PROCEEDINGS —

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Marginal Cost Based Pricing For Short Term Rail Traffic Opportunities In a Free Market Environment

*by Thomas A. Collard**

CHANGES in the regulatory structure, combined with lower demand for transportation service because of the recession and other factors, have forced rail carriers to develop new approaches to pricing and marketing their service product. The threat of long-term traffic loss resulting from competitive contract rate negotiation requires a quick response to market opportunities and a willingness to accept greater business risk in the decision-making process. Failure to accept the risk of a "best guess" decision on a timely basis can result in a superior but useless analysis completed after the market opportunity has been lost.

This paper discusses railroad response to a particular short-term initiative, explains the costing/pricing technique on which the market strategy was based, and evaluates the effectiveness of the response.

Conrail owns and operates a substantial route structure in central Indiana and Ohio, largely comprised of branch lines with light traffic density. This area has an agricultural traffic base, concentrated in the grain and grain product market. With the exception of unit grain trains originating at a few large elevators, this market is essentially truck dominated and characterized by relatively short-distance movements. The unit trains use privately-owned cars. As a result, Conrail had 1,300 railroad-owned covered hopper cars in storage in mid-1981. The Conrail Marketing Department identified substantial traffic segments that might be susceptible to conversion from truck to rail through marginal pricing based on this excess equipment capacity and on excess train capacity. It was thought that this conversion could be accomplished in two ways: first, by direct conversion of very short distance truck movements; and second, by allowing elevators to expand their market area beyond the traditional drawing area to take advantage of lower-priced grain in adjoining territories that was moving in trucks to competing facilities.

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This traffic consists primarily of corn and soybean traffic destined both to processors and to elevators for reshipment in unit trains for export. These country grain movements are characterized by their seasonal nature and by a geographically compact distribution system—normally under 150 miles. Over the past four or five years, Conrail had handled less than five percent of this traffic.[1]

Because these are seasonal markets, Conrail needed to develop a generalized costing technique, perform the costing operation, set prices, and sell a price/service package to the industry prior to the next harvest. The available response time was less than 30 days. If Conrail were to be successful in securing the business, the costing techniques would have to be "quick and dirty," yet accurate enough for decision-making. At the same time, the necessary pricing mechanism needed to be ready for immediate publication once a decision was reached. The success or failure of this initiative was viewed internally as an indication of the ability of Conrail to respond in a deregulated marketplace.

In this paper, the costing rationale and method will be described. Market response will be identified in terms of traffic secured, and this traffic will be analyzed to compare results with the planning hypothesis and to develop relationships that will be useful for future costing/pricing activity. Problem areas will be identified and solutions suggested should the program be continued into the next harvest.

The basic marketing premise of this project was that a shift from truck to rail would occur on the basis of pricing initiatives alone. The price had to be low enough to not only undercut the truck rate, but also to compensate the shipper for a somewhat slower service and to overcome decision inertia, as this traffic had moved successfully via highway for many years.

To determine the proper pricing level to accomplish this market objective, the operating/service plan had to be clearly defined. Because the market was short-term (limited to the current harvest) and because marginal pricing was being used to take advantage of excess equipment and train capacity, the costing analysis was performed within the following parameters:

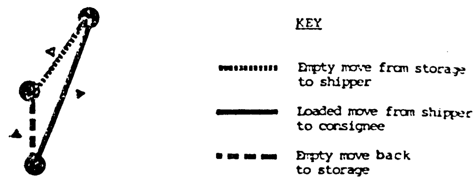
1) Cars to move in existing train service, with no schedule or classification changes.
2) Cars must use excess capacity.
   a) No additional trains would be operated.
   b) No additional locomotives were to be used.
   c) On days when the above constraints forced some traffic to be left behind, other traffic would move to the exclusion of country grain.
3) Cars used for this service were to come from stored, excess capacity.

To properly determine the cost of any movement, the specific origins and destination must be known. In this situation, however, the exact movements were not known, so a generalized "rule-of-thumb" cost was needed. To develop the costs, both the loaded and empty movements had to be included. This added another variable because the cars to be used were in storage on "hold" tracks. The two most common movements (see Figure 1) were assumed to be . . .

