

Customer Challenges

- Inefficient vehicle distribution system
- High inventory at point of sales location
- Low customer responsiveness
- High transportation costs
- Long vehicle delivery times
- Inadequate service levels

PROJECT SUMMARY

The client, a major automotive company, desired a new vehicle distribution system for its North American dealership network. The goal was to create a system that would be responsive to customer choices while reducing distribution costs. After comprehensively evaluating the supply chain, with an emphasis on customer satisfaction metrics, PMC developed and recommended a Distribution Center (DC) plan which optimally balanced customer needs and transportation costs. This plan demonstrated the possibility of reducing transportation costs by 25% while simultaneously improving customer service.

SYSTEM DESCRIPTION

Vehicles manufactured abroad were shipped to multiple ports within the United States to satisfy North American demand. Dealerships received inventory directly from the ports nearest to their respective metro area.

Most transportation from portside distribution centers to dealerships was performed via road transportation (i.e. trucks).

OPPORTUNITY

The primary objective of the project was to improve customer satisfaction with a cost-effective distribution plan. Features of the former plan targeted for improvement included:

- High Transportation costs between ports and metro markets
- Long vehicle delivery times
- Waning customer satisfaction metrics relating to vehicle choice and availability

The client was considering the introduction of more distribution centers, closer to dealerships, as a potential strategy for improvement. PMC was tasked with both developing tools to generate and evaluate various distribution center placement alternatives, and proposing an improved distribution plan. Both the quantity and location of distribution centers were to be analyzed.

Case Study: Supply Chain Optimization for Major Automotive OEM

APPROACH

PMC's first step was to thoroughly document the existing distribution network. To do this, a multi-step plan was initiated: First, process maps describing the customer and vehicle flow were created. Then, key contributors to customer service level and transportation costs were identified, using created dynamic and stochastic input variables. Such variables included dealer inventory control policies, truck load factors, customer demand and demand seasonality, as well as transportation delays.

PMC consultants developed both a Mixed Integer Program (MIP) optimization and discrete event simulation model to represent the details of the distribution network. Results of the MIP, obtained with AMPL Plus, combined with ProModel what-if analysis techniques were used to determine the optimal number of DCs to include and the ideal locations to place them.

SOLUTION

PMC's MIP was developed to generate distribution center alternatives that minimized transportation-related costs per year. The alternatives were then evaluated using the simulation model, which explicitly considered the probability and dynamic elements in the system, and hence, estimated the overall effect of the given options more realistically. The client was updated on the distribution network options available to them, the expected benefits of each, and the new design recommended by PMC.

BENEFIT

The solution outcomes demonstrated that a decentralized DC concept would achieve the designated performance criteria. Significant cost reduction opportunities relating to DC inventories and transportation modes were revealed. It was shown that, under certain circumstances, the recommended distribution network could yield over \$20 million savings per year in transportation-related costs. In addition to cost savings, the distribution plan improves customer service levels by increasing the likelihood of first-choice vehicles being available and reducing the instances of lost customers.

