

Research Pays Off

Computer Model Helps Railroads Improve Freight Operations



PROBLEM

A high percentage of all freight shipments must pass through one or more rail classification yards enroute to their destinations. Since trains are broken up and the cars assembled into new trains in each yard, the problem of scheduling shipments has been a bit overwhelming. Rather than emphasizing origin-to-destination (O-D) times railroad management has attempted to achieve on-time performance of trains and to move cars through classification yards as quickly as possible. But, because of management's difficulty in monitoring and controlling O-D trip times, freight car utilization and the quality of service to shippers have suffered.

SOLUTION

In 1976 the Freight Car Utilization Research-Demonstration Program, sponsored by the Association of American Railroads and the Federal Railroad Administration, commissioned Massachusetts Institute of Technology (MIT) to develop procedures for creating "operating/service plans" that would focus on service quality and to develop an operations/service planning model that could predict shipment O-D trip times and transportation costs for a given operating plan. Input to the model includes data on O-D traffic volumes, yard performance (such as car throughput), train schedules/routes, and unit costs. Output includes O-D trip times or performance standards and systemwide transportation costs. Such output can be used for studies comparing alternative capital improvements and operating strategies. The model can also be used to explore (a) contract service stipulations, such as a minimum

percentage of on-time arrivals, and (b) intermodal service arrangements, including all trailer-on-flatcar trains as opposed to trains that are a mixture of various car types, and use of different terminals to lengthen or shorten the road-haul and rail-haul portions of the trip.

The first version of the model was written in FORTRAN and required a mainframe computer. The Boston and Maine Railroad used the model to develop an operating/service plan and created an organization to manage the planning process. When the usefulness of the model had been demonstrated, the program was redesigned and recoded into modules that could be run on an Apple II microcomputer. This way the model became readily transferable to other railroads. For an investment of \$6000-\$9000 for the microcomputer and roughly 6-10 months of staff time to prepare input data, the model, now known as the Service Planning Model (SPM), can be used to model a division of a large railroad or an entire small railroad. The SPM is available on floppy discs from MIT.

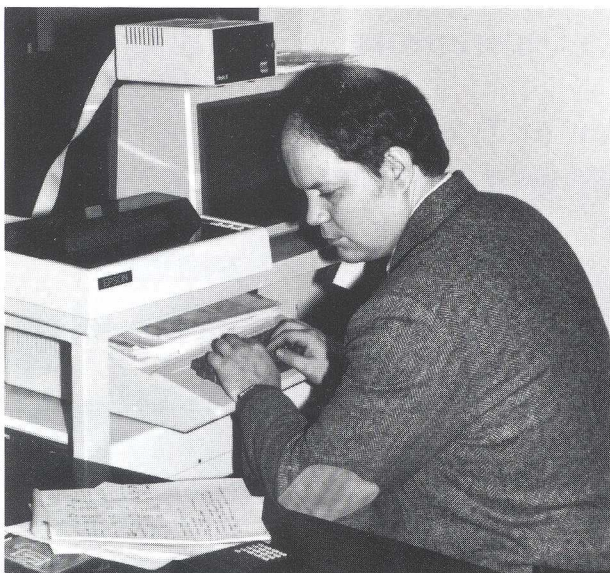
APPLICATION

The development of SPM, its first application on the Boston and Maine and other railroads, and its enhancement for microcomputer use cost the Freight Car Utilization Program about \$700,000 over five years. (This figure excludes costs incurred by the Boston and Maine and other railroads.) The Boston and Maine has been using the SPM for several years and credits it with being one of the major factors in bringing the railroad out of bankruptcy. The Burlington Northern Railroad has installed SPM and is using it as a primary management tool to reduce costs. Other railroads, including the Southern Pacific, the Illinois Central Gulf, Conrail, and the Milwaukee Road, are in various stages of implementing the SPM. The SPM is also being used in research work at the Association of American Railroads.

BENEFIT

The Boston and Maine made several other changes at the same time that the SPM was implemented. Thus, benefits in reduced transportation cost and improved schedules and on-time shipment arrivals cannot be separated from those brought about by improved management. In less than a year, the Burlington Northern has produced \$2 million in benefits from route studies and "preblocking" of cars (i.e., assembling together within a train all cars headed for the same destination) moving on the same route to reduce classification yard operations. Potential benefits are enormous when projected to future years as the SPM is applied to more railroads.

For further information, contact Research and Test Department, Association of American Railroads, 1920 L Street, N.W., Washington, DC 20036, telephone 202-835-9193.



Operator inputs data to obtain O-D times and costs.