



# The Inventory Optimization Handbook

Using Multi-echelon Inventory Optimization (MEIO) to achieve measurable operational improvements



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# Why Inventory Optimization

Today's supply chains operate at an extraordinary pace, driven by a constant influx of data from internal systems, external enterprise platforms, social media, syndicated feeds, and the Internet of Things (IoT). Machine learning plays a pivotal role in transforming this data into actionable insights—helping businesses anticipate customer needs, spot emerging trends, and create a more synchronized supply chain from product ideation to final delivery.

Inventory optimization is a key enabler in this transformation, unlocking working capital, enhancing service levels, and minimizing excess inventory. By analyzing multiple data streams, inventory optimization determines optimal stock levels and locations to meet service goals while adhering to inventory policies. Advanced algorithms then recommend stocking strategies that align with these insights.

Optimizing inventory across the supply network yields powerful strategic advantages. It provides a clear analytical view of what drives inventory—whether it's vendor variability, demand fluctuations, lot sizing, or replenishment cycles—allowing teams to pinpoint areas for improvement and maximize working capital performance. When leadership calls for a targeted inventory reduction, inventory optimization equips supply chain teams with the clarity to identify which inventory can be safely reduced with minimal risk. This precision not only supports executive mandates but also uncovers opportunities for broader strategic enhancements that elevate the performance of the entire supply chain.

# The Large Opportunity for Inventory Optimization

Multi-echelon Inventory Optimization (MEIO) goes a step further to optimize stock locations and amounts across all sites and nodes in a supply chain network.

The right MEIO approach automates the stocking and replenishment process as well as enables rich “what-if” scenario analysis to analyze tradeoffs between costs and service levels. It also uses machine learning to identify stocking patterns for seasonal products or new product introductions. Robust visualizations, MEIO dashboards, and event-driven notifications help improve usability, user adoption, and user efficiency.

This e-book explains the importance of inventory optimization and MEIO strategies to help minimize costs while meeting customer service requirements and provides examples of how to build these capabilities at your company.



# Machine Learning to Boost MEIO Effectiveness

Machine learning with built-in generative AI can automatically improve your planning outcomes. Advanced MEIO solutions can use multiple algorithms to determine the best inventory investment targets based on demand characteristics, service level goals, and available budget.

For example, Logility's digital supply chain platform uses machine learning to automatically select the best inventory policy for each item across a company's portfolio, considering demand characteristics ranging from high volume to sporadic. This automation through artificial intelligence (AI) enables you to accelerate your ability to respond to changing market conditions.



# The Two Levers of Optimization

Inventory optimization uses two powerful performance levers: working capital and service levels. Through the effective use of each lever, you can free trapped working capital while improving service levels (which can result in increased market share).

Multi-echelon Inventory Optimization (MEIO) uses proven machine learning and algorithmic optimization to accurately model inventory flows through the interdependent stages and locations of a supply chain, and analyzes historical behavior under all conditions. The digital twin of your physical network helps create an optimal configuration of inventory requirements and locations adequate to handle any degree of demand and supply uncertainty, seasonality, etc., while achieving desired service levels for minimum cost.

In addition to identifying the causes and types of excess stock held at various locations, MEIO recommends specific strategies for postponing inventory at earlier stages of manufacturing and distribution processes. Postponement can take two forms:



Pooling finished goods inventory to meet aggregated customer demand streams with less waste (lower obsolescence rate).



