

Inventory Chain Optimization: The Next Dimension for Supply Chain Management

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Many firms have invested time and money in a variety of technologies to increase corporate return on investments. These systems have enabled management to make better and more timely decisions, but this has still in many cases resulted in only modest reductions in inventory levels. The ability to quickly reduce such inventories gives management a great opportunity to quickly increase ROI.

Inventory Chain Optimization (ICO) technology is rapidly being introduced to supply chain executives and is resulting in immediate and significant benefits well beyond those expected and received from traditional supply chain systems installations. ICO is a new approach being applied to inventories in the supply chain that employs management sciences and modern information technology to raise inventory service levels up to 99.9%, reduce total operating and financial expenses by up to 50%, and drastically reduce workload. Actual ICO results obtained from a variety of industries indicate that this automated process can be installed quickly and easily into existing ERP and planning systems. This allows for significant benefits to be realized in a fraction of the time required for traditional supply chain improvement projects. ICO achieves what executives require: an automated process that provides optimized inventory management, increased service levels, and ultimately increased ROI.

What is Inventory Chain Optimization?

In supply chain management, specific policies and procedures are implemented to manage inventories at specific locations (links) in the chain. Depending on where inventories are located in the chain, inventory is classified as either supply or demand. The key to optimizing supply chain management is to both optimize the information flow across the chain and optimize the total inventory in the supply chain to meet customer service level goals.

Because the supply chain is made of one or more links, the products flow only one way through the links from the sources

of raw materials to finished goods for the customers. The product flow is controlled by the demand and supply transaction information flowing both ways, back and forth, between customers, distributors, manufacturing raw material sources, etc. Therefore, a supply chain actually consists of two fundamental and functional flows: (1) The flow of transaction information and (2) the flow of material and product.

Traditional supply chain solutions, such as Materials Requirement Planning (MRP), Enterprise Resources Planning (ERP), Inventory Control, and Supply Chain Management (SCM), typically focus on implementing more rapid and efficient systems for reducing time and costs for communication of information, between and across the inventory links in the supply chain (see figure 1).

ICO focuses on optimizing the total investment of material, costs, and workload for every inventory item throughout the supply chain's links, from the source of raw material to the final customer finished goods inventory. Optimization means providing a "balance" of supply to meet demand at a minimum total annual cost, minimum inventory level, and minimum workload to meet customer service level goal for each item in each link in the inventory chain. ICO ensures that the level of inventory planned and held at each location link, given lead times and actual costs, are algorithmically calculated to be at the optimal quantity and costs to meet the service levels strategically selected by management for each item at each location link in the supply chain. Figure 2 shows the balance needed to optimize an item in inventory at each location. In such an optimal relationship, on-time delivery is defined as delivery of the specific item, at the

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specified quantity to meet the customer's request date (see Figure 2).

Why is Inventory Chain Optimization Important?

Considerable capital has been invested in MRP, ERP, SCM, Inventory Control and other systems with the intent of increasing corporate Return On Investment (ROI). Though these systems have increased ROI through inventory reduction caused by more efficiently expediting inventory movement and improving management decision making through faster and more accurate information flow, there still remains additional improvements which can be made by optimizing the inventory levels, costs and workload at each link in the chain. It is interesting to note that during this past period of corporate investment in such systems, inventory levels on a national basis, as a percent of

demand, have seen only a modest reduction. With inventories comprising 40-50% of the average manufacturing or distribution company's capital investment, the ability to significantly reduce such inventories and their associated costs and workload provides management with a great opportunity to quickly increase corporate ROI.

The challenge lies in how to reduce inventories without reducing service levels or increasing associated costs, which may offset the benefits obtained through inventory reduction. ICO meets this challenge and reduces inventories while simultaneously increasing service levels and lowering costs and workload. Optimization is attained for each item, at each location, by determining the optimized inventory and cost per item to meet the most profitable service level in a systematic way (see figure 3).

How was ICO Developed?

