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A Supply Chain Balancing Act

By David Kodama

Effective business has always meant matching supply to demand, whether actual or forecasted. In simple terms, customers create demand and the manufacturer looks at the available inventory and decides how much more, if any, to make in order to fulfill the demand or forecast. Any needs are passed to the plant floor and on to supply chain partners, affecting inventory stored along the way. In most environments, inventory planning means identifying that demand or forecast and figuring out how much inventory to hold and when to replenish. Of course, real life isn't that simple.

For John Deere's (Moline, IL) commercial & consumer equipment (C & CE) division, inventory planning is complicated by having to manage 2,500 dealers and 200 to 300 products. The C & CE division accounts for about \$3 billion of the company's \$14 billion in annual revenue. In 2000, the company realized it had too much invested in inventory to get "an acceptable return on assets," says Loren Troyer, director of order fulfillment for C & CE (Cary, NC).

So, John Deere put plans in place to optimize its inventory levels while maintaining its service levels. "We want to reduce our inventory significantly by 2005," says Troyer. "We've already been able to reduce our inventory by about 25% over the first two years of the project. We reduced finished goods inventory by over \$300 million in 2001 and another \$200 million in 2002. And we aren't done yet." In doing this, the company continues to focus on maintaining its target service levels of 90% to 95% depending on the product.

Effectively planning and managing inventory is made even more complex when a manufacturer has multiple sites to consider. Being able to see inventory levels across all sites and globally is extremely important to optimizing inventory for any company. It's also very important to have visibility into inventory in the various stages of production (finished goods, work-in-process, and parts and materials) to efficiently manage safety stock and service levels.

"It's not good enough for a company to just see its inventory," says Greg Mekjian, SAP America Inc.'s (Newton Square, PA) vice president of supply chain management and product lifecycle management. "It has to see its suppliers' inventory as well as consider multi-tiered supply chains to support customer requirements."

Other vendors like Intenia International AB (Danderyd, Sweden), J.D. Edwards & Co. (Denver, CO), Lilly Software Associates Inc. (Hampton, NH), EXE Technologies Inc. (Dallas, TX), PeopleSoft Inc. (Pleasanton, CA), Prescient Systems Inc. (West Chester, PA), Aspen Technology Inc. (Cambridge, MA), and SYSPRO (Costa Mesa, CA) include inventory planning applications as components of their enterprise resource planning or supply chain management suites. These planning and management tools do the number crunching for manufacturers. Users set service levels, put in lead times, forecast error or variability, and define other parameters, and the software products then calculate optimal inventory levels.

But manufacturers don't always see it that way and sometimes "put up fences between supply chain activities and inventory planning," says Henrik Billgren, Intenia vice president and co-founder. "We encourage them to bring the two processes closer together. The more customers get into the processes, the more they see the two as interlinked activities." Vendors see inventory planning as a key element in their supply chain suites, becoming more important to customers in coming years. According to a recent AMR Research Inc. (Boston, MA) report, the inventory planning market will grow from \$603 million in 2002 to \$664 million in 2003, and reach \$1,051 million in 2006 (see graph). By 2006, it is also expected to account for 14% of the supply chain management market revenue.

To optimize inventory at multiple levels and plan production and replenishment, John Deere uses applications from SmartOps (Pittsburgh, PA). SmartOps lets the company plan and manage inventory in multiple sites and across multiple stages at the same time. It can automatically adjust target inventory levels as needs or service policies change.

"SmartOps helps us set optimal inventory levels at our dealer level, our warehouses, and at the purchase/component level," says Troyer. "We can look at the whole network and come up with the optimal decision, which is different than if you try to set target inventories at each level independently. It lets us account for all of the inventories at the same time. It also lets us look at the factors that affect inventory levels and plans."

It is not just the service level or policies that are important. To get to the most accurate inventories also requires careful analysis and accurate forecasts. "It's examining the influences on inventory needs and how you arrive at the policy that provides the benefit," says Alec Elmore, Prescient's vice president of client services. "The analysis makes or breaks the system. If the forecasts are accurate, you won't have to adjust plans often and can really move to an environment that lets you manage by exception," he explains.

Integration with other systems is also critical in setting inventory levels appropriately. To get an accurate view of inventory, data from order and transaction systems as well as from execution systems must find its way into the inventory planning process. "As companies get the broader picture of the inventory in the chain-from data in execution systems and planning systems-they [become] better at planning," says David Spade, partner in IBM's business consulting services. "Companies need to have the transaction and execution layers in place with visibility to inventory on a global basis. That's required, can't-do-anything-without-it information when it comes to inventory planning."

Integration is also important in automating manual processes. With 2,500 dealers, John Deere had no way to manually analyze the data and calculate optimal inventory levels. The system had to be integrated. "We had to integrate it with our operational systems," explains Troyer. "Once we pass historical sales and forecast data into the software, it does the calculations and we pass recommended stocking levels back to our operating and order management systems."

As integration gets better, companies can become more strategic about inventory planning, which also moves the process out of the factory and into supply chain activities. While there's value in the integration that provides visibility into inventory in all locations, "The bigger bang for the buck comes from integrating the demand side of the equation," says Spade.

Though the integration with other systems can provide real-time information, manufacturers must resist the urge to over-react and adjust plans too often. Planning activities done in real time are unstable models and tend to cause inefficiencies in the supply chain as partners try to adjust to constantly moving targets. "The best-practice companies have a weekly update capability to react to changes," says Spade. "In these companies, there's typically a monthly or quarterly strategic planning window as well. That's state-of-the-art."

To improve the inventory processes, manufacturers need to move beyond simple time-based planning and be more granular about setting their service levels. They can do this by grouping products into categories or by stock-keeping unit (SKU), as well as by location. That gets companies focused on the important products. They can then begin to maximize revenue and margins.

After inventory levels have been optimized, inventory planning applications help manufacturers continue to improve by "getting them thinking more about inventory," says Prescient's Elmore. "Their perspective changes because the tool helps them look at inventory in different ways, and they start to think outside the box for ways to cut inventory and even generate revenue."

For John Deere, one of the most significant changes the company made to impact aggregate inventory levels was to implement a sales and operations planning process. "Every month, we review our retail sales forecast and the target inventory levels at both the dealers and our warehouses," says Troyer. "We then adjust our production plans to cover our needs. We used to estimate target inventory levels based on experience and past history. Now we can calculate the optimal target inventory levels for each week for the year using SmartOps. A good sales and operations planning process is the absolute key to adjusting production levels each month to meet target inventory levels," he says.

As companies get better at managing inventory, they can often provide inventory management as a service to their customers. In some cases, companies can progress to vendor-managed inventory (VMI) or collaborative planning, forecasting, and replenishment (CPFR) processes. Both of these initiatives not only help manufacturers improve the matching of supply with demand, they also help create stronger relationships with both customers and suppliers. A trusting relationship helps manufacturers continue to improve processes and gain efficiencies. MA

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