ACCOUNT LEVEL FORECASTING NEEDS DOWNSTREAM DATA

By Larry Lapide

(This is an ongoing column in The Journal, which is intended to give a brief view on a potential topic of interest to practitioners of business forecasting. Suggestions on topics that you would like to see covered should be sent via email to llapide@mit.edu).

I’m often asked by people I meet how they can start to leverage the Point-of-Sale (POS) data they get from their retail customers to improve their demand forecasting and planning. The first question I ask them is whether they currently do customer- or account-level forecasting and planning. They are usually surprised by my question. However it’s simple to understand why I ask. Currently POS data is provided to a manufacturer by only a small subset of its customer base. In the retail world Wal-Mart and Target provide this type of data, and maybe a few of the other bigger retailers; but mid-sized and mom-and-pop retailers don’t. This means that POS data is collected for (and hence only relevant) for use in improving the forecasting and planning of only a fraction of one’s total demand.

However it’s simple to understand why I ask. Currently POS data is provided to a manufacturer by only a small subset of its customer base. In the retail world Wal-Mart and Target provide this type of data, and maybe a few of the other bigger retailers; but mid-sized and mom-and-pop retailers don’t. This means that POS data is collected for (and hence only relevant) for use in improving the forecasting and planning of only a fraction of one’s total demand.

The answer I get back from most people to my question is that by-and-large their companies do not do account-level planning, except maybe for a couple of their largest customers. Yet even for these customers, account-level forecasting might be done only at a national level, which while useful, is less so when one has to forecast demand placed against individual plants and warehouses, rather than on a national basis.

So my advice to companies that want to start to leverage POS data is that they first need to start doing account-level forecasting for those customers from which they collect the POS data. In addition, the account level forecasting they do should use multi-tier forecasting methods that not only leverage POS data, but any other types of downstream data obtained from their customers — such as retailer warehouse withdrawals and forecasts of these withdrawals, warehouse replenishment requirements, and stores sales (i.e., forecasts of future POS data).

WHY DO ACCOUNT-LEVEL FORECASTING?

Generally the main reason to do account level forecasting is to improve forecast accuracy overall. However it also can be useful for improving marketing and sales planning.

In terms of forecast accuracy, being able to more accurately forecast at the detailed account level for some customers can help to increase accuracy at the overall level. For example assume one’s demand forecast accuracy is 70% overall. Being able to increase the forecast accuracy for one-half of demand to 90%, while keeping the other half the same might increase overall forecast accuracy up to 10%. In contrast to the common belief that is better to forecast at an aggregated customer level because demand variations are lower than at a detailed customer level, it is possible that forecasting accuracy at that aggregated level can be gained by forecasting via a bottom-up approach — by doing account-level forecasting for a portion of customers for which information is available on their future needs.

Account-level forecasting can also be beneficial in supporting demand planning. Being able to forecast at the customer level can help sales and marketing personnel better plan their activities. Once the capability is in place to forecast the demand of a specific account, then one

LARRY LAPIDE

Dr. Lapide is a Research Director at MIT’s Center for Transportation and Logistics where he manages its Supply Chain 2020 Project focused on supply chain management of the future. He has extensive business experience in industry, consulting, and research, and has a broad range of forecasting experiences. He was a forecaster in industry for many years, has led forecasting-related consulting projects for clients across a variety of industries, and has taught forecasting in a college setting. In addition, for 7 years he was a leading market analyst in the research of forecasting and supply chain software.
can more accurately assess the impact of various promotional programs on the demand from that customer. This helps estimate the true cost-benefit of marketing and sales programs aimed at improving the profitability and growth of an account rep’s customer or of a group of targeted customers.

**DOWNSTREAM DATA IMPROVES THE FORECAST**

The simplest way to do account level forecasting for a specific customer is to use historical orders placed by (or shipments to that) customer using statistical time series forecasting techniques. However, orders placed on a manufacturer are often extremely volatile because of the bullwhip effect. Thus, while this statistically-based forecast can be reasonably accurate, it could be made more accurate by incorporating a variety of other future-oriented data about that customer, such as internally-gleaned market intelligence from the customer’s account rep. However, external downstream data might be even more useful because it suffers less from the volatility added by the bullwhip effect, which tends to cloud a manufacturer’s view of fundamental shifts in consumer demand. POS is the one type of data that most closely represents true consumer consumption of a product (minimally distorted by consumer-level promotions and discounts).

Many manufacturers are interested in using POS data. It is collected closer to the end-use consumer, and thus has the potential to be a leading indicator of demand that would be placed on them in the future. Assume for example that there is on average six weeks worth of inventory sitting in the supply chain between a manufacturer and the point-of-consumption. A fundamental (i.e., significant and sustainable) change in consumer demand (i.e., consumption) might not be detected by the manufacturer until up to six weeks later, when it manifests itself in the orders placed on it. However, consumption changes are harder to detect in orders placed upon a manufacturer because of the ‘bullwhip effect’ — that causes extreme volatility in upstream order patterns. Therefore detecting a significant change at the point of consumption via POS data can give a manufacturer up to a 6-week notice of a fundamental shift in customer demand for its products. Plenty of time to get its production operations prepared for the impact on its orders, expected up to six weeks later.

