



INVENTORY OPTIMIZATION

A TECHNIQUE FOR IMPROVING OPERATIONAL
INVENTORY TARGETS

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EXECUTIVE SUMMARY

ON THE ROAD TO OPTIMIZATION

For years, supply chain planners have used outdated inventory management models, resulting in supply chain inefficiencies that their companies can ill afford in today's ultracompetitive environment.

To boost efficiency, run leaner, and drive down the cost of supply, many organizations are exploring inventory optimization – a technique for improving operational inventory targets to address the realities of today's highly complex, ever-evolving global supply chains.

This paper examines how the stochastic multistage, multi-inventory model supports inventory optimization. It also looks at how the SAP® Enterprise Inventory Optimization application by SmartOps uses the model to help supply planners execute more effectively in a highly collaborative enterprise environment that extends beyond organizational boundaries.

Inventory optimization augments existing ERP and advanced planning and scheduling systems, helping planners improve operational inventory targets.

INVENTORY MANAGEMENT HAS CHANGED

HAS YOUR APPROACH CHANGED WITH IT?



Traditional approaches to inventory planning – based largely on rules of thumb rather than formal data analysis – lead to out-of-stock situations and supply inefficiencies.

Traditional approaches to inventory planning are based largely on rules of thumb. Planners develop a set of heuristics for determining safety stock levels, and these rules get handed down from one generation to the next. Some organizations also use rudimentary analysis, where items are weighted on an A-B-C scale with the top priority of keeping A-level items in stock. The assumptions made for this sort of analysis, however, are typically revisited only rarely. In fast-changing environments, this approach leads to out-of-stock situations and supply chain inefficiencies.

The complexities and uncertainties represented by today's constantly evolving global supply chains demand a dynamic new approach, and that's called inventory optimization. The inventory optimization approach augments existing enterprise resource planning (ERP) and advanced planning and scheduling

(APS) systems, helping planners improve operational inventory targets with item-location-period granularity for finished goods, intermediates, or raw materials and components. The result is better visibility into demand, enabling planners to modify inventory to reduce carrying costs without negatively impacting customer service levels and sacrificing product availability. This empowers organizations to improve performance and more effectively meet the terms of service-level agreements.

The Science

The science behind inventory optimization involves stochastic (probabilistic) multistage, multi-inventory modeling where a sophisticated algorithm is used to assess vast amounts of historic and real-time information while accounting for multiple variabilities and interdependencies. By enabling the analysis of a

staggering number of variables, constraints, and what-if scenarios, this model empowers planners to manage the complexity of today's supply chains. This differs from traditional inventory management models that depend on deterministic, discrete-time inventory theory in the following ways.

Molecular, Not Atomic

Traditional inventory management views the supply chain according to a single-stage, single-item model that can be characterized as atomistic. This model sees each stock item and each stage or stock location (such as a distribution center) as isolated entities with few if any meaningful dependencies.

The multistage model, in contrast, views the supply chain in terms of molecules – which are made up of atoms. This reflects the reality of today's multistage supply chains that include suppliers,

numerous manufacturing stages, subcontractors, vendor-managed inventory, central warehouses, and multiple distribution centers. This model recognizes a simple fact: inventory targets at one location affect, and are affected by, targets at other locations. To minimize the need for excess safety stock, this model uses an efficient computational process where multiple mathematical equations are solved simultaneously to reveal optimal inventory targets.

Dynamic, Not Static

To accommodate the reality of constantly changing demand, inventory planners often cobble together sets of unconnected static models to ensure proper levels of safety stock. In contrast, the multistage model is designed to be nonstationary or time varying to accommodate shifting demand. Excess inventory from previous periods can be used to satisfy demand in future lower-demand periods, making the model intertemporally consistent. The nonstationary character of the model also allows organizations to model seasonality, promotions, and end-of-quarter spikes. It also accommodates the fact that uncertainty is greater when looking farther ahead in time – something traditional approaches cannot do.

