

# Realizing the Potential of Retail Analytics

## Plenty of Food for Those with the Appetite

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### Executive Summary

**ANALYTICS** have become one of the most powerful tools available to retailers, and are being used for a broad variety of purposes. This report summarizes trends in the use of analytics in retail across eighteen different categories, as well as several more emerging analytical activities. It is based on interviews with 33 retailers, more than 25 retail analytics experts, and the published literature. For each analytical trend, the description, state of maturity, underlying rationale, and several exemplars in using the trend are presented.

One major issue regarding analytics is that retailers may feel as if there are too many analytical options to explore. The breadth of analytical processes and applications suggests that retailers need to selectively target investments in analytics based on their strategies and industry positions. In a difficult economy, retailers may also need to adopt first those analytical applications that have saved money for other adopters, including pricing and assortment optimization. There is little doubt, however, that the aggressive adoption and exploitation of analytics has led to competitive advantage among some of the world's most successful retailers.

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## Introduction

**IMAGINE** yourself a guest in a high-quality restaurant. The food being served to you is plentiful, with huge portions of many different courses. Unfortunately, you've eaten only a couple of hours previously, and you're still digesting previous meals. Though the food itself is clearly of a high order, it's somewhat foreign to you—the opposite of comfort food. While you

sense that the restaurant's offerings are both nutritious and delicious, the volume and timing make it difficult for you to enjoy. You're a little worried, however, that other diners will eat your lunch if you don't eat it yourself.

That's the situation faced by many retailers today when evaluating not restaurant food, but the data and analytics that could transform their businesses. In this report on a major research project on the state of retail analytics (see "About this Research"), I'll address the following topics:

- Balance inventory with demand so you're never out of stock or carrying excess inventory;
- Charge exactly the price that customers are willing to pay at any moment;
- Determine the best use of marketing investments;
- Locate stores, distribution centers, and other facilities in optimal locations.

A few leading firms have already achieved dramatic benefits. Kroger, for example, gets a 40% redemption rate from its analytically-targeted coupons, compared to an industry average of 2%, and believes the promotions have increased overall sales by 5%. CVS, which uses analytics to target coupons at the point of sale, views its analytical capability as a nine-figure profit center. Hudson's Bay Corp. in Canada traced a 2-to-1 return to its database management and analytical efforts, and broke up a \$26 million fraud ring with one analytical application. Overstock.com used an analytics-based gift recommendation system on its website, and customers who used it bought 2.5 times those who didn't. There are many other such impressive stories from early analytics adopters.

Most retailers, however, like the diner in the restaurant, find it difficult to digest all of the data, technology, and analytics that are available to them. They are drowning in data from POS systems, websites, and internal transaction processes. They can't absorb all the new analytical technologies that vendors have made available. They don't have the skilled analysts to help them improve key decisions. They're not familiar or

### About this Research

In order to learn about major analytical trends facing retailers, we initially reviewed the trade press and academic literature on retail analytics.

Then our research team contacted 33 major retailers in the second half of 2008. We conducted telephone interviews with a wide variety of retail firms and executives, including grocery, apparel, outdoor, fast food, and home improvement firms.

We spoke with supply chain, marketing, and IT executives. We spoke with online, catalog, and "bricks and mortar" retailers. In each interview, we asked executives to describe the trends in analytics and data that most affected their businesses.

We also interviewed more than 25 experts in retail technology and analytics, including consultants, vendors, and academics (see "[List of Retail Analytics Experts Interviewed](#)" at the end of this report). For each major trend area, we prepared a section describing the trend, its underlying rationale, the management issues involved in taking advantage of the trend, and the key exemplars of the trend among major retailers and their partners. Exemplar mentions are taken from both interviews with retailers and the literature we reviewed.

- The opportunity and the challenge of retail analytics;
- The wide range of available analytical options;
- Prerequisites for analytical activity;
- Eighteen specific analytical trends, with examples of retailers adopting them;
- Several other emerging analytical trends;
- Some of the overall barriers to taking advantage of analytical opportunities.

### The Opportunity and the Challenge

The opportunity to achieve competitive advantage from "analytical retail" is enormous. With these analytical tools, retailers can:

- Develop close relationships with customers based on a deep understanding of their behaviors and needs;
- Deliver the targeted advertising, promotions and product offers to customers that will motivate them to buy;

comfortable with strategies built around analytical capabilities. And all of this takes place at a time when the economic situation makes it difficult to survive, much less invest to thrive.

Some firms, of course, have an advantage in digesting all this data and analytics. They are, for example, the online retailers such as Amazon and eBay, which built their businesses around clickstreams and web analytics in the first place. Catalog retailers, who have long been heavily focused on response modeling and the analysis of lift, also have an advantage in their early focus on addressable customers. For these restaurant diners, analytics are meat and potatoes. Among retailers that have adopted an EDLP (everyday low price) orientation, data and analytics are critical to managing margins at the SKU level. Such retailers probably adopted analytics of this type earlier than deal-oriented firms.

Despite challenges of economics, management unfamiliarity, and the difficulty of identifying customers, some traditional retailers are also

**Despite challenges of economics, management unfamiliarity, and the difficulty of identifying customers, some traditional retailers are also heavily focused on analytics.**

heavily focused on analytics. H-E-B, for example, has always been an innovator among retail grocery chains; Len Schlesinger (professor at Harvard Business School, later Vice Chairman of Limited Brands, now President of Babson College) noted: “Virtually every substantive innovation in the supermarket

industry in recent years can be traced in some way to initiatives begun at H-E-B.” The grocer’s current Chief Information Officer, Gavin Gallagher, points out, “Analytics are king at H-E-B. They are where I plan to spend most of my money. There is much more competitive advantage with analytics than in installing additional transaction systems.” If bellwether retailers like H-E-B are investing in analytics, it is likely that others will follow.

### The Breadth of Analytical Options

One of the more interesting results from the research is the breadth of analytical activities being pursued by retailers. In this study we identified eighteen analytical trends that are relatively well established among retailers, with at least several firms using production applications. In addition, there are other emerging analytical applications that retailers who wish to be early adopters should consider. Each of them offers considerable potential value to the retail industry.

However, the broad range of possible analytical tools that retailers could adopt makes it essential for retail executives to understand which analytical activities match their strategies and organizational capabilities. They can’t pursue all of the possibilities with equal rigor. Therefore, they have to target

particular aspects of their strategies, business models, or organizational capabilities for support with analytics.

For example, companies such as Brooks Brothers, Nordstrom, and Nieman Marcus have long-term relationships with their best customers as their primary goal. Each of these firms has a clienteling system in place to capture customer interactions and manage customer relationships. Incorporating analytics into clienteling systems for “next best offer” capabilities is a reasonable objective for such firms.

