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Author: Dr. Hans Levenbach

PEERing into the Future: Why More Accurate and Reliable Forecasts Improve Inventory Planning

A forecast is a forecast is a forecast. This much maligned statement is often spoken to suggest that all forecasts are alike. Nothing is further from the truth. Although a forecast is a predictive statement, we need to be more precise when referring to demand forecasting in an inventory planning environment. In demand forecasting, improved accuracy and modeling uncertainty translates directly into reduced inventory costs and improved service levels.

In today's competitive environment, companies must achieve both in-stock levels and high inventory turns. In addition to competitive pressures, most companies are finding it necessary to share information and forecasts with their business partners. Retailers, in particular, frequently share forecasting information with their suppliers in the supply chain. Manufacturers have also recognized the importance of historical-based forecasting and top-down planning along with joint collaborations in forecasting with suppliers and customers. Because of the high volume of items involved, statistical forecasting is being adopted widely.

What is a Demand Forecast?

The *term demand forecasting* is used because there are many different kinds of forecasting disciplines, not all alike. For instance, we talk of weather forecasting, sports forecasting and stock market forecasting. They are all predictive in nature, but clearly have quite different objectives. In short, demand forecasting is the process of predicting future customer demand for a firm's goods and services.

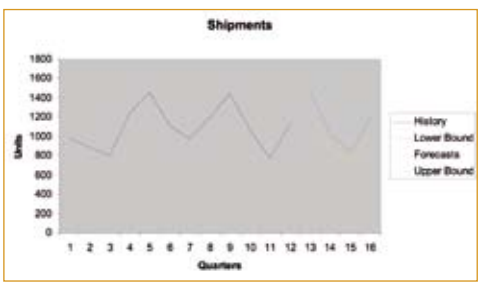

Figure 1 - Product shipment history and forecasts with error bounds

A forecast is often construed to be just a number. A forecast cannot be just a single number if it has to be accurate and reliable. It is at least two-dimensional. An accurate and reliable forecast must also have error bound to describe its uncertainty. Figure 1 displays the historical shipment pattern of a seasonal product along with a statistical forecast and associated error bounds. The quarterly history spans over a 4-year period and clearly shows a seasonal peak in the fourth quarter. If we do not adequately forecast this, there will be a serious shortfall in inventory, especially for the high peak period. By simply taking an average of the past few years or just last year's peak as the peak forecast will likely understate the right forecast and can mean lost sales.

In the context of a supply chain, we can see that a forecast is a statement of a future quantity demanded of a product or service and involves an expression of uncertainty. By making forecasting a vital element in the supply chain, a company is on the right track to achieving the goal of having the right quantity of the *right product at the right place at the right time and for the right price.*

In this statement you will also recognize the important role of price in a demand forecast. There must be a consumer (buyer at a checkout counter, for instance) or a customer (ship-to point for a manufacturer) in order for a demand forecast to have meaning. Hence, as a rule, we exclude forecasting exercises such as weather/climate forecasting involving cyclones and earthquakes, or political forecasting as to who will win an election/primary.

Forecasting for the Supply Chain

Historically, the supply chain was driven by a "push" of product from manufacturers and suppliers through a distribution channel to retailers and consumers. Nowadays, there is also a strong "pull" or demand-driven component to the supply chain (Figure 2.)

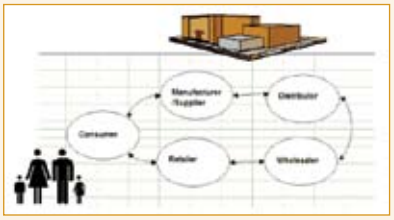

Figure 2. Demand forecasting in the Supply Chain

Companies are in great need to find qualified people to fill the demand planning role to create demand forecasts and replenishment plans so that the right amount of the right product reaches the right customer at the right price. To adequately balance supply and demand, these companies have begun to embrace the Sales and Operations

(S&OP) process. In recent years, educational institutions have begun to offer a Supply Chain curriculum to meet this challenge. Other organizations offer courses to prepare demand planners to fill these demand forecasting functions. Certification of demand planners, like the CPDF® curriculum (www.cpdftraining.org,) can offer several levels of training to reach greater professionalism in forecasting for participants across all industries.

The role of the forecaster in demand planning

A forecaster is a person who needs many talents. Demand forecasting is often perceived to be a complex process because of this. When you examine what a forecaster in a corporation needs to know, then it becomes apparent that he/she needs to be proficient in statistics, operations research, economics, demographics, and database management plus having strong interpersonal skills. Demand forecasters need to be able to collaborate with their peers in sales, marketing, production and finance in creating the inputs for the planning processes required by the other organizations. This places a heavy demand on their time and capabilities. Here are the steps a forecaster goes through in preparing a forecast.

