Reducing Risk in the Demand Planning Process

Process Manufacturing Research Study
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Demand volatility—one of the most common terms used by senior executives within the process and energy industries to describe their markets. This has become a major focus area for supply chain teams—and for good reason. Global economic uncertainty is having a dramatic impact on purchasing behaviors throughout the process and energy industries. Emerging market economies are introducing new and unpredictable demand patterns from a rapidly growing consumer base. New raw material resources are becoming available, changing the competitive landscape and impacting material flows across the global marketplace. The end result is an ever-present unpredictability in market demand that remains the focus of planning teams whose goals are to gain stability in an uncertain environment.

IN THIS STUDY

This study explores several key areas of demand planning and expands on best practices and the benefits of each.

Triple Point conducted a survey by speaking directly with 189 process manufacturers throughout the world. Interviewees include manager, director, and vice president level supply chain professionals.

Facts and trends about business processes, tools, and the organizational structure supporting demand planning processes were collected and validated by each participating company.

Information from individual companies is held in confidence and was used to develop the industry-wide statistics shared in this document.

Participating companies are globally distributed and represent a wide range of sub-verticals from small $25 million operations to enterprises with revenues greater than $50 billion.

“The average improvement from implementing best practices and new technologies is 17 percentage points in forecasting accuracy.”
Attempting to construct a feasible and profitable supply/demand plan in today’s business climate is challenging. At the forefront of that challenge is the task of creating an accurate demand plan that will serve as a guide to drive optimal downstream planning and scheduling decisions. In fact, the efficiency and profitability of downstream production and distribution schedules can be directly tied to the accuracy of the demand plan. While many companies would say that they are doing well using long-established internal workflows and tools, few can claim that their demand planning process is industry-leading or representative of best practices.

But is that OK? Should companies focus on improving current demand planning processes? Our data says “yes.” Getting it right is critical.

Triple Point Technology has conducted an ongoing series of demand planning benchmarking surveys with companies across the process industry. Key trends gleaned from the survey data show that the benefits from demand planning process improvement are many. One of the most compelling findings is the relationship between forecast accuracy and inventory. Benchmarking results show that for every 1% improvement in forecast accuracy, companies report a 1-2% drop in inventory levels. This translates to big savings. Combined with another key finding—that the average improvement from implementing best practices and new technologies is 17 percentage points in forecasting accuracy—the advantages begin to take on new meaning. Ask your company what a 17-34% reduction in inventory would mean, and you’ll begin to understand why focusing on improving your demand planning process is so important.

However, these process improvements require expertise and effort. Companies must approach the numerous possible improvements and individually evaluate each area’s potential impact to the bottom line. Not all areas have to be in sync with best practices before your company can begin to see positive results. The important lesson is to find what works for your organization.

“Benchmarking results show that for every 1% improvement in forecast accuracy, companies report a 1-2% drop in inventory levels. This translates to big savings.”

43% of survey respondents say the chief challenge in improving forecasting accuracy is getting useful collaboration in their own organizations.
Every 1% improvement in forecast accuracy contributes to a 1-2% reduction in inventory. If you are like the companies in this survey, you should expect these annual cost reductions:

- **75% average accuracy**
- **58% average accuracy**

Companies in the lowest quartile of process maturity did not measure forecast accuracy. Companies in the highest quartile average 17% points higher accuracy than the group average.

40% report that they are not currently leveraging the advantages of statistical modeling.
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50% claim a weak or non-existent level of collaboration with external sources, customers, and suppliers
TRENDS AND ANOMALIES

Statistical forecasting based on historical sales

Statistical forecasting can play an important role in a mature demand planning process when sales patterns are somewhat stable and repeatable. Statistical analysis of sales history can often reveal hidden trends and seasonality that are not readily apparent to a person who must review large amounts of data. Typically, a minimum of 24 months of history is needed to generate reliable statistical forecasts that can account for trends and seasonality. Sophisticated statistical forecasting processes use statistical tournaments that automatically evaluate a variety of mathematical forecasting techniques in search of the technique best suited to each item that must be forecasted.

Companies rarely rely solely on statistical forecasts to estimate demand. Those that do generate statistical forecasts typically use them as “starting solutions” that are distributed to personnel who review and adjust them based on human intuition and market intelligence. Best-in-class firms leverage a combination of statistical forecasting and collaborative market intelligence to create sales forecasts.

Statistical forecasting using external econometrics

Using causal factors such as economic trends and industry leading indicators in statistical forecasting is common in many consumer product companies.

Many companies report attempting this practice with no subsequent improvement in forecasting accuracy, but process CPG companies report this to be a valuable practice.

