

Better Inventory Management

Big Challenges, Big Data, Emerging Solutions

The background of the entire page is a photograph of a warehouse. In the foreground, a large cardboard box is on a metal roller conveyor belt. The box has a shipping label with the following text: "Order no.: 005246", "Description: LOW THER FULL KNEE", "Style no.: W23262", "Colour: Green", "Size: 8", "Pairs: 6 PRS", and "Carton no.: 62 1825". The warehouse is filled with high industrial shelving units on both sides, packed with various cardboard boxes. A person is visible in the distance, walking down the aisle. The lighting is industrial, with long fluorescent lights hanging from the ceiling.

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Table of Contents

The Challenge	3
A Multifunctional Process.....	4
Physical	4
Planning	4
Optimization	5
Making Better Use of Big Data.....	6
Analyzing and Forecasting Tools Gain Strength	6
Analysis	6
Forecasting.....	7
Management	7
Optimized Inventory Levels Based Upon Better Decisions.....	7
Conclusion	8
References	9

The Challenge

Because inventory is usually one of the biggest numbers on their balance sheet, effective inventory control and management is a vital function to help insure the continued success of distribution and manufacturing and companies. The effectiveness of inventory control is typically measured by how successful a company is at reducing inventory investment, meeting its customer service goals, and achieving maximum throughput and cost containment.

On paper, the concept of inventory management seems easy enough. In simple terms, it can be summed up as the process of determining what items to stock, how many of each item should be kept on hand, and when orders should be placed for more.

Unfortunately, inventory management is much more complex in practice. The factors that complicate the process fall into two broad categories: 1) conflicting objectives across various segments of each company, and 2) the tentative nature of both supply and demand.

In the case of conflicting objectives, some parts of a business seek to increase inventory and other parts to decrease it. For example, because the sales department prioritizes the delivery of products in the best time frame to satisfy customer demand, they encourage the business to keep finished goods stocks high. The purchasing department achieves volume discounts on large batch and off-season purchases, and this increases inventory. Production wants all parts and raw materials to be available to keep line efficiency high and run large batch sizes, again increasing inventory. Conversely, product developers and finance department trend watchers often want to keep inventory low to advance the roll-out of new products. And most importantly, senior management wants to decrease inventory, because sitting on stock ties up cash flow. Each part of the company has the same goal—better profitability—but differing viewpoints on how to get there.

In the case of supply and demand, difficulties stem from unpredictability. For instance, unsteady supplier performance, supply chain disruptions, scarcity of materials, the perishability and obsolescence of products, and shrinkage contribute to the need to establish buffer stocking levels to provide safety days of lead-time supply. On the demand side, the overall economic environment, new products and innovations, and high-traffic sales volume for some items and sporadic or seasonal sales traffic for others necessitate the institution of a mixed approach to item-by-item stocking levels.

For distributors and manufacturers, the above factors are complicated further when hundreds of thousands of finished goods for sale or thousands of parts for assembly are warehoused across multiple locations.

Yet with all of these complications to consider, inventory control and management still fundamentally amounts to walking a fine line between meeting customer needs and stocking the least amount of inventory possible. Because inventory is the lifeblood of the sales and production processes, it's important to stock enough of it to avoid paying the opportunity costs of lost sales and diminished

customer satisfaction and loyalty. But because inventory is expensive, it's important to stock leaner quantities of it to avoid paying carrying costs like taxes, insurance, security, and storage and to avoid paying the opportunity cost of unavailable working capital.

To repeat, inventory is generally one of the biggest assets on a company balance sheet. Unsurprisingly, recent research strongly suggests that inventory management is an area where distributors and manufacturers are aggressively targeting improvement. For example, in a 2012 survey of supply chain professionals conducted by the Aberdeen Research Group, 60% of respondents cited reducing inventory costs as a top priority, and 42% cited improving customer service levels as a top priority.

A Multifunctional Process

Any discussion of better inventory control and management practices begins with an overview of the process. It helps to remember that effective inventory control and management is rooted in three distinct but interconnected processes.

Physical

Physical inventory control is a term that describes the receiving, movement, stocking, and overall physical control of inventories. In mid-market and larger companies, this component of inventory management is virtually ongoing, with shipments arriving and departing many times each day. Bar-coding stock keeping units (SKUs), consigning, and kit repackaging are notable aspects of physical inventory control.

Another daily responsibility of physical control is data entry. All items that enter or leave the inventory system must be tracked in the company's ERP system and all paperwork pertaining to these movements should be filled out daily as well. Accurate and timely inventory data collection is an imperative.

