Application of Machine Learning to Boost MEIO

THE
ADVANCED
INVENTORY
OPTIMIZATION
HANDBOOK

LOGILITY®

INVENTORY
OPTIMIZATION?

28%

Increase in inventory turns with Multi-Echelon Inventory Optimization
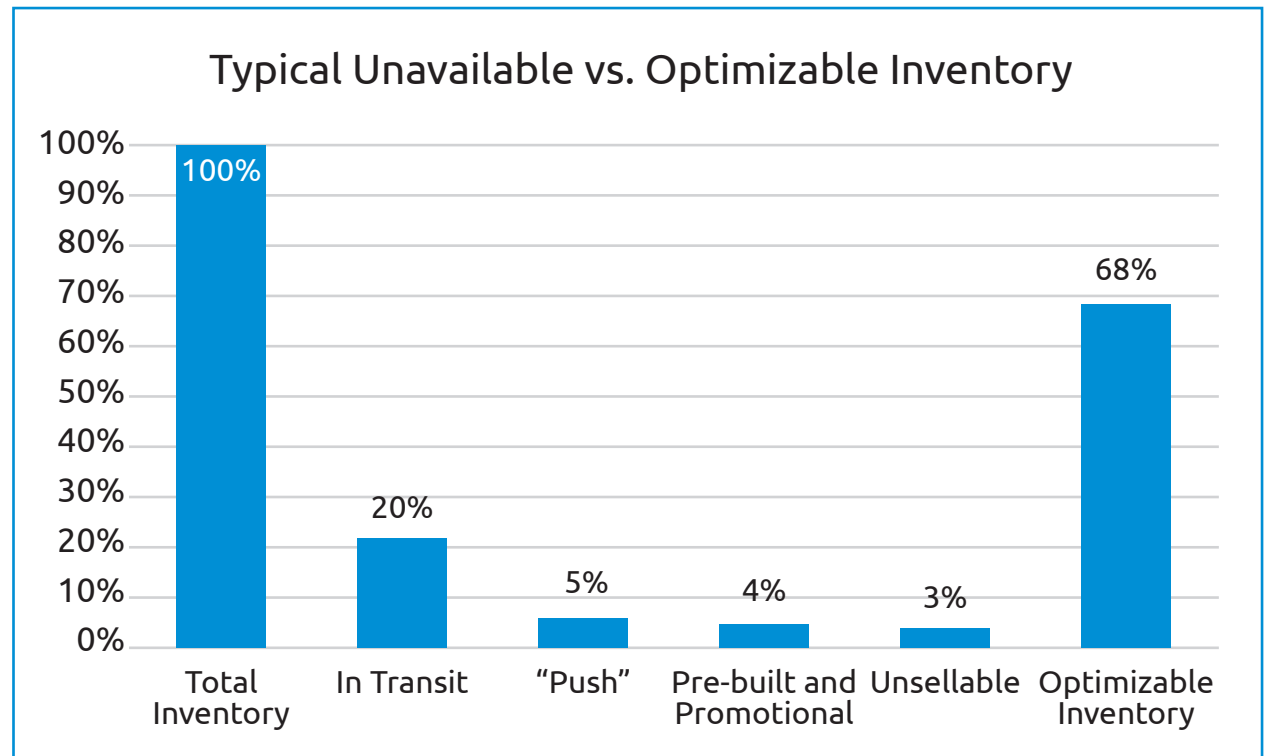
Source:

ABERDEEN GROUP

Today's supply chains move at a ferocious pace fueled by multiple data streams from both internal and external enterprise systems, social networks, syndicated streams, Internet of Things (IoT) and more. Advances in machine learning help transform this data to better predict customer needs, identify trends and deliver a more synchronized supply chain from product concept to customer availability.

Inventory Optimization (IO) can have a huge financial impact by freeing up working capital while boosting service and minimizing inventory.

Harnessing the insights of multiple data streams, IO determines where and how much stock to hold to meet a designated service level while complying with specific inventory policies. Through sophisticated machine learning algorithms, IO makes stocking recommendations to satisfy these needs.

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 scenario analysis to automatically analyze tradeoffs between costs and service levels. It also uses machine learning to identify stocking patterns for seasonal products or new product introductions. Through robust visualizations, MEIO dashboards and event driven notifications help improve usability, user adoption and user efficiency.

Typical Unavailable vs. Optimizable Inventory

Category	Percentage
Total Inventory	100%
In Transit	20%
"Push"	5%
Pre-built and Promotional	4%
Unsellable	3%
Optimizable Inventory	68%

Source: Logility

This e-book explains the importance of IO and MEIO strategies to help minimize costs and reduce risk 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 has the ability to automatically learn to 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
INVENTORY
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.

