Ann Arbor Oct. '73

PROCEEDINGS —

Fourteenth Annual Meeting

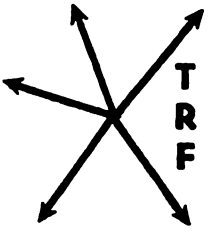
Theme:

"Search For New Transportation Horizons"

October 15-16-17, 1973
Hollenden House
Cleveland, Ohio

Volume XIV • Number 1

1973



TRANSPORTATION RESEARCH FORUM

Use of Computers in Measuring and Evaluating Terminal Operations

*by T. A. Lewis**

INTRODUCTION

I WOULD LIKE to share with you some experiences gained in the development of Southern Pacific's Terminal Management Information System (TMIS). This is a computerized system of gathering, measuring and summarizing railroad terminal cost performance and service performance data.

My own part in this development has been to transfer the concept of the TMIS system from its initial phase in regional mini-computers to its present stage in a centralized system computer. At the same time, I have been participating in a small Operating Department team whose job is to bring about changes in terminal operations, using TMIS reports to identify problems and feedback the results of changes that are made.

The TMIS tool itself approaches terminal operations from both a cost and a service standpoint. The concept of the system is to provide a complete look at the terminal by measuring and costing each individual car movement; and then to group and summarize this data so that it can provide meaningful information about the results of the actual railroad operation. The key to the organization of this computer compiled data is its arrangement in four successive layers of detail. These extend from a summary of the total operation, down through two levels of summary detail concerning functional operations, to a bottom level of exception reports by individual car movements. I cannot overemphasize the need for a clear cut, definitive method of grouping like happenings together if we are going to completely and objectively see what is going on in our railroad terminals.

From this organization of data, some statistics can now be drawn to measure the results of our terminal production. The major statistics produced are:

Car movements completed

Cost per completed car movement

Car movements completed on schedule

Average hours per car movement

To illustrate to you terminal management effectiveness, as measured with such a computer feedback, the following statistics from one large terminal may bring out the point:

**Special Assistant, Operating & Terminal System, Southern Pacific Transportation Co.*

1. Cost per car movement, or unit cost of production, was reduced from $10.83 to $9.01.
2. Schedule performance of terminal car movements increased from 74% to 83%. In fact, in one week the terminal hit 88% performance.
3. Average hours consumed per car movement was reduced from 23.3 hours to 21.0 hours.

SEEING THE TERMINAL PROBLEM

By referring to individual examples we have been told, through our own eyes or others, that railroad terminal production is not dependable. However, in our inability to see the whole picture, we have often failed to see the extent or depth of the problem. One might say that it has been difficult to see the forest through the trees.

By taking a 100% sample of terminal production, at last the forest is becoming apparent. And a selective cutting operation seems to be in order.

To know factually, which these specific terminal operations are, it is necessary to descend into the detail levels of TMIS or another comprehensive data system. At the broad summary levels, many terminal problems are masked out by averaging and the volume of data. The approach to specific operations means going to the summary group level or a car movement detail level in each terminal and testing the cost-service measurements for adverse deviation from the norm or a production goal.

This approach means shifting emphasis to exception management by selected groups of cars, instead of by the past methods of looking at individual cars.

A trouble we have faced for some time is, that at a meaningful level of detail, computer produced or not, the *volume* of detail we are mentally handling confuses the persons attempting to sort out the significant items. The result is that attacks on terminal problem areas have been hit-or-miss. We need help to focus our attention and conserve our time when identifying problems. This function is the major contribution to be made by a computer management system.

DOING SOMETHING ABOUT THE RAILROAD

Comparing computer produced terminal measurements with predetermined performance levels, it is possible to focus terminal management attention on the larger and more significant problems. Furthermore, attention can be kept focused on these problems as long as they exist. The computer portrayal of a terminal operation is both detailed and perceptive, here-to-fore we have only had detail.

