provide the traveling and nontraveling characteristics and a much larger sample used to provide information on trip volume and characteristics. It should then be possible to process the larger sample much more quickly because it would not be used for traveling and nontraveling characteristics.

COMMODITY TRANSPORTATION SURVEY

The purpose of the CTS is to provide statistics on the volume and characteristics of commodity shipments by manufacturing establishments in the United States. The survey is based on shipping data obtained from a net sample of 16 000 manufacturing establishments selected from the 1977 Census of Manufacturers' (COM's) universe of manufacturing establishments. Data collected include weight and value of commodities shipped by means of transport, as well as areas of origin and destination.

The CTS was substantially modified in 1977 in order to strengthen the conceptual framework by linking the sampled data back to COM universe totals. To accomplish this, several major steps were taken:

1. The CTS universe was redefined,
2. The value of shipments was determined from CTS respondents, and
3. CTS establishment data were directly verified at the local level with COM establishment data.

CTS Universe

The most important limitation of the earlier surveys was that the defined universe of the survey, namely intercity shipments of the larger manufacturing establishments, made the results difficult to verify or relate to other figures. (The COM excludes private-sector establishments with no paid employees and all government-owned and government-operated establishments.) Therefore, the universe has been broadened to include all shipments from all establishments classified in manufacturing. As a result, the Census Bureau will be able to edit, review, and analyze the CTS data against known universe totals and to verify and link the commodities "shipped" in the CTS to those "produced" in the COM.

The categories added to the 1977 CTS are

1. Local shipments (less than 25 miles) from in-scope establishments;
2. All shipments of establishments that shipped

90 percent or more of their volume less than 25 miles;

3. All shipments from establishments with less than 20 employees;

4. All shipments included in the following Standard Industrial Classifications (SICs): 19, ordinance and accessories; 2026, fluid milk; 2051, bread and other bakery products, except cookies and crackers; 2097, manufactured ice; 241, primary forest products; and 27, printing, publishing, and allied industries;

5. Shipments made by the following means of transport: (a) own power or towed, including motorized vehicles, aircraft, or vessels that are sometimes moved from the manufacturer under their own power, and commodities such as prefabricated buildings that are towed away; (b) pipeline, primarily affecting shipments of petroleum products from refineries; and (c) parcel post shipments through the U.S. Postal Service; and

6. Shipments originating in Alaska and Hawaii.

Value of Shipments

In order to link the CTS and COM data, a common data item was required. It was decided that the most useful and appropriate device was to request the value of the shipment from CTS respondents. Because traffic records are not usually priced out, i.e., do not carry the value of the shipment, many respondents were required to access other documents such as sales invoices and sales memos. However, there is no evidence that this added workload adversely affected the response rate. Although there was a 20 percent overall nonresponse rate, this compares favorably with the response rates experienced in the other economic censuses. Furthermore, of all those who responded, more than 90 percent reported both weight and value.

Benchmark CTS Data to COM

Each 1977 CTS establishment report was directly verified by a computer match to the corresponding COM establishment report. The CTS value-of-shipment data were summarized at a five-digit Standard Transportation Commodity Code (STCC) level and compared with the appropriate code(s) reported on the census record. (A "bridge" between the STCC and SIC classification systems was developed by the Census Bureau in order to link the reported data.) Those reports that do not fall within previously established tolerances were flagged for review and possible correction.

In 1972, commodity coding was clerically verified by comparison with the SIC code of the establishment. Establishments with a majority of their shipments coded differently from the industry code were referred for review. It is probable that the more rigorous commodity verification conducted for 1977 uncovered a significant number of coding errors by respondents that would not have been corrected by using the 1972 procedure. The 1977 procedure also served as a check on respondents' sampling of shipping documents.

