Tri-State Transportation Commission's Freight Study Program

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•THE Tri-State Transportation Commission's work program is unique among all urban studies because it measures and describes both local and intercity freight traffic by all modes. The completed picture will be fuzzy in spots, but it will be comprehensive.

Objectives of this first, descriptive, phase of Tri-State's freight program are limited. The first objective is to develop good estimates of the region's total traffic flow by mode. This phase has been completed, and the results are shown in Tables 1 and 2 and Figure 1. The differing roles of each mode are evident, as well as the way areas differ in their rates of freight generation per capita. The second objective is to measure and describe each mode's traffic, and the characteristics of the freight-carrying portion of the system.

PURPOSE

The purpose is to develop a base for future projection. By determining the freight requirements of the region's present activities and by using forecasts of those activities, future freight demands can be forecast. Through trend analysis and other techniques, it is possible to estimate each mode's future share of traffic by broad commodity category.

DIFFERENT APPROACHES FOR EACH MODE

The amount and quality of available freight traffic data vary considerably, depending on which mode is being discussed.

Rail and waterborne freight traffic are measured through use of secondary sources. We have obtained special tabulations of the ICC's 1 percent Rail Carload Waybill Sample, covering traffic into, out of and within the Tri-State Region. After some travail in matching the data with data collected by the Port of New York Authority, this ICC source has been validated, subject to some qualifications. The principal source for waterborne freight traffic has been the publications of the Corps of Army Engineers. In this case also, certain discrepancies were found with locally generated data. The major source, "Waterborne Commerce of the United States, Part 1," is not an origin and destination survey, but its detailed commodity analysis of the traffic, plus a breakdown into domestic, foreign, local and other categories, makes it possible to draw firm conclusions on areas of origin and destination.

Air cargo and pipeline sources require more personal contact and interpretation. Air mail, express, and freight tons emplaned are published by airport, but there is no published origin and destination or commodity analysis. Individual carriers have made studies of their own traffic, however. Pipeline volumes are not published except on a company-wide basis, and then only for regulated pipelines. Individual lines must be contacted for this information.

Truck freight data are practically nonexistent. Surveys had to be run by Tri-State to develop meaningful information. These surveys are the central subject of this paper.

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Table 1

FREIGHT TRAFFIC OF THE TRI-STATE REGION

1962 - 1963

by mode of carriage

Millions of Tons Carried	WATER	TRUCK	RAIL	PIPELINE	AIR	TOTAL
into the region	82 *40*	68	43	9	*	202
percent of total	40.5%	33.7%	21.3%	4.5%	*	100.0%
out of the region	13 *7*	68	10	6	*	97
percent of total	13.4%	70.1%	10.3%	6.2%	*	100.0%
within the region	69	195	4	*	*	268
percent of total	25.7%	72.8%	1.5%	*	*	100.0%
Miles of Average Haul						
into the region	2707 *3553*	115	669	90	1428 *2826*	1,286
out of the region	3677 *6000*	115	671	266	1495 *2754*	658
within the region	43	14	40	18	N.A.	22
Billions of Ton-miles						
into the region	222.0 *142.1*	7.8	29.0	0.8	0.2 *0.1*	259.8
percent of total	85.4%	3.0%	11.2%	0.3%	0.1%	100.0%
out of the region	47.8 *42.0*	7.8	6.3	1.6	0.3 *0.2*	63.8
percent of total	74.9%	12.2%	9.9%	2.5%	0.5%	100.0%
within the region	3.0	2.6	0.2	*	*	5.8
percent of total	51.8%	44.8%	3.4%	*	*	100.0%
Millions of Dollars of Freight Revenue or Cost						
into the region	713 *440*	583	483	3	62 *34*	1,844
percent of total	38.6%	31.6%	26.2%	0.2%	3.4%	100.0%
out of the region	285 *239*	583	156	8	83 *50*	1,115
percent of total	25.6%	52.3%	14.0%	0.7%	7.4%	100.0%
within the region	55	1,800	10	*	*	1,865
percent of total	2.9%	96.6%	0.5%	*	*	100.0%
Revenue or Cost per Ton-mile (Cents)						
into the region	.32 *.31*	7.40	1.66	0.39	26.00 *26.31*	0.71
out of the region	.60 *.57*	7.40	2.46	0.39	25.78 *26.32*	1.75
within the region	1.80	69.00	6.11	N.A.	N.A.	32.00

ROMAN: Total Traffic (including foreign)

Italics: *Foreign Traffic*

*: Less than 50 million ton-miles, $500,000, 500,000 tons or 0.05%

N.A.: Not applicable

SOURCE: Tri-State Transportation Commission

Freight tons, average length of haul, ton-miles, revenue (to the common carrier) or cost (to the private carrier) and ton-mile revenue or cost are shown in this table. Tons listed as "into" and tons shown "out of" each represent tons handled once in the region. Tons "within" the region represent two handlings, one at origin and one at destination. Figures are based in part on preliminary findings.

