

Beyond Point of Sale Data

Looking Forward, Not Backwards for Demand Forecasting

STEVE KEIFER, VP INDUSTRY AND PRODUCT MARKETING, GXS

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The Cash Register—Supply Chain’s Most Important Technology

If you were to ask supply chain executives what they think the most important technology in their supply chain is, you might get answers such as Enterprise Resource Planning (ERP); Supply Chain Planning (SCP); or the Transportation Management System (TMS). However, another, perhaps more accurate answer would be the cash register, or what those in the industry formally refer to as the “Point of Sale” (POS) system.

One reason for the importance of this technology would be that the POS represents the most critical function in a retailer’s supply chain—the checkout process. The cash register is the moment of truth at which the consumer has to commit to a purchase and offer tender in exchange for the goods. The POS acts effectively as the collections system for a retailer. Consequently, it is critical that the POS correctly identify each item in the customer’s basket; match the barcode label to appropriate SKU for accurate pricing; and perform authorisation of any electronic transactions. The importance of POS from a receivables perspective is probably obvious to most.

The second reason is probably less apparent to most people outside of supply chain and merchandising circles. The Point-of-Sale represents the most effective point to collect data about shoppers, their purchases and behaviors. The data is useful to a retailer to analyse buying trends. It is even more valuable to upstream distributors and suppliers for activities such as:

- **Demand planning and forecasting**—POS data offers excellent visibility into consumer demand. Analysing last week’s sales or yesterday’s sales can help to identify low inventory positions that could result in an out-of-stock. Armed with better consumer demand insights, manufacturers and distributors can proactively address product availability issues before sales opportunities are missed. In some cases, POS data can identify issues such as distribution voids in which stores are not receiving, selling or allocating shelf space for items that should be in the merchandise mix.
- **Consumer marketing programs**—Armed with rich data about consumer spending patterns, manufacturers can modify trade promotions and pricing strategies to optimise product sales. POS data can also be used in efforts to rationalise product portfolios by identifying under-performing SKUs. New product development efforts benefit from POS data sharing as well. By analysing consumer demographics and “market basket” data, which shows all the products the consumer purchased in a shopping trip, brand owners may identify new concepts they can bring to market.
- **Strategic account development**—Suppliers who can outperform their peer group with sophisticated POS data analysis can position themselves for long-term account growth. For example, demonstrating superior insights into shopper behaviours and market dynamics can position a supplier to assume a category captain role. Alternatively, differentiated approaches to shopper data analysis and demand planning might lead to selection for preferred programs such as New Ways of Working Together (NWWT) or Collaborative Planning, Forecasting and Replenishment (CPFR).

Extensive research studies have been conducted by various industry associations, analyst firms and educational institutions documenting the benefits of POS data for demand-driven supply chains. The findings and best practices will not be repeated in this paper. Instead, the focus will be to examine the use of sales transaction data in the retail supply chain today and to explore potential new demand signals to augment the use of POS. The focus of the POS discussion will be primarily towards demand forecasting and product availability rather than consumer marketing and strategic account development.

Too Much or Not Enough

The largest challenge in retail supply chains continues to be product availability. Retailers and their suppliers either have too much or too little of a particular SKU. Merchandise with short product lifecycles such as consumer electronics, luxury goods and high fashion apparel are often in excess supply. However, the fast moving consumer goods segment typically is challenged with out-of-stocks for popular SKUs. Consumer goods have longer product lifecycles, but greater sales fluctuations due to manufacturer- and retailer-driven trade promotions.

Retailers and their suppliers both seek to avoid the costly out-of-stock situations which result in lost revenue opportunity for both parties. Out-of-stocks can also damage shopper loyalty as frustrated consumers might seek out alternative retailers for the same merchandise. In other scenarios, supplier brand loyalty can be impacted if a competitor's product is substituted instead. The most in-depth analysis of out-of-stocks has been done in the grocery industry. The Food Marketing Institute (FMI) 2002 study on out-of-stocks found that, on average, 8% of all SKUs are not available to consumers when shopping¹. Thirty percent of out-of-stock items are purchased at another store. In some cases they are not purchased at all, resulting in a lost opportunity for the manufacturer of £15 million for every £670 million in sales.

As mentioned above, there are numerous occasions in which retailers and suppliers are burdened with too much inventory rather than not enough. The fate of excess inventory depends upon the type of product and the reason it was not sold. Some products, such as books or DVDs, may be returned to the manufacturer then re-circulated back into the channel. If a product was damaged, expired or no longer retains any useful value, then it will likely be destroyed. Products with relatively low market value, such as discontinued food items, may be donated to charities. Destruction, donations and returns, however, represent the minority of outcomes for excess inventory. Most overstocks are liquidated, often at a significant price reduction, to online and offline discount retailers.

Trade Promotions in Fast-Moving Consumer Goods

The Fast Moving Consumer Goods (FMCG) segment spends a considerable amount of its marketing budget on trade promotions. It is not uncommon for FMCG brands to spend 15% of sales on promotions with retailers. Trade promotions are designed to generate uplift in sales for the brand owner. There are hundreds of different types of promotions. Many involve a discount to the end consumer. Examples include price discounts; manufacturer coupons; value packs; bonus packs and special events. Manufacturers also offer financial incentives to

retailers to perform specialised in-store advertising and product placement on an end-cap or near a checkout. However, retailers and wholesalers of FMCG products also use the promotions as a strategy to maximise profits.

