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**U.S. DEPARTMENT OF COMMERCE
Under Secretary of Commerce for Transportation**

PROGRAM FOR A CENSUS OF TRANSPORTATION

A Series of Transportation Surveys



A Report Submitted to the Secretary of Commerce

August, 1956



August 7, 1956

TO: Secretary of Commerce

FROM: Under Secretary of Commerce for Transportation

SUBJECT: Census of Transportation

I have the honor to transmit a report entitled Program for a Census of Transportation, which is in response to your memorandum of April 6, 1954, requesting:

- (1) A review of the need for and feasibility of Census Bureau activity in the transportation field as required by Public Law 671 (80th Congress), and
- (2) Recommendations either for a specific program or for repeal of the statutory authority.

The report concludes that comprehensive transportation statistics are essential for many public purposes, and recommends a Census Bureau program designed to bridge a number of serious gaps now existing in available data. The proposed program consists of a series of interrelated surveys which have been carefully considered with respect to need and feasibility. When combined with existing data already being collected by other agencies, this program should provide a greatly improved statistical coverage of transportation activities.

The Assistant Secretary for Domestic Affairs and the Director of the Bureau of the Census concur in the conclusions and recommendations of the report.

(Sgd.) Louis S. Rothschild

Foreword

The need for a census of transportation has been analyzed and discussed by many groups over the past decade. In appraising the various factors, maximum use was made of those prior efforts. The Bureau of the Census cooperated closely on all phases. In addition, assistance was wholeheartedly made available by other Government departments and many segments of private industry.

Mr. Donald C. Leavens of the Under Secretary's staff directed the review and preparation of the draft report, with the advice and assistance of Mr. Edward Margolin at all stages of the project. Mr. Paul F. Royster, Assistant to the Under Secretary for Transportation, was responsible for general supervision. Necessary technical assistance and background information were provided by Dr. Donald E. Church, Chief, Transportation Division, Bureau of the Census.

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I. CONCLUSIONS AND RECOMMENDATIONS

In response to a request of the Secretary of Commerce, a review has been made of the need for and feasibility of Census Bureau activities in the field of transportation as provided for by law. The following conclusions and recommendations result from this study:

A. Conclusions

1. Comprehensive transportation statistics are required for many public purposes. They are essential to the conduct of the Nation's commerce, and the administrative and legislative processes of Government.
2. There are serious gaps in presently available transportation data.
3. Comprehensive transportation statistics can be obtained most efficiently through a program which utilizes existing data to the maximum feasible extent, and bridges the gaps by a series of interrelated basic surveys, with provisions for necessary supplemental research and developmental activity.
4. The new statistics resulting from the proposed 1958 program, outlined in Section II of this report, when combined with existing data already being collected by other agencies, will provide a greatly improved statistical coverage of transportation activities.
5. The Bureau of the Census has demonstrated the feasibility of undertaking the transportation surveys in the proposed 1958 program.
6. The Department of Commerce, through its Bureau of the Census, is the appropriate agency to carry out the surveys needed for this program. 2

B. Recommendations

The following actions should be taken:

1. The Department of Commerce should undertake a census of transportation and should continue its exploratory and experimental work in the development of sound and efficient methods in this field.
2. The 1958 program should consist of the following interrelated surveys:
 - a. Commodity Distribution by Land, Air, and Water Transportation.
 - b. Passenger Travel by Land, Air, and Water Transportation.
 - c. Truck Transportation Inventory and Utilization.
 - d. Bus Transportation Inventory and Utilization.
 - e. Air Cargo Commodity Movements.
 - f. Experimental Surveys.
3. Necessary appropriations should be requested for this work.

* * *

II. PROGRAM PROPOSED FOR 1958 CENSUS OF TRANSPORTATION

The purpose of a census program is to make available to the public a comprehensive body of transportation information required by today's complexity of commercial and Government activities. Our study indicates that the most efficient method of achieving that objective is to bridge the gaps in existing transport data by a series of interrelated surveys. The program outlined below will produce data covering aspects of all forms of transportation, including land, air, and water.

A. Proposed Surveys

1. Commodity Distribution by Land, Air, and Water Transportation.--This survey is designed to obtain statistics from major classes of shippers showing the transportation and distribution of products by:
 - a. Each class of carrier (rail, motor, air, water, or other means of transport).
 - b. Market channels (retail, wholesale, interplant, etc.).
 - c. Major market areas served from leading production areas.
 - d. Volume of interregional trade within the United States by major class of shipper and product.

Under present plans, general statistics would be shown for two major classes of shippers -- manufacturers and agricultural assemblers -- with detailed breakdowns separately for about 20 representative industry groups. In order to minimize reporting effort, it is planned to obtain the basic data by microfilming systematically selected samples of sales invoices, or shipping advices, at the manufacturing and assembling establishments.

In general, statistics from this survey would provide answers to such questions as:

What are the principal channels of distribution?
How much of the product moves through wholesalers;
how much moves directly to retail channels; how
much is sold directly to institutional users; to
the Government?

Where is the market? How much of the total production moves to various geographic regions; what is the relationship between producing area and sales area; what areas are most important as market outlets for certain commodities; how important is size of city?

How is the product moved to market? How much moves by rail, truck, air and water; to what extent do shippers furnish their own transportation?

2. Passenger Travel by Land, Air, and Water Transportation.--

This survey is designed to obtain statistics showing the volume and character of the passenger travel market in the United States by:

- a. Means of transportation (railroad, bus, automobile, air, water, or other means of transport).
- b. National and regional areas.
- c. Length and frequency of trips, primary purpose of trip, income or occupational status of passenger, and other related factors.

Under present plans, the basic information would be obtained principally by a diary system from a sample of households. The sample design would be similar to the one used for the Census Bureau's current population survey, although the total number of respondents would be much smaller.

3. Truck Transportation Inventory and Utilization.--The purpose of this survey is to compile and publish statistics on truck transportation, except trucking performed by vehicles owned by Federal, State and local governments. The statistics would cover the following major aspects:

- a. Characteristics of the truck fleet -- number of vehicles, classified by weight, body type, age, annual mileage, occupational use, number of private and for-hire fleets by number and kind of vehicles, and other relevant factors.
- b. Practical capacity and utilization of the truck fleet -- measured by tons carried and ton-miles of service performed, classified by type and size of vehicle, kind of service, class of commodity, and other relevant factors.

- c. Amount and nature of service performed by trucks operated by commercial carriers, by major classes of industry, business or other economic activity -- measured by tons and ton-miles of trucking service, by size and type of vehicle, type of service, and other relevant factors.
- d. Truck-utilization ratios for judging relative efficiency of the use of individual trucks or fleets. These ratios would include such measurements for the various classes of operations as average vehicle miles per truck per week, tons hauled per vehicle per week, etc.

Data for the characteristics of the truck fleet would be compiled for each State and Census region, as well as for the Nation as a whole. These data would be obtained from truck operators through the use of mailed questionnaire. Statistics concerning tons, ton-miles and operating characteristics would be tabulated for Census regions and United States totals. This information would be collected by personal interview from a subsample of the truck owners included in the master sample used for the mail inquiry.

4. Bus Transportation Inventory and Utilization.--This survey is designed to develop statistics especially with respect to:

- a. Characteristics of the bus fleet -- number of vehicles, passenger capacity, bus miles, class of service, etc.
- b. Characteristics of the bus industry -- number of carriers, employment, payrolls, revenues, and passengers carried.

A part of the basic data will be assembled from published carrier reports and tabulations by the Interstate Commerce Commission. Data not otherwise available will be obtained through mail questionnaire and field interview.

5. Air Cargo Commodity Movements.--The purpose of this survey is to obtain statistics on air cargo for both domestic and international movements, particularly with respect to kinds of commodities and characteristics of traffic in terms of origin and destination patterns, length of haul, and other factors. Presently available data on this subject are limited largely to the total weight loaded at each airport, without details as to types of commodities loaded and traffic patterns. This survey is designed principally to obtain data showing:

6.