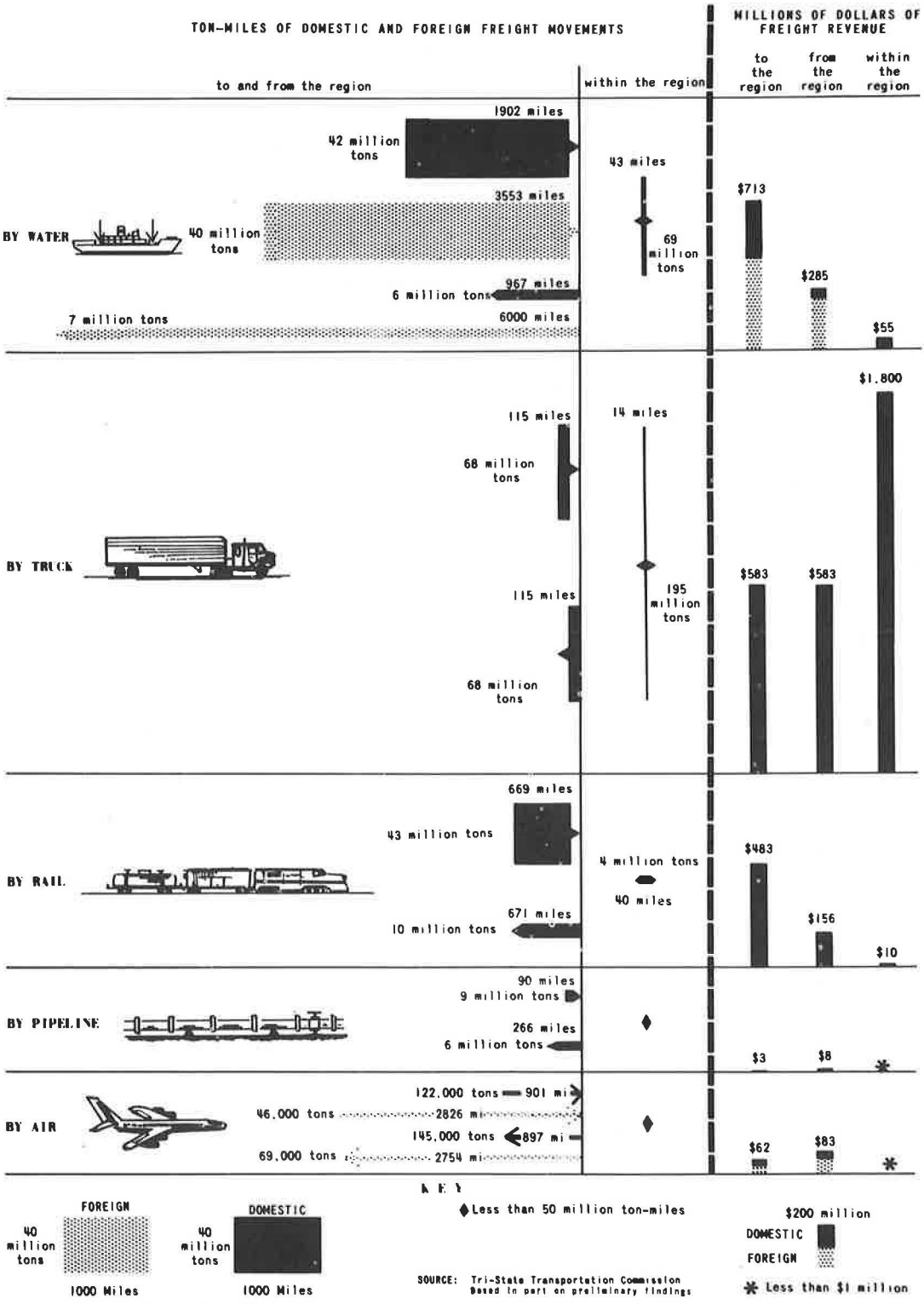

Figure 1. Freight traffic of the Tri-State Region, 1962-1963. Left side shows tons carried as height of bar and average length of haul as horizontal width of bar for 5 different modes of freight carriage. The area of the bar, therefore, measures ton-miles. Arrows show direction of movement into, out of and within the region. Through traffic is not included. On the right, three bars show amount of money spent for each mode's freight service—inbound, outbound and within the region. Note height of money bars compared to size of ton-mile bars.