Wholesalers and retailers will often “forward-buy” inventories during a promotional period. In other words, the retailer purchases greater quantities of merchandise than are needed to satisfy near-term sales. The excess inventory is held for sale at a later point in time, often for higher prices than consumers would obtain during the promotional window. Forward-buying strategies can be quite sophisticated. Some retailers use a process called diversion, which is a price arbitrage strategy to exploit the differences in promotions offered in various geographic regions. A buyer will purchase large inventories of a SKU from a manufacturer offering a deep discount. The inventory is then either transferred internally to another division of a retailer. In other cases the inventory may be resold to a third-party distributor or retailer. The transfer is typically to a different geographic region where the promotion is not currently being offered. There are specialised companies which have developed entire business models to take inventory under consignment and then divert it to other buyers.

Forward-buying and diversion challenge the demand planning efforts of FMCG manufacturers. Large one-time purchases distort demand signals from downstream buyers. FMCG brands cannot distinguish the quantity of SKUs ordered to satisfy end-consumer demand from the inventory stockpiled as a forward-buying strategy. FMCG manufacturers might misinterpret a large purchase order from a retailer as a signal that end-consumer demand for a product has grown. As a result, the manufacturer may over-produce new inventory, which then must be discounted to be sold. The challenges are compounded when products are sold through multiple tiers of distributors. Brand owners do not have visibility to the end-customer’s purchase order and the forward-buying tactics. The amplification of demand signals across multiple tiers of a supply chain is often referred to as the “Bullwhip Effect,” which results in large swings in demand, inventory and production.

21st century supply chain strategies have called for upstream suppliers to adapt to more demand-driven planning, forecasting and replenishment models. In these demand-driven models, brand owners attempt to gauge actual end-consumer demand, rather than their immediate customer’s needs. By planning manufacturing, logistics and fulfillment activities upon end-consumer demand, the distortions of forward-buying, diversion and other retailer strategies can be avoided. One of the best techniques for developing demand-driven forecasts is to monitor ongoing consumer purchases through POS data. Retailers share the POS data for specific stores, neighbourhoods or entire chains on a daily or weekly basis.

Demand Planning and Forecasting

Retailers and suppliers can avoid out-of-stock and excess inventory scenarios through better demand planning and forecasting. The primary methodology used in supply chain planning today is to establish a continuous replenishment model that is driven by actual consumption of product at the stores. The key to these “demand driven

supply chain” models is more active involvement of the supplier in demand forecasting processes. Collaborative Planning, Forecasting and Replenishment (CPFR) is one of the demand driven approaches retailers and suppliers are utilising. In CPFR both parties work towards an agreed-upon forecast that factors in recent consumer buying trends, planned trade promotions and upcoming new product introductions. Most retailers today are not implementing a formal CPFR approach with suppliers, but using a subset of the collaborative demand planning principles.

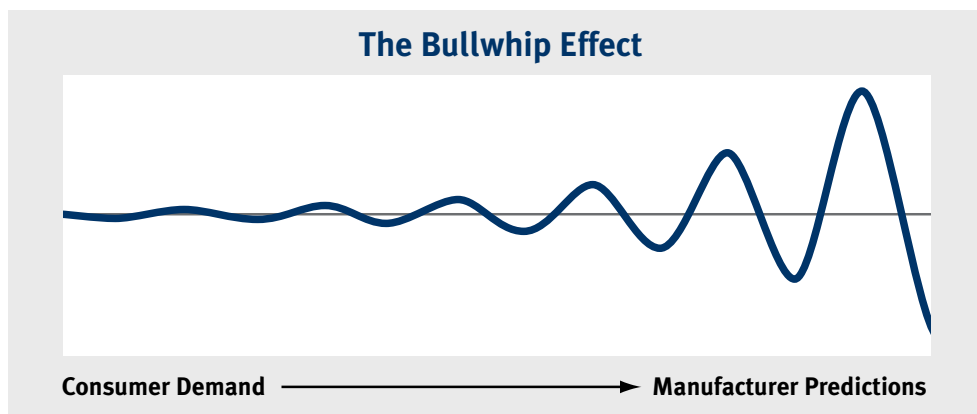


Figure 1: Bullwhip Effect

For categories with more challenging forecast models, retailers are turning over planning and replenishment to suppliers as part of a Vendor Managed Inventory (VMI) program. VMI is popular in the home entertainment merchandise category for items such as movies, music and video games. With VMI the supplier owns demand planning, including the recommended order quantity. An extension of the VMI model is scan-based trading. In Scan-based trading the supplier owns the inventory until it is scanned at the Point-Of-Sale. There are numerous other permutations of supplier-led or collaborative demand planning models. However, one common theme exists across these various models. POS data is the primary information being used for replenishment decisions. Yet despite the potential for improvements in supply chain efficiency, POS data sharing is not as broadly and universally adopted as one might expect.

Challenges with Sharing Point-of-Sale Data

Yes, We Share POS Data

How often is POS data shared? It depends upon who you ask and how you ask the question. Numerous studies have been performed to assess the level of data sharing between retailers and upstream suppliers. Two excellent quantitative studies are from Capgemini and Forrester Research. Capgemini performed a study of 16 retailers from 11 countries in Europe and North America in Q207². Capgemini’s study found that only 40% of retailers shared shopper data with all of their suppliers. Forrester Research teamed with RIS News and Consumer Goods Technology to conduct a broader study in 2006 that included 89 retailers and 80 consumer products manufacturers³. Forrester’s study found 27% of retailers shared shopper data. These percentages (27%-40%) sound impressive at first. However, the numbers are misleading without further explanation. Another study released in 2009 by the Grocery Manufacturers of America (GMA) provides insights as to which North American retail chains are sharing data and in what frequency⁴:

Retailer Name	Type of Data Sharing	Frequency	Geo	Category
Albertson's	Bulk Data Transfer	Weekly	Store	No
BJ's Wholesale	EDI 852	Weekly	Store	No
Carrefour	Bulk	Daily	Country/Banner	No
Costco	Via IRI	Daily	Store	No
CVS	Portal	Daily	Store	Yes
Dollar General	Unknown	Weekly	Store	No
Family Dollar	Bulk Data Transfer	Weekly	Store	No
Food Lion	Portal	Daily	Store	No
Hannaford	FTP	Daily	Store	No
Harris Teeter	Unknown	Weekly	Store	No
Kmart	Portal	Daily	Store	No
Loblaw's	Bulk Data Transfer	Weekly	Store	No
Meijer	Portal	Weekly	Store	No
Metro AG	Portal	Daily	Store	No
Pathmark	Unknown	Weekly	Store	No
PetSmart	Bulk	Weekly	Store	No
RiteAid	Portal	Weekly	Store	Yes
Safeway	FTP	Weekly	Store	No
Supervalu	Portal	Weekly	Store	No
Target	Portal & Bulk Transfer	Daily	Store	Yes
Tesco	Portal	Unknown	Store	Unknown
Walgreen	Portal	Daily	Store	Yes
Walmart	Portal	Daily	Store	Yes
Wegmans	Unknown	Weekly	Store	No

Table 1: North American Retailer Data Sharing Practices

Source: GMA Retailer Direct Data Report 2009

Although a retailer may be sharing POS information, the collaboration may be limited to:

- **Subset of the Supplier Community**—A key follow-up question to ask retailers sharing shopper data is, “With what percentage of your supplier community are you providing POS signals?” Most retailers are only sharing shopper data with a limited set of their supplier community. For example, POS might be shared with contract manufacturers producing private label products; brand owners who provide VMI services, or just a handful of suppliers who represent the largest volume of product.
- **Event-Driven Activities**—Another question to ask is, “How frequently are you sharing the shopper data with suppliers?” Some retailers and manufacturers collaborate on demand planning, but only for short time periods around specific events. For example, shopper data might be shared as part of a collaboration program to support new product introductions, targeted joint promotions or category planogram designs. The term “Give me the Data on a CD” is used to refer to one-time data sharing of specific item- and store-level POS transactions.
- **Monthly Reporting**—Other retailers share the data with suppliers, but only on a monthly basis. Syndicated data providers such as IRI and Nielsen offer POS reporting for a fee to retail suppliers. The syndicated providers contribute value-add such as normalisation, cleansing and trending of the data. However, the analysis process delays distribution by several weeks. Thirty-day-old data is not useful for replenishment and other supply chain activities. In many cases it is not useful for merchandising or trade promotions activities either.
- **Sharing of Only Chain-Level Data**—Some retailers only share aggregated POS data for their entire network of stores. Such “chain-level” data is much better than having no insights to shopper behaviour at all. However, chain-level data

cannot be easily utilised for targeted marketing campaigns to reach specific geographic regions, nor can it be used to drive store-level replenishment decisions. Distribution center-level data offers more insights into demand patterns within a geographic region. Store-specific data is the optimal level of granularity needed by suppliers to perform accurate demand planning.

If the data is so important why isn't it shared more broadly?

There are numerous reasons for why data is not shared more broadly. Some chains lack the IT resources or budget to develop data sharing portals or systems. Another barrier has been the retailer's desire to charge suppliers for the data. For example, the Capgemini study indicated that over 40% of retailers charged their suppliers for the data². Why? A significant amount of value can be derived from analysing shopper data. Retailers know this and seek to profit from the consumer insights they capture. Furthermore, it is costly for the retailers to continuously collect, store and share the massive amounts of data with manufacturers. In recent years, the market dynamics have shifted in favor of sharing the data with suppliers for free due to the numerous benefits to be gained from collaboration.

However, three key reasons still challenge broader sharing of POS data:

- **Retailers Don't Trust Suppliers**— Many of the branded suppliers use the data to develop better marketing strategies to compete with the retailer's private label portfolios. Almost 70% of manufacturers surveyed by Forrester stated that competition between private label and brands created a significant or moderate barrier to collaboration³. Consequently, retailers want to ensure they receive some monetary compensation for sharing information that might be used in a competitive manner.
- **Suppliers Cannot Analyse the Data**— Most of the blame for low levels of data sharing typically is cast on retailers due to their desire to charge and their lack of trust in suppliers. However, retailers believe that the barriers to collaboration are more related to the manufacturer's inability to perform meaningful analysis of the data. In some cases, suppliers lack of qualified resources to perform the analysis. However, there are also many instances in which the supplier lacks motivation to analyse sales transactions. In merchandise categories with highly-fragmented distribution, minimal product innovation and stable market share, there may be very little incentive for suppliers to perform POS analysis.
- **Retailers Cannot Respond to Changes**— Some retail chains have delayed data sharing due to concerns about their ability to accommodate corrective actions that suppliers may request following data analysis. For example, suppliers may identify scenarios in which the product is in the back room of the stores, but out of stock on the shelves. Another example might be trade promotions which were funded by the manufacturer, but not executed in selected stores. Such scenarios often have root causes, which are not easily fixed within the retailer's store operations.

There are many technological, operational and competitive challenges to be overcome in the sharing of POS data. However, the industry is making progress towards eliminating these barriers in the quest to develop demand driven supply chains. All studies indicate that sharing of POS data is increasing year-over-year.