As a final step, the individual CTS establishment reports were adjusted at each five-digit Transportation Commodity Classification (TCC) level by the ratio:

$$A_{ec} = V_{ec}/v_{ec} \quad (1)$$

where

A_{ec} = adustment for five-digit TCC commodity c in establishment e,

V_{ec} = COM value of five-digit TCC commodity c in establishment e, and

v_{ec} = CTS estimated value of five-digit TCC commodity c in establishment e.

The estimation procedure will also take advantage of the known 1977 COM universe totals. Estimates of value and weight shipped will be made for four geographic levels of origin (United States, census division, states, and production areas). Adjustment factors were computed that will reconcile the CTS aggregated data to the COM levels. They will take the following form:

$$A_{ig} = V_{ig}/v_{ig} \quad (2)$$

where

A_{ig} = adjustment to the plant expansion factor for all establishments in industry (SIC) i and area g,

V_{ig} = COM aggregated value of industry (SIC) i in area g, and

v_{ig} = CTS aggregated value of industry (SIC) i in area g.

There are certain assumptions that must hold if these adjustments are to provide unbiased results. The most important are as follows:

1. A high correlation between weight and value exists among shipments of a particular five-digit STCC commodity.

2. Value is reported on the same basis in both the CTS and the COM. Indications are that respondents did report value consistently between the two surveys.

Other Modifications to Survey Design

The sample design for the 1977 CTS is a two-stage stratified sampling plan. In the first stage, a sample of approximately 19 500 individual manufacturing establishments was selected from the Standard Statistical Establishment List (SSEL), a computerized list of all employers and their establishments. Large establishments, as determined by the total employment size code, had a greater probability of selection than smaller establishments. Establishments in certain designated geographical areas of high production activity (production areas) had a greater probability of selection than other establishments, to enable the publication of data for these areas. In the second stage of sampling, each establishment selected shipping documents from its own records. Large establishments were requested to select a greater number of documents than smaller ones. For large establishments ($\geq$500 employees), an average of 120 documents was requested; for medium establishments (100-499 employees), an average of 60 documents; and for small establishments, an average of 30 documents. Correspondingly, there were three separate forms for large, medium, and small establishments. Each establishment was asked to report the number of documents in its files and then to sample at a specified interval starting from the first document.

In the 1972 survey, an average of 150 shipping documents were selected per establishment, regardless of establishment size. Studies showed that, for small and medium establishments, the variance between establishments was greater than the variance within establishments. These component contributions to the variance were made more nearly equal by decreasing the number of shipments per establishment and selecting 50 percent more establishments. The figures of 30, 60, and 120 shipments for small,

medium, and large establishments, respectively, were derived from an approximate cost-variance formula. This distribution has the added benefit of decreasing the reporting burden on the individual establishment.

Evaluation of Respondents' Self-Sampling

As outlined above, the sample design for the CTS is a two-stage stratified sampling plan, with the second stage requiring each establishment to sample its shipping documents according to a sampling plan provided by the Census Bureau. How well these instructions are followed has never been certain, and, consequently, a study of this process was conducted as part of the evaluation process for the 1977 economic censuses (2). The conclusions noted in that study are as follows:

> The evaluation has shown conclusively that a large percent[age] of manufacturers did not take a sample of their shipping documents properly. Mistakes were made in undercoverage, overcoverage, haphazard sampling, and [use of] an incorrect sampling rate. Some of these mistakes were not preventable due to the system of recordkeeping used by the establishments. However, a large percentage of the mistakes could have been avoided if the respondents were willing to follow the instructions.
>
> The mistakes made in sampling apparently have a serious effect on the estimates in the 1977 CTS. This was shown in the third phase of the analysis and was supported by the results of the sign test in the second phase of the analysis. Because the analysis was [done] prior to the CTS edit and adjustments to the Census of Manufactures, final conclusions will not be made until after the future analysis is completed. However, it is being suggested that the procedure for collecting the data in the CTS be carefully studied in order to modify the existing procedure or create a new procedure.

It should be noted that these conclusions are preliminary and were made prior to the match to the COM records. A future analysis will be performed to determine whether the corrections resulting from the match have an effect in reducing the bias.

