

DEMAND PLANNING & FORECASTING

Introduction

Here's a revealing question that operations executives should stop and ask themselves: How much does forecast error cost my company?

To answer this question, think of all the costs that your company would not face if it could forecast demand perfectly. There would be no lost sales, no excess or obsolete inventory, no rush orders in your factories, and no expediting fees paid to suppliers. Your factories could safely operate with longer, lower-cost production runs. The time that your people currently spend responding to product shortages, demand excesses, and forecast changes would be saved.

Add up all these costs and you have a measure of the total cost of forecast error.

What shocks executives is that this cost is very often greater than the company's net profit. Based on our experience with over 30 companies, a typical range for the total cost of forecast error is 5-15% of sales (see Figure 1).

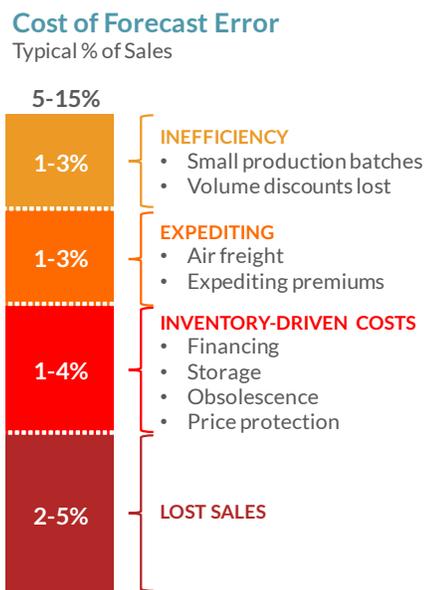


Figure 1

Of course, forecast error can almost never be eliminated. But in our experience improvements of 10-20% are almost always possible, and improvements of up to 50% are not unheard of. That makes forecasting one of the biggest untapped improvement levers in most companies.

Five Keys to Better Forecasting

Is it really possible to get better at predicting the future? Our experience (and 50 years of published research) says that the answer is a clear "yes." Here are 5 techniques which are poorly used or non-existent at most companies. Yet they have consistently been shown to improve forecast accuracy:

1. **Closed-loop forecast monitoring.** Fast, frequent feedback is essential for the forecaster to learn from past errors and build good intuition.

For example, in one engagement we found that the client consistently over-forecasted a key product category by about 20%. The problem was easily corrected – the issue was simply a lack of visibility. For that reason, in our forecasting engagements we put considerable effort into the design of forecast monitoring systems that automatically alert forecasters and managers to consistent errors and deteriorating trends.

Case Study

In a recent forecasting engagement we deployed a number of techniques described in this overview. The work lowered the client's MAPE (Mean Absolute Percentage Error) from 65% to about 40% over the course of six months (see Figure 2).

First we deployed closed-loop forecast monitoring – putting in place tools tracking MAPE and Bias (the tendency to over- or under-forecast) over time and decomposed by brand, region, and product category. This revealed that certain categories in certain brands were consistently over-forecasted, month after month – some by up to 40%. Merely highlighting these biases went a long way to correcting them.

To keep the forecast unbiased we had to break the longstanding practice of forcing the forecast into line with the business's stretch goals. Introducing the "Reality-Check" process equipped forecasters to push back on unrealistic expectations.

Further improvements required more sophisticated techniques. For example, we worked with the client to install econometric forecasting models in SAP's APO-DP package. These predicted demand based on price, promotions, seasonal effects, and the like. This automation in turn freed time to analyze new products, which had previously suffered from lack of attention.

1. **Statistical forecasting.** Statistical models often forecast better than even savvy humans. These models typically use either “time series” techniques (which extrapolate from history) or “econometric” techniques (which measure the impact of forecast drivers like price and promotions).

Moreover, automating forecast generation frees human forecasters to concentrate on incorporating other information not captured by the statistical models. Here the “value added” to the statistical forecast becomes the key measure of forecaster performance. However, statistical forecasting can be tricky to implement. You must choose the right statistical techniques. You have to apply those techniques correctly. And you have to create the IT infrastructure to apply them on an ongoing basis.

2. **Aligning bottom-up and top-down forecasts.** Forecasts are often generated bottom-up, with each item forecasted separately. It is important, though, to apply a top-down “reality check” to the forecast.

We frequently work with clients to automate this review. The Reality Check Tool cycles through all the different levels of aggregation – by brand, by channel, by region, and so on. It automatically detects bottom-up forecasts that lie outside the confidence bands of an aggregate statistical forecast at that level.

3. **Aligning incentives.** Most companies measure forecast accuracy, but few create strong incentives to improve it. In fact, most firms actually have tacit incentives to forecast poorly (e.g., sales team forecasts biased low lead to lower quotas).

Organizations must create meaningful incentives to forecast accurately to overcome the forces implicitly supporting poor forecasts. It can be as simple as putting accuracy targets in performance plans. Nothing stiffens the resolve of a forecaster, or the extended team contributing to a forecast, like the knowledge that it affects their own take-home pay.

Forecasting Engagement Results
Mean Absolute Percent Error (MAPE)

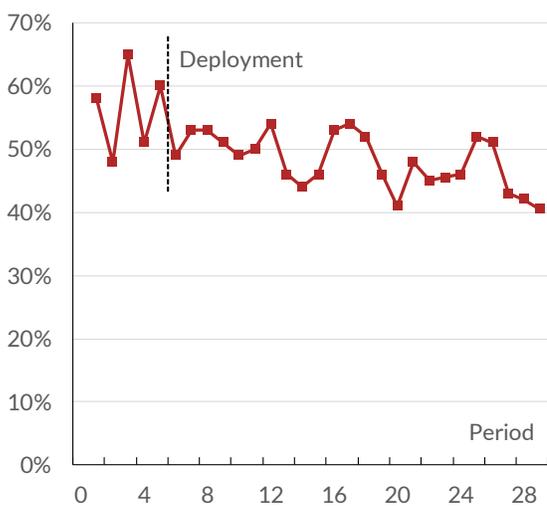


Figure 2

4. **Monitoring underlying demand dynamics.** In some markets, there is no substitute for understanding the dynamics of precisely how demand is generated.

For example, we recently worked with a manufacturer of semiconductor test equipment. Any respectable forecast in that industry takes into account the capacity utilization of the installed base of testers. If capacity utilization currently stands at only 50%, no manufacturer is going to sell many testers in the near future – irrespective of historical demand, or pricing, or promotional strategy. Yet many forecasts in this industry continue to rely on time-series or econometric techniques that comprehensively fail to recognize this basic dynamic.

Why End-to-End Analytics?

Successful forecasting improvement projects usually require a careful blend of approaches. Unfortunately, many of those working in the field are ill-equipped for such a multi-disciplined task. Statisticians focus on the math – but may miss how misaligned incentives are the true driver of poor performance. Process-oriented consultants construct elaborate flowcharts and time-consuming “consensus” processes – which the right statistical tools might render largely irrelevant. Software vendors have strong incentives to promote their tools as the solution, regardless of the true source of the problem.

By contrast, End-to-End Analytics applies a comprehensive approach that focuses not only on quantitative techniques, but also on the enabling tools, business processes, metrics, and incentives. Moreover, we bring to bear years of collective experience working with senior executive to drive forecasting improvement – in industries ranging from semiconductors to cosmetics, and automobiles to baked goods. The cumulative profit impact of our forecasting work is estimated by clients at well over \$50 million.

Getting Started

To learn more please visit us at www.e2eAnalytics.com or contact by email at info@e2eanalytics.com