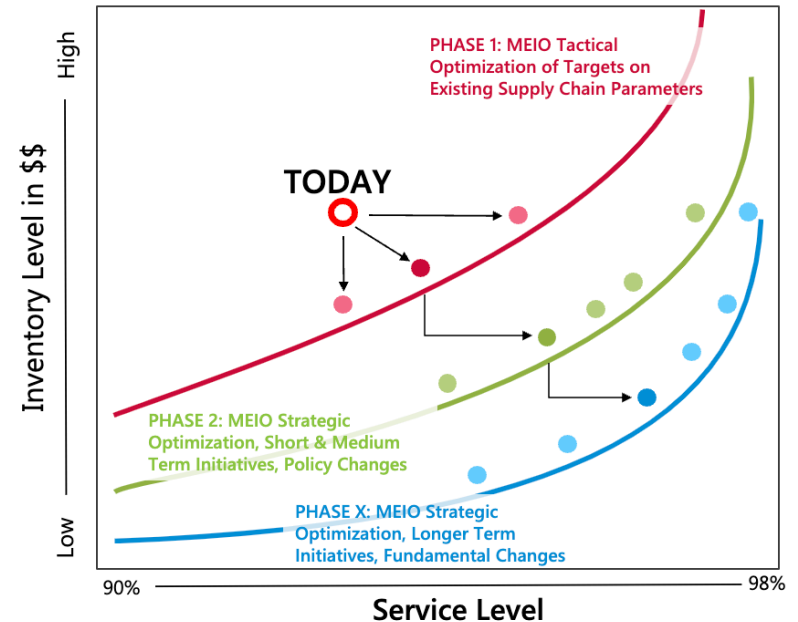
Buffering work-in-progress at crucial points before costly value-add manufacturing steps. This reduces costs and increases flexibility.

# Efficient Frontier

By modifying stock buffers and revamping policies and targets around the supply chain, driven by actual supply and demand history, a MEIO program can create reductions of 10%– 30% in total inventory, freeing millions in working capital that has been trapped in excess stock and carrying costs. That’s one side of the equation.

The other side involves the natural trade-off between service level and inventory cost. The trade-off relationship forms a curve called the “efficient frontier.” The curve shows that, for any status quo, it will always cost more to achieve higher service levels. But phased MEIO initiatives can change the status quo, creating a series of new curves that deliver any desired service level at less cost than the former state allowed.

Inventory Optimization generally allows organizations to lower inventory at the same level of service, raise the level of service for the existing inventory investment, or some combination of the two. MEIO lets the supply chain team evolve to a completely new curve—a new and previously unavailable relationship between inventory and service level that drives continuous improvement.



# Removing Barriers to Inventory Optimization

Supply chain executives worldwide face an ongoing dilemma: improve customer service levels but don't create excess or obsolete inventory at the same time.

It's a double-edged sword for supply chain performance. Because of variability in demand and supply, increasing customer service levels can lead to higher levels of safety stock. Improving cash flow by indiscriminately reducing working capital dollars can result in slashing the wrong inventory, resulting in lower customer service levels.

While many supply chain teams have conducted inventory optimization initiatives to raise service levels while lowering inventory cost, others worry that they won't be successful in the effort.



# Two Common Barriers

Two common barriers prevent an organization from reaping inventory optimization benefits:

- 1 Technology:** Success is often undermined by reliance on limited tools (such as modules built into, or bolted onto, existing ERP systems) or inadequate ones (e.g. error-prone, hard-to maintain spreadsheets). These tools are unable to effectively analyze and model the required amount of inventory.
- 2 Complexity:** An internal perception that understanding and implementing proven mathematical tools and business processes in order to streamline the creation of optimal inventory policies and targets is too difficult for the team to take on.

Advances in machine learning allow you to leverage artificial intelligence to automate scenario analysis, boost visibility and measure your inventory performance.

Overcoming these barriers is easier than you think. Companies that embrace inventory optimization, either at a single stage or across their full, multi-echelon network, achieve on average a 28% increase in inventory turns.

# A Three Step Approach

A simple three-step approach can remove barriers to achieving a successful inventory optimization initiative.

First, assess your organization's capabilities from these perspectives:

- Inventory form, function and performance
- Business process and inventory management expertise
- Technology and organizational readiness

Understanding your current state on these critical dimensions lays the foundation for a solid business case that can deliver real-world benefits.

Second, create a future state, inventory optimization capability—process, technology, organization—that provides your supply chain team with a roadmap to success.

Finally, continue to drive fundamental strategic changes that create greater resiliency and agility throughout the supply chain and establish a cycle of continuous improvement for years.



# Areas of Impact



## Tactical & Strategic Inventory Modeling

Tactical modeling compares actual demand to forecast, and actual receipt of goods to the plan for each SKU. Tactical modeling identifies forecast accuracy and safety stock issues. Adding historical forecast accuracy into the equation enables predictive service level calculations. This fact-based approach to inventory targets allows you to right-size inventory by SKU.

To answer more difficult questions, such as where to make or stock products or the impact of distribution or manufacturing facility closures or openings, use strategic inventory modeling. It can provide quick, side-by-side scenario analysis to help make the right decisions.