Super POS—Six Shopper Data Sources for Demand Planning

The data fields included in POS transactions can vary considerably from retailer to retailer. At its most basic form, POS includes a descriptor for the item (GTIN), the store location and the quantity sold within a week or an individual day. With just these basic data elements, suppliers can perform much better demand planning and replenishment than was ever before possible. However, there is a wealth of additional information that retailers capture in sales transactions that provides further insights into who the consumer is; what motivated the purchase and what else they purchased.

In addition to basic POS, five other types of data are commonly shared between retailers and suppliers for collaboration purposes, including:

- **Market Basket** data extends basic POS by including not only the quantity of each individual SKU purchased, but by showing what other SKUs were purchased by the same shopper during the same store visit. Some retailers will only share market basket data with suppliers for their own brand. For example, suppose a consumer purchased 100 items in a shopping trip, five of which were PepsiCo products. The retailer would share only the 5% of the market basket data, that specific to their brand, with PepsiCo. Other retailers will share the entire market basket with suppliers. In such a scenario, PepsiCo would benefit from understanding not only which of other PepsiCo products were purchased, but which other brands the shopper selected (i.e. the other 95%).
- **Loyalty Card** programs have become mainstream amongst retailers around the world. In order to register for a loyalty program, a consumer will provide detailed information about their identity, address, income, ethnicity and family size. Many retailers are gathering more sophisticated data about hobbies and interests, shopping preferences and technology literacy from members. Consumers provide these details in exchange for the benefits of the loyalty program, such as special pricing available only to members or for the ability to accumulate points which can be redeemed for merchandise. Privacy restrictions prevent sharing of data about the actual consumer's identity. However, "de-identified" data can provide substantial value to suppliers, especially when correlated with the actual purchasing transactions.
- **Consumer Demographics** include data such as the ethnicity, age, household income and average family size for a particular store's shopper population. Loyalty card is preferred over consumer demographic data as it offers the ability to tie specific purchases to the shopper profiles. However, for several reasons, loyalty data is not shared extensively today by retailers. Many retailers view loyalty information as distinctly different from POS transactions. Consequently, retailers simply may be unwilling or unable to share the data with suppliers. Some retailers do not offer loyalty programs. For retailers with loyalty programs, only a percentage of the shoppers participate.
- **Trade Promotions** included with POS transactions enables suppliers to correlate investments in marketing programs with changes in consumer purchasing behaviours. Manufacturers spend significant percentages of their marketing budgets (up to 50%) on trade promotions. Consequently, brand owners are seeking to measure the ROI of trade funds and the associated impacts on sales. Retailers also manage their own promotions programs. Retailers use many of the same

techniques including free goods, buy-one-get-one-free items, price discounts, in-store displays, retailer coupons and promotional sweepstakes.

- **Retail Pricing** linked to the quantity of each SKU purchased offers manufacturers insights into the optimal selling price for a particular product. Manufacturers know the prices they negotiate with distributors and retailers for cases or pallets of goods. However, most suppliers do not know the actual price charged by the retailer to the end consumer. One of the significant challenges associated with sharing pricing data is related to promotions measurement. Many suppliers believe that the trade promotions funds allocated to retailers are not fully applied to the program. Instead, the retailers retain the funds as an effective discount towards the purchase. As a result, the sharing of retailer pricing data might be limited.

Increasingly, retailers are sharing other types of related data with distributors and manufacturers for merchandising or supply chain collaboration purposes. For example, retailers are providing stock positions for inventory on-hand at the distribution center and individual stores. Data such as store receipts, distribution center receipts and warehouse-to-store shipments can add to the supplier's visibility into overall inventory positions. Other examples of data shared include planogram configurations, merchandise returns, shrink reports and RFID reader results.

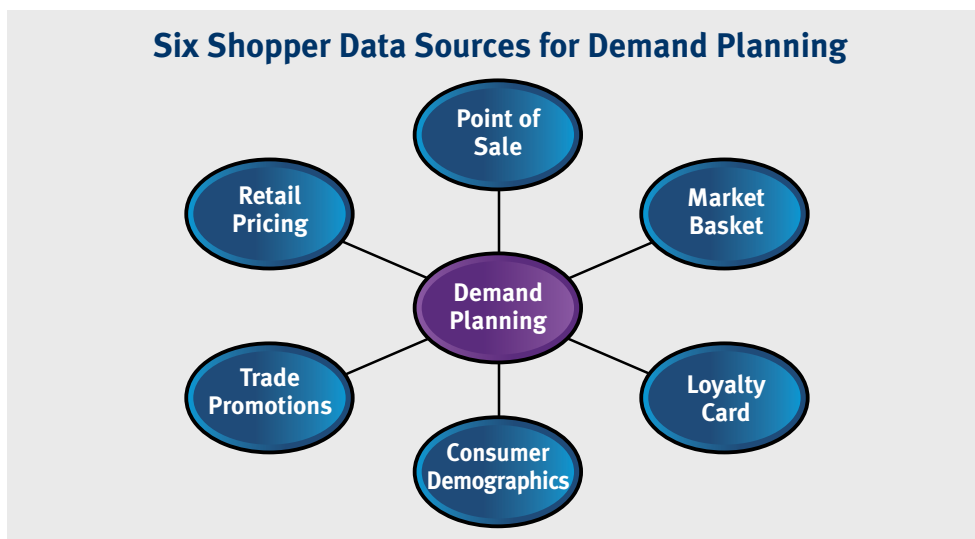


Figure 3: Six Shopper Data Sources for Demand Planning

Demand Forecasting for New DVD Releases

Home entertainment products such as DVDs, as well as their peers in the CD and video game categories, have some of the more complex supply chains in the retail sector. One of the biggest supply chain challenges is in the area of new product introductions. For DVDs, up to 80% of the sales of a product typically occur in the first few weeks after the product launch. As a result, ensuring that products are always available on retail shelves is critical for both home entertainment brands and the retailers who sell them. Out-of-stock scenarios for DVDs can often result in a lost sale. Each lost sale can represent between \$3 and \$6 potential profit. Eliminating out-of-stocks is more challenging than one might expect. Sales grow from zero

