The Inventory High Wire Act: How Demand Modeling Systems Drive Revenue without Breaking the Bank

+ AI-powered demand modeling systems help planners improve their short-term forecast accuracy and correctly set safety stocks, reaching high customer service levels while right-sizing inventory.

Every supply chain planner wants to deliver high service levels to support revenue growth—who wouldn't? Setting the right inventory levels at every stocking point in the supply chain is key to keeping these twin goals in balance with costs. But it can often feel like a high wire act in constant peril. Relying on forecast accuracy alone to set optimal inventory levels doesn't get you there; it's impossible to generate a consistently perfect demand forecast. And as business complexity grows and demand volatility increases, it becomes harder to keep from "falling off the wire" by either failing to meet KPIs or incurring massive costs.

Fortunately, there is a tried and proven way to get this balance right. It involves modeling demand and uncertainty, and using that knowledge to make smart inventory tradeoffs that optimize service levels. Traditional forecasting systems can't do this because they are "deterministic"—their internal processes view all data as absolute and detached from changes in demand behavior and disruptions. Any deviation in demand, no matter how "normal", is read as an error. If recent events have taught us anything, that approach simply doesn't fly in the real world.

Demand modeling works differently. It uses a "stochastic", or probabilistic, approach that produces consistently reliable forecasts by modeling probabilities and then factoring in random behavior. These systems are able to factor in a wide range of variables beyond historical sales data, such as promotions, product launches, weather data, etc. The outcome is a value within a range, and each value is assigned a certain probability of occurring. This approach leads to both higher service levels and revenue growth, and saves human and financial resources. Here's how.

Details Matter with Demand Modeling Systems

Demand modeling lets you break down data so that your baseline demand is as detailed as possible. Using this approach, companies that maintain detailed demand histories, can, for example, view daily sales by order-line, item and ship-to location. This means planners will know if monthly or weekly demand for 48 cases of beer came from one very large order or from 12 smaller orders with an average size of four. *(see Figure 1)*

This information is essential for modeling demand. For instance, variables such as line-order frequency and line-order size are essential for being able to accurately predict future demand and decide how much inventory should be on hand to insure against demand volatility and guarantee target service levels. And from this detail, patterns can be identified. For example, each ship-to location may show clear ordering patterns for certain days within weeks, or weeks within the months.

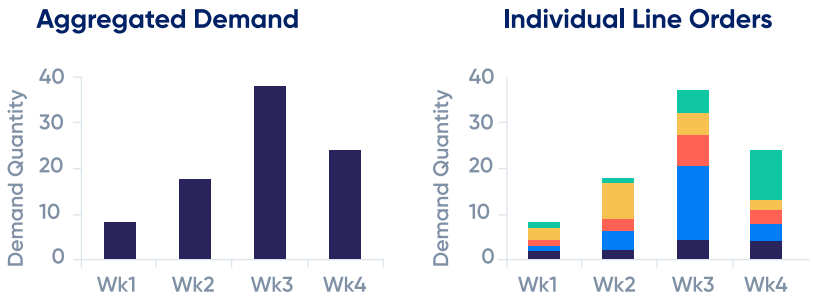

Figure 1 — Line-order frequency and line-order size data is essential for being able to accurately predict future demand

Casting a Wide Net for Demand Modeling Data

You can gain even sharper insights by factoring in downstream or channel data such as daily sell-out data and store-level or DC inventory positions. This gives you a clearer picture of customer behavior so you can be more certain of what orders to expect.

It's impossible for planners to manually factor in the reams of available demand data from promotions, new product launches, projected life cycles, returns, substitutions, and even data from social media that signals customer sentiment. Advanced demand modeling systems automate this, freeing planners to take a low touch, "advisory" approach. Instead of endless number crunching, their roles become fine-tuning the baseline forecasts with their supply chain domain expertise and knowledge of business upside and risk.

Demand modeling disaggregates forecasts down to the channel and SKU level. Combined with POS store data and online sales updates, they predict what stock needs to be in the store for on-site

customers and in a distribution center for online shoppers. After fulfillment they refresh stock, using algorithms to re-balance inventory across multiple points of service, calculating the optimal service point to satisfy the shifting demand.

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Demand modeling systems that apply artificial intelligence (AI) in the form of machine learning can further refine the baseline demand forecast by factoring in the effect of demand indicators by channel. *(see Figure 2)* The beauty of these is that they get smarter over time as they continue to learn from machine and human inputs. This also means that if one of your planners leaves, all their accumulated knowledge doesn't leave with them.

