Hitachi Consulting

Using Supply Chain Design and Optimization to Reduce Inventory

A Knowledge-Driven Consulting® White Paper

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Contents

Executive Summary

Manufacturing and distribution firms are moving beyond transactional and operational technologies to tackle their complex supply chain processes. New solutions, such as Supply Chain Design and Optimization (SCDO), help companies satisfy customer demand while balancing limitations on supply and the need for operational efficiency. SCDO moves beyond automating efficiency to truly optimizing corporate performance — affecting revenue growth, costs, and ultimately, profitability and shareholder value. The decisions that SCDO helps guide include:

- Service level vs. inventory investment
- Facility number, sizes, and locations
- In-house vs. outsource
- Domestic vs. off-shore
- Postponement and delayed differentiation strategies
- Understand and quantify impact of uncertainty and interdependencies in the supply chain

In addition, since SCDO projects are usually completed in months, not years, the payback is often realized within the first few months of implementation. We've found that results like these are not unusual:

- Service level improvements of 25-30 percent
- Reductions in total inventory investment by 30-50 percent while increasing customer service levels
- Increases in inventory turns by 20-25 percent
- Strategic supply chain visibility across multiple organizations-enabling faster, more collaborative decision-making

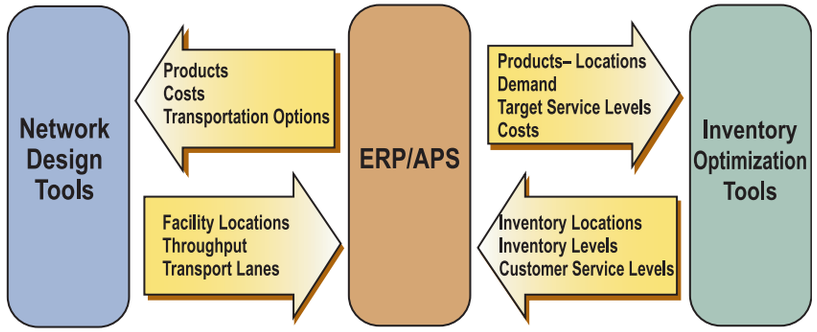
For example, a data storage company reduced total inventory investment by 20 percent while improving service levels by 28 percent with a postponement strategy that effectively balanced offshore labor savings with local customization.

Also, by optimizing the way inventory was pooled in its nationwide dealer network, a $10 billion industrial equipment manufacturer increased market share and service levels while lowering inventory by 30 percent, overcoming the challenges of a 50 percent spike in demand during the busy season, and products that take months to configure.

By evaluating new supply chain design structures, a multi-billion dollar consumer electronics manufacturer identified and implemented savings of over $200 million in supply chain costs.

A consumer adhesives manufacturer aligned inventory with tiered retail service agreements to improve customer service while increasing turns and lowering safety stock by 20 percent.

The real value is when companies incorporate SCDO technologies into a repeatable process that feeds operational systems like ERP and APS (Advanced Planning and Scheduling) applications. (See graphic, next page).



A recent study from the Georgia Institute of Technology quantified the effect of a supply chain glitch on a public company's stock price: when a supply chain malfunction is announced, stock prices plunge an average of 8.62 percent and shareholder wealth decreases by $120 million or more per company.

An Overview of Network Design & Inventory Optimization

Network Design:

The goal of Network Design is to model and then optimize the physical supply chain network and the flow of materials through that network. Network Design captures the costs of the supply chain with a "total landed cost" perspective, and applies advanced mathematical technology to determine optimal answers to both Strategic and Tactical questions.

Strategic questions answered by Network Design:

- Where should the facilities be located?
- How many facilities should I have?
- How big should the facilities be?
- What products should the facilities handle?
- Who should the facilities source?
- Should I use co-packers? Contract packers? Contract manufacturers?
- Does this acquisition make sense?

Tactical questions answered by Network Design:

- Where should I add incremental capacity?
- Should I upgrade a line, add a new line, or a new facility?
- Should I pre-build inventory or increase capacity?
- What is the impact of changing market conditions?
- What is the impact of adding a new product?
- What is the impact of regional products?
- What is the impact of a new national account?
- Is this new account profitable?
- What is the impact of different modes of transportation?