to peak in a matter of days. Retailers and brand owners are challenged to estimate launch time sales as they have no historical demand pattern to build forecast models. The supply chain challenge grows more complex when one considers that, for each title, there may be multiple SKUs. Each DVD launch typically includes a widescreen and standard format version as well as an HD (Blu-Ray) format.

So how do retailers replenish their stores with DVDs? The process works as follows. Each night, the retailer aggregates POS data from its stores and transfers the information to the brand owner. The sales consumption data along with last-known store-level inventory positions are utilised to assess stock positions at each individual store. The data is then fed into a replenishment application which can calculate SKU-level stocking needs for each location. Calculated replenishment quantities are used by companies called video duplicators to manufacture the actual physical DVDs. The shrink-wrapped product is then routed by the duplicator or a third-party logistics company directly to the retail stores. As a result, consumers can expect to find the title of their choice at their local retailer.

Beyond POS—Using Web 2.0 Data for Demand Insights

Daily POS transaction feeds from retailers are one of the key inputs used in forecasting and planning algorithms by not only music, movies and video game publishers, but by fast-moving consumer goods companies, consumer electronics OEMs and mobile phone manufacturers. POS data provides a highly-detailed and near real-time view into actual end-consumer shopping activity. And the use of POS to monitor demand patterns can help companies to avoid misinterpretation and amplification of downstream demand signals such as forward buying, diversion and duplicate ordering. POS is a much better demand signal than the purchase order-driven approach of the 1990s that led to bullwhip effects and frequent out-of-stocks. But there are much better sources to measure consumer demand than POS.

POS transactions are historical nature. And historical demand patterns will not always provide an accurate representation of future trends. What happened in yesterday's stock market is not an indicator of how the markets will perform today. Last year's weather patterns will not always be similar to this year's. And the past week's retail sales will not necessarily be indicative of next week's buying behaviors. So how can supply chain planners capture better signals that provide insights into future demand patterns? Fortunately, more data than ever is being captured electronically via the Internet about consumer's future purchasing plans.

The volume of goods and services purchased over the Internet continues to grow significantly each year. Forrester Research's analysis suggests that 6% of overall US retail sales will occur online in 2010⁵. Web-based shopping has become especially popular in categories such as apparel, computers, consumer electronics, toys, video games, movies and music. European online sales are experiencing a similar trend. Over 20% of European consumers are now shopping online. Forrester Research projects an 8% CAGR for European online retail and travel sales through 2014.⁶

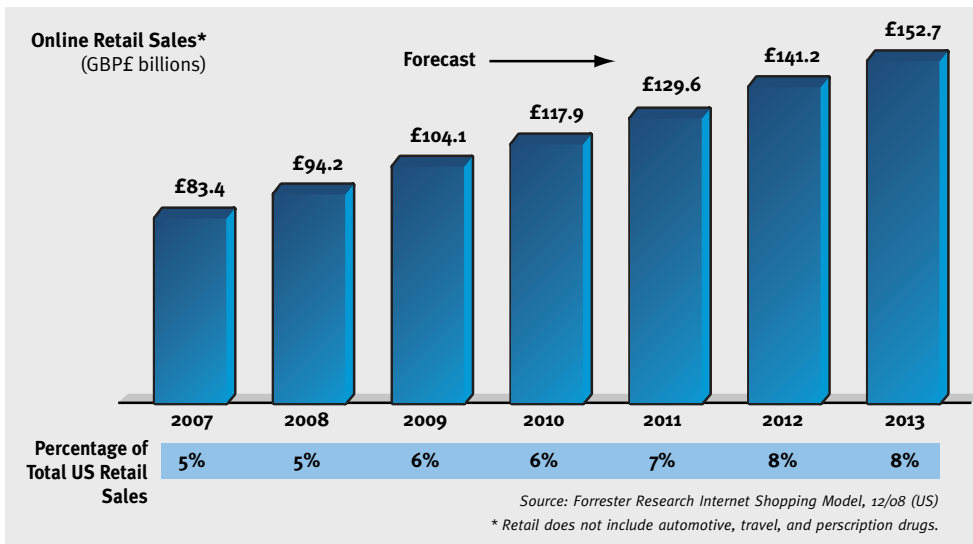


Figure 4 – US e-Commerce Sales Continue to Climb

Source: Forrester Research Internet Shopping Model 12/08

Pre-Orders—How to Get Customers to Tell You What They are Going to Buy

One of the most innovative features that online retailers have introduced is the ability to pre-order a product. Merchandise categories such as books, DVDs, CDs and video games benefit most from pre-orders as there exist pre-defined, highly-anticipated launch dates. Consumer electronics companies which manufacture e-book readers, mobile phones and digital media players have been promoting launch dates and offering pre-ordering options recently as well. Sites such as Amazon.com, Barnesandnoble.com and Borders.com each allow consumers to request home delivery of new products on launch date. These online retailers have a significant advantage over all others in the marketplace in the area of demand planning. They can assess consumer demand for a new title weeks in advance of the launch date. As a result, there is less guesswork involved with planning inventory levels for launch day. Not every customer is going to pre-order, but enough will to provide an indication of how popular a new title will be.