- a. The volume of air cargo by classes of commodities.
- b. Volume of air cargo moving on specific major routes, and the kinds of movements on minor routes.
- c. Volume of interregional air cargo traffic.
- d. Distribution of air cargo by straight-line distance, by class of commodity, size of shipments, revenue and other related factors.
- e. Volume and revenues by major commodity class by type of carrier.

The collection method is designed to minimize reporting effort of carriers by microfilming systematic samples of air bills of lading at the offices of the carriers, or by using other suitable records. Specific information needed from domestic carrier air bills or other records are: Commodity description, weight, revenue, points of origin and destination, and name of carrier. All other information can be obtained by computations based on those facts, or from sources other than carrier records.

6. Developmental Surveys.--In addition to the basic surveys outlined above, the program should make provisions for continuing the experimental work and pilot surveys to develop methods and techniques for undertaking major surveys. The Bureau of the Census has been engaged for a number of years in developing methods for taking transportation surveys. The proposed program is primarily a result of those efforts. Experimental studies are currently in progress to develop ways for cutting costs and speeding up results of surveys in the areas included in the proposed program.

In addition, the law authorizes annual or interim surveys to enable the Bureau to maintain current data. These should be taken in accordance with requirements.

B. Estimated Budget Requirements

The proposed 1958 transportation program is estimated to require the following budget:

1. <u>Basic Surveys in the Field of Transportation.--</u>	
a. Commodity Distribution by Land, Air, and Water Transportation.	\$500,000
b. Passenger Travel by Land, Air, and Water Transportation.	150,000
c. Truck Transportation Inventory and Utilization	250,000
d. Bus Transportation Inventory and Utilization	100,000
e. Air Cargo Commodity Movements.	150,000
2. <u>Experimental Surveys</u>	<u>50,000</u>
	\$1,200,000

* * *

III. STAFF REVIEW OF CENSUS BUREAU ACTIVITY

A. BACKGROUND OF THE PROBLEM

1. Statutory Authority and Present Status

The inadequacy of transportation data, and the need for appropriate action by the Department of Commerce to overcome these deficiencies, were recognized in Public Law 671, which was passed by the 80th Congress in 1948, authorizing a census of transportation. That law, with further amendments broadening the scope of the Department's authority to collect and publish transportation statistics, was incorporated into Title 13, when the statutes were codified in 1954. ^{1/}

The Act of 1948 directed the Department to conduct a census of transportation in 1949 and every fifth year thereafter. The Act further directed that such a census should relate to the year immediately preceding its taking, with the areas covered and the scope of the inquiries to be determined by the Secretary of Commerce. The 1948 Act excluded from the Census "means of transportation for which statistics are required by law to be filed with a designated regulatory body." This exclusion was later clarified by the codification in

^{1/} Title 13, United States Code, as revised, approved August 31, 1954, contains the principal provisions that relate to Census Bureau activities. Section 131 directs the Secretary of Commerce to take ---

"...censuses of manufactures, of mineral industries, and of other businesses, including the distributive trades, service establishments, and transportation (exclusive of means of transportation for which statistics are required by law to be filed with, and are compiled and published by, a designated regulatory body), in the year 1954 and every fifth year thereafter, and each such census shall relate to the year immediately preceding the taking thereof..."

In addition, Section 181 authorizes the Secretary of Commerce to --

"...make surveys deemed necessary to furnish annual and other interim current data on the subjects covered by the censuses provided for in Title 13..."

1954,^{2/} which specified that the exception would be applicable only where statistics, in addition to being filed with a regulatory body, were compiled and published as well.

While the Department was thus authorized and directed to conduct a census of transportation in 1949, funds were not appropriated and the census was not undertaken. Subsequently, funds were appropriated for preparatory work in connection with the regularly scheduled economic censuses then planned for 1953. Intensive developmental work was started in 1951 so as to develop methods that could be employed in the transportation surveys to be undertaken at that time. However, Congress denied appropriations for all the 1953 censuses. As a result, the transportation surveys, as well as the other censuses, were not undertaken.

In the meantime, the Department, on a modest scale, has continued developmental activities at the Bureau of the Census. The principal objective has been to design methods for obtaining essential transportation data at the lowest cost to the Government and business, which at the same time would maintain an acceptable standard of accuracy and detail. In order to test and improve its techniques for undertaking appropriate projects in the field of transportation, the Bureau has completed several pilot surveys ^{3/} and has others in the planning stages.

2. Intensive Review Committee

In view of the fact that Congress denied appropriations for all of the 1953 censuses, the Secretary of Commerce, in October 1953 appointed an Intensive Review Committee to conduct an appraisal of all Census programs. Transportation was only one of the many fields of Census Bureau activity studied by the Committee.

A report of a Panel on Transportation^{4/} was made to the Intensive Review Committee on November 19, 1953. This Panel report confirmed the existence of major gaps in transportation statistics, and recommended that surveys be undertaken in the following areas:

- a. Transportation by trucks not reporting to the Interstate Commerce Commission to be obtained every five years and supplemented by such annual data as are deemed necessary;
- b. Traffic flow surveys of outbound shipments from various classes of industries to be made every five years; and

^{2/} Title 13, U. S. Code, as revised, and approved August 31, 1954.

^{3/} See pages 35 - 39.

^{4/} Part I of Exhibits to the Report of the Intensive Review Committee, February 1954, pages 309-311.

- c. A series of monograph studies in particular areas of transportation where existing statistical data need to be supplemented or refined.

The view was expressed by the Panel of the Intensive Review Committee that "transportation as a whole represents the greatest combination of economic activity in the country" and that a large amount of statistical data is collected which is useful in the management, promotion and regulation of transportation.

In its report to the Secretary of Commerce, the Intensive Review Committee, in February 1954, recommended that no further requests be made for funds to carry out the census of transportation authorized for 1953.^{5/} It recommended instead that the Secretary request the Under Secretary for Transportation to explore further the need for a census of transportation and its feasibility, and to submit either recommendations for a program or for the repeal of statutory authorization and direction. It recommended further that "the Transportation Division of the Bureau of the Census be maintained temporarily with a small staff to continue exploratory and experimental work until such time as a decision is made on the disposition of the transportation census program."

3. The Under Secretary's Review

In April 1954, the Secretary of Commerce, acting on the recommendations of the Intensive Review Committee, directed the Under Secretary for Transportation, with the cooperation of the Assistant Secretary for Domestic Affairs and the Director of the Bureau of the Census, to undertake a complete review of the need for and feasibility of Census Bureau activity in the field of transportation as required by Public Law 671, 80th Congress, and to furnish the Secretary with recommendations either for a specific program or for the repeal of the Act insofar as it pertains to a transportation census. In addition, the Secretary stated in his directive that his general views were "to continue, insofar as our limited budget permits, the development of a sound program...However, if you should conclude that further exploratory or experimental work probably would not be sufficiently fruitful to warrant continuance of developmental activity, I shall recommend the repeal of the provision requiring the Bureau of the Census to act in this field."

This review was approached from its two major aspects, i.e. the determination of need and the determination of feasibility. The determination of "need" was felt to be the immediate task. If substantial need could not be justified, a recommendation could be made

^{5/} "Appraisal of Census Programs, Report of the Intensive Review Committee to the Secretary of Commerce," page 11.

without further examination of feasibility. Furthermore, on the basis of preliminary work of the Bureau of the Census, we felt reasonably certain that Census Bureau activities in the field of transportation were statistically feasible.

As a first step, the Transportation Council of the Department of Commerce was requested to study the census of transportation problem from the viewpoint of the shipper and industry. Also, two other groups were requested to assist in the evaluation of the need for Census Bureau activity in the transportation field. These were: (1) an Interdepartmental Committee consisting of representatives from those agencies having a direct interest in the provision of transportation facilities and in mobilization planning; and (2) an Interagency Committee consisting of representatives from those agencies having a direct interest as users of transportation. Each agency was asked to provide an evaluation of its need for transportation data of the kind that could be developed by the Bureau of the Census.