Aggregation of items that are difficult to forecast / ABC customer segmentation

An important element in a mature forecasting process is the ability to aggregate data elements that are difficult to forecast. Companies with mature processes perform statistical and collaborative forecasting at several simultaneous levels of data aggregation. This method leverages the increased forecast accuracy that results from forecasting families of items while also maintaining forecasts at more detailed item levels whenever possible to aid in planning production and inventory.

Companies report that they reduce the total number of items to be forecasted by up to 80% using these techniques, providing higher statistical forecasting accuracy and allowing the collaborative process to focus on key customers and business segments.

Industry average number of collaboration participants

22
COLLABORATION

Collaborative forecasting within the enterprise

Respondents indicate that the most important contributor to forecast accuracy is the collaborative forecasting process. The most common participant is the front-line sales representative or account manager. This person tends to have the most reliable information about future customer demand.

Mature processes solicit information from multiple sources, including sales personnel, product management, customer service and production planners. A strictly defined timetable, account ownership, and override rules define the best collaborative processes in the industry.

Collaborative forecasting with key customers

Many respondents indicated success soliciting forecast input directly from key customers, either over the phone, via email, or face-to-face. For these companies, an open, collaborative dialogue with customers about the mutual benefit of developing accurate demand predictions is a hallmark of gaining acceptance.

Customers providing automated forecast input

The most mature companies in the survey supplement their manual customer input with automated input gathered from a large portion of their customers. This automated input is collected using several different methods with varying levels of sophistication ranging from integrated spreadsheets to direct links between forecasting platforms. The companies using these automated input techniques reported the highest forecast accuracy among all respondents.

Visibility to customer production schedules or consumption forecasts

A limited group of companies surveyed indicated that their commercial relationships with key customers are strong enough to entice customers to directly share their production schedules.

In these situations, both sides gain visibility to future supply-demand positions, enabling more profitable operations and a reduction of overall inventories.

Collaborative involvement by job role

Participants in the collaborative process varied from company to company.

In some businesses a single demand manager was responsible for creating and publishing the forecast on a given date each month, whereas in other businesses a well-defined calendar of activities was used to control the collection and consolidation of forecast information from scores of sales, marketing and supply chain personnel.
STRUCTURE AND WORKFLOW

Time bucket for sales forecasting
Nearly every respondent reported that they develop tactical forecasts at the monthly level. The ideal time bucket size is a function of the need for precision in the operational and financial planning arena as well as the ability of the people, processes, and tools to provide accuracy at the selected time bucket level. In consumer-facing industries where demand can be highly volatile, the logistics group may ideally want a forecast at the weekly or daily level, but the ability to provide reasonable accuracy at that level may be an unrealistic expectation. Most commodity industry segments have relatively large shipments, making daily or weekly forecasts arbitrary and very difficult to manage.

Forecasting horizon
Most respondents create a yearly business forecast which serves as a corporate budget or annual business plan. Almost all respondents also create a more detailed monthly bucket forecast.

Focusing on the accuracy of a three month rolling tactical forecast appears to be optimal for balancing the difficulty of forecasting long horizons while preserving the ability to plan long lead time items.

Frequency of formal forecast collection
Nearly all respondents have developed a monthly process for collecting forecast inputs. Several companies indicated that they update forecasts on an ad hoc basis as frequently as every day, but all limit their formal, comprehensive forecast creation to once per month.

Demand planning process ownership
A hallmark of a mature demand planning process is a clear definition of the roles of the various participants in the forecast creation process.

Many companies reported having established the role of a demand manager who is the designated owner of the forecasting process.

This person assures that data, tools, processes and participants all work together each month to create an accurate demand plan on an established timetable.

75 Average number of items forecasted per participant
FORECAST ACCURACY

Measurement of forecast accuracy
A number of respondents indicated which forecasting accuracy metrics they use to measure demand planning performance.

The largest percentage of respondents who routinely measure accuracy do so at the stock keeping unit / supply point level based on forecasts collected at the start of the measurement month. Most companies used a mean absolute percentage error (MAPE) formula that looks at absolute errors, not allowing over and under forecasts to cancel each other out.

Forecast accuracy and bias analysis by contributor
Companies measure forecast accuracy to provide feedback and encouragement to contributors and to track improvement trends over time. Forecast accuracy is also used in many companies to calculate safety stock levels and ensure that customer service targets are met. Not surprisingly, the companies that undertook this approach also reported the highest levels of forecast accuracy.

Measuring forecast bias by contributor can detect situations where participants in the collaborative forecasting process are habitually over-forecasting or under-forecasting.

