

CSX Railway Uses OR to Cash on optimized Equipment Distribution

OVERVIEW

CSX transportation Inc is one of the biggest and major railroads company in the entire United States. It has 35000 people working for it. The annual revenue of the company would be \$11 billion. There's a crucial link provided by the company to the transportation supply chain. The overall rail network would be a length of 21,000 miles. It almost covers 2/3 of the entire population of the entire USA. The network would extend for about 23 states in America and goes up to east of the Mississippi river. It also covers some part of Canada as well. CSX railways network covers up to 70 ports. It goes through Atlantic and gulf coasts. It also covers the Mississippi river, the Great Lakes, The St Lawrence Seaway and thousands of production and distribution facilities. Its facilities extend through many track connections and more than 230 short line, regional railroads that provides service all over of North America. To be in good books with regular customers the CSX railways first delivers an empty car to its customers required location. The car goes to the customer's desired location and then its emptied. It later on becomes available for the next customer. The cycle repeats.

APPLICATIONS

1. SHIPPER POOLS- Shipper pools have a set of railcars. This is given to a dedicated customer. It depends on customer's average demand and shipments cycle time. It guarantees the car supply by deleting the daily allocation decision, gives out an easy fleet management. Whenever there's a difference in order patterns and cycle times it has an affect on the timely deliveries eg. Corona ships beer from Mexico to New York in its dedicated pool, whereas International Paper ships paper products from Southeast to Southwest United States.

2. SINGLE CAR ALLOCATION SYSTEMS- A single car allocation system is also called as expert system approach. This approach is commonly used in North American railway industry. The car distributors makes use of some rules to handle large volume of cars assignments. There is an example which can be taken into consideration. Keeping experience and repeated traffic patterns in the mind there are some good heuristic rules that can be applied. Send box-car in Birmingham to Smurfit Stone or Gondolas released in Buffalo go to Newark are some of the good heuristic rules. Whenever an empty is available correct rules are applied and each car is allocated in the order. This single car system has many disadvantages. The rules which show an impact are very difficult to design. The rules have to be changed as demand pattern changes, which in turn makes it difficult to manage. Myopic rules have been applied on cars based on first come first serve basis. Each and every car gets a best suited assignment value, a set of rules are assigned. The latter assignments depend on sequence of events. Timing of car orders and availability of empty cars is very unpredictable.

3. THE DYNAMIC CAR PLANNING SYSTEM- Cost of this system is \$5 million. It took 2 years to develop. The entire dynamic car planning system was written in C++ on a UNIX/RISC midtier computer. It makes use of Sybase database for data management.

OR MODELLING CONSIDERATIONS- A trip plan has been followed by the cars to determine a series of trains. These trains connect from origin to destination. These trains also have a particular time. The CSX network has both cars and orders of different types of cars at different locations. Some have particular specifications. It has its own data requirements, longer

solution times, very uncertain train travel time, supply and demand. Minimum cost flow formulation was adopted. This approach has quick formulation and a solution. It has a medium of information to be communicated from DCP to operations. Basic design were implemented by BNSF railway and Union Pacific Railway.

BENEFITS

1. FINANCIAL BENEFITS TO CSX- CSX is saving \$1million per year. The cars which are empty travel far only for a few miles to their next load destination which in turn saves a lot of money and the company makes profit. The empty car saves and reduces fuel to be used, less crew and equipment depreciation costs. Many different methods were used to estimate and validate our savings before and after the implementation of DCP. DCP and non-DCP was compared and CSX and other railroads were compared in the same fleet. When we looked at the years 2002 to 2008 there was consistency in results. Then compared CSX empty load ratio for the cars in North America boxcar fleet to the empty load ratio achieved by other railroads. Result was that these comparisons supported our savings estimate.

2. CAPITAL AVOIDANCE SAVINGS- When cars have less empty time, they are loaded for more time. DCP's benefit can be evaluated by seeing how much volume has been increased and how much revenue enhancement has happened. DCP's benefits are calculated seeing how much of reduction has happened in the size of the railcar fleets in the existing business. One more important point is that the yard congestion gets reduced by CSX by having less cars on the network. Also it reduces the number of trains that were running. It reduces one more major problem, i.e. it reduces track congestion. When yard line and train capacity is fully utilized it results in delayed empty deliveries. It can also result in lost orders and revenue. By reducing the empty miles and car fleets this improves service to customers.

3. RAIL INDUSTRY BENEFITS- CSX has led the North American rail industry and helped in the development of optimized empty car distribution system. Canadian Pacific (CP) uses the methodology called Turnquist and CSX had implemented as Sentinel system. CP purchased DCP from CSX. Other railroads have implemented similar systems and gained improvements. BNSF also implemented a similar design in 2000. In 2003, Union Pacific Railway followed suit method. Empty car distribution system when used by other railroads it benefitted CSX because US rail network are used more efficiently.