The analysis which follows is based on an evaluation of the various ideas and recommendations developed by the three groups mentioned above, as well as on a review of the voluminous information made available through the efforts of the Intensive Review Committee and other groups which have worked on the problem, and through the experimental work and pilot surveys already completed by the Bureau of the Census.

B. NEED FOR CENSUS BUREAU ACTIVITY

Transportation is the blood stream that nourishes and keeps alive and growing the very tissues of our economic welfare and our national security. The significance of adequate transportation statistics is strikingly indicated by the fact that transportation costs represent probably the third highest expense item in production, following only labor and materials. Accurate information about the flow of raw materials and finished products, as well as the transportation media available, enables private enterprise to solve many of its production and distribution problems. In Government, adequate transportation statistics are necessary for responsible agencies to carry out fully their regulatory and promotional functions, and for the planning and programming of national defense requirements.

While there is unanimity, generally speaking, concerning the need for adequate transportation data, the problem is difficult when approached from the standpoint of precisely what should be

done by the Census Bureau, and by what methods, to provide the kind of information required. The logical starting point to answer these questions is an inquiry into what Congress had in mind in passing the statute.

1. Intent of Congress

The intent of Congress in authorizing a census of transportation by passage of Public Law 671, 80th Congress, is revealed by a study of the hearing records and reports of the House and Senate Committees to which the bills were referred. There were essentially two principal subjects concerned: These were the need for, and the scope or coverage of, the proposed census of transportation.

The discussions at the hearings leave no doubt that inadequacy of transportation data was considered of major importance. Senator Pat McCarran, sponsor of the Senate bill, testified at the hearing before the Senate Committee on Civil Service as follows:

"...no Government agency has in hand, or is currently gathering anything approaching adequate transportation statistics. For example, nowhere are data available as to the relative use which manufacturers in a given line make of railroads, highways, waterways, and air transportation facilities, in the assembling of materials and in the shipment of products. The same holds true of mineral industries, retail trade, wholesale trade, and other businesses.

"...Nor are data available showing the extent to which manufacturers, businessmen, farmers and others furnish their own transportation through truck ownership and use.

"Congress has many problems to solve in or related to the field of transportation, but lacks the data for intelligent solution.

"An example is the transportation study made by a committee of the House of Representatives in the last session. This study lasted considerably more than a year, and was rather costly, but the experts who at the conclusion of the study attempted to evaluate the data produced filed a report that the study was inconclusive because not enough basic data were available."^{7/}

^{7/} Excerpts from statement of Senator Pat McCarran presented at hearings before the Senate Committee on Civil Service on S.6, 80th Congress, 1st Session, April 15, 1947, pages 19-21.

A principal sponsor among Federal agencies was the Bureau of Public Roads, whose spokesman said:

"With the statistics presently available, there is no way of ascertaining the dependence of agriculture, industry, and business on highway transportation. We cannot determine the extent of the use of the highways by these various segments of our economy. Nor do we know the rate of increase in highway use by various types of agriculture and industry to serve as a basis for planning our highway systems of the future...

"Perhaps the most striking example of the deficiency of our statistical record when the need was the greatest is seen in our inability to appraise the extent and adequacy of our highway transportation in relation to wartime needs.

"...Thus, nowhere is there presently available sufficient information to permit adequate evaluation of our highway needs of the future, nor, short of enactment of S.6 [the transportation provisions subsequently incorporated into Public Law 671, 80th Congress], is it likely that such information will be available at any time in the reasonable future...We strongly repeat our endorsement of the bill and its objectives." ^{8/}

With reference to the two Committees of Congress which held hearings on the bill prior to its becoming Public Law 671, 80th Congress, a number of expressions are available. The Senate report in April 1947 stated that --

"The recent war emergency found the Nation without statistics on transportation in general, particularly highway transportation. In the absence of enabling legislation and availability of data, the War Department called upon Public Roads Administration to gather such material as feasible.

"In addition, a number of State universities have attempted to do the job of assembling highway transportation and related data, with small success..." ^{9/}

^{8/} Excerpts from statement of H. S. Fairbank, Deputy Commissioner, Public Roads Administration, presented at hearings before the Senate Committee on Civil Service on S.6, 80th Congress, 1st Session, April 15, 1947; pages 16-19.

^{9/} Senate Report No. 141, 80th Congress, 1st Session, to accompany S.554, April 24, 1947; page 2.

In its report, the House Committee was equally concerned. It stated:

"...It was pointed out to the committee that the country found itself sadly lacking in information concerning highway transportation at the outset of the recent national emergency and that the absence of such information seriously handicapped the organization of the transportation of resources of the country during the war period." 10/

An earlier House Committee report, released in 1947, made special reference to the statistical deficiencies relating to highway transportation as follows:

"...designed primarily to improve existing information on the highway transportation...This form of transportation is of growing importance, not only in the location of industries and the transportation of goods but also in developing and planning the highway transportation system of the country. It also has significant application with respect to problems which would arise in attempting to meet a future national emergency." 11/

While Congress recognized the importance of adequate transportation statistics, it at the same time realized that there already existed a considerable body of transportation statistics and that duplication of such statistics would be undesirable. The House report indicated that it was the intent of Congress that -- "when adequate data is already available from government sources the Director shall not collect such data by means of a census", and for that reason the exclusion clause was placed in the statute. However, the precise wording of the exception exempted means of transport for which statistics were required by law to be filed with designated regulatory bodies. That wording was believed to mean that carriers who reported statistics of any kind to Federal regulatory bodies were exempt, even though they did not report the kind of information being collected by the census. It soon became apparent that such an exemption could prevent the closing of significant gaps in statistics, because there were important aspects for which regulatory bodies did not require reports from carriers under their jurisdiction.

10/ House Report No. 1936, 80th Congress, 2nd Session, to accompany H.R. 6208, May 11, 1948; page 3.

11/ House Report No. 618, 80th Congress, 1st Session, to accompany H.R. 1821, June 20, 1947; page 5.

In connection with the recent codification of Title 13, Congress subsequently made clear its intent by adding the following words in the exemption provisions:

"...and are compiled and published by..."

The purpose for the amendment was stated in the Senate Report:

"...to make clear the intent of the Congress that the exception contained in the parenthetical phrase is applicable only where statistics are, under existing law, regularly compiled, and published. In such cases, this exception would make it unnecessary for the Census Bureau to compile and publish the same statistics already being compiled and published by some other agency under existing law." 12/

The Congressional intent to authorize the collection of statistics in transportation was reaffirmed in connection with the Department of Commerce appropriations in 1955. The Senate Appropriations Committee directed --

"...that the Transportation Division, Bureau of the Census, be maintained during the fiscal year 1955 with a small staff to continue exploratory and experimental work in which they have been engaged looking toward a complete census of transportation." 13/

In summary, it seems clear that Congress fully recognized the importance of overcoming the deficiencies in transportation statistics which existed when the law was under consideration in 1947 and 1948. The discussion with respect to coverage makes clear that existing statistical collection efforts should not be duplicated; rather, the work of the Census Bureau should be concentrated in the collection of new data that, when used in conjunction with existing statistics, would give the public comprehensive information on transportation.

12/ Senate Report No. 2497 on "Revision of Title 13 of United States Code entitled 'Census'", 83d Congress, 2nd Session; page 2.

13/ Senate Report No. 1541, 83d Congress, 2nd Session, June 9, 1954; page 15.

2. Appraisals of Other Groups

Considerable concern was expressed by many Government agencies immediately following World War II regarding the serious gaps in transportation information which were brought to light by the effort to mobilize the transportation industries during the war. Various Government departments spent considerable time and effort in an attempt to pinpoint those areas of deficiencies in transportation statistics considered most critical from the national economy and defense point of view.