This allows companies to normalize these data, minimizing inherent bias and reducing excess inventories in the case of over-forecasting, and providing better customer service at a lower cost in the case of under-forecasting.

INTEGRATION WITH DOWNSTREAM PLANNING AND SCHEDULING

Integration of sales forecasts with downstream S&OP planning process
The value of an accurate demand plan is only realized when that forecast is used to position a company’s supply chain assets to satisfy that demand. To do this, it is necessary to integrate the demand signals provided by the forecast with supply and delivery planning processes.

A high percentage of companies recognize the need to have demand signals drive production, distribution and sourcing decisions. Achieving this level of integration varied based on the toolset each company used.

The most mature companies have a well-defined sales and operations planning (S&OP) process that relies on formal sales forecasts to drive supply decisions. These companies closely monitor changes to the demand plan and adjust plans and schedules throughout the month as necessary.
Demand plan review and revision during downstream planning processes

Companies that indicated high levels of satisfaction with their demand management process take a snapshot of the plan at the start of the month for performance measurement.

They then allow updates to the demand plan to be collected continuously throughout the month as better information becomes available.

The highest level of maturity was characterized by marketing and production planning teams that worked together to track and massage the forecast all month, continually reviewing customer orders, schedules, and inventories to assure high levels of customer service were achieved and inventory targets were met.

Integration of sales forecasts into distribution planning and scheduling

Distribution planning and scheduling involves planning and executing the movements of inventory between plants and off-site, company-controlled storage locations to meet demand. Because of transportation lead times, the positioning of offsite inventories usually requires estimating demands at offsite locations prior to the receipt of firm customer orders against those locations.

In most organizations, the demand plan is used to estimate the future draw on offsite inventories and calculate the timing and volume of stock transfers to replenish warehouses, terminals, and other ex-plant supply points. Most companies use replenishment planning software tools that recommend sourcing locations for each customer demand and create just-in-time replenishments of materials to maintain desired customer service levels given forecast predictability.

Integration of sales forecasts into production planning and scheduling

Mature planning processes automatically integrate demand forecasts with open and shipped order data into production planning and scheduling tools to permit dynamic production scheduling as demands change. High performing companies also tie demands and production schedules together in advanced available-to-promise (ATP) order promising processes to automatically check material availability and manage customer mix during order taking.

Most of the survey respondents operate a combination of Make to Stock (MTS) and Make to Order (MTO). Both MTO and MTS manufacturers were found to maintain production schedules that plan production over a 30 to 90 day horizon. An MTO manufacturer’s production schedule horizon is often established based on the need to plan long lead time raw materials. An MTS manufacturer sets its scheduling horizon both to plan long lead time raw materials and to cover the lead times needed to produce and pre-position inventories in advance of the receipt of customer orders.

Some companies need to extend production planning horizons due to the cyclical nature of process production wheels to minimize transition and set-up times. Because most manufacturers must create schedules that extend beyond the lead time of a typical customer order, accurate demand forecasts are needed to drive production requirements.
DPC’s forecasting approach employs both a statistical and a collaborative process to create a highly accurate forecast.

Statistical forecasting is based on the mathematical analysis of historical sales and/or consideration of other market drivers, such as external econometrics, customer demographics, manufacturing constraints, and performance trends.

Collaborative forecasting is a consensus building process in which contributors combine their knowledge of customer and market intelligence to develop sales forecasts.

This hybrid statistical / collaborative approach results in higher customer service levels and lower inventory levels by allowing your team to make optimal production and shipping decisions based on accurate data that helps get the right product in the right package from the right supply location.

DPC supports industry best practice forecasting techniques including master data cleansing, ABC customer segmentation, statistical modeling, collaborative consensus building, tracking of participation and performance, and decision and review workflows.

Import and condition your sales history

The forecast creation process begins by importing your existing sales history from your corporate systems (usually ERP). DPC not only imports the data but conditions it to correct for outliers. Using a customer order preference guide, DPC conditions the data to prepare a sales history that supports a more accurate statistical forecast. The conditioning process includes cleaning product and customer name changes, correcting non-optimal shipments and consolidating non-key accounts. This process has several benefits. Not only will the quality of the statistical forecast based upon this data be improved, but the overall number of items to forecast is reduced, which allows participants to focus on the customer/product combinations which have the greatest impact.
Create a statistical forecast

Once your sales data have been imported and conditioned, you can proceed to create a statistical forecast. DPC uses a multi-tier tournament of statistical forecasting models to determine the best fit and most accurate final forecast. Drawing on a mix of time series data and (optional) econometric input factors, this flexible tournament approach leverages multiple techniques—such as Box-Jenkins, Exponential Smoothing and Simple Moving Average—to determine the best fit at each user-defined aggregate level. The top-down forecast is then driven down across lower level forecast aggregations to arrive at a detailed forecast by customer ship location, product, package, and supply point. When completed, the final statistical forecast is made available for review to all participants in the collaborative forecasting process.