To further assure and enhance accuracy, inventory specialists follow a strict schedule of cycle counting or perpetual physical inventory (PPI). This manual intervention serves to check and verify that the computerized data records for quantity and location match the physical stock. PPI provides information on the effectiveness of control practices over time, allowing targets to be set, adjusted and monitored.

Planning

Whereas physical inventory emphasizes control and movement, inventory planning emphasizes systematic management. Inventory planning and ordering relies upon various methodologies that in turn depend upon varying rates of demand. Thus companies commonly utilize material requirements planning (MRP) in high sales volume scenarios or kanban in a lean, just-in-time (JIT) environment.

Briefly, MRP systems facilitate the right-sizing of inventory that gets turned over reliably and replenished frequently. Right-sizing means avoiding stock-outs and lost sales of high-demand items, while also avoiding trapping working capital in overages of pricey stock.

JIT systems base purchases of new stock upon customer demand as it happens bit by bit. For instance, companies that sell or assemble only one or two particularly large items per year don't need to have those expensive items (or the parts the items are composed of) sitting around waiting for a buyer.

Significantly, in both high- and low-volume situations, data drives the stocking of inventory, and the accuracy of the data is driven by conscientious data entry. Whether stock is ordered for regular arrival by the truckload or by irregular special deliveries, systematic, preplanned approaches to replenishing inventory involve information relevant to sales, finance, purchasing, possibly production, and shipping and receiving. The interplay of this information through an ERP system undergirds greater efficiency.

Optimization

Nonetheless, despite the best efforts to effectively plan inventory ordering, stock-outs and stock overages happen. The statistics describing the top priorities of inventory specialists cited above illustrate that fact. The frequent occurrence of stock-outs and stock overages indicate that inventory levels have not been optimized.

Enter the inventory optimization system. These emerging technologies are the supply chain management mechanism used to mathematically calculate where and when inventory should be deployed to satisfy predetermined management objectives. They're designed to better classify stocking levels (buffer, replenishment, overage) based upon an analysis of past demand, augment supplier management based upon past supplier performance, and improve demand forecasting going forward.

The latter function has the greatest ramifications for optimizing inventory levels. Stock-outs and stock overages, after all, stem from a mismatch between the stock a company has on hand and the actual demand for it. Obviously, inventory specialists cannot eliminate those mismatches entirely. However, the advent of new inventory optimization technology holds the promise of reducing those mismatches significantly by forecasting demand more accurately and with much greater speed, thereby putting the predetermined management objectives—again, measurable reductions in inventory investment, increased customer satisfaction, maximized throughput, and cost containment—well within reach.

Making Better Use of Big Data

It's well worth highlighting the fact that the new inventory optimization tools possess the capacities they do because recent technological developments have focused on improving the ways in which the power of big data is harnessed.

As alluded to above, Internet, mobile, and software technologies have enabled businesses to amass and continuously expand gigantic datasets within their ERP systems. That data has been used to prepare tax returns and financial statements and improve productivity through information sharing within and outside of an enterprise to facilitate communication and collaboration between stakeholders.

ERP solutions have also provided new and improved ways to manipulate the data within customized financial reports that offer the potential for deep insight into customer behavior, operational trends, and ways to change to more efficient business models. The concept has always been about the ability of a company to use the massive amounts of data generated to become more agile and responsive—and ERP systems have advanced steadily to help them do that. Still, the size of the ever-accumulating datasets consistently outpaced the ability of technology to realize the full potential of the intelligence within all that data. For example, ERP systems house plenty of data related to inventory, but most of them do little beyond tracking the amounts of inventory on hand and alerting management about levels that are running low. However, as the latest inventory optimization systems demonstrate, today's technology is catching up with all that data and doing more with it.

Now recall the fine line that the inventory specialist walks: balancing having enough stock to meet customer demand with as little inventory as possible. Recall, too, the complex organizational needs and the fluctuations of supply and demand. Then multiply the complexities over millions of SKUs, thousands of global supply chains, and far-flung warehouses. Because so many factors have real and potential impacts on inventory levels, modern inventory optimization systems are engineered to exploit data generated from everywhere within an ERP system.

Analyzing and Forecasting Tools Gain Strength

Take, for example, longitudinal sales, purchasing, financial, supplier, and production data. Most ERP systems make it possible to produce reports using each dataset complete with helpful charts designed to compare results against industry wide key performance indicators over time. Business managers resolve problems, build on successes, and fine-tune best practices and decision making based upon reports like these.