Modifications to the Report Form

In addition to the items required for the expanded scope of the survey, other data items have been expanded somewhat, with the additional items available, for the most part, from the shipping document.

In 1972, when the shipping document contained more than one commodity, the respondent was instructed to code the entire shipment to the commodity that contributed the greatest proportion to the total weight. The 1977 survey instructed the respondent to list and code each commodity separately (up to a maximum of seven).

The name and street address of the consignee, along with city and state of destination, were requested. This information will provide a potential for studies involving input-output analysis at both national and regional levels, as well as serve as a unique marketing tool for identifying industries that purchase particular commodities. By matching the consignee's name and address to the SSEL, it will be possible to derive the consignee's characteristics (e.g., industry, employment, and receipt size) and to summarize this information in a disclosure-free way. This is an experimental project not yet funded. However, this approach has been strongly endorsed by the Gross National Product Data Improvement Project Committee (3), Bureau of Economic Analysis, U.S. Department of Transportation, and U.S. Department of Energy.

An additional breakdown was added to distinguish motor carriers regulated by the Interstate Commerce Commission (ICC) from those exempt from ICC regulation.

Publication Plans

The publication plans for 1982 call for an expansion in the amount of data available to the public. The major changes include

1. An increase in the number of production areas from 27 to 49;
2. An increase in data classified by industry (shipper groups) for analysts who wish to study the shipping characteristics of establishments and industries and who wish to link the CTS flow data to regional and national production consumption data;
3. An increase in the number of more analytical summary tables and more cross-classification within tables;
4. The use of actual numbers in all tables rather than percentages; and
5. The expansion of commodity group tables to show data at the two-digit major group level.

Benefits and Trade-Offs of Modifying 1977 CTS

As a result of the foregoing modifications, the CTS has been greatly improved through (a) a stronger conceptual framework that allows cross checking to other data sets; (b) greatly improved editing and estimation procedures through benchmarking to the COM; (c) more usable tabulations, including expanded geographic and industry detail; and (d) fewer suppressions for reasons of confidentiality and reliability of data.

What has been traded away in this process? The answer cannot be complete until users have a chance to scrutinize the publications and public use tape. These are currently scheduled for release in 1980. A partial list would include

1. Loss of comparability with prior CTS data,
2. Fewer individual observations (In 1972, the 13 000 responding establishments provided 1.6 million shipments, an average of 123 shipments/plant. In 1977, the 16 000 responding establishments provided slightly more than 1 million shipments, an average of 64 shipments/plant. The effects of this reduction in the number of observations will not be completely known until final data are tabulated; however, preliminary figures indicate that the sampling variability is comparable to the 1972 experience), and
3. Less timely release of data (In 1972, the individual publications were issued from October 1974 to August 1975. The current time schedule calls for publication to begin about July 1980, or about nine months later than the comparable 1972 data, and end in October 1980).

Things to Do in 1982

The 1977 CTS will make a significant contribution toward solving the jigsaw puzzle that is commodity flow freight data. There is much left to do. Unfortunately, the proposed budget for the 1982 Census of Transportation is unchanged from the 1977 level of activity. Nevertheless, several improvements are possible.

The 1977 CTS was, in many ways, a pioneering effort. In particular, the development of appropriate matching, editing, and estimation procedures required much more effort than initially expected. With the experience gained in 1977, the operational schedule for 1982 can be improved. The number of discrete points of origin may be extended. This is potentially possible in two major ways. In 1977, the number of establishments reporting was extended and the number of shipments from each reporting plant was reduced. The results of this redesign will be evaluated with a view toward further extending the principle in 1982. This may permit an increase in the number of origin points, thereby resulting in a wider geographic distribution and description of the transportation network. Small shippers whose products are primarily for local consumption will also be identified. If these can be successfully identified, they will be asked to report on a summary, short form that would simplify the reporting burden and processing. With the resulting savings, more resources can be directed to further increasing the points of origin.