Other types of downstream information can also be useful as leading indicators of future customer orders placed on a manufacturer. Figure 1 depicts a pyramid of increasing future-oriented data collected from points along a supply chain that can be obtained under various programs involving the sharing of information between a manufacturer and retailer. Each of these is described below:

1. **Manufacturer Shipments or Customer Orders:** This data is not future-oriented since it is historical upstream data. Therefore it has little value in indicating future demand except by using statistical forecasting methods to detect recurring patterns that might continue to appear in future demand. It is the type of internal data that companies normally use to forecast demand and it requires no information from their customers.

2. **Retailer Warehouse Withdrawals:** This is data that represents shipments from a retailer’s warehouse to its stores. This is external data that might be shared by the retailer with the manufacturer. In contrast to historical order data, this data is future-oriented — despite the fact that it is historical data! Using an example similar to the one previously used for POS, assume there are six weeks of inventory from the manufacturer to the point of consumption and that four weeks of it are in the retailer’s warehouse and two in the stores. Then any fundamental change to consumption will be detected two weeks later in the warehouse withdrawal data, hence 4 weeks earlier than it would show up in the manufacturer’s order data. A manufacturer monitoring this data can thus get up to a 4-week notice on significant changes to its future...
orders.

3. **Point-of-Sale (POS) Data:** As previously discussed, this data represents sales at the retail store that is external data that might be shared by the retailer with the manufacturer. This data is future-oriented as demonstrated by the previous example that described how a manufacturer monitoring this data can detect a significant change in its future orders up to six weeks in advance.

4. **Order and POS Forecasts:** This data represents forecasts provided to a manufacturer from a retailer through some type of forecast-sharing program. The former represents the retailer’s forecast of orders placed against the manufacturer to replenish the retailer’s warehouses. This data is future-oriented in a different way than the previous data types discussed above in that it represents an estimate of what might be, rather than representing an actual result. It can, however, provide the manufacturer with some idea of significant demand shifts. Of course only to the extent that the retailer can identify them in advance. POS forecasts are similar in this regard, in that they represent estimates of future demand, but on consumption further out into the future. Carrying out the example used in point 2 above, if the retailer is able to estimate a fundamental shift in consumption three weeks out into future, then using the retailer’s POS forecasts can give a manufacturer up to a 9-week advance notice of this shift that would show up in its customer orders.

5. **Vendor Managed Inventory (VMI) Data:** This is information gleaned via a VMI program where the manufacturer takes on some responsibility for managing the retailer’s inventory usually in the retailer’s warehouses, but in some cases in the retailer’s stores. Under these types of programs the manufacturer often has access to not only the retailer’s warehouse withdrawals and POS data, but also to the retailer’s warehouse inventories, and possibly store inventories. This gives the manufacturer even more opportunities to identify and even control (to some extent) future fundamental shifts in the orders placed on it by the retailer.

6. **Collaborative, Planning, Forecasting and Replenishment (CPFR) Data:** This information is gleaned from CPFR programs where the manufacturer and retailer jointly develop warehouse replenishment plans and POS forecasts. In addition, under these types of programs the manufacturer can work with the retailer to coordinate and synchronize their respective marketing, sales, and promotional plans. Since the manufacturer not only has access to all the information described under the VMI programs mentioned in 5 above, but also has access and some influence on the retailer’s promotional plans, even more advanced notice of future significant demand shifts can be gleaned from CPFR programs.

**LEVERAGING DOWNSTREAM DATA VARIETY**

All the six types of downstream data mentioned above can help add accuracy to account level forecasting. Each type of information can help a manufacturer detect (in advance) fundamental changes in consumer demand for its product. That is the good news for forecasters. The bad news is that not all this type of information can be gotten from every customer. Some customers are not willing to share historical data, while others may not be willing to provide forecasts of their needs. In addition, some will not want to participate in co-managed inventories programs or do any type of joint marketing and sales planning.

What this means is that a manufacturer that wants to leverage the data will have to develop a variety of different account-level forecasting methods to get the best value out of the information received. Each method would be designed to leverage the six types of data described above in a variety of combinations as worked out with customers. This could be quite sizable, as some customers might provide no data or others might provide POS data, but no warehouse withdrawals data; while some others might be on a VMI or CPFR program, and some not. Different multi-tier forecasting approaches would be needed to fully leverage the variety of information gotten from each customer. (See my column in the 1999-2000 Winter copy of JBF for a description of multi-tier forecasting).

For the forecaster, one of the most difficult parts of account-level forecasting and leveraging downstream information will be assessing for which customers it makes sense to forecast at the account-level; and when it does, what types of information they provide will really help to improve forecast accuracy. Account-level forecasting for one’s biggest customers is probably a no-brainer, because it can be justified on the basis of forming a more collaborative partnership with them, in addition to the forecast accuracy improvement opportunities. However deciding whether to do it for medium and small customers will require cost-benefit analyses. These would need to look at the supply chain savings and other benefits, as well as the revenue enhancements that can be achieved from forecast accuracy improvements versus the costs of getting these improvements. The extent to which account-level forecasting for some customers can be automated would likely be a big factor in these analyses.

When these cost-benefits analyses are completed, I suspect most forecasters will find that they should start doing account level forecasting for some of their customers, because with regard to the value of using downstream data, “there’s gold in them hills”!