Pre-order is only one of the demand signal repositories that can be mined for better forecasting. Others include gift registries and wish lists.

Demand Forecasting for Video Games

Much like DVDs, forecasting demand for new video games is challenging because there is no historical sales pattern on which to base your plan. Unfortunately, there is little room for error as the majority of the lifetime sales of a game occur in the first two to three months after their birthday. Consequently, if the publisher has a bad forecast or manufacturing challenges there could be significant out-of-stocks impacting profitability and sales. Supply chain planners must not only manage minimise out-of-stocks, but also be mindful of the risk that game sales being too low. In some cases, the publisher may not be able to recover their investment in product development. Of course, if the forecast is accurate, then publishers and retailers enjoying optimum sales levels after the launch.

The video game category has a set of unique considerations which impact demand planning:

- **Cyclical Buying Patterns**—Typically, the highest sales occur in the fourth quarter of the year leading up to the December holiday season. Sales are the weakest in early summer. The anticipated introduction of a new console platform by Nintendo, Microsoft or Sony actually dampens demand for the months prior to the launch. But post-launch typically witnesses a surge in sales of new games, resulting in a spike to sales.
- **Multiple SKUs**—Inventory management and demand forecasting are further compounded by the fact that there are several different versions of the game. Games are introduced typically for each of the primary console platforms—Nintendo Wii, Sony Playstation and Microsoft Xbox. How many will sell for each platform? Furthermore, some games now include accessories such as specialised controllers, steering wheels and musical instruments.
- **Digital Substitution**—Video games have been less impacted by online downloads than related categories such as DVDs and CDs. However, the popularity of online games is growing steadily with increased broadband connectivity and 3G mobile devices. Game publishers must try to forecast how many of each title will be sold digitally online versus physically in stores. Fortunately, the need for physical instruments to play Rock Band eliminates the threat of digital substitution in this case.

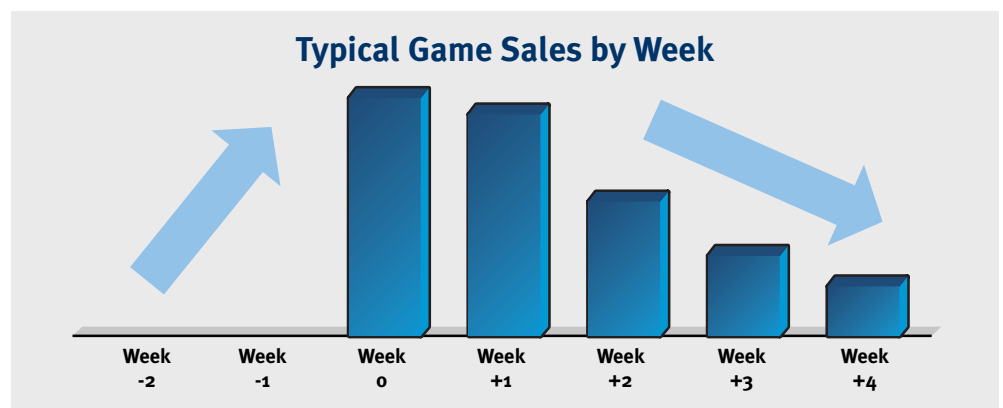


Figure 5: Demand Curve for Video Game New Product Introduction

How Newborns and Newlyweds Can Help the Supply Chain

In the US, it has become very common for engaged couples and expecting parents to create an online gift registry, which contains a list of items they need to grow into the next stage of their lives. Expecting parents might request baby clothes, toys, books and food utensils. Engaged couples might request silverware, fine china, linens and other housewares. The online gift registry makes it convenient for friends and family around the world to purchase a thoughtful present that the receiver actually wants. It is a win-win-win for the giver, receiver and the retailer.

But there is much more benefit to be gained by online retailers and suppliers from this process. We can exploit these gift registries to perform much better demand planning than has ever been possible. Baby and wedding registries contain a massive amount of data about future purchasing intentions. Gift registries not only tell you what is going to be purchased, they also provide a fairly good indication of the timeframe

under which the transaction will occur. Most baby registry items will be purchased shortly before or after the due date (and the shower). Even those items which are not purchased by friends and family will likely be picked up by the newborn's parents. Similarly, with wedding registries, most purchasing transactions will occur shortly before or after the due date. And the newlyweds are likely to buy the remaining items on the registry within six months of the wedding. No bride wants to live with seven table settings.

Gift registry data, when aggregated, could be used as an input to private label and branded supplier manufacturing plans. Furthermore, the data could be analysed by geographic region to determine store and distribution center stocking levels for department and specialty store retailers. Retail chains that offer gift registry options are in an enviable position to leverage these demand signals. Leading registry destinations such as Target, Macy's, Williams Sonoma, Crate & Barrel, Home Depot and Babies "R" Us have already leveraged this data to optimise their supply chains.

The Wish List—It's Better to Track than to Receive

Wish lists provide a similar function to gift registries, but are limited to a smaller list of online retailers such as Amazon.com and Barnes & Noble. Users typically create a wish list to provide friends and family with gift ideas for upcoming birthdays or holidays, such as Christmas. Much like gift registries, wish lists contain a wealth of data about future purchasing behaviours. And not only do the gift registries identify what is going to be purchased, but they also provide insights into the timeframe of the transaction. For example, most wish lists require an end-user to enter their birthday. Chances are high that items on a wish list are going to be purchased in the weeks preceding either 1.) the end user's birthday or 2.) the holiday season.