ICO was professionally developed after years of evaluating inventory and business management policies, practices and procedures throughout many industries. From this extensive analysis, four critical

issues with traditional inventory management methods and processes were identified as inherently inadequate if applied to today's dynamic market environment:

Management Theory

With the advent of client/server computer technology, corporations and international software companies went forward with developing inventory planning and management systems by fitting traditional inventory policies, processes and methods to run on computers. It was rarely recognized that management sciences coupled with advanced computer power laid the foundation for a significant paradigm shift in reengineering the actual methods and processes used for managing, planning, and optimizing the inventory chain. Therefore, these advanced MRP and ERP systems evolved using traditional management theory.

Inventory Management

Traditional inventory management methods were driven from financial decisions in a top-down management environment. This top-down approach drove management to focus on such variables as inventory turns and targeted inventory investment levels. These management rules rarely considered such issues as customer service levels and their inter-relationship with lead times, total annual costs and workload. In some cases, such top-down methods actually resulted in increased corporate costs due to the extra effort to meet customer demands. Major costs were incurred in operating advanced ERP and SCM computer systems to support the expediting of replenishments because of inadequate inventory policies.

Demand Forecasting

Traditional demand forecasting, used by management to plan inventories, had four inherent over-simplifications that exacerbated the errors in forecasts:

- Forecasting methods seldom dealt with the actual lead-time of an item.
- Forecasting techniques were based on ad hoc calculations, which did not effectively deal with the volume of data

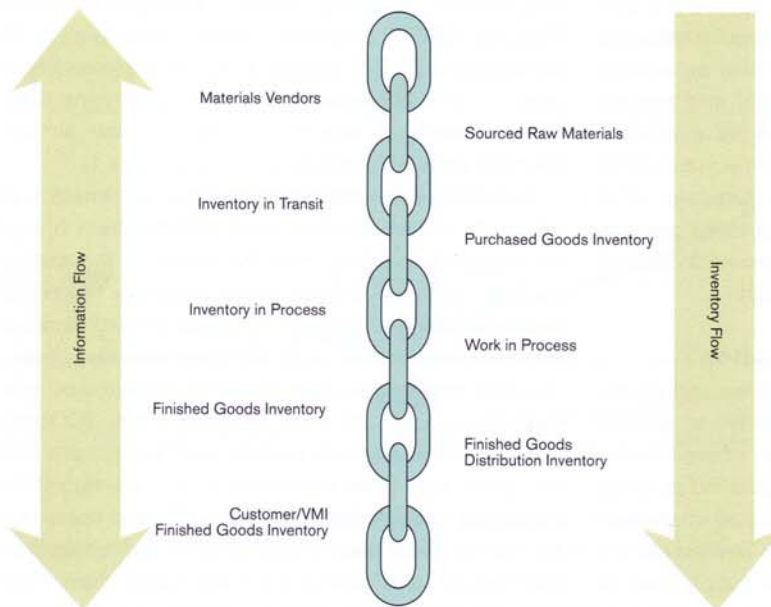


FIGURE 1 Inventory Links in the Supply Chain

required for a production environment.

- Forecasting techniques relied on human judgement for forecast model technique selection.
- Because of the complexities of the task, most forecasting policies dealt with aggregate data. Since demand patterns can differ for individual items at different locations, aggregate forecasting compounded forecast error.

Implementation

Even though inventories typically account for 50% or more of a product intensive company's total assets, the typical senior manager had a limited understanding of the actual impact inventory management decisions had on corporate earnings and customer service levels. This was partially due to the inability of inventory systems to provide senior managers with executive information that showed the actual impact of business decisions on all links in the inventory chain.

By recognizing the shortcomings in traditional inventory management methods and the software used to support them, ICO was developed. ICO not only resolved the major issues identified in traditional inventory management and demand planning, but also fully exploited the power of management science techniques in optimizing inventories. ICO differs from traditional approaches to inventory planning by using the computer as a powerful tool for deploying optimization techniques and expert systems technology. ICO provides corporate management with an effective tool to better manage and optimize the financial and operational performance of their inventory investment. Utilizing ICO's algorithm optimization processes, executive management is provided with a powerful system to increase profits by simultaneously maximizing customer service levels, minimizing total annual costs, reducing workloads and reducing inventories.