Step Up to a Complete View of Demand

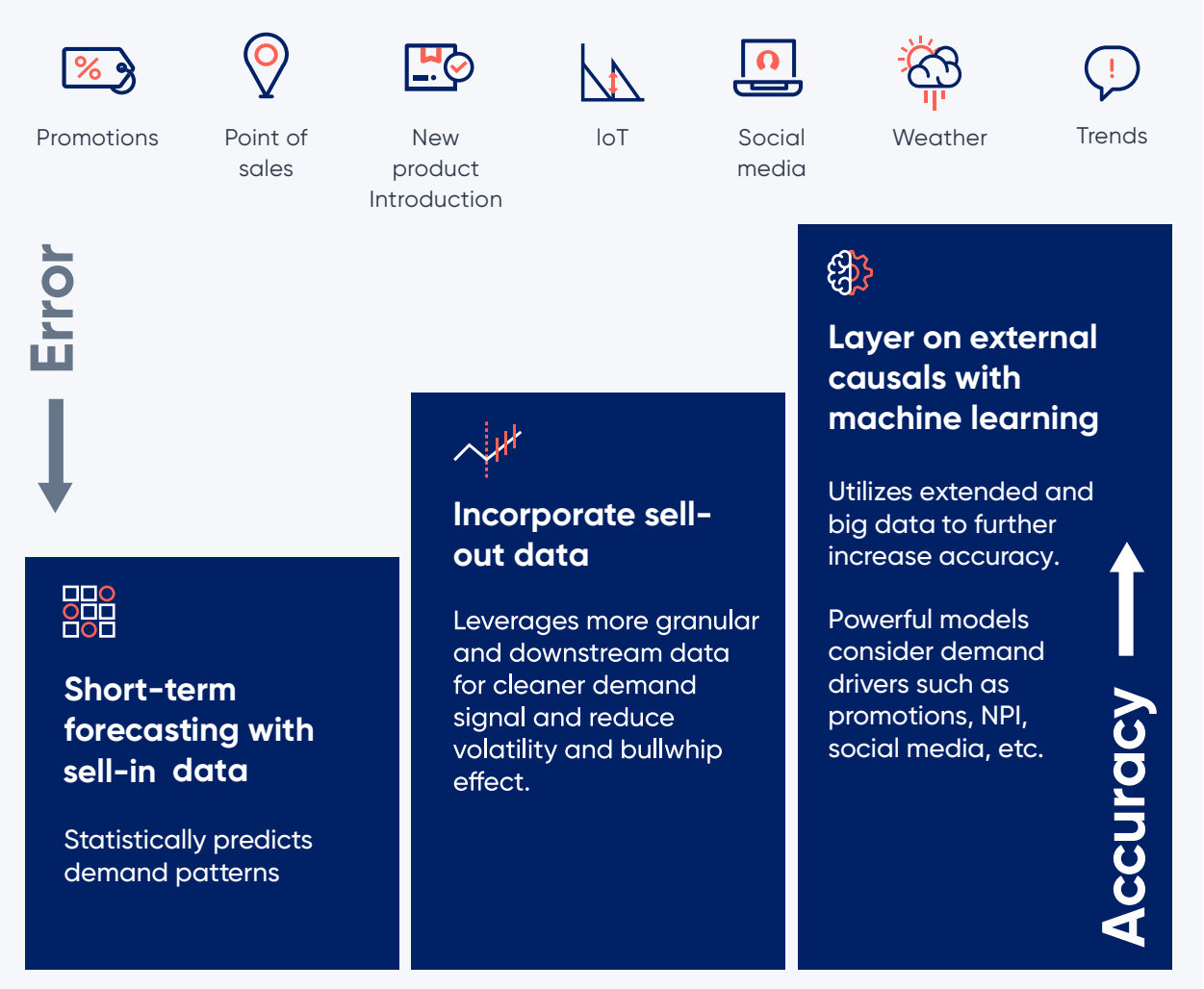

Figure 2 – Putting all three pieces together—the sell-in and sell-out data along with relevant demand casuals—gives you a full, connected picture of demand and enables automated demand forecasting for the best results.

Smarter Inventory Trade-offs

This more sophisticated approach to demand modeling is the key to improving safety stock calculations for smarter inventory tradeoffs. While it can be useful for senior executives to get a snapshot view of demand aggregates, the planners in the trenches need to see the full spectrum of probabilities. Knowing the likelihood of each possible demand outcome, whether it's one unit or 10, or some number in between, is far more valuable than a "one number" forecast.