Consumer electronics, books, movies and music are amongst the popular items stored on wish lists. Therefore, publishing, media, entertainment and consumer electronics companies are the most likely to benefit from the demand signals wish lists provide. But as sites such as Target and Amazon.com broaden the categories of merchandise available on their site, a more diverse set of products will appear.



Figure 6: Six Web 2.0 Data Sources for Demand Planning

Amazon.com has the Best Forward-Looking Demand Signal Repository

Online retailers which enable functions such as pre-ordering, gift registries and wish lists have a natural advantage in their demand forecasting process. These e-commerce merchants have better insights into future consumer spending patterns than any brick-and-mortar chain does. Amazon.com is, perhaps, best-positioned to leverage its wish lists, gift registries and pre-order functionality for supply chain advantage. Not only do they have the largest online store, but they have also proven to be far more innovative than any other retailer in their introduction of new functionality and adoption of new techniques.

Online retailers such as Amazon.com have been utilising this forward-looking demand pattern data for years to optimise their stocking models. But this is just the beginning. Where the opportunity becomes more interesting is cross-analysing data from online storefronts with brick and mortar stores. Retailers such as Barnes & Noble and Borders, for example, can utilise demand data obtained from e-commerce sites to augment their forecasting models for physical product. To take it a step further, online retailers can leverage their unique insights into future consumer purchasing patterns with the product manufacturers. The data could be aggregated and sold to suppliers, much as POS transactions are today. Alternatively, collaborative relationships for exclusive merchandise or promotions could be established between buyer and supplier to create competitive advantage.

Utilising Search Engine Results for Demand Forecasting

Google Flu Trends

The H1N1 pandemic and the avian flu have led to a renewed interest in computing applications designed to track the spread of influenza viruses. There have been massive efforts by public health authorities to track the outbreak of the H1N1 flu strain. Both the European Influenza Surveillance Scheme (EISS) and the US Centers for Disease Control (CDC) have been closely monitoring clinical data from health care providers to quantify the pandemic. Perhaps the best source of data on flu outbreaks is Google. The search engine leader launched an application called Google Flu Trends in November 2008. Officially, Flu Trends is called a “syndromic surveillance system,” which is a form of “infoveillance.”⁷ What it does is to analyse end-user search patterns in an attempt to map flu outbreaks geographically. Google states:

“We have found a close relationship between how many people search for flu-related topics and how many people actually have flu symptoms. Of course, not every person who searches for “flu” is actually sick, but a pattern emerges when all the flu-related search queries are added together.”⁸

Flu-related topics might include symptoms such as fever, fatigue and headache. The search terms could also include products such as cold medicine, tissues and orange juice. The scope of Google flu trends originally included just the US, Mexico, Australia and New Zealand, but now Google has expanded the product to cover 16 more countries, including Russia, Norway, Sweden, Germany, France, Poland and Spain.

Google has found a very high correlation between its flu models and the actual statistics reported by the European and US CDC. There is one key difference. Google's data is several days, if not weeks, ahead of the public health authorities. Why? Google is analysing search patterns in real time, while the public agencies are analysing historical data from clinical providers. The situation is very similar to the retail supply chain. Manufacturers of consumer products all rely upon getting copies of POS transactions from their retail customers to analyse demand patterns. Much like the CDC data used to analyse flu patterns, POS data is historical in nature. Historical consumer activity is not necessarily a good predictor of future behaviour.

Google Flu Trends is a free service from Google.org (not dot com), which is a philanthropic arm of the technology innovator. Google.org has altruistic motivations behind its various applications that it creates to better society. But there are less noble ambitions for these applications as well. Instead of limiting search engine data about cough medicines, tissues and orange juice to just public health applications, why not extend the analysis to commercial applications? For example, the manufacturers of these cold-related products could substantially benefit from using Google's search engine data in the demand forecasting process. Google has a wealth of information about consumer purchasing plans in its search engine data. The best part about these demand signals is that they are indicative of future consumer behaviors rather than what occurred in the past.

Search engine data can be quite revealing when analysed. Remember the case of AOL user 4417749. In 2006, AOL published copies of stored search queries from 650,000 of its users to general public. The data was de-identified removing screen names to make it anonymous. However, through relatively straightforward analysis, New York Times reporters were able to uniquely identify the people conducting the searches⁹. User 4417749 was determined to be Thelma Arnold, a 62-year-old widow who lives in Lilburn, Ga. The point is not that Google should violate the privacy of its users, but rather that relatively simple web log and search engine data can provide very powerful insights into consumer behaviour.

Demand Forecasting in Automotive Retailing

Historically, demand forecasting by automotive OEMs, particularly the US "big three", has been a significant challenge. The lack of forecast accuracy is due to the inside-out thinking model that is pervasive in the industry. Production and sales forecasts have historically been based upon internally-driven factors, such as:

- Quantity of vehicles for each make and model were sold last year
- Ensuring optimal plant utilisation for each manufacturing location
- Maximising resource utilisation to comply with organised labour agreements
- Meeting shareholder expectations for vehicle production targets

Of course, there is a much better approach to forecasting vehicle sales—basing forecasts on actual consumer demand signals. For most auto buyers, the purchasing process is a multistage, multichannel model in which vehicles are researched on

the web, road-tested via a dealership, and then actually purchased at the location which offers the lowest price over the phone or Internet. A tremendous amount of data is collected during the researching and test driving process that occurs in the weeks preceding the actual purchase. Aggregating and synthesising the billions of consumer interactions that occur online or via dealerships can enable OEMs and their suppliers to better forecast actual consumer demand. Such techniques are particularly valuable in times like these where there is considerable sales volatility.