Preparing data. The starting point for the forecasting process is to identify all things that are needed to put a forecast together. These are inputs: typical inputs are finding sources of data about the item to be forecast; obtaining information about external conditions, that is , about factors in the environment influencing a forecast; determining the needs of the user of the forecast; gathering the human and financial resources required to product a forecast; and listing projection techniques and models. These are inputs not only to the forecasting process but also to the forecaster's judgment, which is applied throughout the process. Figure 3 illustrates the multiple dimensions needed in a product hierarchy for a typical supply chain company.

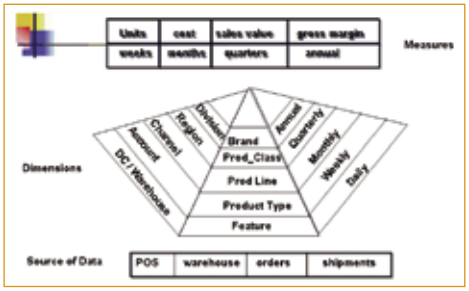

Figure 3 Considering the dimension of a product hierarchy and customer segmentation

Once you identify your forecasting needs, you have created a data-gathering network capable of continuously providing pertinent information about market conditions. In the contact lens industry, for example, the popularity of soft lenses may change among demographic groups as well as by country or region. →

Executing models. For many forecasters, working with models can be the fun part of the job. Though necessary, computer technology and automation has made this a much smaller step in the forecasting process. A forecasting model is a job aid for a forecaster and can be invaluable in deriving objectivity in the forecasting process. What it does for you is to create a simplified representation of reality. With it, you try to include all the factors that are critical and to exclude those that are not. This process of stripping away the non-essential and concentrating on the essential is the essence of forecast modeling. You cannot do without it; however, its accuracy of models is often overplayed. Lack of familiarity on the part of the forecaster sometimes leads to excessive dependence on computer model outputs at the expense of insight and understanding.

Evaluating results. It is generally recognized that accurate forecasts are necessary and provide significant improvements in manufacturing, distribution, and the operations in many firms. This step is iterative – we may need to go back through the analysis two or three times before we can be happy with the results. We need to ask ourselves how well these models have worked in the past. For example, Figure 4 shows the results of comparing the forecasts made in Figure 1 to the four periods that were kept as a "hold-out" sample. This "ex-post" forecast analysis shows that on average, the mean absolute percentage error turns out to be 10.4%. Are they likely to hold up in the future and how do assumptions affect this? The process of forecasting focuses attention on evaluating forecasts and using the right methodology for a given forecast. For example, do not use short-term methods for long-term projections.

Year		Period	Forecast	Actual	Error
4	1	13	1475	1268	-16.3%
	2	14	1026	1117	8.1%
	3	15	845	990	14.6%
	4	16	1190	1222	2.6%

Figure 4 Forecast performance of the shipments data

Reconciling the Final Forecast. During the forecasting cycle you could be making changes to the models, projections, and assumptions behind your forecasts. Your peers in other organizations also contribute their assumptions and projections. In many supply chain organizations this has resulted in the need for a formal balancing of supply and demand considerations with input from the financial group, as well. The Sales & Operations (S&OP) initiatives found in a number of industries has begun to yield some positive benefits for a corporation. The demand forecasters play a central role in these meetings and their presence as experts and professionals have become a recognized function in the process.

But in the end you need to come up with a final forecast, essentially a number (plus error bounds) or a set of numbers on which the company can make its future plans. Instead of focusing on the numbers, though, you and your peers must reconcile your planning approaches so that the most likely assumptions will produce accurate forecasts.

Is demand forecasting worthwhile?

If you now take the first letters in the four bold-faced paragraphs above, you will find out that it spells **PEER.** You are PEERing into the future while collaborating with your peers. To make accurate forecasts will require their cooperation and collaboration. It is not something you can do in isolation. Hence, it may require some real professionalism on the job.

The PEER process of forecasting is not an exact science; it is more like an art form. As with any worthwhile art form, the forecasting process is definitive and systematic and is supported by a set of special tools and techniques that are dependent on human judgment. To forecast the soft contact lens markets in a region, for instance, requires (1) the careful collection and cleansing of data from multiple manufactures throughout the markets, (2) identifying the wearer base and the factors driving the demand for products in this market, (3) thoroughly analyzing the changes, potential errors and impacts of these factors on the market, and finally (4) drawing rational conclusions that can serve as the basis of a futuristic outlook and communicate them effectively to all forecast users. ■

Hans Levenbach is one of the lecturers at the EFCLIN Congress in October in Glasgow, Scotland. His presentation will be on Saturday 11 October. The day after the EFCLIN Congress, a special full day course will be presented by Hans. It will be in the same hotel as the EFCLIN Congress will be held (the Thistle Hotel.) The costs for attending the seminar are 375 Euro. Readers of Global CONTACT will receive a discount of 10% on the registration costs if they register before 15 September.

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