WalMart realized a couple of decades ago that supply chain analytics were key to their success in keeping costs low and product availability high. With over 2,500 WalMart and almost 600 Sam’s Club stores, the company also focused heavily on site selection analytics. Now, in addition to maintaining those capabilities, it’s time for the giant retailer to pursue a relatively new set of targets involving customer behavior and the shaping of customer demand based on available supply.

It would not be sensible for a retailer focused on low cost to have its initial analytical efforts address customer loyalty and close personal relationships. The margins achieved by low-cost retailers would probably not justify a premium for customers for displaying loyalty, and they probably also wouldn’t be able to afford the information and analytical infrastructure (people and technology) to mount a major analytical initiative. Supply chain and pricing analytics would be more logical for such a firm. Nor would it be reasonable for the first

analytical target of a high-end retailer with relatively few stores to be supply chain and site selection analytics; customer-oriented capabilities would be more logical.

The analytical focus of retailers should also be influenced by their economic environments. Loyalty, product selection, and clienteling analytics are typically focused on growing revenues in periods of economic growth. In difficult economic times like these, however, hard-pressed retailers are more likely to pursue applications such as price optimization, promotion effectiveness, marketing mix allocation, and labor force analytics, each of which can reduce costs and improve profitability relatively quickly and with relatively low investment.

### Prerequisites of Analytical Retail

Regardless of the particular analytical process or application, there are some key prerequisites of analytical progress in retail that are common to virtually every organization. First, of course, is data. You can't do analytics without somewhat clean, high quality, integrated, and accessible data. Fortunately, retailers increasingly have vast amounts of it available—from point-of-sale (POS) transactions, from websites, from credit programs, from current loyalty programs and from enterprise resource planning (ERP) and other business applications.

Data must be accessible (i.e., separated from the transaction-oriented applications in which it was created, and in a place where potential analysts can actually find it) to be analyzed, so leading retailers provide access to data in the form of a data warehouse. Many companies

have proliferated warehouses and single-purpose data marts, but since integration is critical for advanced analytics, most sophisticated

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retailers have built an enterprise data warehouse (EDW) for key analytical applications to draw from. The EDW probably includes customer, product, pricing, supply chain, and financial data—making it much easier to interrelate data across those functions. Many of the retail analytics professionals noted in interviews that their lives became much easier when their companies adopted an EDW. The other key prerequisite is management interest and even passion about analytics. In many cases when interviewing leading companies, we heard comments like the following: “We have a new CEO who is a real data dog,” or, “Our company culture emphasizes fact-based decision-making.” When that management orientation is present, it's natural to explore and develop more and more analytical processes over time. If it's not, it may be an uphill battle for lower-level analysts to get the resources and prioritization their work needs, particularly in difficult economic times.

A related factor is a retail management team's desire to build up their own analytical capabilities, rather than relying on manufacturers. Historically, manufacturers (particularly in grocery and consumer packaged goods) did much of the analysis for the retail industry. Many

large manufacturers serve, for example, as “category captains” for their retailers. Now, however, retailers with scale and sophisticated analysts

are slowly taking back analytical functions. They are managing their own categories, optimizing their own shelf space, and monitoring the lift of their own promotions. Some retailers, such as WalMart, aren't interested in sharing their data with syndicators; they want control over data distribution as well. Therefore, in order to still provide value to retailers, manufacturers will have to offer new analytical insights on how best to market their own goods.

While it's not an absolute prerequisite for success in retail analytics, a certain level of scale is undeniably helpful. When our research team found examples of firms that were taking a leading position on an analytical application, it was almost invariably a large firm. Scale provides the ability to invest in analytics and the people who make them possible. Remember, however, that some of the retail analytical leaders were once much smaller; investments in analytical capabilities helped to make them large and successful.

## Widely-Adopted Analytical Trends in Retail

In this section I will describe eighteen major analytical trends that are being widely adopted by leading retailers. For each trend I present the type of trend, a brief description, status of the trend, the underlying rationale for the trend, the leading exemplars, and the management implications of the trend. The trends are grouped by three different types: analytical process, organizational, and strategic initiative.

Trend Name:	<p><b>Assortment Optimization and Shelf Space Allocation</b></p> <p>Using analytics to determine what products to offer in what quantities</p>
Type of Trend:	Analytical process
Description of Trend:	<p>Product inventory and shelf space have always been a retailer's most valuable resources. Now analytics can be used to determine which products provide the highest level of sales and profits. Assortments and shelf space allocations are increasingly being localized to the store cluster and even individual store level. Optimization tools allow analysis of the profit contribution of each brand and SKU on the category, pull-through analysis, and identification of cannibalization effects. Pioneers have been optimizing assortments at the micro level, trading off brands and sizes of the same product. Increasingly, however, some retailers are beginning to optimize macro-level store layouts (category store space allocations and adjacencies) as well, and to integrate them with micro-level analyses.</p>
Status of Trend:	<p>Rapidly maturing with regard to micro-level analysis and chain-wide assortment planning; more emergent at the macro level and for cluster-specific or store-specific optimization. Assortment and shelf space optimization has historically been a periodic (e.g., seasonal) activity, but it is evolving toward a continuous process. Space optimization was often done by manufacturers as category captains in grocery retailing, but is evolving toward a joint process between retailers and key suppliers.</p>
Underlying Rationale:	<p>Retailers have planned shelf space for decades, and planogramming has become increasingly more computerized (i.e., with CAD tools). However, only through the use of optimization techniques can the profit impact of different planograms and store layouts be realized. Automated planogram generation exploits optimization techniques to make store-level tradeoffs between shelf space and assortment depth (i.e. facings), while considering desired product display blocking. Shelf space management is increasingly being analyzed with respect to the financial impact of different assortments, the specific preferences of shoppers in the store area, and the likely responses to pricing and promotions. Retailers are also able to optimize not only SKU facings, but also whole departments and sections. Assortment planning at the cluster level requires previous analysis to create store segments and profiles. Manufacturers are also participating in this process, particularly in retail environments with vendor-managed inventory.</p> <p>According to one study, retailers are likely to lose almost half of the intended purchases when a consumer confronts an out-of-stock product. Consultants estimate that assortment optimization can lead to a 7-15% increase in sales and gross margin dollars, and 10% increases in full price sales. Stockouts create dissatisfied customers, uneven presentation across stores, and lost sales, while excess inventory results in store clutter, reduced turns, and increased markdowns.</p>

## Exemplars of Trend:

**Lowes**, the US home improvement retailer, manages over 800 planograms per store in collaboration with over 150 key suppliers.

Apparel retailer **Belk** employs collaborative merchandising business processes and technology to drive better assortments on the selling floor, optimizing style/color/size by store, and allowing collaboration among internal departments and with suppliers. Better assortments have led to higher sales.

UK-based retailer **Marks & Spencer** achieved \$2.5 million in labor efficiencies and \$1.5 million in operating improvements, as well as a number of intangible improvements, through planogram automation and optimization.