Examples of the types of demand signals, which can be captured during the multi-stage, multichannel car purchasing process, include:

- **Web Site Registrations**—Serious buyers will be seeking out quotations on the makes and models of vehicles they are considering. Few web sites will provide a quotation without first requiring registration from the user. The registration process typically captures the buyer's location, timeframe, option preference and desired purchasing price. These details provide excellent indications of future buying trends.
- **Online Product Configuration Tools**—In addition to registrations, the online product configuration tools available from most OEM and dealer web sites can provide insights into consumer demand for different options such as transmissions (V-8; manual); configurations (two-door or four-door); interior fabrics (leather or cloth); entertainment (satellite radio; rear-DVD); and telematics systems (navigation; tracking systems).
- **Dealer Sales**—Actual vehicle sales for each dealership including demographic profile of buyer; make and model of vehicle purchased; options and accessories included. This POS data should be reported daily by dealerships to OEMs along with sales forecasts for the upcoming week. Even statistics on test drives can be a valuable demand signal for upstream manufacturers.

Google Insights—The First Step

Google is already moving towards this type of model with its Insights product Beta¹⁰. Google Insights allows you to compare search volume patterns across specific regions, categories, timeframes and properties. For example, you could inquire how many people have searched on the term “iPhone” in the Baltimore, MD area within the past 90 days. By comparing historical search patterns, you could have an indication of whether demand is rising or declining for Apple's phone within that geographic region. Such Insights could be added into demand forecasting models along with other inputs to assess what stocking levels should be in the AT&T retail locations which sell the iPhone. The same process could be applied to home appliances, automobiles, consumer electronics and a wide variety of other merchandise categories. Google could sell syndicated, zip code-level data to manufacturing companies, much as Nielsen or IRI do with aggregated POS transactions.

Today, Google Insights is a free service with limited flexibility in search parameters and insufficient granularity to provide neighborhood-level demand patterns. However, the limitations are not a function of the lack of data, but rather the fact that Google has only begun to develop the Insights service.

Gift registries, wish lists, search engines and pre-order sites can offer powerful insights into future buying behaviours. However, these web-based demand signals are only the beginning. There are millions of demand signals being transmitted through Web 2.0 technologies every day. Consumers are talking about consumer electronics; food and beverage; and games, movies and music in a wide variety of social media. Examples include blogs (e.g. WordPress), videos (e.g. YouTube), social networks (e.g. Facebook), microblogs (e.g. Twitter) and product review sites (e.g. Amazon.com). Within the Web 2.0 sites are a rich set of consumer demand signals that are increasingly influencing purchasing behaviour. The challenge for supply chain planners is that much of this data is unstructured and in qualitative format. Unfortunately, the technologies to mine this data or monitor it are relatively immature. Today, it is the marketing communications organisation within manufacturers and retailers that is monitoring these social media.

The Internet-based demand signals described above are not a substitute for POS transactions. As long as the majority of sales volume for retail purchases occurs in physical stores, POS will be the key input to forecasting models. However, supply chain planners seeking an extra edge in demand forecasting models need to begin to monitor these online discussions as well. The Internet data should be used to augment and extend demand forecasts based upon downstream data from the physical supply chain. In the next five years, companies which can leverage the power of forward-looking demand data from gift registries, wish lists, search engines and pre-order sites as well as qualitative data from product reviews, microblogs and social networks will have a distinct competitive advantage in the marketplace.

About the Author

Steve Keifer is the Vice President of Industry and Product Marketing for GXS. Steve has responsibility for marketing and positioning the entire GXS product line ranging from EDI services for SMBs to B2B e-commerce outsourcing solutions for enterprises. In addition, Steve leads the strategy and marketing for GXS's vertical industry programs. In the retail sector, Steve has spearheaded marketing efforts for GXS's data synchronisation services. In the manufacturing sector, he has driven programs to target the fast-growing Chinese market with B2B e-commerce solutions. Most recently, Steve led the development of GXS financial services strategy, launching several solutions for supply chain finance and cash management. In 2008, Steve was recognised as a "Pro to Know" by Supply & Demand Chain Executive magazine and by CompTIA for Best Practices in B2B e-Commerce. Steve maintains a popular blog entitled EDInomics (<http://blogs.gxs.com/keifers>) in which he discusses news, trends and strategies for B2B e-commerce including demand forecasting strategies such as Beyond POS.

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UNITED KINGDOM

18 Station Road
Sunbury-on-Thames
Middlesex TW16 6SU
United Kingdom
+44 (0)1932 776047 t
+44 (0)1932 776216 f
www.gxs.co.uk

NORTH AMERICA AND GLOBAL HEADQUARTERS

9711 Washingtonian Blvd.
Gaithersburg, MD 20878
U.S.A.
+1-800-560-4347 t
+1-301-340-4000 t
+1-301-340-5299 f
www.gxs.com

FRANCE

Cachan Porte Sud
191, av. Aristide Briand
94230 Cachan
France
+33 1 46 73 16 00 t
+33 1 46 73 16 01 f
www.gxs.fr

GERMANY

Leyboldstrasse 16
50354 Hürth-Efferen
Germany
+49 2233 609 0 t
+49 2233 609 205 f
www.gxs-gmbh.de

ASIA PACIFIC

Room 1609-10
16/F China Resources Building
26 Harbour Road, Wanchai
Hong Kong
+852 2884-6088 t
+852 2513-0650 f
www.gxs.asia.com



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