When Should Inventory Chain Optimization Be Considered?

The major objective in managing a company's inventory chain is to ensure the chain

has the optimum level and mix of inventory required at every link in the supply chain to meet strategically targeted customer service levels. The targeted service level must be met through identifying optimum inventory policies to ensure the lowest possible cost with the least amount of workload. To do this, an effective supply chain management system requires an ICO engine that optimizes all related costs, workload, and inventory investment against the service level that management has targeted for each customer and/or product line at each location in the supply chain. When management's focus is on optimizing all resources – costs, workload and inventory – to meet targeted service levels, the traditional control concepts of fixed safety stock and inventory turns must be replaced by dynamic policies recognizing total costs and adapting to variability in both supply and demand (see Figure 4).

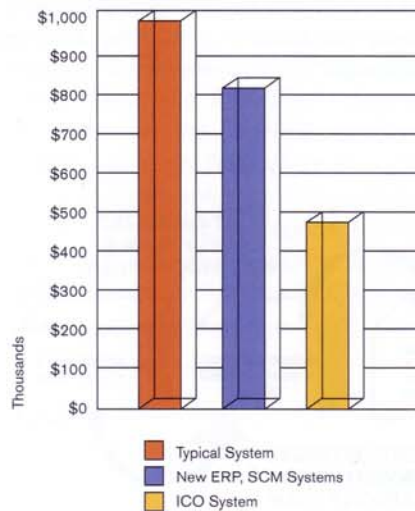
Business leaders have begun to recognize that traditional inventory management methods are inadequate to meet the dynamic needs of today's marketplace. They have recognized that to reduce costs and improve ROI, they need to opti-



FIGURE 2 The Goal - An Optimized, Balanced Inventory

mize inventories throughout the supply chain. Although most existing SCM systems can leverage today's computer and networking power to enable processes to run faster, ICO has achieved major success in increasing the accuracy of inventory levels, costs and workloads through more accurate demand and supply planning methods. ICO systems are driven by customer service levels. They create optimized demand and supply plans based on

Potential Inventory Investment At The Same Service Level



Inventory Turnover

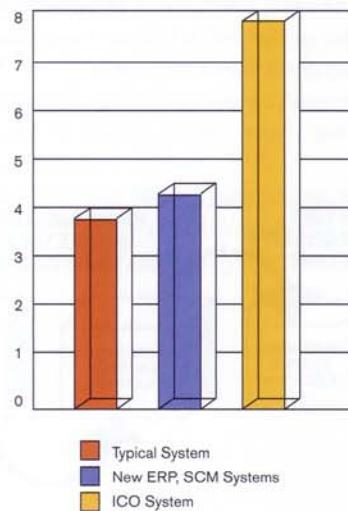


FIGURE 3 Inventory Chain Optimization Benefits

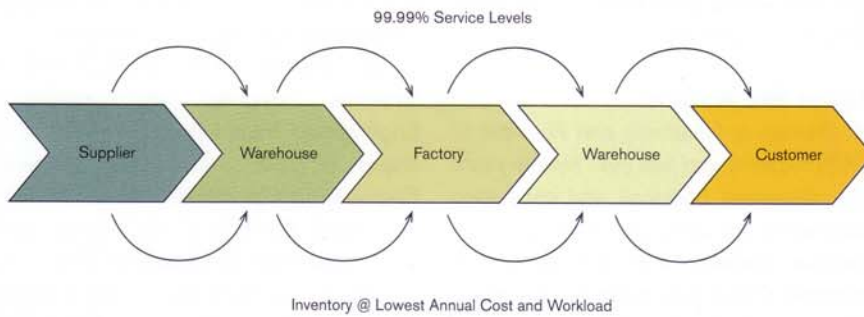


FIGURE 4 Inventory Chain Optimization

optimized planning policies that consider the realistic and dynamic interaction of all costs and other resources throughout the inventory chain to ensure customer service levels are achieved as directed by management (see Figure 5).