In 1946, the Department of Commerce (Office of Domestic Commerce) reviewed the entire field of domestic transportation statistics and found that "the major gaps that now exist in our transportation data as a whole..." are as follows:

- a. "Private transportation by airway, highway, pipeline and waterway.
- b. "Intrastate transportation by for-hire carriers in all fields.
- c. "For-hire trucking in cities and metropolitan areas.
- d. "Interstate for-hire transportation by air carriers, motor carriers, and water carriers exempt from regulation by Federal regulatory agencies, such as non-scheduled air carriers, exempt motor carriers handling agricultural products exclusively, and the bulk commodity water carriers.
- e. "Class II and III interstate motor carriers of passengers and property regulated by the Interstate Commerce Commission but from whom annual reports are not required at the present time.
- f. "Commodity movement data by all agencies of transportation, except to a limited extent from railroads, and some water carriers."

The Subcommittee on Transportation of the Federal Committee on Economic Statistics established a Panel on Motor Transport Statistics to investigate and report on the need for additional highway statistics. The members of the panel represented the primary Government agencies that were concerned with transportation, and agreed unanimously that "present Federal statistics on motor transport are inadequate" and recommended that the situation be remedied by coordinated action by two Federal agencies -- the Interstate Commerce Commission and the Bureau of the Census. The panel recommended that

The Commission require annual reports from all carriers subject to its economic regulations, and that the Bureau obtain statistics for all other for-hire and private highway carriers, in order --

"That the reports issued by the Bureau of the Census incorporate the basic data from the reports rendered to the ICC to the end that there may be available, for the use of the Government and the public, uniform statistics on motor carriage of property and passengers." ^{14/}

The Interstate Commerce Commission, shortly thereafter, increased the scope of its reporting requirements to include all classes of carriers subject to its economic regulations. In 1945, the Commission initiated its continuous waybill sample to measure traffic flow on railroads, which closed a serious gap. The Corps of Engineers, in recent years, has undertaken tabulation of origin and destination statistics for selected commodities on domestic waterways.

a. Transportation Panel of the Intensive Review Committee

An intensive sampling of the degree of interest in the field of business and Government in closing the gaps indicated above was conducted by the Transportation Panel of the Intensive Review Committee in 1953. Individuals included in the sample represented industrial and agricultural traffic managers, transportation labor, transportation research, marketers, manufacturers, trade associations, carrier associations, and Federal, State and local officials.

The comments of the Transportation Panel on the results of this survey were as follows:

"Useful replies were received from 45 individuals and conversations were held with others. All but four of them expressed views that significant gaps in transportation statistics exist and need to be filled through surveys conducted by the Census Bureau. Three respondents indicated the belief

^{14/} Statement of Charles D. Bohannon, Chairman, Panel on Motor Transport Statistics, at Hearings before a Subcommittee of the Committee on Post Office and Civil Service, House of Representatives, on H.R. 1821, 80th Congress, 1st Session, May 2 and 28, 1947; page 72.

"that no important gaps exist; and one stated that gaps of some importance exist but need not be filled. Nearly all agreed that the Bureau's program was sound, but there were substantial differences with respect to the relative needs for specific programs. At least two respondents felt that some of the proposed activities should be done by agencies other than the Census Bureau.

"In addition to obtaining views through correspondence and individual contact, informal group discussions were held with six leading transportation authorities in Washington, mostly in Government. The principal function of this group was to review the census program critically.

"The consensus of the results of these written and oral comments is that there are two major gaps in our knowledge of transportation: (1) the field of private truck transportation and trucking that is exempt from regulation by the Interstate Commerce Commission. Most trucks are privately owned and operated, and many for-hire trucks are exempt from ICC regulation, either because they are engaged wholly in intrastate haulage or because as haulers of particular commodities they are exempt from Federal regulation. (2) The relative traffic moved by various carriers in total and by different commodities. Despite our dependence on transportation, we do not have anything like a complete picture of how traffic of various types is divided among the several types of transportation or among various regions.

"The filling of these gaps is important to producers of transportation equipment and supplies in connection with marketing; to shippers and carriers in connection with formal and informal negotiations on rates and services; to carriers in connection with their promotional activities; to Federal, State and local agencies in connection with the development and regulation of transportation facilities; to regional and local planning activities from the standpoint of the competitive position of one geographic area with another; and to mobilization officials concerned with the determination of requirements for scarce materials, the allocation of transportation resources, and the establishment of effective emergency regulations. It was the consensus of those contacted that data needed to serve those purposes should be made available on an annual basis to the fullest extent possible.

"There are other gaps to which attention must also be directed. Water transportation, where private and exempt carriers predominate, is one of these. Passenger transportation by bus is another. We need not only to obtain data that do not now exist, but to examine the data we do have in order to eliminate or at least explain the variations, inconsistencies, and contradictions.

"In this report, however, specific recommendations are limited to three areas for which it is felt that there is almost universal support among those contacted. These recommendations call for conducting the following surveys:

"1. Truck Transportation.--For all trucks that do not report to the ICC, the Census Bureau should develop information on the physical characteristics of vehicles in operation, their ownership, the nature of the business in which they are engaged, and the volume of commodities transported. This will involve a sample study of more than 8 of our 9 million trucks. This is a consolidation of the Bureau's proposed surveys of Truck Ownership and Operation, and Commodity Movements by Truck. This information should be obtained on an intensive basis every 5 years, supplemented by such annual data as are deemed necessary.

"2. Traffic Flow.--Surveys should be made of out-bound shipments from various classes of shippers -- manufacturers, wholesalers, agricultural assemblers and possibly other classes of shippers in order to obtain a true picture of the competitive relations among carriers and a true representation of the geographic distribution of the movement of goods. While traffic flow data now exist for railroads and to a greater or less extent for pipelines and water carriers, and would exist for private and exempt trucks by our preceding proposal, these data cannot be added to derive an accurate picture of competitive movements, interregional trade, or volume of traffic originated by specific classes of shippers. This information also should be obtained on an intensive basis every 5 years, supplemented by an annual sample survey and such special studies as are deemed necessary.

"3. Monograph Series.--It has been apparent in this undertaking that the scope of transportation activities in this country and the complexity of the problem of establishing a meaningful statistical base require continuing research on further gaps, the need for filling them, and feasible methods of accomplishment. To this end it is recommended that instead of the handbook suggested by the Census Bureau, there should be undertaken a series of studies of available statistics in areas of transportation where existing data need to be supplemented or refined. Out of such a series would come proposals for such further Census Bureau activity as seems desirable in this field." 16/

As previously indicated, the Intensive Review Committee recommended further exploration by the Under Secretary of Commerce for Transportation. As a preface to its recommendations, the Committee said:

"Transportation is one of the most changing and one of the largest sectors of economic activity in this country. There are serious gaps in the statistics provided by and for this industry. The Congress, in 1948, authorized a census of transportation, and the Bureau has developed a program for bridging certain of the gaps. This program related primarily to information on motor trucks not covered by the Interstate Commerce Commission and to measurement of the relative traffic flow of the several competing modes of transportation.

"The Committee has found broad interest in more and better data on transportation but considerable difference of opinion on specific needs and serious doubts as to the feasibility of parts of the proposed program." 17/

The Committee's reason for advising further study by the Under Secretary for Transportation seems therefore to be based largely on the difference of opinion on specific needs.

For this reason, the three committees (mentioned on page 11) were asked to direct their attention primarily to the specific types of information needed. The results of the work of each of the groups are summarized below:

16/ Part I, Exhibits to the Report of the Intensive Review Committee to the Secretary of Commerce on the Programs, Policies, and Procedures of the Bureau of the Census, February 1954; pages 310-311.

17/ Appraisal of Census Programs, Report of the Intensive Review Committee to the Secretary of Commerce, February 1954; page 11.

b. Transportation Council of the Department of Commerce

The Council established a panel under the chairmanship of Mr. E. Grover Plowman, Vice President and General Traffic Manager, United States Steel Company.

The conclusions of the Panel are as follows:

"a. Transportation is not a distinct industry or economic activity but a group of industries, the activities of which are associated with other phases of economic activity -- production, manufacturing, processing, distribution and consumption. The transportation and storage facilities and functions are associated with and often enumerated in other census compilations, and for these reasons the desirability of a separate transportation census which would enumerate all transportation facilities, services and traffic is considered unnecessary and undesirable. This conclusion does not mean that the Panel opposes publication by the Bureau of the Census of transportation data, assembled into a single report from appropriate public and private sources.

