

**TRANSPORTATION DATA BASES AND  
THEIR USE IN TRANSPORTATION  
AND MARKETING ANALYSIS**

**By**

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**UGPTI Staff Paper No. 35**

**December 1982**

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**DECEMBER 1982**

## **FORWARD**

The development and use of transportation data bases is an essential prerequisite to transportation and marketing analysis. In few other disciplines are the data bases so scattered and uncoordinated as in the field of transportation. Yet, there are few disciplines which are so data-dependent, particularly given the enormous changes which are occurring in the system and the counter-vailing claims made by industry, government, and the shipping public.

This paper presents an overview of the transportation data bases which are available, what they contain, and how they might be used in conjunction with each other to draw a more complete picture of transportation issues and changes. The paper is designed to provide transportation and marketing analysts with a synopsis of data sources, and to illustrate the manner in which these might be used.

## **I. INTRODUCTION**

Transportation is a field rich with potential data sources. These sources, however, are frequently obscure, at best, and do not form any sort of concise or coordinated pattern.

Transportation data bases may be classified, as to either: (1) movement or traffic statistics, (2) operating or service data, (3) revenue or rate statistics, or (4) cost/economic data. The sources, or potential sources, of these data range all the way from census statistics to data which can be developed only from widely-scattered and difficult-to-obtain information.

This paper presents an overview of the data bases which are available to transportation analysts, and explains how many relevant data items may be synthesized from a combination of unrelated data sources.

## **II. TRANSPORTATION CENSUS**

At the very aggregate level, the Census of Transportation provides information regarding transportation flows and the delivered price of commodities. The Census of Transportation, however, is currently taken only at five year intervals, and thus does not constitute a continuous source of data.

The major uses of the Census data would be to evaluate broad policy issues, or to monitor long-term changes in transportation flows and modal shares.

## **III. MOVEMENT DATA BASES**

One of the first set of questions that a transportation analyst entertains is: what is moving, where, by what mode and in what quantities. General long-term traffic trends may be obtained from the transportation census as noted above. More specific traffic flows must be developed from a variety of sources, which differ among the modes.

## **Rail Data Bases**

Origin-destination traffic flows are best documented in terms of rail transportation. The principal source is the **Rail Carload Waybill Sample** (RCWS), published annually by the Interstate Commerce Commission and the Federal Railroad Administration.

The RCWS is a one percent sample of all terminating waybills on all Class I railroads. Each observation in the sample contains information regarding: (1) the origin and destination of the movement, (2) the specific classification of commodities, (3) the car-type, (4) originating and terminating railroads, (5) line-haul revenues, (6) the weight of consignment, (7) the short line miles of the movement, and (8) the number of carloads in the consignment. As will be noted later, certain versions of the RCWS have cost information as well.

### ***Versions of the Waybill Sample***

There are several versions of the processed waybill sample which are available to the public. An annual summary, published by the Federal Railroad Administration, shows a territorial distribution of traffic and revenue by commodity classes. The publication, entitled Statement TD-1, may be obtained from the Office of Rail Systems Analysis and Information of the FRA, and contains most of the data elements noted above, on a regional basis.

A second version of the waybill sample may be obtained from the ICC or FRA by state agencies concerned with state-wide rail planning (DOT's and Highway Departments) or regulation. In addition, universities or university agencies may obtain this more detailed sample, if work is performed for either of the State agencies, or by special permission.

This second version of the RCWS is different from Statement TD-1 in that here the data are shown by individual railroads rather than territories. This sample is thus much more specific in nature and can be costed using Rail Form A (RFA) or the Uniform Rail Costing System (URCS).

### ***Expanding the Waybill Sample***

The major qualification in using the RCWS is the representativeness of the sample among various commodity groupings. For large movements of traffic, which occur on a regular basis, the one percent sample is likely to be large enough to constitute a statistically-valid sample. In other instances, where commodity movements are infrequent and not on a regular basis, the validity of the sample must be scrutinized.