Inventory Chain Optimization Should be Considered When:

- Business goals require greater service levels, lower costs, or lower inventories
- Inventories and service levels can be used as a strategic tool (weapon) to maintain or increase market share
- Customers demand higher (faster)

customer service

- Inventories are significant and not transitory
- All data needed is available in the automated supply chain system
- An evolutionary improvement process is sought for further investment in the business to obtain higher ROI

Where Should Inventory Chain Optimization Be Utilized?

ICO is being used in many product intensive industries, e.g. Aerospace, Telecommunication, Computer, Electronic, Automotive, Chemical, Footwear, Apparel,

Fashion Goods, Government, Paper, Machinery, Medical and other product intensive businesses. Several types of inventories are good candidates for Inventory Optimization such as:

- Raw materials at supplier
- Finished components at supplier
- Raw materials at plants
- Finished components at plants or resale points
- Finished goods at plants
- Finished goods in master warehouses
- Finished goods at distributor warehouses
- Finished goods in vendor managed inventories (VMI)
- Packaging supplies, labels, etc...
- Service and repair parts (MRO)

Corporate Successes from ICO

Companies have taken advantage of the flexibility of implementing ICO for selected inventories that maximize profitability across the supply chain. The following examples are representative of corporations benefiting from ICO.

Example 1: A Global Supplier of Consumer Appliances

This manufacturer of water coolers and dispensers supports a dealer-distributor network of almost 5,000 companies in 14 countries. To meet the demands of these dealers and distributors this company was using traditional ERP and demand planning systems. However, these systems were unable to fulfill up to 30% of customer orders in three days (the industry standard fulfillment time). To improve business performance, the company front-ended its ERP system with the ICO solution. Through using ICO, the company was able to optimize service levels to 99.9% fulfillment in 48 hours or less. Due to the consistent reliability of ICO to balance inventories, this manufacturer was able to announce to its customers that it would deliver in "48 hours or the product was free." This ICO-based market strategy enabled the manufacturer to increase market share by over 34% in an 18 month period. This significant increase in service levels was achieved while simultaneously

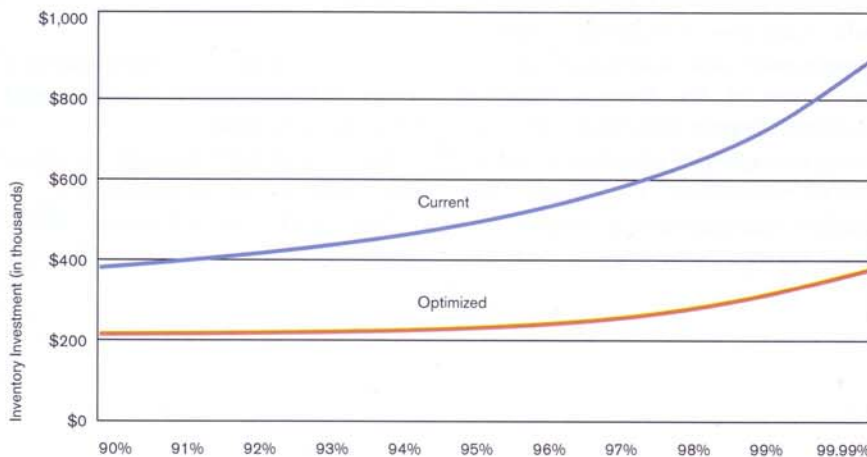


FIGURE 5 Dynamic Benefits of Inventory Chain Optimization

reducing inventories 40% in the first 10 months and by reducing operating costs by 28%.

Example 2: An International Distributor of OEM Engines and Engine Parts

This distributor was faced with a significant challenge: in order to maintain and grow their market share in North America, it needed to significantly increase its customer service levels. The distributor had already invested a significant amount of time and resources in an ERP solution, but was not seeing significant improvements in service levels or inventory reductions. Less than 12 months after implementing the Inventory Chain Optimization solution, the company saw a 22% increase in customer service levels as measured to the standard of "on unit, on quantity, to the customer's initial request date." This increase in customer service level was accompanied by a 17% increase in sales revenue. While achieving these benefits, the company was also able to reduce operating expenses associated with expediting and materials management by 23%.