Inventory Optimization:

The goal of Inventory Optimization is to balance the costs of maintaining inventory with the costs of lost business, service penalties and expediting, should inventory not be available. Inventory optimization is a relatively new approach and technology. It focuses on modeling uncertainty and variability, and minimizing the risks they impose on the supply chain. Inventory Optimization employs stochastic methods of analysis and optimization that can help optimize inventory across all levels of the supply chain, not just individual locations

	Network Design	Inventory Optimization
Optimized Outputs	Facility Locations Throughout Transport Lanes	Inventory Locations Inventory Levels Customer Service Levels
Cost Perspective	Total Landed Cost	Total Supply Chain Cost
Planning Horizon and Frequency	Monthly/Quarterly/Seasonal	Monthly/Quarterly/Seasonal
Level of Aggregation	Major Product Categories/Families	Product Line/SKU
Treatment of Uncertainty	Deterministic	Stochastic

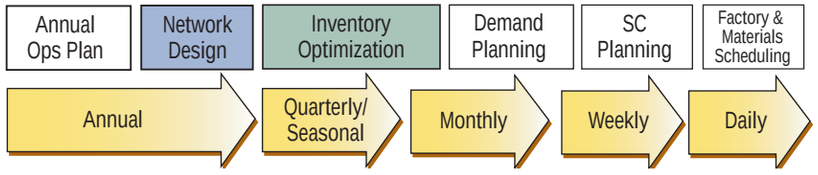
Strategic questions answered by Inventory Optimization:

- What is the total supply chain cost, including inventory related costs, for a given end-to-end supply chain structure?
- What are the tradeoffs of time vs. cost in evaluating new inventory deployment strategies?
- Postponement
- In-house versus contract manufacturer
- Domestic versus off-shore
- New suppliers versus current suppliers
- VMI and SMI strategies
- Demand and supply risk pooling strategies

Tactical questions answered by Inventory Optimization:

- How do I determine cost optimal safety stock levels and locations for an end-to-end supply chain?
- How do I compare S&OP weekly, monthly, quarterly updates to inventory targets?
- What is the process for a service level evaluation on inventory and total supply chain cost?
- What is the process for evaluating demand, cost, and time changes on total supply chain cost?

How Network Design & Inventory Optimization Fit into the Operations Planning Process:



Could Inventory Optimization & Network Design Help Your Business?

The extent to which your company will benefit from Inventory Optimization and Network Design is based largely on two factors:

1. Your ability to control your supply chain processes.

2. The complexity of your supply chain

First, assess your company's ability to control your supply chain processes:

Limited control: There are gaps in your inventory planning and execution processes, with poor inventory visibility and accuracy.

Basic Control: You are using spreadsheets for planning and execution and legacy transactional systems, with little integration across your supply chain.

Control with pure pull systems or ERP: You have basic MRP and inventory planning functionality in place, but lack advanced planning and execution capabilities.

Control with Advanced Planning and Scheduling: You are using APS for forecasting and all levels of inventory and replenishment planning. Target safety stock levels and locations are determined outside of APS.

Next, assess your company's supply chain complexity:

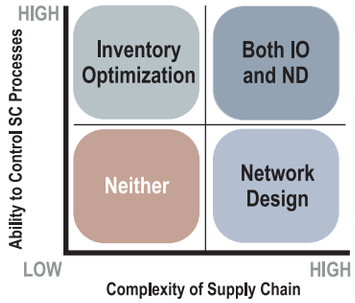
Fewer than five company-owned facilities for manufacturing and distribution. Limited customer base. Limited supply base. Single country-focused. Limited number of options to source, make, and distribute products.

Five to ten company-owned facilities. Globally focused sales and operations. Multiple options to source, make, and distribute products.

Ten to twenty company-owned facilities. Outsourced processes in addition to company-owned processes. Complex sources of supply, many customer classes, many SKUs.

More than twenty company-owned facilities. Very complex supply, customers and SKUs.

Now that you have assessed where your company falls on these two factors, place yourself in the model, below.



"Neither" Quadrant: Your company's supply chain in not sufficiently complex to warrant a network design project. Your current level of supply chain control won't help your company see the benefits of inventory optimization. You should improve your current control processes before implementing inventory optimization or Network Design.