There are data sources, however, which are available and which can be used to verify the representativeness of the sample for various commodity classifications. In their annual report to the Interstate Commerce Commission, each railroad reports the number of carloads and freight tons originated and gross revenue dollars by commodity classifications. Some Public Service Commissions also require some of this data on a state-wide basis. So when the RCWS is expanded to population levels, there are several key parameters available, which can be compared to actual population totals on a commodity-specific basis.

The FRA, in publishing Statement TD-1, reconciles the waybill sample against the QCS for freight tons, carloads, and gross revenues. Instead of expanding the sample by 100, as might normally be done with a one percent sample, the sample is expanded by the ratio of the waybill sample value to the QCS total for each commodity classification.

### ***Special Waybill Studies***

Special waybill studies, such as costed samples and/or burden studies, are available and will be discussed later.

### **Truck Movement Data Bases**

Regulated motor carrier data bases are less developed than rail. While carriers report to the I.C.C. annually, there is no movement or traffic sample as in the case of rails. The Census of Transportation, therefore, is the only real source of data for regulated truckers.

Exempt carriers do not have to report to regulatory commissions, so data concerning their activities is even more spotty. Exempt carrier data is usually available through special study only.

### **Waterway Traffic**

The major source of waterway statistics is contained in **Waterborne Commerce of the United States** (WCUS), an annual publication of the Department of the Army Corps of Engineers. WCUS provides traffic data for the various inland waterway systems, aggregated by division and by river section and harbor. The publication provides time-series data on the number of tons by section for each division, broken-down by commodity type. The statistics reflect upbound and downriver traffic, through traffic, local traffic, and general ferry services.

### **III. REVENUE DATA BASES**

Revenue data bases are often a critical item for transportation analysts and are sometimes difficult to obtain. Revenue bases can normally be generated for any mode by using published rates in conjunction with a traffic sample. This will generate modal revenues for any given region or class of traffic.

This method is time-consuming, however, and usually requires facility with tariffs. For a great deal of transportation analysis, revenue data bases already exist without resorting to use of tariffs.

#### **Rail Revenue Data Bases**

Rail revenue data may be generated from either of the two sources noted earlier. Revenues per carload or per ton mile may be generated for various commodity classifications from the RCWS. Summaries of these by territory are published in Statement TD-1.

In addition, revenues per carload or per freight ton may be generated from the Quarterly Commodity Statistics published in the carrier's annual report. These provide general indications of the distribution of revenues among commodity classes. The shortcoming of the QCS data is that they do not provide indications of revenue by distance interval, as the TD-1 statistics do.



## **Truck Revenues**

Truck revenue sources, as in the case of traffic data, are not as well developed as rail. For regulated motor carriers, the annual reports to the I.C.C. provide a summary of revenues generated on a freight ton or vehicle mile basis. These do not normally provide commodity-specific breakdowns, although for certain special classifications of carriers (Household Goods Carriers, for example) commodity-specific data are available because of the nature of their operating rights.

Rates for exempt carriers are not normally published and may fluctuate considerably. These rate structures can be obtained only through special study and/or survey.

## **Waterway Revenues**

Regulated water carrier revenues must be generated primarily from published scales of rates, as revenue data are not summarized in any source. Rates for exempt commodity transportation are normally not published and must be obtained by special study.

## **IV. COST OR ECONOMIC DATA AND SERVICE STATISTICS**

Operating or service statistics are available at different levels of aggregation for certain modes. Cost and operating data are available particularly for rail and truck modes on the basis of their annual report. The development and use of this data is discussed below.