Example 3: A global Supplier of Service Parts

This international provider of paper manufacturing equipment previously required very large inventories of service parts to ensure a high level of maintenance service to their installed equipment base – in hundreds of locations world-wide. Inventory Chain Optimization allowed the company to reduce its spare parts inventories by over 60% while increasing and maintaining exceptional service levels to its customers. Total costs were reduced over

50% and workload for planning and expediting were cut in half.

About the Author

Mr. Benton is Chairman and Founder of GAINSystems and has over twenty years of professional business and consulting experience. He is recognized as an international speaker and the author of Inventory Chain Optimization. He maintains consulting relationships with many Fortune 1000 companies and government organizations.

Mr. Benton has extensive experience in developing and managing improvement programs in several major functional areas, including strategic, tactical, and organizational planning, business systems development, data processing, inventory and manufacturing management, supply chain management, logistics, inventory distribution, telecommunications, budgeting, and business controls.

In the area of inventory management, Mr. Benton has management expertise in the fields of inventory control, procurement and distribution systems development, and order processing systems. Through working with over 400 companies in the past twenty years, he has earned recognition as a pioneer in developing optimal processes for demand management, supply management, multi-level forecasting, inventory management, and distribution, and is the author of the General Adaptive Inventory System (GAINS®) for optimizing management of inventory chains. GAINS embodies a concept that employs management sciences and expert systems technology to maximize

service levels, optimize costs, reduce inventories, and reduce workload.

Mr. Benton holds a Bachelor of Science degree in Industrial Engineering from Purdue University, a Master of Science degree in Industrial Engineering Operations Research from the Illinois Institute of Technology, and is a registered Professional Engineer. Previous professional experience includes the position of Managing Principal and Director of Management Information Services for a major international consulting firm. He also directed the Systems Development and the Operations Research departments for a leading international manufacturer. Prior to that, he worked for several years as an Industrial Engineer in the steel industry, and as Assistant Professor of Technology at Purdue University.

Mr. Benton has served as a member of several professional societies, including the American Management Presidents Association, the Institute of Management Sciences, the American Production and Inventory Control Society (APICS), the Council for Logistics Management, and was appointed an officer with the Institute of Industrial Engineers. He is a frequent speaker before business groups and professional societies.

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We analyze and optimize the inventory chain to maximize profit



The GAINS business optimization solution is a dynamic new Inventory Chain Optimization technology that enables management to provide world-class customer service levels of 99%+ while simultaneously ensuring maximum profit. With documented results from hundreds of companies, GAINS Inventory Chain Optimization has enabled manufacturers, service and repair organizations (MRO), and distributors to consistently achieve measurable reductions in inventories and operating costs while simultaneously increasing service levels in less than six months from implementation. Typical results are as follows:

- Customer Service Levels Increased to 99%+ (on item, on quantity, to customer request date)
- Inventories Reduced 30-50%
- Annual Costs Reduced 15-25%
- Workload Reduced 50% or More

These results are achieved in addition to benefits realized from a company's MRPII, ERP or supply chain management system. The GAINS solution is a complementary technology designed to optimize management's supply chain planning systems.

The GAINS optimization technology is offered in the following product solutions:

- GAINS Supply Chain Optimization Engine
- GAINS MRO Optimization Engine (spare and repair parts organizations)
- GAINS MRP II Optimization Engine
- GAINS ERP Optimization Engine

The methodologies and technologies that have gone into crafting these unique optimization solutions have evolved from real world problems and have been validated by over 400 companies in 16 countries. The GAINS Solution is currently being used to optimize service levels and costs for over 2,000 customer locations as an optimization tool for companies that have implemented BaaN, SAP, Oracle, and many other ERP and existing MRP systems.

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