Special Issue
POS Data Based
Forecasting & Planning

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Letter from the Editor

Over the past 25 years, market dynamics have changed significantly and so have demand planning and forecasting. Consumers are now less loyal and more demanding. Consumers have more choices than ever before as the number of products has exploded. They are very impatient; if you don't have what they want, someone else will. The life cycle of products has shortened, and lead times have increased. Competition has intensified. To operate efficiently and profitably in such an environment, businesses have to change the way they operate.

Well-managed businesses have responded to these challenges in a number of ways. They have changed the way they do demand planning and forecasting—from Silo Forecasting and Planning to Consensus Forecasting and Planning to Sales & Operations Planning (S&OP) to Collaboration, Planning, Forecasting and Replenishment (CPFR). The forecasting models have progressed from averages to exponential smoothing to regression to ARIMA to neural networks. Demand planning cannot go anywhere without technology, which is necessary to store, access, manipulate, and analyze data, as well as to prepare forecasts and plans. Software vendors have kept pace not only by providing state of the art forecasting engines to generate forecasts, but also systems to translate forecasts into the most effective plans—plans for production, procurement, logistics, sales, marketing, and finance.

The most recent development that has taken place is in the data used for forecasting, which has evolved from shipment to demand (customer order) to Point of Sales (POS) data, which is the focus of this special issue. To suppliers, what matters most is not what retailers/distributors are ordering, but what the end-consumers are buying, and when, where, and why. POS data provides that information. It provides the market intelligence at the most granular level, which cannot be obtained from shipment or demand data. Furthermore, businesses can get the information quickly enough to react. With POS data, one manufacturer of jewelry products found that its white pierced earrings peak in June, and other colors in December; region-wise, they are sold more in March in the South but more in June and July in the East; and time-wise, they are sold more in the third week of a month than in any other week. It can also give you fairly reliable information, which promotion works and which one does not. Furthermore, since POS data is more stable than shipment and demand data, it gives more accurate forecasts. More accurate forecasts means less inventory, less stock-outs, better customer service, more sales, and, of course, more profit.

Big box retailers are now sharing their POS data with their suppliers, recognizing information gained from it would be mutually beneficial. If such data is not directly available from retailers, it can be bought from the third party data vendors such as Nielsen and IRI, which provide what is known as syndicated data.

This issue is very unique as it includes 12 articles on POS data, which gives you all you need to know about POS/ consumption-based demand planning and forecasting. Robin Simon of SimonSez Consulting Corp. gives the ABC's of POS-based demand planning and forecasting. Larry Lapide from MIT discusses the what, why, and how of POS data. We have also asked demand forecasters from different industries who have gone through this journey to share with us their experience, benefits reaped, and lessons learned—John Gallucci and Hugh McCarthy from Nestlé, Jeff Brown from Brown Shoe, Mike Borgos from Osram Sylvania, Richard Shapiro from Jarden Consumer Solutions, and Sara Park from Heinz. Fred Andres from PhredTek discusses a case study of a beverage company for which he successfully implemented the system from POS forecasting all the way to replenishment at a store level. Bill Sichel also discusses a case study of a jewelry segment of Liz Claiborne (acquired from Monet Group) and shows how he gained market intelligence from POS data at a very low level of granularity, which is not possible with shipment or demand data. Technology also plays an important role in making effective use of such data. So we asked three software vendors—Karin Bursa from Logility, Kai Trepte from John Galt Solutions, and Fred Tolbert from Demand Solutions—to share with us their experience when their clients used POS data for demand planning and forecasting, the challenges they encountered and overcome, and the lessons they learned. We did it thinking it would provide another perspective to our readers. So the point here is not whether or not you should use POS/ consumption data; rather, how do you make the most of it, which is the objective of this issue.

I hope you will enjoy reading this issue as much as I did in putting it together. I am grateful to all who contributed to this issue, without their support it would not have been possible.

Happy Forecasting & Planning

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THE ABCs OF POINT OF SALES (POS) DATA

By Robin Simon

In recent years there has been increasing use of Point of Sales (POS) data by both manufacturers and retailers to gain insight into consumer behavior. Therefore, it is important to know what POS data is, from where the data comes, and how to reconcile shipments with consumer takeaway to reduce inventory and increase sales and profit.

WHAT IS POS DATA?