"b. There is need for additional and more accurate information with respect to the pattern of traffic flows by broad categories of agencies of transportation to serve as the factual basis for an appraisal of the need of transportation facilities and services of different types. These data, it was agreed, could be obtained with sufficient accuracy for the purposes suggested by sampling techniques such as the ICC waybill study and other recognized statistical sampling techniques, and should be recommended to be obtained either by the Bureau of the Census or other appropriate Government agencies. It was further agreed that obtaining of truck usage and location data would, except in limited fields, be difficult to collect and of little value.

"c. The need for information with respect to transportation facilities and their availability for national defense purposes was, in the sense of the members of the Panel present, valuable although difficult of ascertainment. It was the sense of the Panel members present that transportation census data required by the defense

"agencies should be collected and compiled at some future time and only as and when needed by the Bureau of the Census under the sponsorship and responsibility of appropriate defense agencies.

"d. A member of the Panel pointed out that there is special need for census data in the motor bus industry. Such a census would serve to locate all the operators of motor bus service, including intra-state and local, and enable the motor bus industry to keep current essential defense and economic data. The Panel approved this special project, and concluded that other similar special projects, if supported by their own segment of transportation activity, should be given assistance in data collection, analysis and publication by the Bureau of the Census."

In summarizing the view of the Panel, it is clear that in recommending against a "separate transportation census which would enumerate all transportation facilities, services and traffic," the Panel was consistent with the intent of Congress, reflected by the provisions of the statute which prohibits the collection of data already published by other Government agencies. Also in recommending Census Bureau activity in determining traffic flow through sampling techniques and conducting special surveys in specific transportation fields, the Panel's views are in harmony with the views expressed by the Bureau of the Census. This approach has been successfully tested by the Bureau in a number of pilot surveys.

c. Federal Agencies Concerned with Defense and Provision of Transportation Facilities

A committee was set up to represent Federal agencies that were primarily concerned with problems of defense mobilization and provision of facilities. The committee as a whole was not requested to submit a joint report, but each agency was asked to indicate the value of transportation data of the type which could be compiled by the Bureau of the Census.

Members representing agencies responsible for specific programs for allocation of critical materials and facilities universally urged the adoption of a census program. Members of agencies primarily responsible for military operations and defense found less need.

The Bureau of Public Roads expressed a very urgent need for the type of data proposed in the census program. Business and

Defense Services Administration likewise showed urgent need in connection with their general business program, as well as defense planning.

The Civil Aeronautics Administration indicated that statistics on air cargo and on passenger travel by all modes of transport would be of substantial value to them in appraising future trends in air requirements for new facilities. The Office of Business Economics indicated that there was substantial need for further information on transportation by automobile.

d. Federal Agencies Concerned as Users of Transportation

The third committee consisted of representatives of Federal agencies that are major users of transportation services. Each of the agency representatives recommended as a part of his statement that the Bureau of the Census should undertake the collection of transportation statistics. The recommendations of each of the principal agencies represented are summarized below:

- (1) General Services Administration.--This agency emphasized particularly the need for Census Bureau activity in the transportation field, as related to national defense. While indicating a limited application of such data to its routine business operations, the report supported a census program as follows:

"The limited utility of the data in connection with GSA [routine business] operations does not in any respect detract from the need for the types of surveys proposed since they will in large measure fill in existing gaps and supply for the first time an over-all picture of the physical and general economic characteristics of the motor transportation industry and its role in the national economy."

- (2) Department of Defense.--The Department of Defense report took a position analogous to that of the General Services Administration. While indicating that the type of statistics proposed would not be directly applicable to its activities, this Department considered that, "the compiling of statistics...[of the type proposed]... would be of benefit to the United States Government as a whole."

(3) Department of Agriculture.--The response from this agency stated that:

"Adequate data on both for-hire and private motor carriers, necessary as they are for rational transportation and industrial planning during peacetime, are of outstanding importance during a wartime emergency. During World War II, the lack of such data seriously handicapped and delayed numerous phases of war planning with which the Department of Agriculture was concerned."

With reference to current needs, more complete data are needed by the Department of Agriculture for the following purposes:

"(1) The measurement and analysis of significant factors useful to the understanding of current and probable future trends in the transportation of agricultural products and supplies.

"(2) Determining the patterns for distribution of farm products, including the relative importance of production areas, processing centers, and marketing areas and facilities.

"(3) As a means of studying the actual and prospective economic effect of substantial innovations in transportation services, equipment, and methods, with special reference to the benefits and dislocations which they are likely to bring about.

"(4) The preparation of exhibits and testimony for presentation before State and Federal regulatory transportation agencies.

"(5) The determination of marketing costs and margins of farm products.

"(6) The computation of the Transportation Bill for farm food products.

"(7) The determination of freight rate indexes for agricultural commodities."

(4) The Bureau of Mines.--This agency was particularly concerned about the need for more adequate statistics covering domestic water transportation and confined its views to this media of transport. It urged that a transportation census program should include a survey of Great Lakes and tidewater

transport by vessels because -- "mineral industries appear to account for over half of the tonnage carried by all transportation industries...No comprehensive census-type data are available for transportation industries even though more detailed data are available for certain federally regulated portions of the transportation industries..."

In summarizing the views of users of transportation in Government, it is clear that there is a wide range of specialized interests. From an analytical point of view, they seem to point to two conclusions: (1) general transportation statistics of the kind proposed will find many important uses in assisting the Government in its utilization of the transportation system, and (2) a reservoir of basic transportation statistics will improve the ability of Government agencies to carry out required transportation programs under both normal and emergency conditions.

3. The Appropriate Collection Agency

The question may be raised as to why the Department of Commerce should be charged with this work, or more specifically, whether the Bureau of the Census is the most appropriate agency to carry out a transportation statistics program. Congress has vested the authority for undertaking a census of transportation in the Secretary of Commerce. In accordance with the existing organizational structure of the Department, the Bureau of the Census would be the appropriate agency for carrying out the program.

Hearings held by Congressional Committees prior to the passage of Public Law 671, 80th Congress, indicate that the Bureau of the Census was generally considered to be the appropriate agency to undertake this work. Senator Pat McCarran's statement in this connection is particularly significant:

"The original census of 1790 covered population only. In later years the scope of census taking has been progressively broadened, as its importance in the national economy came to be recognized. Census taking has thus come to be acknowledged as the appropriate medium for collecting data, not otherwise available, for the use of the Congress, of executive branches of the Government, and of others in their study of our national problems. The Bureau of the Census was specifically created by the Congress as a national fact-finding agency.

"Down through the years, it has proved helpful in many ways. Clearly, the time has come when Congress should add to the functions of the Census Bureau to provide for the obtaining of the basic facts concerning transportation at periodic intervals." ^{18/}

The Library of Congress Reference Service, which studied this question at the request of the Senate Committee on Civil Service, found that obtaining transportation data through the facilities of the Bureau of the Census rather than through separate individual agencies would have the following advantages:

"(1) It would be more economical than for such other agencies to supply and train a separate force of enumerators and interviewers;

"(2) It would obviate the necessity of business, industries, etc., having to report to two different Federal agencies at about the same time and such reporting would necessarily involve duplication of certain inquiries;

"(3) It would provide opportunity to obtain at the same time the information as to the use of various forms of transportation;

"(4) It would be more likely to result in uniformity of and hence increased usefulness of reports." ^{19/}

In addition, the Director of the Bureau of the Census believed that his agency was prepared to carry out a census of transportation and so recommended to the Secretary of Commerce. The following passage is contained in a letter from the Secretary of Commerce to the Chairman of the Committee on Civil Service, United States Senate:

"The Director of the Census has advised me that he is confident of the ability of his Bureau to conduct a comprehensive census of transportation

^{18/} Hearings before the Committee on Civil Service, U. S. Senate, 80th Congress, 1st Session, on S.6, S.554, and S.614, Census of Manufactures, Transportation, and Church Statistics, April 15, 1947; pages 19-20.