Analysis

Integrating an inventory optimization tool with the existing ERP system allows inventory specialists to take the data analysis functionality much further. Employing proprietary algorithms, the best such optimization systems provide a graphical interface capable of illustrating a synthesis of the data from

all five of the above departments. Such a synthesis would analyze, diagnose, and identify seasonal shifts in item-by-item demand, patterns for large customer orders, when stock-outs and overages were likely to occur, lost sales, excess orders, items that are moving slowly enough to warrant draw downs, unsellable items in need of disposal, patterns of price reductions and volume discounts from suppliers, patterns of suboptimal and optimal performance by suppliers, patterns of production line downtime, concomitant periods of strained overall organizational cash flow . . . and more.

Forecasting

An inventory optimization tool then uses this analysis of cross-functional big data to forecast demand more accurately and much faster than previously possible. This enables the system to recommend optimal inventory levels for sales availability, taking into account risks of stock-outs and overages and to provide inventory specialists with advance warnings about stock levels approaching numbers that are too high or too low.

Management

The inventory optimization tool also makes recommendations about optimal restocking schedules, and it can provide unit-level thresholds for automated ordering and replenishment. A key feature of the system is its capacity to recognize exceptions and alert management when mitigation is necessitated. And because the inventory optimization tool is integrated with an existing ERP system, the recommended stock levels, replenishment schedules, automated orders, and exception alerts are communicated cross-functionally and to stakeholders outside the organization. Thus, an optimization tool uses actionable intelligence.

Optimized Inventory Levels Based Upon Better Decisions

Ultimately, inventory optimization depends upon decisions made by inventory specialists and senior management based upon several considerations unique to their companies. Using sophisticated tools to make those decisions helps management more accurately balance the trade-offs between the costs of a stock-out versus the costs of overstocking.

That means the capacity of the inventory management tool to adjust recommended stocking levels dependent upon variable risk tolerance comes into focus. For instance, analysis of sales data may reveal that per unit profit far exceeds the investment in inventory, a disproportionate reliance upon repeat and/or particularly high-volume clients, or that each sale opens additional revenue streams. These factors would compel management to push their risk tolerance in the direction of avoiding stock-outs, and thus having more inventory at the ready.

Conversely, some companies stock costly and/or perishable items, which are expensive to store and maintain, or sell to customers with limited alternatives to turn to. Furthermore, economic

conditions may dictate that a company must generate working capital from every possible source, a situation that certainly pertains in today's competitive environment. These factors would push management to stock as little inventory as possible to avoid the storage costs.

Of course the reality is that mid-market and larger distributors and manufacturers commonly stock a mix of inventory that falls into both rubrics with varying levels of overlap. This means they need to push multiple turns of high volume items and pull lean inventory of items that move less frequently and everything in between. As a result, the ability of an inventory optimization tool to adjust forecasts based on "what-if" parameters is a huge plus to management.

Again, the responsibility of inventory management is to make better decisions that result in a better balance of trade-offs, depending on shifting goals influenced by events on the ground. When innovative and sophisticated tools become available to help them improve that balance, those tools can provide a large and ongoing return on investment. If a distributor has typically carried \$60 million worth of inventory and utilized an inventory optimization tool to reduce that level of inventory by 5 percent while maintaining customer satisfaction, that company has added \$3 million of working capital to the balance sheet. Some companies look to reduce inventory much further. According to a recent WSJ.com report, "The best supply organizations deploy sophisticated analytical tools to reduce inventory levels by 20 percent to 50 percent, resulting in savings for years."

In Conclusion

Despite right-sizing inventory's being a complex challenge, the emphases placed by senior management on cost control and customer satisfaction are driving the adoption of more sophisticated systems of inventory management.

As it stands, stocking too much inventory and suboptimal customer service are very common, yet often unnecessary. There are proven technologies that can help management project customer demand more accurately and calculate the optimal inventory levels needed to balance the benefits of meeting uniquely defined levels of customer service with the benefits of stocking as little inventory as possible. These emerging technologies take in big data to account for complex and vast networks of cross-disciplinary needs, product and service mixes, and fluctuating supply and demand matrices. Furthermore, using the right techniques for sales forecasting and inventory management allows inventory specialists to monitor changes and initiate cross-functional responses to alerts when action needs to be taken.

By utilizing new, flexible, and more refined tools that provide for dynamic optimization of inventories to maximize customer service, throughput, and market share, while decreasing inventory investment and lowering costs, inventory managers can significantly impact overall competitiveness and profitability.

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