POS data measures the last part of the supply chain—how much product the ultimate end-users purchase. In other words, how much cereal shoppers buy from grocery stores; how many cars consumers buy from local dealers; and how much paint people buy from Home Depot, Lowe's, Wal-Mart, and hardware stores. This is what occurs at the far end of the supply chain, so there are other measures (elements) to be forecasted for different points throughout the supply chain. Let's review those first. The two most popular measures used in forecasting are orders and shipments. Orders capture the amount of product that customers want from a supplier, while shipments capture the amount of product that is actually shipped to them by the supplier. A few examples of orders are:

- Kroger places orders for cereal with General Mills and Kellogg's, which in turn ship products to Kroger's warehouses (or possibly directly to their stores).
- Main Street Chevrolet places orders for cars with General Motors, which ships cars to Main Street Chevrolet.
- Home Depot places orders for paint with either paint manufacturers or distributors, which ship directly to Home Depot.

In an ideal world, orders would always equal shipments, and the fill rate would always be 100%. Of course, that is never true because of various hiccups that occur between an order getting placed with a supplier and the supplier's ability to provide the desired quantity of product at the desired delivery location at the desired time. Fortunately, most fill-rates are in the range of 95% and higher, so orders and shipments usually line up quite well. The most common reason for differences is probably when the supplier has an out-of-stock situation.

ROBIN SIMON

Ms. Simon is the founder of SimonSez Consulting Corp. She has over 20 years of business experience, primarily in the consumer products industry. During her 12-year tenure at Kraft Foods in both the United States and Canada, she managed the forecasting process for several categories, from building regression-based models to conducting cross-functional consensus meetings. Her client list includes S. C. Johnson, ConAgra Foods, Sara Lee, General Mills, Barilla Pasta, McNeil Labs (Johnson & Johnson), Alberto Culver, and the Tropicana Division of PepsiCo. She has been a frequent speaker at IBF forecasting conferences and tutorials. She received an MBA in Marketing and Statistics from the University of Chicago, and two undergraduate degrees from the University of Pennsylvania, a BA in Applied Mathematics from the College of Arts & Sciences, and a BS in Economics from the Wharton School.

Figure 1 illustrates how POS data is related to orders and shipments. If a supplier sells its product directly to people or companies that ultimately use the product, then the shipments would be the same as the POS data. Companies like Amazon and other Internet-based firms (or the Web-based divisions of other companies) ship their products directly to the end-users, so their shipment data is the same as their POS data. This would be the simplest possible supply chain scenario. Most companies, however, have more complex supply chains; their product must be available in a retail outlet before somebody can purchase it and use it. In theory, shipments should be determined by how much end-users are likely to demand, so POS data can be used to forecast what end-users will buy.

SOURCES OF POS DATA

There are generally two sources of POS data: Directly from retailers and from third party data vendors. Table 1 summarizes the key differences between these sources, which will be explained in more detail.

The most popular POS data that comes directly from a retailer is probably Wal-Mart's Retail Link. Wal-Mart's suppliers can get sales data for their own items (not of competitors) and use software (or an Internet portal) supplied by Wal-Mart to access the information. Whole Foods is another retailer that allows suppliers to access POS data through an Internet portal. Other retailers also provide POS data to their suppliers, sometimes electronically (in Excel or another

format), via a Website, or in hardcopy. Each retailer can only provide POS data from their own stores. Some retailers (like Wal-Mart) encourage the use of their POS data while others provide it almost as an afterthought. There is wide variability in the data and ease of use across retailers, which is why the third party data vendors exist. Some retailers provide transaction level data that needs to be aggregated into product subtotals, markets, and longer than daily time periods while others have a user-friendly front end and pre-formatted reports that present the data in ways that are ready for use by the suppliers.

Nielsen and IRI are the two key syndicated data suppliers for the Grocery, Drug, Mass Merchandiser, Convenience Store, and Warehouse Club channels. Many manufacturing companies that are in the business of producing retail products do not want to invest a great deal of time and resources in processing POS data from all of their customers. The third-party data vendors fill this gap by providing this service. Such data is often referred to as "syndicated data" because the vendors sell the same information to many different client manufacturers. It is important to note that Wal-Mart, Whole Foods, and some other retailers do not make their data available to any third-party vendors. Manufacturers must use Retail Link to access Wal-Mart POS data and the Whole Foods portal to access Whole Foods POS data. To get an overall picture of their product sales, the manufacturer must add Wal-Mart and Whole Foods POS data to the data received from a third-party vendor. (Other syndicated POS data providers are SPINS for the Natural Grocery channel and IMS for prescription pharmaceuticals.) There are several advantages of using syndicated POS data when it is available for a business:

- Data is in standardized product, geography, and time period groupings across available channels and retailers.
- Data is available for all products in a category, including all competitors.
- Data can usually be accessed with user-friendly software and with pre-formatted reports.
- More data is typically available, in