TRUCK INVENTORY AND USE SURVEY

The TIUS provides data on the physical and operational characteristics of the nation's truck population. It is based on a probability sample of private and commercial trucks registered (or licensed) in the state during 1977.

The 1977 survey was conducted in a similar fashion to the 1972 survey. However, there were important changes in methodology and content.

Methodological Changes

Stratification of the sample was based on small versus large trucks (body type) rather than light versus heavy trucks (registered weight) as in previous surveys. The small-truck stratum included pickups, panels, vans, multisteps, and walk-ins with a gross vehicle weight of 14 000 pounds or less. All other vehicles were selected as large. This revision in stratification was an effort to reduce the amount of crossover from one stratum to the other. Although the number of crossovers in 1977 compared with 1972 has not been quantified yet, preliminary indications are that this has been somewhat reduced in 1977.

As in past surveys, the registration files maintained by R.L. Polk and Company served as the sampling frame from which the sample was drawn except for a few states that were sampled directly by the Census Bureau. (In 1977, only Oklahoma was sampled directly by the Census Bureau.) To develop the publication totals for the 1972 and earlier surveys, the proportions derived from the sample reports were benchmarked to Federal Highway Administration (FHWA) totals of private and commercial truck registrations. These FHWA estimates are based on calendar-year summary reports from the individual states that reflect differences in truck definitions used by the states for vehicle registration. This can be expressed as

$$T_c = (t_c \cdot T_{FHWA})/t_t \quad (3)$$

where

T_c = estimated number of trucks with characteristic c,
t_c = number of trucks with characteristic c in sample,
t_t = total number of in-scope trucks in sample, and
T_{FHWA} = total number of private and commercial trucks reported by FHWA.

For 1977, this procedure was revised so that the individual state universe estimates represent the base from which the sample was drawn, adjusted to a common date (July 1, 1977). These estimates serve as the benchmark to which the survey results were adjusted to produce the more detailed estimates shown in the publications. They were developed through a review of the characteristics of each vehicle registered in each state.

The estimates were developed independently for small and large trucks and can be expressed in the following manner:

$$T_c = [(ts_c \cdot TS)/ts_t] + [(tl_c \cdot TL)/tl_t] \quad (4)$$

where

T_c = estimated number of trucks with characteristic c,
ts_c = number of small trucks in sample with characteristic c,
ts_t = total number of small trucks in sample,
TS = Polk count (July 1, 1977) of small trucks adjusted by census-determined out-of-scope trucks,
tl_c = number of large trucks in sample with characteristic c,
tl_t = total number of large trucks in sample, and
TL = Polk count (July 1, 1977) of large trucks adjusted by census-determined out-of-scope trucks.

The item-by-item computer edit performed more consistency checks between data entries to identify and correct major errors and/or contradictions in reporting. At this time, missing data were imputed for annual and lifetime miles, type of engine, and number of trucks and truck-tractors operated from the base of operation.

The procedure for imputing annual and/or lifetime miles was revised from the technique used in 1972. Rather than using a standard estimating technique of imputing missing data with cell averages, a mean ratio for each model year was computed and an algorithm was developed that used a combination of reported variables (e.g., annual miles, lifetime miles, and age of vehicles) and the computed mean ratio to determine values for missing data.

Content of the Questionnaire

The questions asked of respondents were substantially increased to provide greater detail on the physical and operational characteristics of the sampled trucks. The full questionnaire is reproduced in the TIUS published reports.

Improvements for 1982

We believe a substantial improvement has been made in the usefulness of the TIUS by providing greatly expanded detail and making the user's job easier by showing actual numbers in the tables rather than percentage figures. However, there is clearly one major improvement due for 1982--more timely release of data. Due to a combination of circumstances, some beyond our control and some not, the 1977 reports were about 18 months behind the 1972 release dates. Our goal for 1982 is to return to and perhaps beat the 1972 release dates.