^{19/} Ibid., page 42.

"or to cover any part of the transportation industry which is deemed to be inadequately covered by present statistical services, and he believes that the extensive facilities of that Bureau for the collecting and compiling of data should be given consideration in any new undertaking including the collection of transportation data." 20/

It is fully recognized that a considerable volume of transportation data are collected, and in many instances published, by other agencies of the Government, primarily as a by-product of their administrative or operating responsibilities in specified fields. Particularly, the regulatory agencies obtain information on financial and operating aspects of the carriers and other organizations under their jurisdiction, and these data are widely used by other agencies and the public. However, the primary purpose of the statistics collected by these agencies is to supply the information they need for their own administrative use, even though the information may be applicable for specific or general uses by other agencies and the public.

On the other hand, as stated by the Bureau of the Budget --

"The foundation of the Federal statistical system is a group of agencies designated as 'general-purpose' statistical agencies. The primary function of these agencies is the collection of statistics for general use, and each of them is responsible for the regular collection, analysis and publication of data in specified fields..." 21/

The agencies in this class are the Bureau of the Census, Bureau of Labor Statistics, Bureau of Agricultural Economics, National Office of Vital Statistics, Bureau of Mines, and Office of Education. Among these agencies, the Census Bureau is the logical one to collect transportation data.

20/ Hearing before the Committee on Civil Service, United States Senate, 80th Congress, 1st Session, on S.6, S.554, and S.614, Census of Manufactures, Transportation and Church Statistics, April 15, 1947; page 34.

21/ "Statistical Services of the United States Government" issued by the Bureau of the Budget, June 1952; page 3.

This conclusion is based not only upon the general organizational structure of the Federal statistical system, but also upon the extensive use that must be made of sampling techniques in which the Census Bureau is in a better position than any other agency to design reliable probability samples and to undertake the field work involved in collecting and tabulating the information. The Bureau has a permanent staff of sampling experts and a field force that is well distributed in all parts of the country for the purpose of continuously taking and supervising surveys in a wide range of fields.

4. Summary of Need

From this review of the numerous factors which bear on the need for the Department to include in its census activities a program for the development of transportation data, several observations seem to be clearly indicated. First, there is general agreement among interested groups that in the conduct of the Nation's commerce, as well as the administrative and legislative processes of Government, there is a vital need for adequate transportation data. Second, the consensus indicates there are major gaps in our knowledge of transportation, particularly with respect to transportation that is not subject to regulation by Federal agencies. Third, the broad area of coverage required in a program to span the gaps in available transportation data indicates that the Department of Commerce logically is the proper agency to be vested with this responsibility, as well as being the best equipped, through its Bureau of the Census, to carry out the required programs.

C. USES FOR TRANSPORTATION DATA

While the importance of adequate transportation data has been widely recognized, many potential users of the data are unable to visualize the kind of figures that might be obtained, and consequently, are not able to see how such figures could be useful to them.

In order to demonstrate what essential information can be developed and to test the feasibility of methods, the Bureau of the Census has been engaged in developmental activity since 1951. This activity has resulted in a number of successful pilot surveys, which have given a much clearer concept of the kinds of information that can be developed through Census activity, and the uses to which the data can be put by industry and Government.

The employment of transportation statistics can be conveniently classified as between Government and industry uses. Governmental agencies, both Federal and State, require a great deal of data in connection with issues of general public policy and as factual background for regulatory, promotional and legislative activities. Of particular importance are the national defense uses, especially with regard to probable impact of production programs on transportation requirements, and impact of possible transportation equipment shortages on the economy.

Industry users include shippers, manufacturers and distributors of transportation equipment, the carriers themselves, and others concerned in business activities in which distribution is an important element. An important use by shippers and traffic organizations is in connection with negotiations with carriers, or before regulatory bodies, in rate and service adjustments. The carriers themselves are constantly in need of such data for their own analysis of rate structures and of competitive conditions, and in traffic solicitation and other promotional activities. Producers and distributors of transportation equipment, parts, and supplies are assisted in their formulation of production schedules and marketing programs. Similarly, other producers and marketing agencies use such data in activities in which the geographic distribution of products is an important consideration.

In order to present a more concrete appraisal of the uses to which a census program in transportation could be put, we have analyzed the proposed 1958 program, described in Section II above, with respect to its usefulness for problems that were studied by the Transportation Council of the Department of Commerce during the last two years. One or two direct applications are mentioned in connection with each problem, although it is recognized the surveys, in most instances, would supply additional useful background information.

1. Agricultural exemption under the I.C.C. Act.--With respect to traffic originated by packers, graders, processors and other agricultural assemblers, the commodity distribution survey would have shown the volume and characteristics of movements of commodities subject to agricultural exemption under the I.C.C. Act (the nature of the movements, type of carriers, and other selected factors). It also would have shown the characteristics of movements by carriers in exempt status compared with non-exempt. The truck survey would have provided additional facts for exempt, as compared with non-exempt movements by truck for all classes of truck operation. These data would have been extremely useful in describing the precise nature of the problem, its importance to carriers and to the general public.

2. Excise taxes on transportation charges.--Both the commodity distribution and truck surveys would have shown background information concerning the extent to which commodities move subject to excise taxes in comparison with those that are not subject to the tax. The classifications by commodities, length of haul, areas, and types of carriers would have supplied a partial factual basis for estimating the effect of excise taxes upon the competitive position of shippers, as well as carriers.

3. Federal aid to airports.--The air cargo survey would have supplied essential data concerning the nature of present cargo traffic and a partial basis for estimating potentials. The passenger travel survey also would bear directly on this problem in connection with estimating air passenger potentials, particularly for commercial helicopter service and other short-distance travel.

4. Railroad passenger deficit.--The passenger travel and bus surveys would have contributed useful background information with regard to the nature of the over-all passenger travel pattern, and the potential markets for each type of carrier. Useful information on competition railroads have from trucks for the kind of merchandise that is being diverted from the "head-end" of passenger trains would be found in the commodity distribution, truck, and air cargo surveys.

5. Repeal or modification of 4th section (of Interstate Commerce Act).--The principal reason for requesting "4th section relief" is to meet competition from other carriers. Data bearing directly upon inter-carrier competition would have been available from the commodity distribution survey. This would have been useful as a basis for estimating the magnitude of the problem and probable effects of modifying the present statutory provisions.

6. Small shipments and merchandise problem.--The dynamic changes that have taken place in the distribution system and practices have intensified the small shipments problem. Tabulations of the commodity distribution survey would be of considerable help in determining the incidence of small shipments in terms of volume, length of haul, kind of carrier, extent to which they are being moved in company's own trucks, etc.

7. Single regulatory agency.--One of the primary objectives cited by proponents of a single regulatory agency is the coordination of regulatory policies affecting all classes of carrier, and possible coordination of regulatory with promotional activities and policies concerning the provision of facilities. The entire series of surveys would supply essential background information for appraisal of such coordination. In particular,

the facts shown with respect to the competitive position among carriers by the commodity distribution and passenger travel surveys should have a substantial bearing upon conclusions reached on the subject, aside from policy issues concerning administration and other related matters.

8. Trailer flat car service.--The truck survey would have given data showing the volume and kinds of commodities moving in trailers by length of haul and type of origin and destination points. The commodity distribution survey would give a basis for estimating the potentials for the class of movements that was believed to be susceptible to this type of service.
9. Relative advantages of and need for common, contract, and private carriers.--Statistics showing relative volumes hauled by class of carrier, type of shipper and class of commodity would be helpful background. This would have been supplied by the commodity distribution, truck and air cargo surveys. For example, the truck survey would have given considerable data on the characteristics of for-hire truckers (common and contract combined) as compared with private carriers. The commodity distribution survey would show the relative position of trucking in the total movement of commodities.
10. Desirability of a less restrictive policy on integration of different types of common carriers.--One of the important elements in reaching a conclusion on this issue would be the extent to which the traffic by one type of carrier tends to be complementary or directly competitive with others. Data developed from the commodity distribution survey would show the nature of movements, by length of haul and classes of commodities by type of carrier, which would help to estimate the extent and nature of competitive traffic. In addition, basic information would be punched in cards which could be tabulated to show other facts, such as the extent to which shipments of a given type move by one means of transport, or are spread among various types of carriers.

