Succeeding in an Imperfect World: Best Practices in Demand Management in the Face of Poor Forecasts and Demand Volatility

Consider for a minute the route a semiconductor—say a transceiver chip—takes from the component manufacturer to the retail store where a consumer buys a finished product that contains the device—let's say it's a cell phone.

This fictitious component is manufactured in Taiwan, tested, packaged, and shipped to a contract manufacturer in, say, southern China. The contract manufacturer places the chip on a circuit board that is assembled into a cell phone. The phone is then trucked to a distribution center in Hong Kong and then shipped to a distribution center in the Netherlands. From there it makes its way to a retailer in Paris where it's bought by the customer.

Now consider how the information that drives the demand for that chip makes its way from the retailer to the component manufacturer.

First consider how this would happen in a perfect world. The moment the retailer completes the transaction, it sends an electronic signal to the distribution center in the Netherlands that their inventory of phones has dropped by one unit. The distributor sends a signal to the OEM, which sends a signal to the contract manufacturer, who orders more transceiver chips from the component manufacturer. The fab in Taiwan gets the message and starts the process of making another chip. This all happens with no human involvement or intervention and it happens within a few minutes of the consumer buying the phone. The point of sale (POS) transaction triggers a series of electronic signals that cascade through the supply chain to companies scattered across the globe.

Of course, we are a long way from this machine-to-machine Nirvana. In fact, it may never come to pass for a number of reasons. Without POS communications, demand signals will always be imperfect. There will always be "noise" in the information flow up and down the chain due to inexact estimates, missing data, and a lack of willingness on the part of some companies to share data.

Second, and perhaps more importantly, there is a fundamental disconnect between the cell phone manufacturing cycle of say a week or two and the manufacturing cycle of the transceiver chip, which ranges from 12 to 16 weeks. There's no escaping the need for forecasts so the chip maker can have product ready to ship to the cell phone production line in time to produce the next phone to replace the inventory at the retailer in Paris. Forecasting will remain a necessary evil until the semiconductor manufacturing cycle can match the cell phone manufacturing cycle, which will probably never happen.

Third, there is volatility inherent in the demand of any product or service. It's impossible to accurately predict the number of cell phones a retailer will sell on any given day. Anything from macro-economic trends—GDP growth, inflation, exchange rates—to the weather can affect demand. And of course the tastes and actions of consumers (and businesses) involve some degree of irrationality.

This volatility materializes in a few forms: long-term demand cycles, the effects of seasonality, and of course the fickleness of the consumer and business decision maker. Combined, the result is that the cell phone maker and the chip maker both have to deal with daily volatility and somehow match up their supply and demand. It's more difficult than landing a fighter jet on an aircraft carrier in high seas and total darkness.

And of course, the mechanisms sometimes fail. The electronics industry in the late 1990s and early 2000s exhibited a severe macro cycle. The heady ramp up of the dot-com boom produced the worst downturn in the industry's history. Even in late 2000, many OEMs—cell phone makers included—projected demand to continue up and to the right and so they double- and sometimes triple-booked orders to ensure they got parts that were on allocation. Their contract manufacturers didn't question the forecasts and cranked out more product as instructed.

Forecasts drive manufacturing decisions and forecasts rarely, if ever, reflect reality. That's why they are called forecasts.

When the bottom fell out of the market in early 2001, billions upon billions of dollars worth of inventory throughout this imperfect chain had to be written off. There was a lot of finger-pointing and lawyers were busy for months reviewing and arguing over contract language. For the next two years the electronics industry found itself digging its way out of a very deep hole.

Will it happen again? Perhaps not to the degree it did in 2001 but yes, it will happen again. The reason is imperfect information flow, a lack of visibility up and down the chain, and volatile demand, combined with all the worst human characteristics that are exhibited in heady markets: irrational behavior, greed, and fear.

Yes, there is more skepticism of forecasts today than there was in 2001. Component makers and contract manufacturers don't blindly follow their OEMs' forecasts anymore. They corroborate the forecast with other sources of information to plan their production. But the fact remains that OEMs will continue to rely on forecasts from their sales organizations, distributors, resellers, and retailers to schedule future production. And information flows will by definition remain imperfect as neither the OEM nor any of their supply partners have access to perfect information (i.e. point of sale data).

