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### Inventory Optimization: The Last Frontier

By *David Simchi-Levi* and *Edith Simchi-Levi*

Two opposing forces are at work in business today: the need to reduce costs and the need to improve service levels. Bolstering one almost certainly causes the other to suffer.

For example, lower your inventory to reduce costs and it becomes difficult to meet varying customer demand. Increase safety stock to meet peak demands and you could wind up with a great deal of excess inventory on the books with nowhere to sell it.

#### The Push/Pull Model

Traditionally, two prevailing supply chain strategies have dominated the industry: push and pull. In the last few years, however, new technologies have enabled the creation of a third strategy, a hybrid push-pull model that offers the best of both worlds without their corresponding disadvantages. But understanding how a push-pull strategy works in optimizing inventory requires first looking at push and pull separately.

In a push supply chain, production and distribution decisions are based on long-term forecasts. Typically, the manufacturer uses orders received from the retailers' warehouses to forecast demand.

The problem with this strategy is that it depends on forecasts from outside the manufacturer's control. For retailers who have negotiated favorable terms, there is little risk: If the inventory doesn't move after a certain period of time, the manufacturer takes it back. For manufacturers, however, there is considerable risk: Quality products may

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eventually wind up being sold in the closeout market.

### **Pull Strategy Strengths and Weaknesses**

In the 1970s, when concerns about driving down costs were at an unprecedented high, the pull strategy came into vogue. The just-in-time teachings of Dr. W. Edwards Deming were a major contributor to this movement. With a pull supply chain, true customer demand, rather than forecasts, drives production and distribution.

In other words, the manufacturer holds no inventory, but instead produces to order. On the surface, such a system is attractive because it allows the firm to eliminate inventory and the associated costs, reduce the bullwhip effect, and increase service levels.

- The pull strategy, however, breaks down when lead times are too long to react to demand in a way that satisfies the customer. A pure pull strategy also makes it more difficult to take advantage of economies of scale, because production and distribution are based on demand, and therefore only scheduled as needed.

These inherent strengths and weaknesses have led companies to look at a hybrid strategy that takes advantage of the best of each while overcoming their disadvantages: the push-pull supply chain system.

In a push-pull system, the initial stages of the supply chain generally follow a push strategy, while the remaining stages move to a pull strategy. The interface between the two stages is typically called the push-pull boundary.

Factors, called inventory drivers, have an impact on the strategy a company should follow. The issue is compounded because many of these factors are constantly changing. As a result, it's difficult for manufacturers to know with certainty which stages of the supply chain should follow a push strategy, and which should be pull.

New inventory optimization technologies, however, provide manufacturers with the ability to run "what-if" scenarios to determine their inventory drivers and which strategy should be applied to each stage.

In some cases, the answer is obvious. For example, if long-term forecasts have little uncertainty and variability, a push strategy should be followed. Stages where individual demand varies greatly should follow a pull

strategy. Where it is not obvious, these technologies can help organizations review the impact of various inventory drivers before making a decision.

### **From Local to Global View**

Inventory optimization technologies can also help organizations move from a local to a global view of inventory needs. In the local view, each decision-making center looks at the impact of various strategies only in terms of how they affect its operation. Moving to a global view helps determine the impact of various strategic decisions on the organization as a whole.

In other words, what is good for the local entity may not be good for the entire organization. Running "what-if" scenarios provides a larger perspective and helps improve efficiencies across the entire supply chain.

A well-designed push-pull strategy helps organizations provide the most value with the least amount of committed inventory. By optimally positioning inventory across the supply chain, the firm is able to shift the trade-off between committed service to customers and the cost of inventory required to support that commitment.

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