### **Rail Operating/Service Statistics**

Railroad operating statistics by type of car are obtainable from Schedule 755 of the carrier's annual report, or on a regional basis, from **Transportation Statistics of Class I Railroads**, published annually by the I.C.C. From these statistics, certain operating or service factors may be derived related to railroad productivity and operations, such as: (1) car miles by car type, (2) weights of various types of trains, (3) locomotive units per train and running and switching data, as well as (4) train and yard switching hours. These data would primarily be of importance for railroad efficiency or operations studies.

### **Cost/Economic Data**

Certain levels of economic data for both regulated motor carriers and railroads are contained in the annual reports. Various cost elements such as fuel and labor may be analyzed on the basis of this data. Movement costs, however, cannot normally be developed except on a gross basis (i.e., ton-mile).

### **Special Cost Sources**

As noted earlier, special versions of the ICC waybill sample are available or will potentially be available which can be used to analyze commodity cost characteristics. At five-year intervals, or thereabouts, the ICC publishes a "revenue-burden study". These studies provide estimates of the revenue-cost position of various commodities hauled by the railroads. As was the case with the TD-1 statistics, the data are potentially available on a territorial or a carrier basis.

In addition, the I.C.C. is required to calculate revenue-cost comparisons by commodity groupings for use in calculating the annual Railroad Cost Recovery Percentage (RCRP). The Bureau of Accounts is currently in the process of applying 1980 Rail Form A costs to the 1980 waybill sample. Once this sample is costed, it will be available to the public under the Freedom of Information Act.

#### **V. NORTH DAKOTA DATA BASES: A ROLE MODEL**

For exempt motor carriers and railroads, the Upper Great Plains Transportation Institute data base provides an example of how movement statistics, and revenue and cost data may be developed on a state-wide basis to facilitate transportation and marketing analysis.

Movement statistics for both truck and rail are obtained from the North Dakota Public Service Commission. The NDPSC requires each elevator in the state to report truck and rail traffic on a crop year basis. Rail commodity rates are developed from published tariffs and use to calculate rail revenues for each elevator, city, or line-segment. Rail Form A costs are developed for each railroad in the state and can be used to develop estimates of commodity costs.

Where NDPSC grain movement statistics do not provide a complete picture, ICC waybill statistics are used to complement the statistics. Also, non-grain traffic, particularly movements of lignite coal and inbound movements of fertilizer are developed from the waybill sample. The end result is a fairly inclusive transportation data base, which brings together a variety of independent sources to produce the data needed.

## VI. SUMMARY

Transportation analysis is potentially a data-rich endeavor. These sources, however, are many and scattered. This paper has attempted to overview the sources of data available, and to describe how they might be accessed and used. To summarize matters, a summary table of potential data sources is presented in Table 2. This is intended to be somewhat an inventory for transportation and marketing analyst rather than a detailed listing.

**TABLE 1. SUMMARY OF TRANSPORTATION DATA SOURCES BY MODE.**

MODE	MOVEMENT STATISTICS	COST/ECONOMIC STATISTICS	REVENUE DATA
Rail	WB Sample, QCS Census	R-1 Sch. 755, Burden Studies , RCRP, Cost Scales	WB Sample, QCS Tariffs
Truck	Census, Survey	Annual Reports	Tariffs, Annual Reports, Surveys
Waterways	Corps of Engineers	Corps of Engineers	Tariffs, Special Studies
<b>LEGEND</b>			
WB Sample - Rail Carload Waybill Statistics, Statement TD-1, published jointly by ICC and FRA.			
R-1 - Annual Report of Class I Railroads to the Interstate Commerce Commission.			
Burden Study - Revenue Contribution Study, Interstate Commerce Commission.			
Cost Scales - Rail Carload Cost Scales, Statement IS1-77, Interstate Commerce Commission.			
RCRP - Rail Cost Recovery Percentages. This demotes that a costed waybill sample must be developed by the ICC annually for purposes of calculating the cost recovery percentage.			
Schedule 755. Train and Yard Service Report (formerly Form OJ-A) WBC - Waterborne Commerce of the U. S. Army Corps of Engineers.			