The downturn of 2001 was an extreme example of failure of the system. But volatility and poor visibility contribute to demand and supply imbalances on a daily basis. The OEM's challenge is to figure out intelligent ways to deal with this daily volatility and improve human responsiveness to exceptions. One major investment they've made to address this issue is to invest in response management software.

In a Technology Forecasters Inc. (TFI) survey report published in June 2007, we examined OEMs' supply chain software investments. We found that most OEMs current supply chain software solutions met expectations, with a small select group of systems actually exceeding expectations.

Still, OEMs face challenges. They complained that many systems were overly complex, they had problems with data inconsistencies and data mapping between disparate IT systems, and functionality was limited. The ability to configure is a key factor to success, as is adequate internal training, and of course doing the necessary work up-front on business process re-engineering before installing the software.

Perhaps the most important finding of the study revolved around attitudes toward collaboration, or more specifically the sharing of actual production and inventory data. Technology companies talk a great deal about collaboration across the demand and supply chain and the need for real-time information sharing. To be effective, this collaboration needs to be sanctioned by senior management and implemented in peer-to-peer relationship across the supply chain. It also needs to be engineered into software tools. Indeed, software vendors are stepping up to the challenge by providing platforms for trading partners to securely share sensitive data. But even with advances in software, TFI found that collaboration remains fairly limited.

Crafting a Solution: Two Case Studies

So barring any turn around in the willingness to boost collaboration, and accepting that we live in an imperfect world, the question we need to ask is: How do you improve the effectiveness of forecasts, manage volatility, and increase visibility so manufacturing operations and inventory levels can be optimized and customer demand can be met? All while SKUs are multiplying and the complexities of global demand and supply chains are increasing.

It's instructive to take a look at how two companies are dealing with the challenge.

Case 1: Improving Demand Management in Europe

For the European sales operation of one global computer manufacturer, the challenge begins with data collection. The company's European headquarters gathers demand forecasts monthly from the regional offices, which gather data from their local retailers and channel partners. Most of the data the company collects is in the form of Excel spreadsheets, so there are typically data entry issues. Most channel partners are systematic in their data collection but a handful are not, which increases the "noise" in the system.

European headquarters then sends the demand forecast to its global headquarters, where it is reviewed and aggregated with other regions and used to create build orders for its contract manufacturers. The production cycle is about 5 days, after which, the product is shipped to the European distribution center and then transferred to regional distribution centers.

Because of the nature of the beast, demand and supply are always out of balance. Historically, the solution was human intervention—sometimes a lot of it—on almost a daily basis to determine how to shift product from one region of the continent to another based on the priority of the customer and the cost of reconfiguring the unit and transportation.

Recently, the company initiated a response management program to reduce this imbalance. One part of the solution was to address the quality of the data being collected. This involved collecting data from channel partners using intelligent software tools. The result: no more Excel spreadsheets, better data integrity, and less human intervention. These tools enabled the OEM to see where inventory resides and run scenarios for how to improve supply and demand imbalances.

According to the company, replacing Excel spreadsheets alone has improved the quality of the data and the speed of transmission information across the enterprise. The next step, according to the company, is to implement a more robust reporting system for channel partners. This way they can directly input their inventory levels and forecasts so the OEM can gain greater visibility.

Case 2: Balancing Chip Supply and Demand

A challenge faced by a global semiconductor company is more complex. This company produces high-value chips and so minimizing inventory levels is critical for controlling costs. The product is also highly customized to the design requirements of the customer and to the region of the world it will be operating in. And while the production and sales cycle of the customer's products can be measured in days and weeks, the manufacturing cycle for the chip is measured in months—three to four to be precise. At the same time, OEM customers are asking for vendor managed inventory (VMI) services, which requires the chip make to pay even closer attention to inventory levels.