A) • Empty from hold track to patron for loading
   • Short distance loaded movement in regular train service.
   • Empty from consignee to the same or another hold track.

B) • Empty from hold track to patron for loading.
   • Short distance loaded movement in regular train service.
   • Empty movement directly to another patron for loading.

CASE A:
Two Empty Moves For One Loaded Move



CASE B:
One Empty Move Per Loaded Move

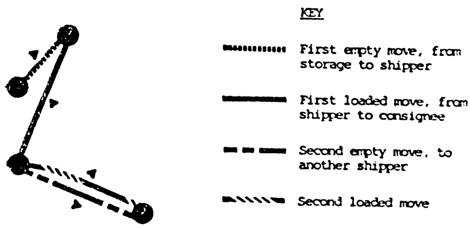


FIGURE 1

Any one loaded or empty segment might move on a single local train, interconnecting locals, or a combination of local and through train service.

The Conrail cost system provides two cost levels for management decisions: Long Term Variable (LTV) costs and Modified Long Term Variable (MLTV) costs. The MLTV, usually used for short-term decisions, excludes items that vary over time but tend to be fixed in the short run, such as traffic department expenses and depreciation. In this case, MLTV costs might seem appropriate, because the service plan was to use excess capacity in the short term. However, the MLTV cost level includes certain costs, such as full car hire, that were not applicable in this case, because the cars to be used for this service were idle. The actual costing method employed utilized the Conrail Controlled Input Cost Analysis (CICA) process, plus some special techniques designed through an interdepartmental effort by the Costing group in Finance and the Service Development group in Marketing. Assistance was also provided by Service Control and Transportation Analysis in Operations.[2]

Since the beginning of this paper, the term "marginal cost" has been repeated several times. In general, marginal cost at any production level is considered to be the incremental cost of producing additional unit.[3] Although this definition is helpful, it does not distinguish between short-term and long-term costs. In railroad costing, not only is the short-term vs. long-term distinction difficult to draw, but, because of shared costs with other units of transportation produced, the allocation of costs is extremely complex. For the purpose of this exercise, we equated marginal cost with MLTV less the cost of equipment ownership. An exception to this was switching costs at the origins and destinations, which would not have been incurred without this new traffic. The costs for origin and destination switch minutes were calculated at the LTV level to reflect certain cost elements Conrail wanted to include if the program were to be repeated for subsequent harvests. These switching costs were calculated for a single car, for two cars, and for three cars shipped together to account for the efficiency of multiple car shipments. Cuts of more than three cars were not considered, because most of the potential shippers could not load more than three cars due to limited track capacity.

To develop a general pricing scheme based on marginal cost, about two dozen potential destinations (see Figure 2) were selected. The base cost for these movements included origin and destination switching, transportation costs for the first 50 miles, train-to-train switching, and certain maintenance costs. Added to the base were the costs for moving the empty cars, and transportation costs for any miles over 50. This sum gave us the marginal cost.

Using this cost data, Conrail established country grain rates for this traffic, publishing them on June 26, 1982, in Conrail tariff CR 4186. The tariff was good for one year, but was really applicable only to the fall harvest in 1982.

The rates were stated in dollars per carload, based on mileage in 25-mile increments to a maximum of 125 miles. Mileage was determined by CR Freight Mileage Tables published in Tariff ICC CR 9516 Series. Weighing was not permitted. Equipment was restricted to Conrail-owned cars by specifying qualifying car marks. Measuring the success of a program of this type can be somewhat difficult. However, at least 5,125 cars were identified as moving under this special rate structure. If Conrail is assumed to have handled 5% of the market prior to this program, then at least 4,954 cars moved under the new rates that would otherwise have been handled via highway. This total is shown in Table 1 by mileage block.

The program was certainly a success in terms of attracting new volume. Shipper response demonstrated that diversion from truck to rail was possible, at the right price. Further, the market test provided important data about local grain movements that would otherwise not be known, setting the stage for securing additional gains during future harvests. It also provided some interesting data on the costing technique and on car handling that can be used to increase efficiency of future programs.