High

Low

Inventory Levels in $$

TODAY

PHASE 1

PHASE 2

PHASE 3

Source: Logility

90%

99.8%

Service Level
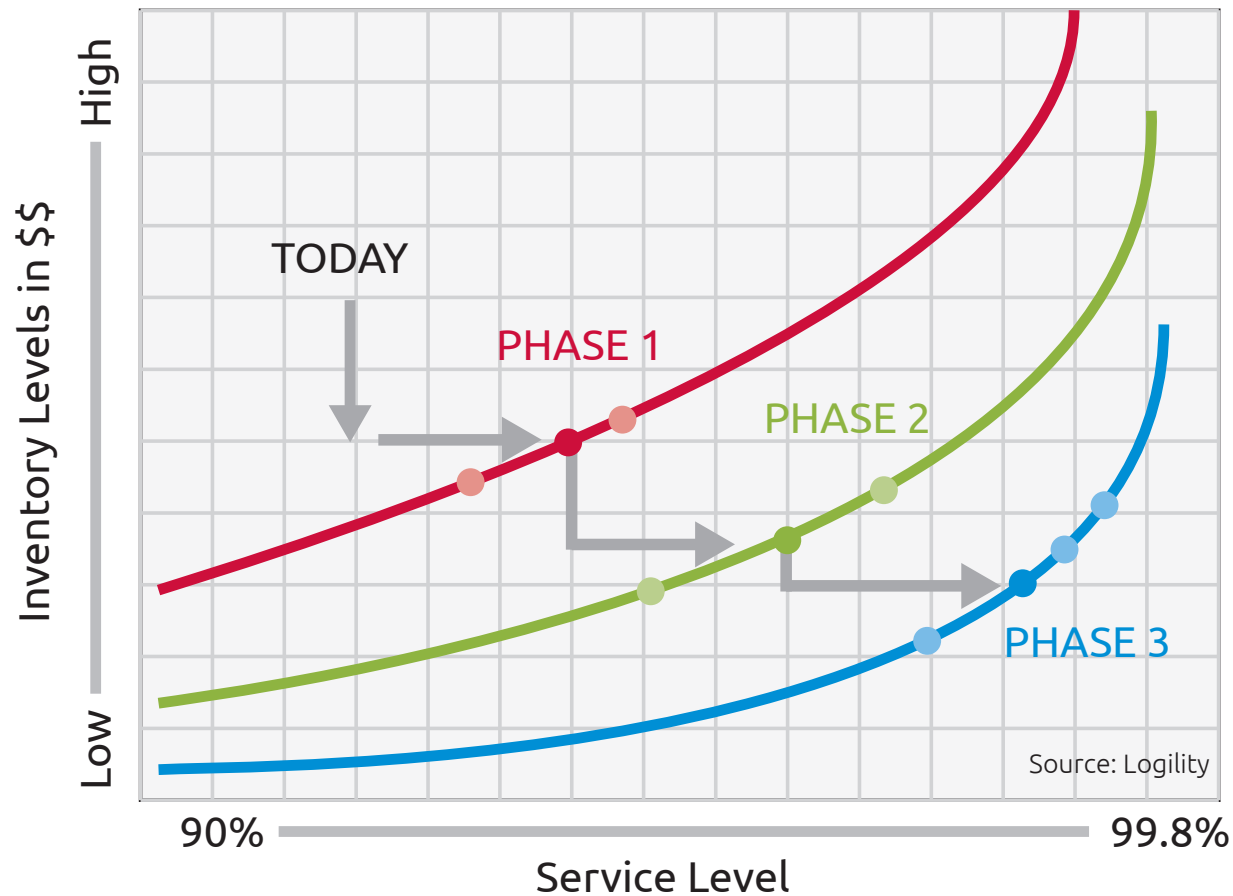
EFFICIENT FRONTIER

Overall, by modifying stock buffers (lowering some, raising others) and revamping policies and targets around the supply chain—all driven by actual supply and demand history—a solid 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.

6

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 IO 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 often prevent an organization from reaping IO benefits:

■ **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.
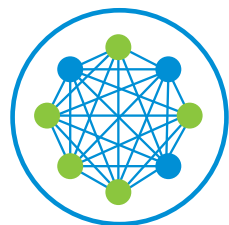
■ **COMPLEXITY:** An internal perception that understanding and implementing proven mathematical tools and business processes in order to streamline the creation of optimal inventory policies and targets is too difficult for the team to take on.