US retailer **Shopko Stores** adopted an enterprise-level approach to merchandising of both apparel and hard goods, yielding margin increases, better integration of private brands, closer vendor collaboration, and more consistent store layouts.

Department store chain **Kohl's** addressed store-level assortment optimization as one of four key initiatives in 2008. The company's assortment systems generate store-level assortments, orders, store allocations, and customized floor plan updates. Analysts believe that 50% of the chain's receipts are affected by its size optimization tools.

US grocery retailer **Giant Eagle** is implementing a broad range of assortment planning and space optimization capabilities. The company's objective is customer centric assortments, communicated through tailored, automated planograms, for all stores. Other goals are to increase the frequency of category assortment reviews, and optimization of sales and profitability.

Multi-brand apparel retailer **Limited Brands** views assortment optimization as a variable to be tested with randomized testing approaches and control groups. The tests have, according to executives, improved not only its stores' assortments, but also the segmentation of its stores by brand and customer.

## Managerial Implications:

Assortment and shelf space optimization impacts one of the broadest sets of business processes among the categories available to retailers. Therefore, retail executives should have a plan and sequence in mind for how they will implement such a broad capability. For example, assortment and space optimization are also closely linked with price optimization, in that it is difficult to optimize prices on the wrong product inventory. As one grocery executive put it,

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capabilities.” The fact that all these capabilities are linked makes it particularly important to carefully plan their implementation. It is also very important to coordinate implementation of these capabilities with suppliers and supply chain executives. Assortment plans must be developed with the constraints of replenishment and packing that these stakeholders impose, along with an awareness of available shelf space.

Trend Name:	<p><b>Customer-Driven Marketing</b></p> <p>Use of customer data to segment, target, and personalize offerings</p>
Type of Trend:	Analytical process
Description of Trend:	<p>Since customers first became identifiable through loyalty or credit cards (or even earlier through personal recognition), retailers have strived to personalize offers and marketing approaches. The offers may be based on simple extrapolations of existing customer behaviors, or more complex propensity models. Offers may include products with a high likelihood of customer interest (“next best offer”), targeted promotions, or customized product display in catalogs or on web pages. In the past, offers were often delivered through traditional direct mail, but more recently have been delivered through email, web pages, and in-store kiosks and register tapes.</p>
Status of Trend:	Mature but evolving; new channels (e.g., mobile devices) are always emerging, as are new restrictions on customer data acquisition and management (which vary by country).
Underlying Rationale:	<p>Customers are most likely to respond to offers and promotions that are relevant to their needs and consistent with past behaviors. In the past, offers were customized primarily on the basis of psycho-demographic segments or clusters based on syndicated data (e.g., the Claritas PRIZM model). More recently, sophisticated retailers have largely focused on actual customer behavior as a predictor of future buying behaviors, and have used internal behavioral data to target offers. Regardless of the source and type of data, targeting is much more successful with identification of unique customers at the individual or household level. Therefore, many retailers have established loyalty programs to identify customers, or use proprietary credit cards to do so.</p>
Exemplars of Trend:	<p>UK-based retailer <b>Tesco</b> has profited greatly from the introduction of its loyalty card program ClubCard. 80% of Tesco’s sales can be tracked through ClubCard. The retailer provides rebates of 1% of customer purchases—historically by direct mail, but increasingly by email. In addition to the rebate, customized coupons based on shopper behavior are provided to customers; there are over 10 million variations in coupons for about 13 million customers.</p> <p>US grocer <b>Kroger</b>, using the same consultant (dunnhumby) as Tesco, is taking a similar approach with highly positive results. As a Wall Street analyst report describes, “Kroger’s partnership with dunnhumby is a competitive advantage that is allowing the company to better understand changing consumer behavior and to target customers’ needs and wants... Kroger receives customer data weekly from dunnhumby, which allows the company to rapidly make decisions regarding any change in consumer behavior, which is important in this environment as consumers change spending habits. Additionally, vendors also work with dunnhumby which allows them to work closely with Kroger in terms of the products and promotions consumers desire. We believe that Kroger’s work with dunnhumby is driving the company’s progress with price competitiveness. Kroger now does more customized direct mailings to customers based on their prior shopping patterns. Most retailers just do blanket promotions. The promotions in these Kroger mailings have a 40% redemption rate and coupons on the bottom of register receipts have a 20% redemption rate, which compares to the industry average of less than 2%.”</p> <p>High-end retailers such as <b>Nieman Marcus</b> and <b>Nordstrom</b> have loyalty programs that are successful in part because they have sufficiently large revenues per customer to be able to offer</p>

substantial premiums to their most loyal customers. Nieman Marcus believes, for example, that the top 100,000 customers in its complex (20 different levels) loyalty program, InCircle, account for almost half of its revenues. Top customers can win free fur coats and even a Lexus luxury car.

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Drugstore chain **CVS** has what it believes to be the largest loyalty program in the world in its ExtraCare card. Data on customer purchase patterns (in the nonpharmacy component of stores) is used to customize offers presented on more than one billion register receipts, in kiosks, and emails. In part because manufacturers pay for coupons presented to customers, the ExtraCare program is a substantial profit center for CVS.

**Hallmark** uses its Gold Crown card, with over 14 million members, to segment customers, to customize direct mail offers, and to assess customer reactions to promotions. Card data is also used to customize event triggers, such as recent or infrequent visits to its Gold Crown stores. Customers earn discounts on store merchandise through a points-based system.

The online discount retailer **Overstock.com** uses targeted and event-driven email marketing to customize category and product offers and even pricing under different circumstances. Targeting email offers has led to a 50% revenue lift from the email channel, and average order size increased by 6%.

#### Managerial Implications:

Analytics are not the most difficult issue in customer-driven marketing for offline retailers; getting and maintaining unique customer information is often more problematic. Most retailers grasp the importance of a unique means of identifying customers, so they have already considered or adopted loyalty programs. Firms relying on credit card-based identification can typically uniquely identify no more than 50% of customers, and the Graham-Leach-Bliley Act in the US has placed additional restrictions on using credit card purchase data to uniquely identify customers. However, a major issue for retailers considering loyalty programs is the ability to offer a substantial premium to loyal customers; this typically requires expenditures of between 1 and 2% of revenues. Retailers with high margins are much more able to offer such premiums. The trend for lower-margin retailers is to rely on manufacturers for coupons and other premiums (as at Tesco), or to make offers available on private-label goods with higher margins (as at the UK drugstore chain Boots).

The proliferation of loyalty programs in sophisticated economies suggests that saturation is approaching, if not here already. The average household already belongs to more than 10 loyalty programs, but is only active in four. This suggests the need for collaboration among retailers, as with the successful AirMiles program in Canada and the UK. AirMiles tracks spending across a variety of retail and service sponsors; members can redeem the accumulated miles for free flights and other rewards.