## Demand Forecast Accuracy

MEIO enables timely answers to complex “what-if” scenario assessments including impacts of channel changes and stocking policies across a complex and volatile unified commerce global distribution network.

MEIO users are more likely to boost forecast accuracy to further synchronize inventory alignment.



## Inventory Replenishment Strategies

Improving inventory replenishment strategies include postponement, cycle time, supplier improvements, and changes to replenishment parameters. A formal MEIO platform can help pinpoint which products are susceptible to supply issues so root cause analysis and corrective action can be applied.

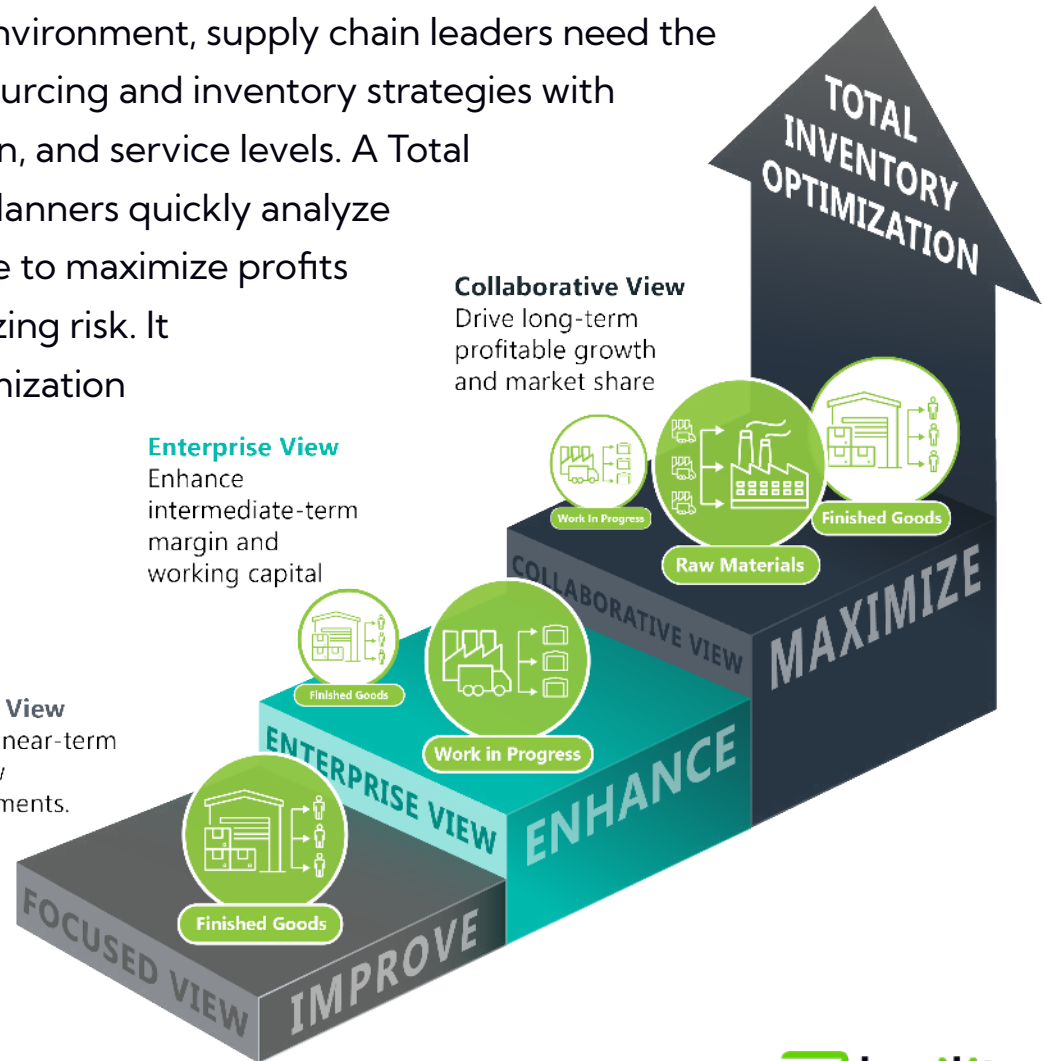
# Total Inventory Optimization

To safeguard margins in this complex environment, supply chain leaders need the ability to quickly evaluate alternative sourcing and inventory strategies with a holistic view of production, distribution, and service levels. A Total Inventory Optimization approach lets planners quickly analyze the trade-offs between cost and service to maximize profits and boost working capital while minimizing risk. It goes beyond traditional inventory optimization by considering the stock locations and amounts across all nodes in a supply chain network. This approach enables CSCOs to consider unique strategies for positioning inventory at earlier stages of the manufacturing and distribution process.