"Inventory Optimization" Quadrant: Since your company has the mechanisms needed to execute the suggested changes to inventory locations and levels, you could benefit from an inventory optimization project. But your company's supply chain is simple enough to not warrant Network Design.

"Network Design" Quadrant: Your company has a very complex supply chain with multiple tiers of warehouses and/or manufacturing facilities. Your supply chain may also have several modes of transportation available between tiers. A network design project could greatly benefit your company. However, your company does not have the supply chain control infrastructure in place to support Inventory Optimization.

"Both Inventory Optimization and Network Design" Quadrant: Your company has the supply chain control infrastructure to implement optimized inventory policies and you have a sufficiently complex supply chain to benefit from periodic Network Design.

How to Get Started with SCDO

Our experience has shown that there are four basic approaches that companies use to execute a SCDO strategy:

Proof of Concept: Some companies develop a business case through a "proof of concept" pilot project where they optimize results for a subset of products and/or supply chain structure and compare that to the current structure and processes. This approach limits the risk of investment in new technologies and processes, while quantifying the real value they will get from deploying SCDO. This approach also gives the company real examples of improvement that can be used to justify and motivate additional SCDO activities.

Software Implementation: Companies that have sophisticated operations research, business strategy, and knowledgeable IT personnel may wish to move right to implementing and training on specific SCDO software.

Roadmap: Companies with little experience and few resources may wish to work with outside consultancies that have SCDO expertise. An expert can help develop a roadmap for deploying new SCDO processes and technologies, train and develop the appropriate personnel, and implement and integrate the appropriate software.

Outsourced SCDO: Some companies may not want to hire the resources necessary to deploy new SCDO processes and technologies. These companies choose to use consultancies on an ongoing basis to implement SCDO best practices across the organization, without the organization acquiring software or adding resources.

Summary

Historically, companies have invested in tactical and operational supply chain technology solutions. These solutions helped companies effectively model and operate their existing supply chains, but did not address the larger issue of overall supply chain design and strategy. Companies are increasingly turning to more strategic solutions such as Supply Chain Design and Optimization (SCDO) to help them satisfy customer demand, while balancing limitations on supply and the need for operational efficiency. Typically, SCDO solutions determine facility locations, inventory levels and customer service levels that are then integrated to existing ERP/APS solutions.

A company's approach to SCDO depends on both its supply chain complexity and its ability to control inventory within the supply chain. SCDO projects are usually completed in months, not years, and the payback is often realized within the first few months of implementation. The nature of SCDO allows for an initial assessment of potential benefits before a large scale project is started. This process usually involves modeling a subset of a company's products across the supply chain to determine the inventory and customer service improvements that SCDO will provide. This initial project establishes the value proposition for the enterprise, and provides a roadmap for a larger scale deployment. The objective for organizations would be to imbed the new technologies and processes of SCDO into the day-to-day operations, creating a repeatable, sustainable competitive advantage.

If you would like to learn more about what our clients are doing in the area of SCDO and our perspective on the topic, we would enjoy the opportunity to talk with you further. Call us at 877.644.0010 or visit our web site at www.hitachiconsulting.com.

About Hitachi Consulting

As Hitachi, Ltd.'s (NYSE: HIT) global consulting company, Hitachi Consulting is a recognized leader in delivering proven business and IT solutions to Global 2000 companies across many industries. We leverage decades of business process, vertical industry, and leading-edge technology experience to understand each company's unique business needs. From business strategy development through application deployment, our consultants are committed to helping clients quickly realize measurable business value and achieve sustainable ROI.

Hitachi Consulting's client base includes nearly 30 percent of the Fortune 100 as well as many leading mid-market companies. We offer a client-focused, collaborative approach and transfer knowledge throughout each engagement. For more information, call 1.877.664.0010 or visit www.hitachiconsulting.com.

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About Hitachi

Hitachi, Ltd. (NYSE: HIT), headquartered in Tokyo, Japan, is a leading global electronics company, with approximately 347,000 employees worldwide. Fiscal 2004 (ended March 31, 2005) consolidated sales totaled 9,027.0 billion yen ($84.4 billion). The company offers a wide range of systems, products and services in market sectors including information systems, electronic devices, power and industrial systems, consumer products, materials and financial services. For more information on Hitachi, please visit the company's Web site at http://www.hitachi.com.

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