Several retailers noted that one of their key challenges was capturing and acting upon multi-channel data, particularly for channels that they have not traditionally exploited with customers (see [“Multi-Channel Analytics and Data Integration”](#) trend). Retailers of all types should focus on multi-channel data and customer targeting at the earliest opportunity.



Trend Name:	<p><b>Fraud Detection and Prevention</b></p> <p>The use of analytics to detect and prevent online and offline fraud</p>
Type of Trend:	Analytical process
Description of Trend:	<p>Fraud detection is a critical issue for retailers determined to prevent losses and preserve customer trust. Fraud can originate from customers or people masquerading as customers, store associates, or external criminals or hackers. The most prominent recent frauds have involved stolen credit card information and fraudulent merchandise returns. Shrinkage is a long-term problem for retailers, but can be addressed through some new analytical approaches.</p>
Status of Trend:	The problem is mature, but the use of analytics and business intelligence to address fraud is relatively nascent.
Underlying Rationale:	<p>Criminals and orchestrators of fraud are always using new tools, and retailers must employ analytics as well as other tools to identify and fight the various forms of fraudulent activity. Analytics are one of the newest tools for identifying fraudulent activity and, in some cases, preventing it before it happens.</p> <p>In shrinkage and fraud by store associates, analytics can identify unusual patterns of product and inventory movement. Shrinkage, which amounts to about 1.5% of US retail revenues, can occur from shoplifting, breakage, embezzlement, and simple human error—each of which can be identified through the use of analytics. In credit card fraud, analytics can be used in collaboration by banks and retailers to identify fraudulent activity before it becomes widespread. In online retail, fraud also typically involves credit cards, but online retailers fight it with their own tools because they are usually responsible for losses.</p> <p>Price optimization systems, exception reporting, and automated deal pricing also help to control cash losses, which constitute 0.3% of retail sales.</p>
Exemplars of Trend:	<p>Online retailer <b>Amazon.com</b> has an aggressive program to identify and prevent credit card fraud, which in its first six months led to 50% reductions in fraud. Amazon uses a scoring approach to identify the most likely fraud situations in customer purchases. Some of the circumstances conducive to fraud include purchases of easily-resold goods on the gray market (such as electronics), the use of different billing and shipping addresses, and use of the fastest shipping option. Such variables are used to identify and prioritize cases for investigation.</p> <p>Canadian department store retailer <b>Hudson's Bay Company (HBC)</b> has used analytics to fight returns fraud—when a customer brings back a shoplifted item or reuses a sales receipt to return an item multiple times.</p> <p>HBC uses a data warehouse and analytics to link customer purchases and returns activity. Within moments of a point of sale transaction, the data warehouse is updated with sale, return, exchange and void data, allowing instantaneous system response to returns. A receipt can't be reused to fraudulently return merchandise, and legitimate returns are processed with</p>

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greater speed and accuracy. The system has reduced fraud by \$26 million since installation, and delivered a 100% return on investment after five months.

Drugstore chain **CVS** is using business intelligence to address fraud by analyzing trends in store inventory movements at the SKU level into, within, and out of the stores. Staff are analyzing 1,600 key performance indicators, including warehouse invoices, transfers, returns, positive order adjustments and store alarms. They also look for large continuing discrepancies between items sold and ordered. CVS is now prosecuting eight times as many suspected fraud incidents as it did five years ago.

Midsized English fashion retailer **Jaeger** is using data mining of point-of-sale data with other, more complex data streams to identify losses resulting from employee theft as well as process-related errors. After only three months Jaeger determined that its savings were significantly more than predicted before implementation.

**Managerial Implications:**

Because fraud typically involves either employee theft, payment mechanisms, or customer returns, retailers should put systems and processes in place that address all three issues. Payment-related fraud should be addressed in collaboration with banks and providers of private-label credit cards. Customer-oriented fraud often takes place in returns, so retailers should address both clearly fraudulent returns and return policies that facilitate fraud. In most cases, analytical systems and processes do not identify fraud sufficiently clearly to enable prosecution, so employees must be trained to pursue the highest-likelihood cases of potential fraud with further investigation.

Trend Name:	<p><b>Integrated Forecasting</b> The use of statistical forecasting to support multiple functions</p>
Type of Trend:	Analytical process
Description of Trend:	<p>Forecasting has long been important to retailers across a variety of functions. In many cases in the past, however, different groups and functions created their own forecasts to inform ordering, staffing, merchandising, and budgeting. Stores and regions created bottom-up forecasts; corporate created top-down forecasts. Of course, the forecasts often differed, and led to difficulties in integration and performance. Today increasing numbers of retailers are both centralizing the forecasting function to create integrated forecasts, and also moving to more automated and statistical forecasting approaches (rather than straightforward extrapolation) to rapidly generate forecasts with ranges of outcomes and probabilities. Additionally, retailers are looking to synchronize store and distribution center order forecasts over an extended period of time. This delivers a time-phased (up to 65 weeks) accurate inventory order forecast to various constituent groups within the company and to upstream sources of supply, based on true consumer demand.</p>
Status of Trend:	Forecasting is very mature, but rapidly evolving due to ever more sophisticated automated statistical forecasting technologies.
Underlying Rationale:	<p>Forecasting of sales and demand in retail is more difficult than in most industries because of the thousands of different products and variants, constantly changing trends and consumer preferences, seasonal impacts on demand, thousands of different stores, alternative channels, and promotional influences on demand. This all results in a tremendous amount of data that potentially can be leveraged to drive a more accurate view of demand. Sales and demand forecasts drive a number of key merchandising, operational, and finance processes, including replenishment, promotions, real estate, budgeting, and even human resource decisions. Having multiple manual forecasts not only takes more management time, but forecast differences make it difficult to coordinate operational and financial decisions across the retail enterprise.</p> <p>Contemporary forecasting tools—sometimes referred to as “demand chain management” software—can generate millions of forecasts down to the store/item/day level, places confidence intervals around forecast results, creates forecasts for special events such as holidays, can take weather and marketing promotions into account, and can generate a time-phased order forecast. Benefits of better forecasting include effective and efficient allocation of resources, reduced inventory stockouts and excess goods, faster and more accurate management decision-making, and enhanced coordination between functional groups, headquarters and stores, and with external suppliers.</p>
Exemplars of Trend:	<p>Office products retailer <b>Staples</b> has adopted a new approach to sales forecasting that was originally used for making real estate decisions on over 5,000 potential store sites. It takes eight million data transactions each week as input, and forecasts weekly and daily sales for more than 1,100 US stores. In addition to real estate decisions, the integrated forecasts are now used throughout the company for forecasting seasonal sales, scheduling labor, managing inventory and replenishment, and estimating annual budgets. The forecasts are also used to</p>

help target marketing promotions by geographical area, and have reduced overall promotion costs by 25%. Staples estimates that the forecasting approach is justified by the better real estate decisions alone.