None of this wealth of data, however, is worth producing or studying unless the railroad's management structure will put it to use. In other words, at some point in time, we have got to lay down our computer reports and pay attention to the *organization and quality of performance of the persons* and machines who are causing the terminal car movements.

It has been our experience in attempting to encourage use of computer compiled terminal data, that some barriers often get in the way of effective use. These are:

1. Many persons do not understand the significance of the data they are reading. For example, in reading an average, it is necessary to realize that individual movements occur above or below average. The average is only the barometer of the overall situation being measured. Or in another instance, it is necessary in looking at the cost of a car movement to know which costs are included (or excluded) and how these costs are allocated to the movement.

   Statistics cannot be meaningful indicators unless the user understands their meaning.

2. Most persons cannot read large quantities of data and effectively separate the most significant items for attention. Their heads either turn off or they make a random or expedient selection of items for attention.

   The data needs to be organized.

3. Most persons when using statistics will use only a limited number of categories of measurement; the ones they think they understand and are comfortable with. For example, average hours/car becomes a very popular and singular way to look at a terminal.

   The variety of statistics then needs to be limited.

4. If adverse cost or service show in the reports, first the reports are attacked as invalid. If the reports are validated, a group of persons will rap until the problem is explained away. Not often enough does it happen that someone walks out the door into the terminal and seriously looks into changing the organization of the operation or insists, at a front line level, that work be done correctly and completely.

   Data users then need training and encouragement in real problem solving.

5. At the terminal management level, there is a lack of direction in setting priorities as to what deserves attention first.

   Our management systems need to be focused on a limited number of worthwhile items.

6. A leader is needed on the terminal management team who *personally* wants top-notch terminal performance and has sufficient elbow room to bring this about without excessive alternate demands on his time and direction.

   Our terminal staffing procedures need to better identify and encourage leadership.

The key to more effective terminal management then, is not a set of complicated, computer produced reports alone. Instead, the key remains the locating and encouragement of individual leaders, who can understand and

use computer reports as a feedback tool for their efforts to organize and direct the energies of the front line employees in the terminals.

DOES THIS TECHNIQUE REALLY WORK

Does this technique work? Yes! The best example of which I am aware to date has been at one of our larger terminals. Here the Terminal Manager got into the operation, looking at the terminal production differently than had been past practice.

To start with, computer reports indicated that the car hours consumed in the terminal process accounted for 1/4 to 1/3 of the cost of production. Therefore, emphasis was placed on reduction of car hours. But where were these car hours to come from? The computer reports can give some hints as to where to look, but the real work in this example was by the staff out on the ground, in the terminal. The car hours were found in the departure yard. But what could be done about it? The key here was not reports but the organization of the outbound train process.

By changing the organization of the work and the expectations of what the men on the ground were to accomplish, two hours were cut from the average hours needed to complete a car movement through the terminal. The computer reports didn't make the change but they were able to impartially confirm the results of the changes.

In another approach in this same terminal, it was decided to find out what an engine could reasonably produce rather than accept past guide lines. Engine shifts, in various functions, were progressively reduced and at the same time feedback results were read from the computer reports. Surprisingly, performance stayed the same. The reduction finally hit a point where service was disrupted and these production figures were recorded to use in planning engine assignments.

Engines could now be used in the terminal on the basis of inbound inventory and outbound trim demand, adjusting the engine count from shift to shift according to the demand for that moment instead of following a preset pattern.

One of the significant changes associated with this study, was development of an objective policy for calling engines with the result that more control of the yard could be passed back into the hands of the yardmasters. Again, this organizational change was confirmed by feedback through the computer reports.

The net results of the management approach in this example was the feedback statistics that I quoted to you early in this report.

CONCLUSION

From experience with the Southern Pacific's Terminal Management Information System, I conclude that the computer can be a useful tool for bringing about better terminal performance. The computer is capable of presenting a more complete picture of a terminal than was possible before and by doing just that can help focus efforts to change and improve the terminal process.