There are many important uses for comprehensive transportation statistics in Government, industry, and other segments of our society. We have attempted to demonstrate only some of these applications. However, when taken as a whole, they do indicate that an essential relationship exists between adequate factual information and the solution of major transportation problems.

D. FEASIBILITY OF CENSUS BUREAU ACTIVITY

The Secretary's memorandum directed a review of the "feasibility of Census Bureau activity in the field of transportation" as well as need. Continuous experimental and developmental work has been carried on by the Bureau since 1951. In view of the results of this developmental work and the application of basic sampling techniques in pilot studies that have been completed by the Bureau, we believe that the basic feasibility of Census Bureau activity has been established for the surveys included in the proposed 1958 program.

1. Basic Considerations

In addition to a review of the methods employed and results of pilot studies, our conclusions are based in part on the following considerations: (1) sampling techniques have been developed to the point of giving reliable results, (2) data developed by sampling should satisfy substantially all the needs for transportation statistics, and (3) the information can be obtained at reasonable cost and without undue reporting burden.

a. Reliability of Sampling Techniques.--The Office of Statistical Standards of the Bureau of the Budget has stated that --

"The use of modern methods of sampling has greatly improved the accuracy and speed of many Federal surveys, and reduced their cost and the burden of response...

"The accuracy of a scientifically planned sample can be calculated closely in advance, and geared to the requirements of precision or to the limitations of cost. This is one of the most important features of modern sampling, because a survey can now be planned in accordance with the precision needed in uses that are to be made of the data, or within the range of the permissible costs, whichever is the determining factor.

"Almost any required degree of precision can be obtained through the use of sampling, provided the information sought is obtainable. A sample cannot produce information on subjects for which the techniques of the questionnaire and of interviewing are yet so undeveloped that accurate information cannot be obtained from respondents. Even in these cases, however, sampling may make a contribution, for if a smaller number of respondents is covered more attention may be given to each at the same total cost.

"...sampling requires expert knowledge. Sampling is not merely the substitution of a part for the whole...it is instead a methodical procedure, planned with the aid of the theory of probability, and carried out strictly in accordance with the demands of theory so that the errors arising from sampling can be calculated mathematically." 22/

The Bureau of the Census itself has been a principal pioneer in the development and application of modern sampling techniques. Prior to the 1940 census, the Bureau did not employ sampling techniques in its regular censuses, but relied entirely upon complete enumerations. In the census of population for 1940, sampling was, for the first time, employed for obtaining information relating to selected topics in a major census. Since that time, some phases of practically every census have been undertaken through the use of sampling because it provides adequate data for those aspects at a much lower cost. This relatively recent development of scientific sampling techniques has made it possible to obtain reliable statistics for large area coverage, such as States, regions, and the Nation as a whole, at only a small fraction of the cost of complete enumeration.

As examples of the use of sampling by the Bureau of the Census in traditional censuses, the following recent applications are cited:

- (1) The 1950 census of population and housing contained a considerable block of questions which were asked only of every fifth person. Totals were developed by expanding the sample data.
- (2) The 1950 and 1955 censuses of agriculture likewise contained a block of questions which were asked only of every fifth farm, plus every "large" farm.
- (3) The 1948 census of retail trade used a "long" and a "short" form. All large establishments, plus one in ten small establishments, reported on the long form, while nine out of ten small firms reported on the short form.

22/ Statistical Services of the United States Government, issued by the Office of Statistical Standards of the Bureau of the Budget, Revised Edition, June 1952; page 16.

- (4) The 1954 census of business used sample techniques for selected aspects. The small area data for small firms was obtained by use of income tax returns. This cut out about one million reports from businesses operated by owners without employees. However, to obtain data not shown in income tax forms, a sample was drawn of income tax returns and a regular census form was obtained from those persons.
- (5) Post enumeration samples have been employed to check the coverage and quality of response to complete enumerations. For example, a sample was used to determine the coverage of the 1947 census of manufactures and showed that the "total enumeration" included 98.2 percent of the production workers in the United States that should be counted in the census. A corresponding quality check by sample survey for the 1948 census of business showed that enumerators missed 1.8 percent of the business establishments that were "within scope." Similar sample tests have been and are being conducted for the censuses of agriculture, population and housing.

The Office of the Assistant Director for Statistical Standards of the Bureau of the Census is concerned primarily with sampling techniques and the application of these techniques in census work. In addition to sampling experts available at the Bureau for consultation on the transportation program, the Transportation Division employed a sampling expert working expressly on the research and development program in connection with the census of transportation surveys during most of the developmental period.

b. Suitability of sampling.--With reference to the second conclusion relating to the suitability of sampling for obtaining transportation data, we believe that two aspects in particular make this approach especially advantageous.

First, in almost all instances, the need for data was expressed in terms of large areas, such as States, regions, or the Nation as a whole. We found little or no need for statistics relating to areas smaller than States, or for minute cross-classifications.

Second, the potential "universe" of respondents or "reporting units" may run into very large numbers. For some segments of the trucking industry, for example, the number of potential reporting units could reach many millions of persons, firms, or individuals. The Bureau of the Census has verified that reliable results can be achieved for a limited number of categories (such as data for each of the 48 States, for each class of carrier) by sampling.

c. Reporting Burden and Cost.--Pilot surveys have proven the ability and willingness of respondents to supply required information. For example, in the test survey of trucking, over 90 percent of truck owners contacted submitted the necessary information. The replies were reliable as judged by comparing known United States and area data with the totals estimated mathematically from the small samples used in the tests. Likewise, the rate of response among manufacturers in the test of the commodity distribution survey was high -- every manufacturing plant participating in the test agreed to submit the reports or to permit the enumerator to summarize the information from the plant's records.

With respect to costs, it has already been indicated that the use of sampling greatly reduced the cost of obtaining census data as compared to complete enumerations. Cost being an important factor in any program, we believe that the use of sampling should be employed in connection with the census of transportation to the extent that the results obtained are sufficiently accurate to satisfy the users of the data.

This approach to the census of transportation -- bridging the gaps in available statistics by carefully planned surveys, based on tried and tested sampling techniques -- we believe is sound. Because of its economy and flexibility, the program can be tailored to the limitations of cost and accuracy that may be required. Furthermore, the field collection of information, and its coding and tabulation, can be done more rapidly than is possible in a complete enumeration, so that final results will be available to the public much sooner. This gain in time is important to our dynamic industrial economy.

2. Review of Test Surveys

As well conceived as survey methods may be, their ultimate soundness for solving specific problems can be determined only by conducting test surveys in the field. For this reason, the Bureau of the Census, as a part of its planning activities in the transportation field, has conducted a number of pilot surveys to test the methods and sampling techniques to be employed. The proposed 1958 program includes only surveys for which methods have been tested through pilot surveys, or which involve proven techniques used under similar circumstances in other fields.

Given below is a summary of the pilot surveys undertaken by the Bureau in preparation for a full-scale program of major transportation surveys and the results achieved:

a. Truck Inventory and Use, June 1954

The purpose of this pilot survey was to test methods and sources for such data as the number of vehicles classified by body type, size, age, occupational use, annual mileage, miles per gallon, and length of haul. Earlier studies by the Bureau of the Census showed that uniform data in these areas could not be obtained from State registration records. The tabulations in the report resulting from the survey were new and not available from any other Government or private source.

The test survey itself was conducted in five stages. These were (1) a review of the vehicle registration systems of five States selected for the test, (2) preparation of sampling instructions designed for the specific requirements of each State, (3) selection of a sample from each State identifying each vehicle and its owner, (4) obtaining the required information from each vehicle owner through mailed report forms and follow-up by field staff, and (5) compilation, editing and tabulation of all completed reports.