Department store chain **J.C. Penney** began a major transformation of forecasting processes in 2001, when groups from the board of directors to store managers agreed to employ

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common demand forecasts for the entire merchandising process. Financial, sales, and inventory plans, and in-season forecasts at the company and store level, are fully integrated. Forecasts are also linked to assortments, allocations, and pricing optimization systems.

Penney executives credit the new integrated approaches with five extra points of gross margin, improvements in inventory turns of 10%, and growth in top-line and comparable store sales for four consecutive years—and double digit increases in operating profit.

UK-based grocery retailer **Waitrose** has developed a new system for store-level sales and demand forecasting. It takes into account holidays (including Pancake Day), promotions, and seasonality for predicting demand and feeding replenishment processes. Forecasts are produced for each category and SKU per day per store. Benefits from the new system include more efficient inventory levels, particularly for refrigerated products; improved accuracy in replenishment of dry goods; a 40% reduction in order changes, and less time spent by managers in forecasting, freeing them up for customer interaction.

Toy chain **Toys R Us** uses a time-phased approach to replenishment that gives the company and its suppliers greater visibility into the continuous stream of future product needs. By continuously providing order projections to its suppliers, Toys R Us reduces its own inventory risk. Planners at all levels are able to be proactive to resolve potential problems before they arise. By focusing on demand and replenishment at the store and at the SKU-level, the company puts the emphasis on the customer rather than simply pushing product into its supply chain. Synchronization of demand between stores and distribution centers has enabled lower inventory levels while at the same time reducing out-of-stocks.

#### Managerial Implications:

Implementing integrated forecasting is not only a technological initiative, but also a change in business processes and organizational roles. Most organizations have to reassign forecasting to a centralized organization to ensure that integrated forecasts are produced and employed throughout the organization. There also may be political issues around forecasting to be addressed by senior management teams. After improved forecasts are initially developed, it may take substantial time for the organization to link them to merchandising, supply chain, financial, human resource, and other processes. Ideally, better forecasting would be only one aspect of a broad approach to improving retail operating and financial processes with analytics.

Trend Name:	<p><b>Localization and Clustering</b> Tailoring multiple aspects of retailing to local stores or similar clusters</p>
Type of Trend:	Analytical process
Description of Trend:	<p>The era of standardization in retail is ending. Retailers are customizing, for localization purposes, a wide variety of value proposition elements, including assortments, pricing, store formats, promotions, and staffing. The localization may be based on demographics, locational attributes such as proximity to certain businesses, and the actual shopping behaviors of local consumers. Localization can be pursued to the individual store level, or, more commonly and economically, to the level of a store cluster.</p>
Status of Trend:	<p>Clustering is relatively mature, having taken place in retailing for more than a decade; store-level localization is only emerging now. In general, localization is a less mature trend among apparel and some hard goods retailers.</p>
Underlying Rationale:	<p>Most retailers would acknowledge that the demand for their goods, promotions, and store formats varies by geography and the demographic and behavioral attributes of customers. While standardization is an economical approach to retailing, retailers are attempting to localize to the degree that is possible and economical, and to the degree that it increases sales and profits. In most cases, this is not to the level of individual stores, but rather to clusters based on customer and geographical attributes.</p> <p>Localization techniques involve a variety of different analytical approaches, including store site selection analytics, price and assortment optimization, behavioral targeting, and so forth. If the goal is to localize to clusters, a technique for clustering must be employed. The most sophisticated clustering approaches involve the use of actual customer sales by store, and the optimization</p>
Exemplars of Trend:	<p><b>WalMart has created a “store of the community” localization program that tailors store formats, assortments, shelf space allocations, and department layouts by cluster. Where in 2001 WalMart had only 5 different planograms, today it has over 200 to select from.</b></p> <p>of a particular variable that the retailer is attempting to maximize, e.g., seasonality or price elasticity. Clustering may also be based on market segments or personas that were developed for a variety of reasons.</p> <p>Localization in online retail is not generally geographically-oriented, but online retailers can target offers, pricing, and product assortments based on previous customer behavior.</p> <p><b>WalMart</b> has created a “store of the community” localization program that tailors store formats, assortments, shelf space allocations, and department layouts by cluster. Where in 2001 WalMart had only 5 different planograms, today it has over 200 to select from. Stocking patterns are based on actual consumer purchases, area demographics, preferences from consumer surveys, and inputs by local store managers. Local managers, for example, can specify important local events and the beginning and end of local seasons, e.g., for hunting. The company’s Retail Link portal is used to pass on local store assortments and replenishment needs to manufacturers.</p>

**Macy's** has embarked upon a major localization initiative called "My Macy's." The primary focus is on localized allocations by item, color, and size. Macy's is accomplishing the new program with a mixture of new allocation technologies and approximately 250 new district and regional personnel.

UK-based retailer **Tesco** uses localization approaches to tailor store formats to particular locations. Tesco has five different formats—from hypermarkets to convenience stores and an online store—and it builds them in particular areas based on analysis of data from ClubCard, its successful loyalty program. From ClubCard data Tesco can determine exactly what types of customers buy from each store format, and what products they buy.

**American Eagle Outfitters**, an apparel retailer, clustered its more than 750 stores based on the types of assortments to which shoppers were most responsive. The company found, for example, that customers in Western Florida bought merchandise similar to those in parts of Texas and California. In addition to localizing store assortments by cluster, American Eagle is also localizing pricing by a regional clustering structure.

Electronics retailer **Best Buy** has primarily based its localization approach on market segments. The company's well-known personas (such as Barry, the home theatre fan, and Jill, the soccer mom) are used to customize store layouts, assortments, and service approaches. Perhaps most notable about the segment-based localization approach is the extensive training given to store managers and personnel on how best to serve each segment. Best Buy is also beginning to localize store formats based on area demographics and customer behavior data.

Managerial Implications:

Localization to some degree is almost always desirable, but approaches based on store clusters may be just as effective as those based on individual stores, and are much easier and more economical to implement. Localization decisions may require local personnel to execute, but must be coordinated by headquarters, which typically possesses all the relevant information on consumer behavior, geo-demographics, and supply chain movements. Local stores and clusters, however, must be trained to effectively execute localization programs and to provide input to headquarters on local variations. Since localization can affect so many different dimensions of retailing, deciding upon the aspects of a store that will be localized should be based on both strategic decision-making and the results of smaller-scale testing.