FIGURE 1
RELATIONSHIP OF SUPPLIERS, CUSTOMERS, AND CONSUMERS

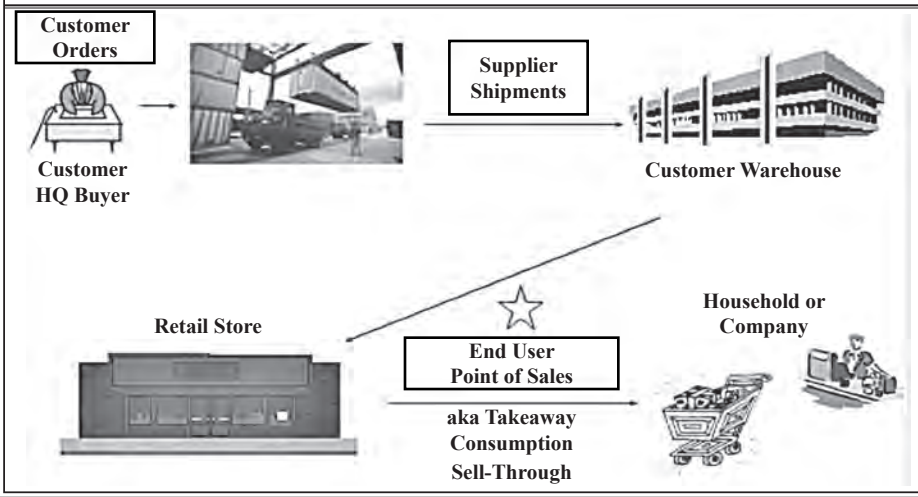


TABLE 1
SOURCES OF POS DATA

	POS Data (Direct from retailers)	Syndicated Data (From third-party vendor)
Who supplies it	Individual retailers	Nielsen, IRI, SPINS, IMS, etc. (Remainder of this table focuses on Nielsen and IRI capabilities for Grocery channel)
Types of data available	Typical: Volume Sometimes: Distribution, price	Volume, distribution, price, and merchandising
Geographies available	Individual retailers Sometimes: Store level	National, channel, region, market, and chain
Products available	Typically supplier's own SKUs only	All SKUs in a product category, regardless of supplier (so includes competitors)
Periods available	Varies from daily to quarterly, may contain comparisons to year ago period	Weekly, monthly, quarterly, annual, and year-to-date (YTD), typically for three years of rolling data
Coverage	All stores	All stores of most participating retailers, sample for others
Delivery lag time	Varies between real time and one quarter	Varies between about 10 days and one month
Processing required	Varies by retailer	Minimal
Cost	Varies from $0 to thousands of dollars	Varies from thousands to millions of dollars depending on product, geography, period, and types of data purchased; delivery time; and software tools used

addition to product sales in the POS data obtained directly from a retailer.
- Last but not least, data provided requires minimal processing by the manufacturer.

COLLECTION OF SYNDICATED POS DATA

Most consumer package goods (CPG) companies purchase Nielsen or IRI data, often signing multi-year contracts that incorporate data delivery, software, and client service. These contracts are typically managed by the Sales, Market Research, Marketing, or IT functions, depending on the size of the company. There are many different uses of this data, within both Sales and Marketing. It is not uncommon for people working in demand planning, logistics, or other supply functions not to be aware of this type data. If you work at a CPG company, ask around until you find the "owner" of this data to see if you can either access it or at least gain an understanding of what is available to your company.

Why would a retailer provide its data to Nielsen and IRI? Simple answer: They are paid or compensated for doing so. This happens either via barter agreements whereby the third-party data vendor supplies certain analyses in exchange for a retailer's data or literally pays for it. The vast majority of retailers see the value in allowing their suppliers to have this data, but they do not necessarily want to be in the data processing business themselves.

Nielsen and IRI collect the data in three different ways, depending on the type of data.

1. Volume, retail price charged to shoppers, and distribution (what portion of stores carry the product) come directly from the retailer's POS system. Information on retail price and distribution can be used to conduct analyses that determine the impact of changes in pricing and distribution on product sales.
2. The third-party data vendors have subscriptions to over 300 newspapers around the country, and people go through the circulars every week to track all the products that appear in any retailer's weekly advertising. A Feature is a retailer's print ad, usually called a "circular" by most consumers. They are generally distributed via the local newspaper on "Best Food Day," which differs by market. Wednesday is Best Food Day in Chicago, for example, and Jewel and Dominick's (the major grocery chains) have their weekly circulars in the two major newspapers every Wednesday. Some retailers distribute their Features via in-store circulars and/or direct mail, too. Features are not to be confused with manufacturer's advertising (print, TV, or other media) or with manufacturer's free-standing inserts (FSIs), the coupons that typically come in the Sunday newspaper.
3. The third way Nielsen and IRI collect data is by using in-store auditors. There are several hundred people who go to designated stores every week to keep track of which products are on display every week. The most common display type is on the end-aisle, in addition to the product's regular shelf location. Displays can also be found in the center of the aisle in some stores. This way the third-party data vendors estimate the effect of these displays on the sale of these products.