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 IO, 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 IO 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, IO 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.

1. ASSESS CAPABILITY

2. BUILD AND SUSTAIN

3. DRIVE STRATEGIC VALUE
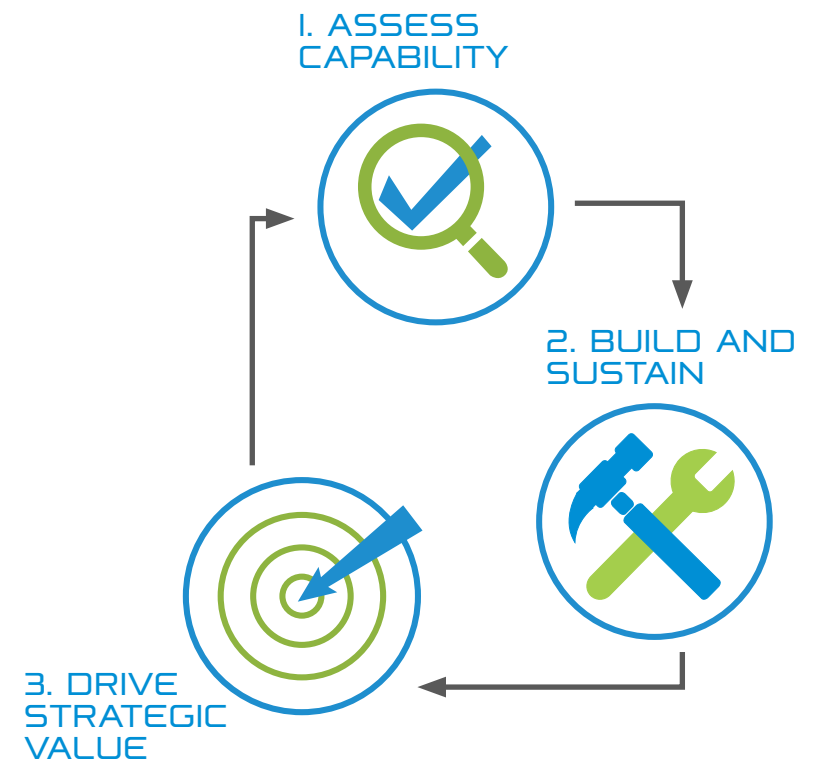
> **"Logility gives us the visibility we need across our entire supply chain."**
>
> **Maegan Huber**
> Forecasting and Inventory Optimization Supervisor, Ashley Furniture

VIDEO

SUCCESS STORY:
Ashley Furniture Designs the Perfect Order with Inventory Optimization

Ashley Furniture is the third largest home furniture manufacturing company providing case goods, mattresses, upholstered goods and home accessories that are sold by more than 6,000 retail partners.

Challenge

Ashley Furniture needed to fuel profitable growth while creating a customer-first experience by improving its perfect order index with fast and efficient delivery without increasing safety stock.

Solution

Ashley Furniture deployed the Logility Digital Supply Chain Platform to help right-size inventory across its global supply chain network and reduce safety stock.

The Bottom Line

- Improved customer satisfaction

- Expanded visibility and planning throughout the global supply chain

- Reduced safety stock

- Optimized inventory at the item level

- Activated management by exception so biggest issues get first attention

- Avoided the need for additional distribution center space

THE TOP THREE
AREAS OF IMPACT

1) 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.

2) DEMAND FORECASTING 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.

3) INVENTORY REPLENISHMENT STRATEGIES

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

CHECKLIST

If your organization is considering an inventory optimization initiative, consider these points:

✅ **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, make sure you can 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 (IO) 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. IO and MEIO initiatives typically reduce inventory by 10-30% while improving service levels, resulting in dramatically improved profitability and happier customers.

Significant recurring benefits can include:

Lower working capital

Reduction in logistics cost burden

Savings from decreased obsolescence

Revenue uplift from fewer permanently lost sales orders

ABOUT LOGILITY

Accelerating the sustainable digital supply chain, Logility helps companies seize new opportunities, sense and respond to changing market dynamics and more profitably manage their complex global businesses. The Logility® Digital Supply Chain Platform leverages an innovative blend of artificial intelligence (AI) and advanced analytics to automate planning, accelerate cycle times, increase precision, improve operating performance, break down business silos and deliver greater visibility. Logility is a wholly owned subsidiary of American Software, Inc. (NASDAQ: AMSWA).

To learn how Logility can help you make smarter decisions faster, visit www.logility.com.

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