Trend Name:	<p><b>Marketing Mix Modeling</b></p> <p>Determining which marketing investments work, and which are less effective</p>
Type of Trend:	Analytical process
Description of Trend:	Marketing mix models help retailers to determine where they should spend their marketing resources. They employ econometric models to determine whether particular promotional approaches—online or offline advertising in various media, event sponsorships, press mentions, and other marketing tools—provide significant sales lift.
Status of Trend:	Somewhat mature; the econometric tools have been available for decades, but the task of measuring returns on the marketing mix has become somewhat more complex as media have proliferated, and as alternative explanations of marketing lift have to be ruled out.
Underlying Rationale:	<p>Retail marketers have many possible media and promotional approaches to choose from, and the number grows all the time. Marketing mix models allow retail managers to determine which marketing vehicles provide the greatest sales lift. The old complaint that, “Half of the money I spend on advertising is wasted; the trouble is I don’t know which half” no longer has to be true—retailers can find out whether advertising works, and how it compares to other marketing tools. Variations on marketing mix models can also be used to assess the timing of various marketing vehicles—how often, for example, a particular ad should be run for maximum impact.</p> <p>The rise of marketing mix models is one factor behind the decline of traditional print and broadcast advertising, and the rise of online media. In general, marketing mix analyses have determined that the traditional, non-addressable media are less effective overall at lifting sales, and retailers and other advertisers have responded by reallocating their resources.</p>
Exemplars of Trend:	<p>Office products retailer <b>Office Depot</b> brought in a new leader of the marketing and merchandising functions, who had a strong focus on fact-based decisions. The company embarked upon multiple analytical projects, including a media mix optimization project. There were 36 models that analyzed channel, segment, and department sales data from three years of transactions. Circulars, in particular, were used more sparingly after the analysis. Space in the circulars must be earned by particular product categories based on demonstrated sales results.</p> <p>Department store chain <b>Macy’s</b> has undertaken a broad approach to marketing mix analysis. In general, the analysis has resulted in less spending on print, and more on other media. Direct mail has become more targeted, freeing up resources for advertising. More marketing resources have been devoted to local markets, and guidelines have been provided to local marketers on the ideal marketing mix for their markets.</p> <p>Hardgoods and apparel chain <b>Sears Canada</b>, facing profit pressures from its parent company, analyzed the returns from its over \$100 million in advertising spending. The modeling covered</p>

300 product lines from 45 divisions. Discounts and print media were discovered to yield the greatest sales lift. Most types of TV advertising were subsequently reduced, and radio advertising was redistributed. The optimization suggested that 7% more profit could be achieved with an optimal mix, but the company is limiting the amount of change to ensure execution.

Computer manufacturer and retailer **Dell**, working with its advertising agency's analytics group, built over eight years a data warehouse with more than 1.5 million records containing

### Online retailer Amazon.com used marketing mix models and test market advertising to determine that broadcast television advertising was not cost-effective.

data on all ads in print, radio, cable TV, and other media. The database also contained alternative factors that might affect advertising effectiveness and lift—from weather to competitive activity. Dell was

able to use the database to determine under what conditions the advertising worked.

Online retailer **Amazon.com** used marketing mix models and test market advertising to determine that broadcast television advertising was not cost-effective. The ads did increase sales, but not as much as other marketing approaches, including offering free shipping. Amazon stopped TV ads altogether and dismantled its five-person TV advertising department.

#### Managerial Implications:

Marketing mix models are relatively easy to perform from a technical standpoint, but it is difficult to gather all the necessary data. Results may sometimes be equivocal or difficult to interpret because of small samples or measurement error. Many retailers employ specialized consultants for such analyses because they are episodic and because they lack the specific skills to perform them. One challenge for retailers with marketing mix models is that even after determining that some traditional channels are ineffective or less effective than other approaches, they may continue to employ them anyway out of tradition or inertia. Truly analytical retailers need to take decisive action when it is clear that historical activities no longer work.



Trend Name:	<p><b>Pricing Optimization</b> Using analytics to determine the optimal pricing of products and services through their lifecycles</p>
Type of Trend:	Analytical process
Description of Trend:	<p>Around the turn of the millennium, retailers began to apply revenue optimization models, which had been applied more than a decade earlier to airline seats and then hotel rooms. In retail, price optimization was initially applied to markdown pricing in apparel, and shortly thereafter extended to initial pricing, and to everyday pricing in grocery retailing. Price optimization software takes as input point-of-sale information and seasonal sales data at the store level. The data feeds probability and forecasting algorithms to create a set of demand curves for particular SKUs in particular stores or clusters. The demand curve identifies the products that are the most and least price-sensitive. Additional optimization routines leverage these demand curves to determine optimal recommended pricing.</p>
Status of Trend:	<p>Markdown optimization among large apparel and general merchandise retailers is fairly mature as is the use of everyday price optimization in grocery and hard lines chains. End-to-end lifecycle pricing that incorporates trade fund management and promotion effectiveness is still emergent. In all cases the analytical techniques are well-established. Significant effort is required to ensure sufficient data and process integration.</p>
Underlying Rationale:	<p>Pricing in retail has historically been an art, not a science. Merchandisers have set prices based on intuition and experience, and goods are promoted and marked down based on the same tools. The results from historical techniques have not been impressive; Accenture research suggests that one third of retailers have at least 10% of their merchandise left over at the end of a season, and for some the figure approaches 25%.</p> <p><b>Pricing optimization has been shown time after time to increase sales and margins; it is one of the most direct routes between analytics and the bottom line.</b></p>
Exemplars of Trend:	<p>Pricing optimization has been shown time after time to increase sales and margins; it is one of the most direct routes between analytics and the bottom line. A study by the Yankee Group suggests that returns on price optimization investments typically approach 20%.</p> <p>New York area grocer <b>D'Agostino Supermarkets</b>, in a 2002 trial of 10 stores and 13 categories, found unit-volume gains in the categories tested of over 6%, and sales increases of 9.7%. Gross profit rose 16.1% and net profit 2%. Similar results were achieved in a broad rollout.</p> <p>Drugstore retailer <b>Duane Reade</b> increased unit sales of baby formula by 14% and of disposable diapers by 10% in a 20-store trial, and then expanded the use of price optimization in all its stores for non-pharmaceutical products.</p> <p>Grocery retailer <b>Albertson's</b> credited pricing optimization and related changes for a 50 basis point improvement in gross margins in 2006.</p> <p>Canadian apparel retailer <b>Northern Group Retail</b> reports that price optimization software has helped it increase gross margins by 4.5% (a 2% gain the first year and an additional 2.5% in the second). Northern has also reduced inventory and increased turns of the remaining stock.</p>

Department store retailer **Kohl's** credit rating increased because of price optimization, and the company credited the approach (among other changes) with gross margin increases of 140 basis points. According to analyst reports, Kohl's feels that the primary benefit of price optimization is improved sell-through.

**Managerial Implications:**

While pricing optimization usually results in margin improvements and pays back its investment quickly, it does normally require a substantial upfront investment. This has been the primary obstacle for smaller retailers thus far leading to availability of Software as a Service (SaaS) options with far lower initial capital investment requirements. Pricing optimization should ideally be undertaken along with other approaches to merchandising optimization such as shelf space and assortment management. However, the integration issues involved in end-to-end pricing lifecycle optimization, along with merchandising optimization, are considerable. This is clearly the direction in which retailing is moving given the potential for significant benefits.