FIGURE 2

List of Destinations

Illinois
- Champaign
- Danville
- E. St. Louis
- Kankakee
- Paris
- Pekin
- Peoria
- Sheldon

Indiana
- Burns Harbor
- Decatur
- Frankfort
- Indianapolis

Kentucky
- Louisville

Ohio
- Cincinnati
- Columbus
- Dayton
- Kenton
- Lima
- Loudonville
- Marion
- Mansfield
- Mechanicsburg
- Sidney
- Toledo

For specific application, see CR 4168B Item 160

TABLE 1

COUNTRY GRAIN GATHERING BY MILEAGE BLOCK

Miles	O-D Pairs	Volume	%
0- 50	43	815	15.6
51- 75	54	1141	21.9
76-100	53	1506	28.9
101-125	50	1753	33.6
TOTAL	200	5215	100.0

Using a printout of all covered hopper traffic in railroad-owned cars originating and terminating in this grain gathering territory, a stratified random sample was selected for analysis, using the following criteria:

1. Only cars of CR initials were selected.
2. Every 35th car was selected for analysis except: a) If the car was not a country grain movement, the next country grain car was used; b) If the car had incomplete records, the next country grain car with useable records was selected.

From this data, a sample of 45 cars was selected. Each loaded movement was linked with its previous empty move. In only one case did a sample loaded car have two empty moves immediately before the loaded move (as in Figure 1, Case A).

The remaining 98% made only one empty move between loads, from the previous unloading point to the next load. Therefore, Case A movements were not a significant factor.

Using this sample, it was determined that the typical car moved about 92 car miles. This corresponds fairly well with the data in Table 1. If one assumes that the average car in the first block moved the full 50 miles, and that cars on each of the remaining blocks moved to the midpoint, then the average load moved about 85 miles. This is a very general assumption, but it is close enough for the sample data to pass a "sanity test."

One significant item revealed by the

sample was the relationship between loaded and empty miles. It was determined that the typical empty moved 168 miles, so for every loaded mile, there was an associated 1.8-mile empty move. This is a cause of concern, but it also represents an opportunity for the next harvest. If empty miles can be reduced, contribution will increase substantially.

This data can also be used in another way. With the load/empty mileage ratio known, the costs for the first 50-mile basic mileage block can be restated to include empty miles. Further, the cost for each additional loaded mile can be restated to include the cost of the associated empty movement. This can be stated either in terms of actual experience or adjusted for a specific planned improvement. To determine a cost floor for pricing, the Business Group no longer needs to develop empty car data; it can derive a cost based on the appropriate 50-mile basic mileage block for the proper number of cars and add the new mileage cost for each mile over fifty: as the cost includes both the loaded and empty move.

The data in Table 1 suggests another opportunity that requires further market research. More than one-third of the volume moved was in the last mileage block, 101-125 miles. It would be interesting to determine how much traffic is moving under the normal rate structure in the block from 126-150 miles. If the volume is relatively small, it might make sense to publish these special rates for the additional distance and absorb the revenue reduction on existing traffic in order to test the market for growth potential. Market researchers within the Business Group might conclude that the growth potential is substantial, with total contribution increasing as a result of this additional longer-distance volume.

More important, the securing of nearly 5000 carloads of new business, with only 30 days to analyze the market and publish rates, demonstrates that, in a deregulated environment, a large carrier can respond to the market place and participate in traffic growth.

FOOTNOTES

1 Data supplied by the Conrail Covered Hopper and Tank Car Business Group.

2 For a more complete discussion of the costing system applied, see J. F. Folk, "Cost Systems at Conrail," published in **Proceedings — Twenty-third Annual Meeting. Transportation Research Forum, 1982.** A discussion of the organizational relationships between Service Development and Service Control at Conrail appears in "Service Planning and Control for Railroad Operations" by T. A. Collard in the same publication.

3 Samuelson. Economics, 7th edition. McGraw-Hill, 1967, p. 438.