NONREGULATED MOTOR CARRIERS AND PUBLIC WAREHOUSING

This survey is the only phase of the Census of Transportation that deals with privately owned business enterprises that were engaged primarily in pro-

viding for-hire transportation to the public. It has had a rather checkered career in that it began in 1963 as part of the Census of Transportation, was transferred to the Census of Selected Services in 1967 and 1972, and returned to the fold in 1977.

The survey presents data only on that portion of the motor carrier industry not subject to economic regulation by the ICC and the public warehousing industry. As a result, it has a rather limited audience, primarily intended to fill a void of information needed for the national accounts.

It is being conducted under substantially the same methodology as the previous surveys except that certain questions on expenses and fringe benefits were added. Also, the categories of revenue freight equipment were made comparable to the definitions used by ICC.

There are currently no plans to expand this survey in 1982. However, the Advisory Committee on Gross National Product Data Improvement recommended that there should be a "census of transportation industries with a full complement of questions on inputs and outputs by relevant subindustries." The major obstacle in implementing this recommendation is the restriction in Title 13, U.S. Code, under which the Census Bureau operates, that prohibits the Census Bureau from collecting data for means of transportation for which statistics are required by law to be filed with a designated body (3).

CONCLUSION

The Census of Transportation was originally designed to fill in major data gaps without unnecessary duplication. Therefore, the general structure and objectives of the transportation program differ from those of the orthodox economic censuses, largely because of the availability of various types of transportation data from other government and private sources (4).

While the individual surveys have been expanded and improved on over the years, the goal of the Census of Transportation has not changed since it was conceived nearly 20 years ago. It would appear that the original objective has been substantially achieved. Policymakers, planners, and other users have much more information than existed 20 years ago and are able to make decisions more effectively.

However, there is still much left to do. In this day when questions about energy and transportation are critical, perhaps a new goal should be espoused--the goal of providing an integrated, comprehensive body of statistics that serve rather than confuse the user community. The current state of transportation statistics is characterized by a whole series of conflicting pieces of information, a veritable jigsaw puzzle. New approaches must be conceived if we are to be able to put the pieces together and develop a body of statistics that accurately describe the real world.

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Evaluation of the FHWA Vehicle Classification and Automobile-Occupancy Sampling Manual

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The Federal Highway Administration recently sponsored the development of a how-to manual for conducting automobile-occupancy and/or vehicle classification studies. A draft version of the manual, Guide for Estimating Urban Vehicle Classification and Occupancy, was field tested by the Southeast Michigan Council of Governments in cooperation with the Michigan Department of Transportation. This paper describes how the guide was used to set up a regional vehicle classification and automobile-occupancy study. Study procedures and results are discussed. Overall, the guide was found to be an excellent how-to manual for vehicle classification and automobile-occupancy studies. Perhaps the largest contribution of the guide is the short-count sampling approach it recommends. This approach results in a significant survey cost saving with no loss of accuracy.

The U.S. Department of Transportation continuously reviews and evaluates the kinds of data required to support national and local decisions on transportation. In support of this process the Transportation Research Board established the Advisory Committee on Urban Transportation Data-Reporting Needs and Requirements in 1975. The committee identified vehicle type and automobile occupancy as two important traffic variables that describe the highway system and recommended that the Federal Highway Administration (FHWA) develop and test sampling methods to obtain these data (1). The FHWA implemented this recommendation by contracting with Peat, Marwick, Mitchell, and Company to develop a sampling manual entitled Guide for Estimating Urban Vehicle Classification and Occupancy (2). In addition, the FHWA worked with several metropolitan planning organizations (MPOs) to have them test the procedures described in the guide.

The Southeast Michigan Council of Governments (SEMCOG), the MPO for the southeast Michigan region, in conjunction with the Michigan Department of Transportation (MDOT), was one of two MPOs that tested the guide. This paper describes how the guide was used in setting up a vehicle-classification and