Stock-to-service modeling can then drive the stock calculations and inventory tradeoffs. To achieve a target service level, you need to generate a stock-to-service curve *(see Figure 3)* that specifies how much inventory is required for each level of service. To do this, you incorporate a statistical description of each demand stream and replenishment parameter. These descriptions take into account the expected demand behavior and factors like inventory control policy, minimum and incremental lot-sizes, lead-times and lead-time variability and review periods.

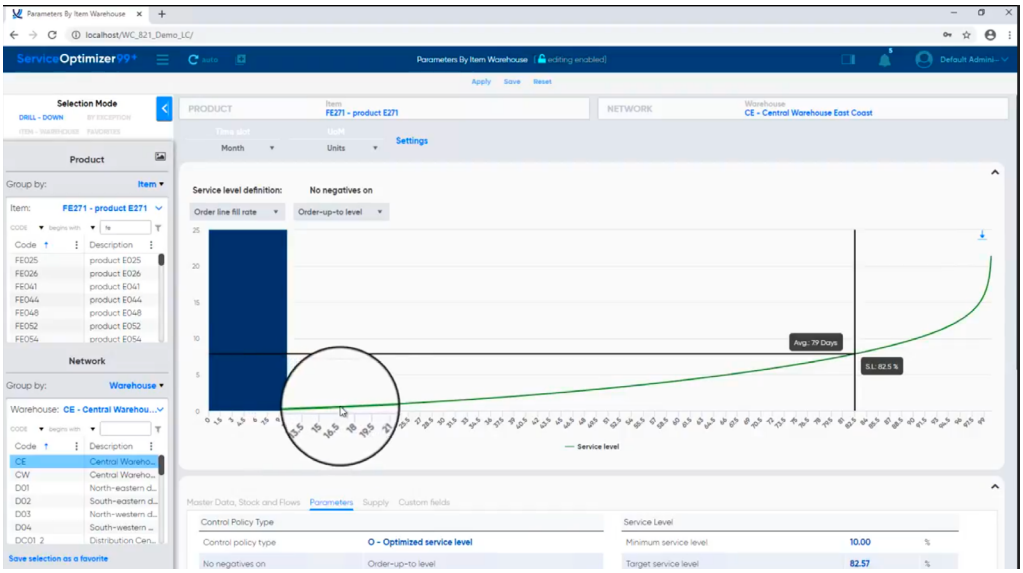

Figure 3 — Using probabilistic forecast, supply parameters (lead time, order frequency, minimum order quantities), and service level, ToolsGroup generates a "stock to service curve" that gives you the ability to trade off service level against inventory requirements needed to meet a given target.

Driving Better Business Outcomes and Service at Polaris

Polaris, which manufactures snowmobiles, ATVs, and other recreational and utility vehicles has high service expectations for a simple reason: many of its products are either urgent or impulse purchases. And when a customer gets the impulse to buy, products better be available! Another of Polaris' big supply chain challenges is optimizing spare parts inventory. Each vehicle is customized so a wide range of accessories and parts need to be available in the many dealerships and retailers where products customers shop. Historically, this has meant that Polaris' EMEA operation had been keeping very high safety stock levels to meet service levels.

Ilaria Maruccia, Polaris' WG&PGA SIOP Manager for EMEA sums up the impact on inventory: "Providing a good service level is crucial to the customer experience, but this often comes at the expense of huge inventory levels and too much capital being immobilized in warehouses. Some inventory ends up never being sold and that's a huge risk."

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By applying probabilistic forecasting and optimizing its stock mix, Polaris has seen significant improvement in its KPIs. "The first two years, we really turned the business around. We reduced inventory by 15 percentage points and improved service levels by 10 percentage points," explained Ilaria.

Polaris also dramatically increased planner productivity, allowing a team of five to efficiently manage all the planning for the EMEA region. This is because planners can rely on automation and typically only need to manage exceptions.

Staying Balanced on the Tightrope

Demand modeling systems help planners improve their short-term forecast accuracy and correctly set safety stocks, reaching high customer service levels while right-sizing inventory. Demand modeling understands the SKU by the SKU demand variability at the heart of the inventory issue. It sets targets at an SKU, not aggregate level, for each stocking location. Because it precisely targets and continuously optimizes inventory, firms don't blindly overstock, but buffer only where there is a likelihood of demand and sales.

The result is that achieving industry-beating customer service levels of 99+ percent are now within reach. You gain higher revenues, profits, customer loyalty, and market share without burning out your planners or breaking the bank.