Collaborate and drive to a consensus

With the statistical forecast created, your team begins the collaborative forecasting process. DPC allows multiple users with different organizational responsibilities to participate in the collaborative forecasting process. Using personalized views of sales history, prior forecasts, and the statistical forecast, your team makes adjustments to improve the forecast as needed. Market intelligence about new customers, sales trends, price increases, new products, and product substitutions are tracked and recorded and can be accompanied by notes to provide additional information to the team. Using a customized override hierarchy, the collaborative process allows these edits to be reviewed and modified by a succession of contributors with increasing responsibility—each taking precedence over the previous—ultimately concluding with the consensus forecast value.
The sales forecast that results from the combination of statistical forecasting and collaborative forecasting can be thought of as the “unconstrained” forecast. Such forecasts are not constrained by current inventory levels or by company distribution and production capacities. Typically these unconstrained forecasts are then evaluated in some form of supply/demand balancing exercise or sales and operations planning process to evaluate the company’s ability to satisfy the forecasts given supply chain operating constraints, profitability objectives, and strategic corporate goals.

Ultimately, a “constrained” forecast will be derived as a result of the sales and operations planning process that reflects a feasible, achievable, desirable sales forecast. Once determined, the constrained forecast can be reflected back into the DPC solution for further analysis, reporting, and comparison to the unconstrained forecast.

**Collaborate using customized forecast views**

Each member of your team can edit the forecast from a view that is customized to their specific needs. Team members can create views that present data critical to their responsibilities, supporting their specialized reporting and evaluation needs. The flexible view definition design permits users to specify the level at which they wish to forecast, and the portion of the business data they want to view. A sales representative may wish to enter forecast totals by customer and product while an inventory planner may wish to evaluate and modify forecasts by product, package, and supply location. With DPC, each user can define unique view definitions to satisfy forecasting review and entry requirements.

**Extend Collaboration to Remote Contributors**

DPC supports both local and remote contributors to the collaborative forecasting process.

Local users have a direct link to the shared forecast database maintained on a company-controlled network. Remote users are those who have no direct, high bandwidth access to the corporate forecast database. They can use a remote console to enter demand information and synchronize their inputs with a centralized planning database. This optional capability to have remote users review and edit extracts of the forecast database can be deployed in a number of ways depending on the specific needs of your organization.

DPC contributes significantly to overall forecast accuracy. When compared to those using a spreadsheet-based forecasting approach, companies using DPC see accuracy improvements of 17 percentage points.

Triple Point’s best-in-class approach translates to greater forecast accuracy for your organization. This ultimately improves utilization and cost-savings in all dependent business processes.
**CONCLUSION**

Is it worth investing time and effort in improving the demand planning process? The research is unequivocal: Yes.

Companies that invest in new tools and processes cut forecast error by nearly half, resulting in dramatic inventory reductions, production efficiency increases, and customer service improvements.

These strategies are especially critical at a time of unprecedented demand volatility. Companies adopting demand planning best practices out-compete and out-perform their peers.

**ABOUT TRIPLE POINT TECHNOLOGY**

Triple Point Technology® is the leading global provider of on-premise and in-cloud Commodity Management software that delivers advanced analytics for optimizing end-to-end commodity and energy value chains. The company provides innovative solutions for managing all aspects of volatile commodity supply chains: trading, procurement, enterprise risk management, logistics, scheduling, storage/inventory, processing, settlement, and accounting.

Over 400 customers in 35+ countries across industries including energy, metals, minerals, chemicals, agriculture, shipping, consumer products, food and beverage, retail, and manufacturing depend on Triple Point solutions. Triple Point has been named a “Leader” in Gartner’s ETRM Magic Quadrant for four consecutive years.

Triple Point’s industry-leading supply chain decision support and optimization technology has been deployed across a wide variety of process manufacturing markets including polymers, chemicals, CPG, pharmaceuticals, and refining. Customers around the world include Arkema, Celanese, ERGON, FMC, Honam, Indian Oil, Ineos, LyondellBasell, Kraton, Lonza, Oxea, PetroRabigh, and Solvay.

More information is available at [www.tpt.com](http://www.tpt.com).