TABLE 2
FREIGHT GENERATION RATES FOR SELECTED AREAS
(Domestic Intercity Tons)

Category	United States (1962)		Tri-State Region (1962)		Northeast Corridor[a] (1960)	
	Received	Shipped	Received	Shipped	Received	Shipped
Total tons (millions)	4,812	4,812	214	142	625	411
Population (millions)	185.8		18.5		38.1	
Tons per person	25.9	25.9	11.6	7.7	16.4	10.8

[a]Source: Intercity Freight Transportation Requirements of the Washington-Boston Corridor in 1980.

TRUCK SURVEYS: TWO SEPARATE APPROACHES

There are two obvious conclusions about truck freight and measurement of it: (a) the major truck distribution patterns have been identified; and (b) methods for measuring the freight which moves through these channels are not fully satisfactory.

Measuring internal truck freight was deliberately limited to determining the total freight distributed throughout the area by locally registered trucks, and the cargo-carrying characteristics and utilization of the fleet. Experience gained in executing this survey was immeasurably helpful in developing the Goods Movement External Truck Survey (GOMETS) performed in 1964.

The Internal Truck Survey—Three Percent Sample, 13,000 Trucks

Since plans for a Truck-Taxi Survey in the classical form were well under way in early 1963, the obvious move was to put questions on freight traffic into that survey. We investigated and pretested at two levels. Large and small companies were called on for a judgment sample, first with general questions, then with a questionnaire. Since these people—traffic managers, dispatchers, contract truckers, petroleum distributors, etc.—all seemed to know what they carried and how much of it, we selected a random sample of 21 registrations and carried out pretest interviews.

Since many operators make from 30 to 120 stops a day to pick up or deliver freight, and since this project concerned only the total freight distributed, only questions about the total load carried from the base and the total returned to the base were asked. This greatly reduced the burden on the respondent. This system works fine for route deliverymen, but there are a variety of other situations described later.

In the face of this wide variety of truck freight operations, the interviewer was instructed to follow the manual concerning the recording of freight information, but to add footnotes as necessary to explain the action when a load was delivered and another picked up at the same stop. In spite of this, there was a serious control problem. It was solved by assigning one coder to do all the freight coding, and then supervising him closely. Considerable telephone follow-up work was performed by quality control, field supervisors, and the coder himself. The control problem turned out to be manageable for three reasons:

1. About $\frac{1}{3}$ of registered trucks do not move on any given day;
2. Up to half of those that move do not carry any freight; and
3. About $\frac{3}{4}$ of those which carry freight carry only one commodity.

Coding Specifications and Procedures

This is the system set up for organizing freight data obtained in the field.

1. For delivery routes—show total load carried from the base and the total returned to the base.
2. For a serviceman (TV repairs, oil burner repairs, etc.)—show his tools and equipment on the first trip from the base. If additional material is delivered or installed at a stop (such as a hot water heater)—show this item on the trip where it was delivered.
3. On department store deliveries, or on a for-hire truck line's pickup and delivery routes where a different item is handled at each stop, show each item on the trip on which it was delivered, or on the trip at whose origin it was picked up.
4. Unspecified situations—show the article only once, either at the pickup or delivery point.
5. Where more than one commodity is handled at one stop, use a multiple commodity card on which additional commodities are shown.

Commodity Coding

The commodity code used in this project was the Standard Transportation Commodity Code developed by the Bureau of the Budget and used in the 1963 Census of Transportation. Due to the small number of observations expected, detail was carried only to the three-digit level. Appended to this commodity code was a density code developed from the New England Motor Rate Bureau Coordinated Classification No. 11, by which commodities are grouped in classes of 1-5, 5-10, 10-20, and over 20 pounds per cubic foot.