Trend Name:	<p><b>Product Recommendation</b></p> <p>Using analytical approaches to recommend product offerings for particular customers</p>
Type of Trend:	Analytical process
Description of Trend:	<p>With the proliferation of product offerings in retail has come a need for analytical approaches to recommend particular products. The recommendations are typically based on correlations with what other customers who bought the same product are also buying (“customers who bought what you bought also bought this”), which is known as “collaborative filtering.” Recommendations may also be based on specific product attributes. Delivery of product recommendations is usually online, but could also be delivered by salespeople.</p>
Status of Trend:	<p>Fairly mature in online businesses; Amazon.com began to offer collaborative filtering more than a decade ago. Nascent at best in bricks-and-mortar retailers, other than in their online businesses. There are patents of systems to provide a combination of clienteling and collaborative filtering, but no known use by retailers. The most likely platform for product recommendation in bricks-and-mortar retailers is the in-store kiosk; usage is still emerging.</p>
Underlying Rationale:	<p>Online distribution has made it possible for retailers to offer a much broader range of products. However, it can be difficult for consumers to navigate through a complex product array. Many online retailers have discovered that they can ease this process for consumers by offering recommendation systems. Most retailers have not developed this capability themselves, but have licensed it from software providers. Online entertainment (movies, books, etc.) is the most popular product category for recommendation systems, but some hard goods retailers use it as well.</p> <p>While collaborative filtering is the most common analytical approach for product recommendation, recommending products based on their specific attributes may yield more accurate recommendations. This requires, however, a database of product attributes, which may be difficult to develop if it doesn’t already exist within an industry.</p>
Exemplars of Trend:	<p><b>Amazon.com</b> is the pioneer of using item-based collaborative filtering in online retailing, using technology it licensed in 1997. It uses a pre-calculated item similarity matrix to make real-time recommendations for customers it recognizes through cookies. While the capability operates at a large scale, it has been criticized for not distinguishing between consumer preferences for themselves and gifts (although now it does so), and for not recognizing consumer desires for novelty (i.e., items on the “long tail”).</p> <p><b>Overstock’s CEO notes that the GiftFinder drives 2.5 times the average purchase revenue for the site compared to when customers don’t use it.</b></p> <p><b>Overstock.com</b> uses a Bayesian attribute-based technology in its GiftFinder application. The application asks consumers to specify the occasion, the age of the gift recipient, the relationship to the recipient, and the interests of the recipient, and then recommends specific products. Overstock’s CEO notes that the GiftFinder drives 2.5 times the average purchase revenue for the site compared to when customers don’t use it.</p>

**Tesco** has recently licensed a Bayesian system for use in its online business, Tesco Direct. The recommendation system will recommend particular grocery items that customers may enjoy, and replaces a previous set of manual recommendations.

**Sony** has begun to use a new technology labeled “online discovery.” It focuses on identification of products that may surprise or delight customers, and bases its recommendations on past user behavior as well as the search terms users have employed. Other customers of the same technology include online wine merchant **Vinfoлио.com** and discount online site **SmartBargains.com**.

**Netflix**, **Blockbuster Video**, and **Apple’s iTunes** all use various forms of recommendation tools for movies and music. Netflix built its own recommendation engine, called CineMatch, and is currently sponsoring the Netflix Prize for anyone who can improve its recommendation algorithm by 10%. Blockbuster licenses an attribute-based solution, using attributes from the allmovieguide.com site. Apple has recently implemented a “Genius” function on iTunes, which employs a conventional collaborative filtering approach.

Managerial Implications:

Product recommendations are increasingly becoming commoditized in online retail. Executives should try to determine how their recommendations will be differentiated from other providers. Differentiation may be difficult, for example, when technology is licensed from providers who sell to multiple customers in an industry.

Recommendation technology is important in online environments, but will be even more important in mobile technology settings, where small screens and lower bandwidth make it more difficult to search through a wide range of products.

Trend Name:	<p><b>Real Estate Optimization</b></p> <p>Using analytics to optimize real estate sites and formats</p>
Type of Trend:	Analytical process
Description of Trend:	<p>Site selection has been important to bricks-and-mortar retailers for decades if not centuries, and the process has also long involved geographic and demographic data analysis. However, there are evolutionary changes in both the inputs to and outputs from real estate optimization. New inputs include more frequent and reliable data than was previously available from public sources; new outputs of site selection analyses include not only whether to build a new store, but what format to employ, whether to remodel, and even what merchandising approach to adopt. Substantially different approaches to site selection are present between large and specialty retailers, restaurants, and boutique retailers.</p>
Status of Trend:	Among the most mature of analytical trends, though continuing to evolve via more sophisticated analytics that apply more probabilistic algorithms and leverage ever more detailed and varied data sources.
Underlying Rationale:	<p>Site selection approaches are evolving incrementally. Whereas in the past retailers might have based analyses on census data about populations and incomes in target store areas, current data are both more recent (every quarter as opposed to every decade) and more varied (demographic, psychographic, competitor stores, customer data from loyalty programs, shopper intercepts, etc.).</p> <p>The breadth of decisions made in site selection have also evolved, from selecting sites for standardized new stores to continuously optimizing the real estate portfolio. This task has become more complex with the localization of store formats. The most sophisticated firms even include supply chain decisions (with respect to distribution center replenishment) and merchandising decisions on the same data as site selection.</p> <p>Retailers can increasingly develop integrated repositories of their real estate assets, integrated with geographic information systems (GIS) data and all data on leases, costs, store performance through its lifecycle (opening to modernization to closure) operations and maintenance, and format changes and modernization projects. The data can be used for rapid analysis of what-if scenarios and analysis of financial performance drivers.</p>
Exemplars of Trend:	<p><b>Office retailer OfficeMax, with over 900 locations, is employing a new site optimization approach that has allowed it to double its pace of new store openings.</b></p> <p>Office retailer <b>OfficeMax</b>, with over 900 locations, is employing a new site optimization approach that has allowed it to double its pace of new store openings. The company has prioritized all of its core markets in terms of economic potential. Thus far the new stores have produced results in line with the forecasting model's predictions. OfficeMax takes current customer information into account in terms of possible cannibalization. It also considers the proximity to existing distribution networks as one factor in the economics of a new store. Other users of site selection data include marketing, finance, and store operations.</p>

Apparel and related retailer **Limited Brands** established in 2006 a new internal group that addresses both assortment and real estate optimization. They are using the groups to optimize returns from the existing fleet of stores, optimizing space requirements, segmenting the stores, and optimizing assortments and inventory. Stores opened in 2007 with this new approach are performing well thus far.