The results of the survey proved the feasibility of the methods and approach used. About 92 percent of all persons in the sample responded to the inquiry, even though reporting was not mandatory. The test confirmed that a sample of as few as 1,000 cases, by State, should provide results sufficiently reliable for most purposes. Percentage distributions based on a sample of that size would not differ by more than one to three percentage points from corresponding data that could be developed by a complete enumeration. The test provided the necessary information for appraising the feasibility of obtaining truck inventory and use data, and for appraising and correcting the methodology for the collection and compilation of the raw statistics. Complete information on this survey is available from the Bureau of the Census in its publication entitled, Report of Test Survey of Truck Inventory and Use, June 1954.

b. Commodity Movements by Truck, December 1954

One of the most frequently mentioned gaps in transportation data is the almost complete absence of information concerning the volume of commodities hauled by truck,

classified by commodity class, by type of equipment used, and by length of haul. For this reason the Bureau felt that experimental and exploratory work should be initiated in this field.

In December 1951, informal interviews were held with a few intrastate for-hire motor carriers in Baltimore to determine the extent to which traffic data could be obtained from their records or could be estimated. The results indicated that at least a substantial number of carriers do not keep any records, even trip tickets, that could be sampled to determine origin, destination, commodity loaded, etc. Consequently, a diary or "logging" technique was devised to handle truckers who do not maintain records. In May 1952, a combination method was tested on a small sample of truck owners in 10 areas in the Nation. A sample of shipping records was used for truckers who had such records, and a "log" for those who did not have records that could be readily sampled. The results of that test demonstrated that logging techniques were satisfactory, and preferable, to the combination of the two methods.

Consequently, a pilot study was undertaken during the first half of 1953 to obtain data needed to judge the merits of the proposed logging method. A sample of 5,800 vehicles owned by slightly less than 2,000 persons, or firms, was included in the survey. In order to avoid complications arising from intermingling local, rural, and intercity movements, commodity movements of less than 25 miles were excluded.

The results of the survey demonstrated that practically all classes of truck owners -- farmers, retailers, wholesalers, manufacturers, commercial motor carriers, and others -- will cooperate fully with the Bureau of the Census in carrying out surveys designed to obtain data on the movement of commodities by truck. As evidence of this, 97 percent of those requested, submitted detailed reports. In addition, the test revealed that a relatively small probability sample would yield reliable results, even though there are millions of truck owners; and, perhaps, billions of shipments annually. As an indicator of reliability, it was determined that the sampling error in the estimate of total tons and ton-miles hauled by truck would not exceed five percent in a country-wide sample of the size used in the test.

The survey was also useful from the standpoint of testing methods. It was learned that some procedures could be improved substantially, both in terms of obtaining a higher degree of reliability from a given sample and improving the quality of response. Expansion of the survey to cover hauls of all lengths would eliminate certain types of response error and provide additional information of considerable value. Complete details and coverage of this survey are contained in the Bureau of the Census publication entitled, Pilot Survey, Commodity Movements by Truck (December 1954).

c. Method for Collecting "Traffic Flow" Data from Shippers, September 1953

Another major gap in transportation and distribution statistics is the scarcity of data showing the geographic distribution of products and the means by which they move from points of production to consumption. In order to find suitable ways to overcome the scarcity of information in this area, the Bureau of the Census undertook to develop and test a method for obtaining reliable "traffic flow" statistics for commodities shipped by manufacturers, assemblers of agricultural products, and other classes of shippers.

A method was proposed for obtaining this information by sampling sales invoices (or related papers) in the files of shippers. The availability of such records was tested informally with a small sample of shippers located in New York, Baltimore, and Atlanta, in December 1951 and January 1952. That test indicated the records were available, that they could be sampled effectively, and that shippers would willingly cooperate with the Bureau on such a survey. In February 1953, a test was made at approximately 150 manufacturing plants that represented a cross section of the entire manufacturing field. This was done to find as many types of "problem situations" as possible, and to determine the feasibility of utilizing a limited number of standardized sampling plans that would fit the particular record-keeping system in use at each manufacturing plant.

The results showed full cooperation by manufacturers; again proving the availability of records. They also demonstrated the feasibility of standardizing sampling plans, and indicated that a sample of shipments (or sales invoices) at each plant would yield reliable results. A complete description of this test survey is reported by the Bureau under the title, Method for Collecting "Traffic Flow" Data from Shippers, September 1953.

d. Distribution of Products by the Canning and Preserving Industry, 1955

As a result of the studies described in the preceding section, a pilot survey was initiated by the Bureau of the Census in August 1955 to obtain data concerning the distribution of products by the canning and preserving industry. This survey was based on a sample of approximately 100 shipments from each of about 200 plants. In this survey, the Bureau developed and used portable equipment to microfilm records at the offices of the companies in the sample. This equipment substantially cut costs, reduced reporting effort, and increased the accuracy of results. Preliminary tabulations have been completed and demonstrate that the method is sound for conducting the major survey entitled, "Commodity Distribution by Land, Air and Water Transportation," in the proposed 1958 program.

e. Other Field Tests

In addition to specific test surveys undertaken by the Bureau of the Census, a considerable amount of exploratory work, particularly in the trucking field, has preceded the taking of surveys. There has been a somewhat generally held notion that trucking data are readily available from records or published materials of our State governments. Before embarking on surveys in the trucking field, the Bureau wanted to know precisely what was available in the way of reliable motor carrier data on the State level.

(1) Reports to State Regulatory Bodies.--The first major field test was started in March 1952 to determine the nature of statistical data that could be obtained from State regulatory bodies, or that could be tabulated from reports submitted by carriers to such bodies. It was found that 42 States obtained annual reports from at least one class of motor carrier, but only about one-third of them regularly prepared statistical tables of any kind from those reports. The variations among States in definitions, coverage, and items on the reports, prevented effective use of the original reports as a basis for tabulating data that would be comparable even among the States that obtain mandatory reports. Full details are shown in Census Bureau Transportation Survey Report No. 1 entitled Annual Reports by Motor Carriers to State Regulatory Bodies, 1952.

(2) Vehicle Registration Records.--Another approach to the problem of obtaining motor vehicle data by States was started in the fall of 1951 by an informal review of motor vehicle application forms used in each State, and an inquiry into the statistical data compiled from such registrations. The Bureau of Public Roads, in cooperation with the States, tabulates essentially all of the data of general public interest that can be drawn from such records. In addition, R. L. Polk & Company (and other private organizations) prepares mailing lists and compiles other information that is useful to advertisers, marketers, and vehicle producers. The Bureau's review indicated that while some additional useful information was obtainable from such registrations, uniform data could not be obtained from this source for such aspects as the number of vehicles classified by body type, occupational use, annual mileage, and other related factors.

Consequently, it was concluded that significant gaps that continue to exist in motor vehicle data could not be closed by data obtainable from existing registration records. During World War II, defense agencies and others proposed that a joint effort be undertaken to have each State uniformly ask at least selected major items on their registration forms. While collection of selected facts by uniform vehicle registration forms may ultimately prove to be feasible, the experience in this area during the last decade or two has not been sufficiently encouraging to be relied upon for the next census.

E. STAFF CONCLUSION

In general, the census of transportation should consist of an interrelated series of basic surveys to obtain "benchmark" type data on a 5-year periodic basis, which, when combined with other available data, should provide greatly improved statistical coverage of transportation activities. In addition, the Census Bureau should undertake developmental and interim surveys to devise and perfect methods and measure trends of selected aspects in the field of transportation.

As our review has indicated, the question of the need for and feasibility of a Census Bureau program should be considered in terms of a number of distinct factors. The more important of these are: (1) the need for the data, (2) the cost of the program relative to the results achieved, (3) the reporting burden, and (4) soundness of methods employed.

The Bureau of the Census has evaluated the proposed surveys with respect to those factors, and believes the program is sound and feasible. We concur.

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