Part of the solution is to hold as much inventory as possible in bare die form for as long as possible. This way the chip maker has the flexibility to shift product from one customer to another, based on demand signals it receives late in production cycle—that is, within the last four weeks of the 16-week semiconductor manufacturing cycle.

While this helps the chip maker balance supply and demand, the demand signals it receives in this four week period remain volatile. The volatility comes from the vagaries of the customers' customers. They may play one OEM against the other and change their orders late in the product cycle. So the signals the chip maker gets from its OEM customers are often misleading. This is a problem, because the singular source of its forecast information comes from the OEMs. It gets nothing from the OEM's customers or the end customer. So the chip maker must supplement its customers' forecasts with its own intelligence gathering. Otherwise, the chip maker risks producing unwanted product that can't be reconfigured.

And customer forecasts have a considerable amount of noise in them. Typically in the past, customers provided the chip company with three to four months of forecast data, but because the chip manufacturing cycle is about that long, it was not able to effectively match demand. So it asked for 12-month forecasts. But the further out the forecast, the less valuable the information. So the chip maker was having to make value judgments based on design-win activity and other subjective inputs.

To address the challenge, the chip maker has been moving away from an open forecast to more of a shared forecast with its customers. Before, the OEM would place an order at 12 weeks and then provide updates throughout the 12-16 week chip fabrication process. Now, the customer provides forecasts from 12 weeks out, but the chip vendor formally commits to the forecast and takes the order at four to six weeks out. This locks the OEM in and encourages the customer to be more accurate in its forecasting closer to the delivery date.

The chip maker is also trying to put a little bit more rigor and formality into the demand forecasting process. In the past, there was a lot of manual work involved in the process because customers for the most part provided data in Excel spreadsheets, the company's regional response centers would manually review the forecast to look for duplicate entries and wrong numbers.

As with the company in Case1, the chip maker is automating the gathering of forecasts by asking customers to enter the data directly into its system and thus eliminating the error-prone manual process of keying in data. Then, utilizing a tool from Kinaxis called RapidResponse, the chip maker can do some intelligent analysis on the forecast, such as comparing the current data to the previous week's entry to check for anomalies. This reduces the human intervention in the process, improves cycle time, and reduces cost.

To improve the data gathering further, the chip maker is looking to introduce a true B2B solution, which will allow it to move further away from manual interventions. This B2B mechanism will improve the chip maker's confidence in its ability to commit to the customer's forecasted demand.

This is expected to be a significant improvement in managing demand volatility. That's because for the components it manufacturers, there is always limited supply to satisfy the expanding demand. So typically, the commitment the chip maker is able to make to the customer is below its demand. But with B2B weekly forecast updates and with RapidResponse it can continue to adjust its assembly, test and packaging in the final few weeks to improve its ability to meet the customer's requests.

Take Aways

As outlined in the introduction, the ideal of any demand and supply management system is to create an inventory pull system where there is a seamless flow of information from the point of sale all the way up the chain to the suppliers of the raw materials. While efforts are being made to create these systems, the likelihood is slim to none that they will materialize in the next 10 or even 20 years. Forecasting is a fact of life and so is volatility. So for the foreseeable future, the industry is saddled with having to manage with imprecise and often inaccurate forecasts and unpredictable and volatile demand and supply. The challenge is to learn how to manage them both more effectively.

Managing exceptions to the plan comes down to the quality of human judgment. In order for frontline decision makers to act quickly, decisively, and accurately, they must be empowered with better information and tools.

Part of the solution is to refine demand management through a combination of steps including improving data gathering techniques and frequency. Addressing the quality of the sources of the data and working to tighten the collaboration with customers and suppliers. Much of this work revolves around improving business processes and relationship building, but it is also being enhanced with B2B and IT solutions.

As data quality improves (not necessarily forecast quality or volatility) through better data gathering techniques, these tools can be used for "what-if" scenario planning and intelligent analysis of forecasts, inventory ,and production levels to meet—or more efficiently prioritize—customer demand.

Combined, these enhancements will trim inventory, reduce the amount of expediting, and eliminate a lot of reconfiguring of product in the field, which is the next best thing to the Nirvana of point of sale driven pull systems.

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