Data-Driven, Not Assumption-Based

The multistage model recognizes that organizations work only with finite historical data. Traditional models, on the other hand, start with an idealized assumption that planners possess complete knowledge of demand distribution. No planner knows everything, and the models that planners use should reflect this reality.

Variable, Not Unvarying

Traditional models lack the mechanisms to dynamically capture changing values or correct for time-varying errors. The multistage model, by contrast, is flexible enough to continuously incorporate the results of ongoing data analysis. This analysis helps identify forecast errors and biases so that planners can correct values and modify assumptions over time, thus supporting continuous improvement and closing the loop on inventory management.

The Business Requirements

The purpose of the multistage model is to help planners in real-world supply planning scenarios. Any application that seeks to leverage the multistage model must meet the following requirements.

No planner knows everything, and the models that planners work with should reflect this reality.

Enterprise Readiness

Many inventory optimization applications – designed as desktop tools for offline analysis – fail to address the fact that supply planning is a collaborative activity that extends beyond enterprise boundaries. They are neither scalable nor capable of automating planning processes. What's needed is an application that leverages the multistage model at an enterprise level. Requirements include visibility across multiple ERP applications and planning systems, along with support for global inventory-

planning functionality for understanding inventory liabilities, maintaining service levels, and operating according to supplier and vendor-managed inventory business models.

Flexibility

An inventory optimization application needs to be flexible enough to accommodate different industries – such as consumer products, chemicals, manufacturing, wholesale distribution, and high tech. A useful feature in this respect would be reporting tools that can help validate, analyze, and improve industry-specific supply chain information regarding demand, supply, and production elements.

Data Input Connectivity

Better outputs require better inputs. Thus, an inventory optimization application should include data connectivity modules that can work with a wide range of data sources to transform and load raw data easily and automatically. These modules should also accommodate the supply chain network structure itself, which is often the most challenging aspect of data connectivity.

Built-In Intelligence

The ability to access data is important. But planners also need to work with that data. An inventory optimization application, then, must support robust analysis to help planners understand issues involving forecast bias and accuracy, supplier uncertainty, schedule adherence, and more.

Approval Workflow

Planners need to review updated inputs (such as forecasts), perform due diligence, and formally approve any modified targets in order to avoid problems downstream. An inventory optimization application should accommodate this

or the SAP Advanced Planning & Optimization component. In either case, it enables planners to dynamically determine optimal demand-driven, time-phased inventory targets for every item at every location throughout your supply chain. Specifically, planners can:

In the end, these capabilities enable your planners to optimize inventory levels throughout the organization, helping you improve customer service levels while minimizing working capital requirements. This makes you more efficient and far more competitive.

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Find Out More

To learn more find out more about inventory optimization and how SAP Enterprise Inventory Optimization can help your organization compete more effectively, contact your SAP representative today or visit us online at www.sap.com/solutions/solutionextensions.

requirement with automated workflow and alerts that allow planners to manage by exception.

Continuous Improvement

Supply chains are in constant flux. This is why inventory optimization applications need to support continuous improvement processes. Planners should have the ability to play out what-if scenarios and study the ramifications of proposed actions.

The Application

The SAP Enterprise Inventory Optimization application addresses these requirements, helping organizations strike the right balance between service levels and inventory investment. The application can be used on a stand-alone basis, if desired, or as an integrated part of the SAP ERP application

- Coordinate capacity, inventory, demand, lead time, and product availability variables to gauge how much inventory should be carried by item, location, and time period
- Leverage a multistage modeling approach to calculate the relationships among inventories, service levels, capacity, and costs across all stocking locations and stages – and across different types of supply chains within organizations and beyond enterprise boundaries to support supplier- and vendor-managed inventory
- Set and manage targets such as safety stocks more frequently at a more granular level, supporting lean processes
- Accurately track and streamline inventory positions throughout the order-to-cash value chain, using advanced algorithms that eliminate waste and help the organization run lean

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