**Focused View**  
Evaluate near-term cash flow improvements.

**Enterprise View**  
Enhance intermediate-term margin and working capital

**Collaborative View**  
Drive long-term profitable growth and market share



# Three Steps to Total Inventory Optimization

1

**Limited View:** Identify and optimize near-term cash flow improvements.

The first step is to define the digital twin with the correct parameters to ensure it mimics the existing supply chain. A supply chain digital twin allows planners to deeply analyze the trade-offs between cost, lead time, quality, inventory carrying costs, supply chain risk, and strategy. The organization can use it to operate for cash by selling nonmoving stock, reducing supply, and becoming more precise in supply replenishment. However, while most companies already optimize their supply chains for nearterm cash flow, their optimization strategy typically ends here.

2

**Enterprise View:** Optimize intermediate-term margin and working capital.

The next step is to look at the bigger picture and evaluate more scenarios and alternatives. CSCOs can do this by considering the other layers in the supply chain, such as the customers, warehouses, plants, and suppliers. Using a guaranteed service model, the organization can optimize these layers individually and based on how they impact each other.

3

**Collaborative View:** Drive long-term profitable growth and market share.

The last step is to continue driving fundamental strategic changes that create greater resiliency and agility with a cycle of continuous improvement. This can include disposing of obsolete stock, increasing common parts and materials, and rationalizing underperforming products.

# Checklist

- Innovation:** Ensure your solution provider harnesses the power of machine learning and artificial intelligence to drive automation and help your company accelerate market response.
- Usability:** Choose a solution that will empower users across different areas of your business to automate routine analysis and deliver more value to the bottom line.
- Tactical Target Setting:** When setting tactical inventory targets on an ongoing basis, automatically characterize demand and uncertainty, both in lead time and in the demand signal.
- Flexibility:** Some inventory cannot be statistically modeled. Make sure the solution you select can set smart inventory parameters for your most problematic SKUs as well as your fast movers.
- Supply Chain Data Management:** Leveraging your enterprise data for strategic and tactical analysis is a major consideration. Select a software provider who can simplify the process, leverage artificial intelligence to boost data quality and offer a powerful integration platform with little or no customization required.
- Risk Aversion:** The right IO/MEIO approach can do more than deliver better service levels. It can also make your C-Level team happy by identifying and mitigating risk and freeing valuable working capital.
- Strategic Modeling:** Once tactical processes are in place, turn your efforts to year-over-year improvements. Leverage tactical and strategic planning capabilities to perform comprehensive analytics across your supply chain for ongoing business insight.

# Conclusion

The benefits of both Inventory Optimization and Multi-echelon Inventory Optimization (MEIO) are well established by hundreds of companies of all sizes in industries ranging from consumer products to life sciences, high technology to process and discrete manufacturing.

Leading organizations have shown that right-sizing inventory buffers and restructuring where and how inventory is held can drive powerful financial benefits and adds tremendous value to the Sales & Operations Planning (S&OP) process. Inventory Optimization provides a knowledge platform for better decision-making and enables organizations to use inventory as a lever for balancing supply and demand.

This platform also recommends where and how to hold inventory across all tiers of the value chain. Inventory Optimization and MEIO initiatives can reduce inventory by 10–30% while improving service levels, resulting in improved profitability and happier customers.

Significant recurring benefits include:

- Lower working capital
- Reduction in logistics cost burden
- Savings from decreased obsolescence
- Revenue uplift from fewer permanently lost sales orders

# REIMAGINE SUPPLY CHAIN

## About Logility, an Aptean company

Logility's AI-first supply chain management software helps organizations build sustainable digital supply chains that improve people's lives and the world we live in. Our fully integrated, AI-driven end-to-end platform helps clients know faster, turn uncertainty into opportunity, and transform supply chain from a cost center to an engine for growth.