It was found that the STC Code, which was developed for intercity transportation, was not adequate for some common situations that arise in local movements. Codes were therefore added to take care of service equipment (e.g., TV repair), to show the types of people carried by truck (migrant labor, longshoremen, etc.) and to take care of unusual situations, such as the delivery of autos or road equipment under dealer plates.

Evaluation—Internal Truck Freight Survey

Our 20-20 hindsight shows several areas in which the questionnaire and the procedures were lacking.

1. The questionnaire did not adequately provide for recording the freight generated in the distribution patterns described above. As a minimum step, a simple field code ("p" or "d") opposite the description of the item, to show whether it was picked up or delivered, would have saved a great deal of editing time.
2. In most cases we depended on the driver's information. Validation of interviewers' work against company records might have been worthwhile where large companies were concerned.
3. A more extensive program of pretesting would have uncovered more of these various truck distribution patterns, and would have led to clearer questions on freight and clearer coding instructions.

THE GOMETS SURVEY

The one large remaining gap in the developing freight picture was the freight carried by truck across the cordon line. Trucks had been interviewed in the External Survey in 1963, but due to interviewing time restrictions no questions on freight had been asked and only the origin and the destination of the trip that was intercepted at the cordon line were obtained.

Pretesting was carried out at two levels: (a) by interviewing drivers at truck stops, which are gas stations specializing in serving over-the-road trucks; and (b) by setting up and operating a roadside interviewing station under actual conditions.

It was decided to ask the freight-related questions in as simple a form as possible, in essence:

Do you have freight aboard?

If you do:

Where did you get it?
Where are you taking it?

If you don't have freight aboard,

Where was your last previous stop?
Where are you going next?

It became evident during the pretest that interviewers would have to get information on the home base of the truck, the identifying number of the truck and/or trailer, and the dispatcher, for each sample. This was done with little complaint from the drivers. Most control problems arose from these patterns:

1. Multi-stop (deliverymen);
2. Multi-commodity freight, terminal to terminal (Less-Than-Truckload or LTL); and
3. Multi-commodity and multi-stop combined.

In many cases the driver would have a sealed pouch containing the freight bills for his load. He could not or would not open this pouch. Such loads were coded as "miscellaneous freight," and a special subsample of 10 percent received intensive follow-up to develop weight, commodities, and number of shipments.

Coding Specifications and Procedures

This GOMETS questionnaire was much more successful in determining the origins and destinations of the freight than the Truck Survey questionnaire. The principal remaining problem was to identify double crossings of the cordon. The coding rule was to code all of the truck's stops until it crosses the cordon again or gets rid of its load. Where more than one shipment was handled at a stop, special multi-commodity forms and cards were used. The follow-up work required gave rise to a special problem of controlling the flow of schedules between coding and quality control.

Commodity Code

The commodity code used was the same as that used for the internal Truck Survey.

Special Points About the GOMETS Survey

This survey was designed to obtain actual weight of the load, from documents or from the driver's knowledge of his own business. Most other roadside freight surveys have either sampled and weighed loaded trucks and unloaded trucks by vehicle type, or have obtained weight of the load in terms of percent loaded—1/4, 1/2, 3/4, or full. In either case the characteristics of particular types of traffic have not been made clear.

This is the first roadside survey to make use of the Standard Transportation Commodity Code which describes the traffic carried by truck much better than the old ICC classification that it replaced.

The sample was drawn to achieve round-the-clock representation from 10 p.m. Sunday night through 10 p.m. Friday night for the cordon line as a whole.

The classification data of the 1963 External Survey was used as a frame. All of the top eleven routes, with 3/4 of the tractor-trailer traffic, were sampled. Nineteen of the 71 remaining routes were sampled at a lower rate. The probability of selection of each route was made proportionate to truck traffic. All traffic was classified during each 8-hr shift. Trucks were sampled from the traffic stream at a rate designed to keep the interview site full. This was done because on-the-spot inspection by our sampling group showed no bias from this procedure, and sampling on any other basis was impractical. All four-tire trucks were declared out-of-scope.

Evaluation—GOMETS Survey

The approach developed for this survey is basically sound. Good origin and destination data were obtained for freight crossing the line. The traffic characteristics of the freight crossing the cordon were successfully measured. While information on most loads is obtainable in the field, it is absolutely necessary to obtain vehicle information and to provide a follow-up procedure, much of which can be handled by phone.