Features, displays, and in-store price cuts are commonly called "merchandising tactics." As expected, there is typically a large increase in sales during weeks when a product is on display or in a Feature, which can be quantified using the syndicated POS data. The retail pricing data allows one to conduct pricing analyses to determine the relationship between change in price and change in volume.

COMPARISON OF CONSUMER TAKEAWAY AND SHIPMENTS

As mentioned earlier, POS data is a measure of sales at the final point in the supply chain. Therefore, product shipments to retailers must occur before consumer takeaway can take place in stores. In order to use POS data as an aid in forecasting shipments, it is essential to make sure that the product, geography, periods, and volume measures are comparable between the two different kinds of sales data. A good first step is to graph both sets of data on the same chart to see if things appear to "make sense." Both data sets should exhibit the same approximate trend (increasing, decreasing, or flat) over time. Shipments and POS data will not be the same in any specific week, month, or even quarter but they should be very close over any 12-month aggregate period. If there is a difference of more than 5% to 10% between shipments and POS data over 12 months, then you need to look at things in more detail and confirm that both data sets are measuring the same thing.

- Are the same SKUs or items included in the product aggregate?
- Do the geographies cover the same customers/stores?
- Is volume measured the same way in both data sources? (POS data is usually reported in units that the consumer buys, while shipments can be in cases that the retailer buys.)

If the answer to any of the preceding questions is "no," then you need to adjust the data sources so that they are using the same volume measure and are as close as possible to each other in terms of product and geography. Once that is taken care of, there are two other remaining things to consider. One is the period definitions and the other is if it is necessary to adjust the POS data using a coverage factor. If data is weekly, for example, confirm that both data sources end on the same day of the week. (Note that Nielsen weeks always end on a Saturday while IRI weeks end on a Sunday.) If data is monthly (a common period for forecasting and analysis), make sure that both data sources have the same number of days in their months and that the months end on the same day. Manufacturers track shipments based on calendar months or fiscal months, which vary by company. POS monthly data can be made up of 13 four-week periods in each year, or 12 periods in a year, occurring in a pattern of 4-4-5 weeks in each quarter. It is common to adjust the Nielsen or IRI data to align with a company's

internal shipment data. Figure 2 shows a typical pattern of shipments vs. POS consumption takeaway for a consumer product: Shipments are much more volatile than consumer takeaway is. That is, the highs are higher and the lows are lower for manufacturer shipments, while the consumer behavior is more consistent. We could guess that this is a shelf-stable product (not refrigerated or frozen) because of the large spikes in shipments. If there was a risk of product going bad before being sold to shoppers, retailers are less likely to buy too much in advance. In fact, this is a personal care product so it has no real shelf-life to be worried about. Note that both data sources are increasing over time and we can see that the shipments increase before consumer takeaway does. In any month where consumer takeaway exceeds shipments, it means that the retail trade is selling to shoppers from inventory that it had already purchased in previous months.

Once product, geography, volume measure, and periods are fully aligned, it often happens that the shipment volume is consistently higher than the POS consumer takeaway, even over long (annual) time periods. This is because the manufacturer is selling the product in stores that are not covered by the syndicated POS vendor. (But this is generally not an issue when using POS data directly from the retailer since the retailer provides data for all of its stores.) Figure 3 illustrates this for a shelf-stable food product, as it is quite obvious that shipments are always greater than consumer takeaway. In order to better align this data, calculate the "coverage factor," that is, the long-term difference between shipments and consumer takeaway. This is typically expressed as a decimal or percentage and is in the range of 90% to 98%. First calculate the rolling 12-month shipments and consumer takeaway, then divide takeaway by shipments. In the above example, once we graph the rolling 12-month shipments vs. takeaway, it is easy to see the relationship between the two data sources (see Figure 4). Note that in this specific case, we can see from the graph that the shipments and takeaway are closer together in the more recent periods

FIGURE 2
BRAND X
MANUFACTURER SHIPMENTS VS. RETAILER TAKEAWAY
(Total U.S. Grocery by Month)

FIGURE 3
BRAND A
MANUFACTURER SHIPMENTS VS. RETAILER TAKEAWAY
(Total U.S. Grocery by Month)

