Optimization in Supply Chain Planning and Management

A White Paper "Brief" from OptTek Systems, Inc.
October 17, 2000

Optimization has recently become a "hot" technology in supply chain planning and management. The latest advancements in integrating optimization technology with evaluation techniques that model the complex supply chain environment have contributed to enabling improved and more focused decisions by the diverse set of managers involved in extracting the most value from the supply chain. Expected benefits from these improved decisions include:

- Increased throughput
- Reduced inventories
- Lower supply chain costs
- Increased return on assets
- Greater customer satisfaction
- Reduced lead times

OptTek Systems, Inc., a software and consulting services firm, has developed a powerful method of integrating optimization and evaluation techniques, which, when applied in a supply chain setting, is capable of guiding a series of simulations to uncover optimal solution scenarios. The uniqueness of its underlying technology, which is based on integrating metaheuristic procedures with classical optimization methods, has resulted in improved outcomes in several thousand real world applications by companies using the software; and most of these applications have involved optimization under uncertainty. And uncertainty is exactly the condition that best describes the supply chain environment.

To illustrate the application of the method in a typical supply chain environment, consider the following before and after situations in a hypothetical company.

Before employing the OptTek methods:

As customer orders continue to increase, key purchasing managers are getting pressure from senior management to improve the performance of supplier response to purchase requests. Second and third tier suppliers have been late with deliveries that have delayed production and caused deliveries to key customers to be late.

Key managers in purchasing would like to understand the problem and implement a process that would result in significantly improving the performance of these suppliers.
A TQM action team is assembled to fix the problem. Participants are drawn from several departments including purchasing, finance, manufacturing, and marketing. The team puts together a three-month plan to understand the problem and make recommendations.
Senior management wants the situation to improve immediately and cannot wait three months to receive recommendations on what to do.

The possible consequences are:

Alternative 1: Key customers migrate to competitors, market share is reduced, and stock prices decline.

Alternative 2: Purchase orders are expedited, but costs increase, profit margins decrease, and stock prices decline.

After employing the OptTek methods:

As predicted volume for customer orders continues to grow, key managers update their OptTek supplier planning and scheduling software to record the increased forecasted volume. The software provides priority-based revised schedules for planning, managing, and tracking of suppliers' delivery. The schedules have been established to maximize on-time deliveries, minimize purchased material costs, improve purchased material quality- e.g., minimize return rates and minimize deviations from order specifications.

The OptTek software electronically optimizes the appropriate supply chain schedules when internal and external environment factors change. Demand shifts in customer orders, plant capacity changes, raw material modifications, and supplier replacement are examples of these changes that can all be adjusted for in the software. Additionally, the software provides a priority list of suppliers the company can work with to provide incentives to improve performance in reliability, fulfillment lead-time, quality, commodity allocation, and lowest price.

The potential economic rewards:

A confident process for supply chain planning and scheduling not only avoids the consequences that caused the pressure from senior management, it also enables dramatic improvements in customer response time for deliveries, inventory management, throughput, and purchasing and operating expenses. The improvements in overall supply chain response times also enables increased market share and higher profitability.

The overall improvement of the supply chain planning and management that can be accomplished through the use of optimization methods can be significant. The availability of these new methods opens the door to handling decision-making problems in purchasing, manufacturing, and distribution that could not be adequately approached in the past.

OptTek methods empower decision makers to look beyond conventional decision-making approaches and actually pinpoint the most effective choices in uncertain situations. And it is the first optimization technology to incorporate risk analysis, thus bringing corporate decision-making to a higher level of accuracy.
Illustrative applications involve the goals of finding:

- maximum return on budgets allocated to different uses, given uncertain product demand, machine reliability, and raw material availability.

- optimal distribution channels to minimize transportation costs and delivery time.

- most effective configuration of machines for production scheduling under variable conditions of demand and operation.

- most effective location of facilities for commercial distribution in the face of changing customer orders and distribution alternatives.

In these applications and many others, OptTek provides decisions and scenarios that are beyond the capability of standard simulation or optimization packages to identify, and that are essential for effective planning in competitive and uncertain environments. The technology embodied in OptTek's methods represents a successful transfer of cutting-edge research to powerful and practical commercial software.

For additional information, please contact:

OptTek Systems, Inc.
1919 Seventh St.
Boulder, CO 80302, USA

Tel. (303) 447-3255 x104
Web: www.opttek.com
email: optinfo@opttek.com