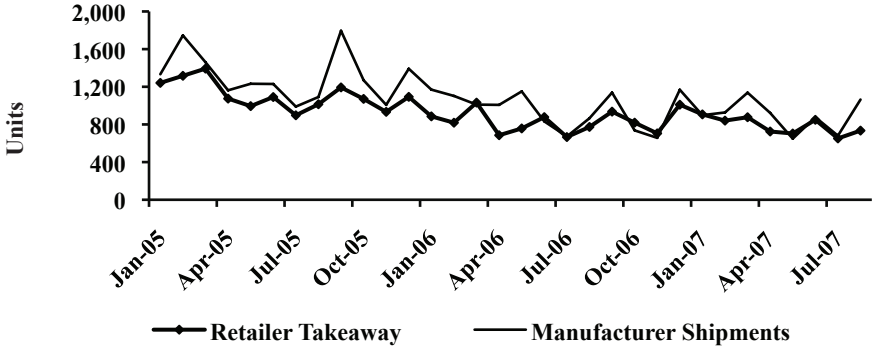
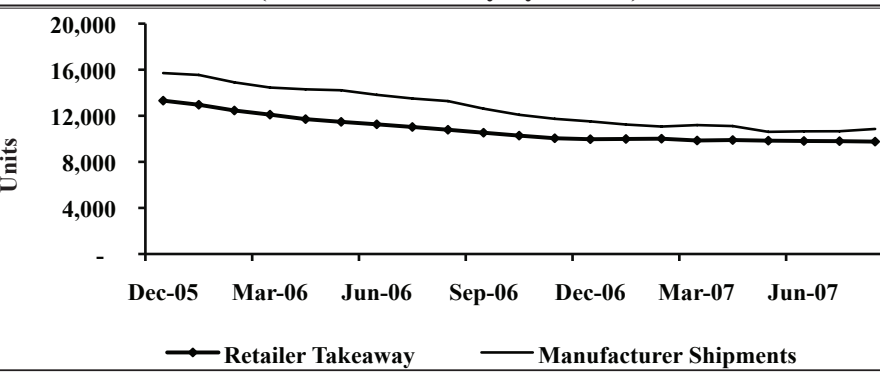


FIGURE 4
BRAND A
ROLLING 12-MONTH PERIODS
MANUFACTURER SHIPMENTS VS. RETAILER TAKEAWAY
(Total U.S. Grocery by Month)



than in the periods further back in history.

Figure 5 shows the results of the coverage factor calculation for each rolling 12-month period. The numbers confirm what we saw in Figure 4: The coverage factor was 80% to 85% during the first several rolling 12-month periods but increased to just over 90% in the more recent periods.

Once you have a coverage factor for each year of data, apply it to the POS data to arrive at adjusted takeaway, which is more directly comparable to shipments. This is done by dividing the POS takeaway by the coverage factor. Since the coverage factor in the denominator is less than 1, this will adjust the POS takeaway upward. Now when we compare shipments to the adjusted POS takeaway as in Figure 6, we can see how the two are related.

Note that it is often easier to forecast consumer takeaway than shipments, since consumer behavior is highly related to the product's price, presence in stores (distribution), and in-store merchandising activity taking place. By comparing supplier shipments to retailer takeaway, both parties can identify opportunities to improve order patterns that allow for a more consistent pattern throughout the supply chain that minimizes/optimizes inventory for both the manufacturer and retailer. ■

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FIGURE 5
BRAND A
ROLLING 12-MONTH PERIODS COVERAGE FACTOR
(Total U.S. Grocery by Month)

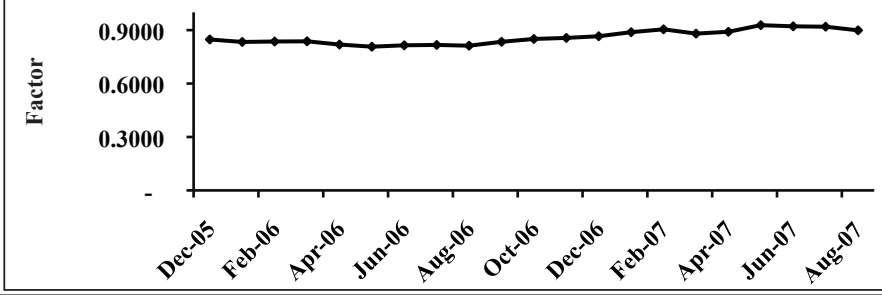

FIGURE 6
BRAND A
MFR. SHIPMENTS VS. ADJUSTED RETAILER TAKEAWAY
(Total U.S. Grocery by Month)