Fabric and craft retailer **Jo-Ann Stores** is using more analytical approaches to site selection and evaluation to, among other purposes, compare returns and attributes of superstores versus its traditional stores. The company also analyzed differences in customers between the two formats using their own customer database; the customer base was similar, contrary to their expectations. The superstore format tested very positively, and the company used data and analysis to select new sites for the format. Jo-Ann identified the best markets for superstores, and was able to not only open new stores in those markets, but to transition several existing formats to the superstore format. Jo-Ann executives also use site selection data for revenue forecasting purposes for new stores. The changes to traditional stores have significantly increased sales.

**Home Depot** has used analytical site selection tools since its inception in the late 1970s. More recently, it has begun to use data and analyses for international expansion, including in China. Site selection and sales forecasting tools suggested, for example, that the garden center sections of most stores could be profitably expanded, and many already have been. Home Depot has also modeled the number of stores a given geographical area can support, and is prioritizing stores for modernization.

Managerial Implications:

The close relationship between some of the underlying analytics used for assortment planning, sales forecasting, customer analysis, and analytical site selection suggests that these groups should be either combined or closely coordinated in many retailers. Site selection has often been done with the assistance of external consultants, but it may be necessary to create more in-house capabilities if they are to be integrated with other functions. Retailers with an eye on expansion should also not only measure the result of site decisions, but also the length of time to make good decisions. Site selection personnel will find it easier to get online data for their analyses, but this should not replace the traditional site visits on which they have historically relied.

Trend Name:	<p><b>Supply Chain Analytics</b> Optimizing inventory, replenishment, and transportation costs with analytics</p>
Type of Trend:	Analytical process
Description of Trend:	<p>Supply chain management is a process of long-term importance to retailers, and various forms of supply chain analytics have been used for more than a decade. Analytics are employed to determine product quantities, identify optimal distribution center locations, and minimize transportation costs.</p>
Status of Trend:	<p>Relatively mature; recent advances primarily involve collaborative planning with suppliers and new sources of product movement data. Only the largest and most sophisticated retailers employ full optimization approaches.</p>
Underlying Rationale:	<p>Supply chain analytics have involved optimization of locations, inventory levels, and supply routes for many years; these “operations research” approaches were among the earliest analytical approaches in business. Sophisticated retailers are also now familiar with predictive models of replenishment times and likely stockout conditions. Just as they segment customers, they have segmented products (based on product and shipping cost and turn rate) for differential treatment in supply chain processes.</p> <p>More recently, retailers have strived to create supply chains that are more global, flexible, optimized, and event-driven. They attempt to implement rapid resupply on fast-moving goods, and to minimize stockouts as customers spend less time in stores. Radio-frequency identification (RFID) tags and readers are increasingly providing substantially more data on product movements and locations for retailers to analyze. Another major trend is to make data and analyses available across the extended supply chain to manufacturers and distributors. The “Collaborative Planning, Forecasting, and Replenishment” (CPFR) model provides joint visibility for key supply chain metrics and iterative planning and forecasting by all supply chain participants.</p> <p><b>More recently, retailers have strived to create supply chains that are more global, flexible, optimized, and event-driven.</b></p>
Exemplars of Trend:	<p>Online retailer <b>Amazon.com</b> built a new supply chain process and systems on a nonstationary stochastic model. The approach supports fulfillment, sourcing, capacity, and inventory decisions. Amazon developed new algorithms for joint and coordinated replenishment. It also implemented a new national forecasting approach at the SKU level, based on historical demand, event history and plans, forecasts for each fulfillment center, inventory planning, procurement cycles, and purchase orders. Amazon hired a new team of supply chain analysts and operations researchers in order to create the new model.</p> <p>Office products retailer <b>OfficeMax</b> has put in place new processes and systems for supply chain management over the past several years. The company works to achieve the highest availability (in-stock by segmented SKU) at optimal inventory, transportation cost, and warehouse investment. Analyses of store product movements drive both differential assortments and restocking frequencies. Store promotions and promotion execution effectiveness are other variables used in replenishment models.</p>

German department store retailer **Metro Group** is getting early advantage from the use of RFID data in a pilot program involving 30,000 SKUs. It can detect the movement of goods within stores, and display appropriate information to customers and store personnel. For example, if a customer takes an item into the dressing room, product recommendation systems recommend other related products while the apparel is being tried on, and informs the customer whether those products are in stock. The system also records patterns of movement on and off the shelf for later analysis. The dashboard reporting capability for store managers provides information on on-site inventory and provides automated out-of-stock alerts. Analytics can also alert managers to possible product abnormalities by noting unusual patterns, such as a product that is frequently taken from the shelf and/or tried on but not purchased.

Electronics retailer **Best Buy** uses CPFR to exchange reports and analyses with major suppliers. It makes available, for example, base and promotional forecasts, inventory available and required, and forecast accuracy reports for several weeks out. The company integrates the data into backend systems for forecasting and allocation decisions, and expects its trading partners to do the same. Best Buy expects to see improvements in forecast accuracy and product availability to customers in monthly supplier scorecards after they adopt CPFR.

**The Wine House**, a midsized on- and offline retailer of wine, has no IT department and few systems. But it concluded it needed to analyze inventory movements, and the first day the system went live, it identified 1,000 cases of wine that hadn't sold for more than a year. With further analysis, the firm has learned which price points sell best, and which suppliers' products are most profitable.

#### Managerial Implications:

Supply chain analytics are relatively familiar to many retailers, but the investments to use them are typically greater for the needed supply chain process changes than for the systems and analytical tools themselves. Supply chain analytics should also be jointly determined and analyzed by retailers and their distribution and manufacturing partners. This collaborative activity is not as common for other analytical trends. Retailers should begin thinking today about how they will take advantage of RFID data, so that when it becomes available they can be ready to analyze it.



Trend Name:	<p><b>Test and Learn</b></p> <p>The use of randomized testing to experiment with retail innovations on a small scale</p>
Type of Trend:	Analytical process
Description of Trend:	<p>Large retailers with multiple stores are uniquely positioned to employ the “test and learn” analytical approach, in which a relatively small sample of stores is used to test whether a particular change or intervention delivers the desired result. Such “randomized testing” requires that test stores are randomly assigned and that no such intervention is applied to a set of control group scores. After the test, the learning from it is absorbed into the retailer’s knowledge of how the business is best operated.</p> <p><b>Large retailers with multiple stores are uniquely positioned to employ the “test and learn” analytical approach, in which a relatively small sample of stores is used to test whether a particular change or intervention delivers the desired result.</b></p>
Status of Trend:	Mature in some business contexts, but still emerging in retail; new software makes possible the design of experiments by business people rather than professional statisticians. Testing alternative versions of websites is relatively straightforward, and is becoming widely practiced in online retail environments.
Underlying Rationale:	Randomized testing is at the heart of the scientific method; if there is no random assignment to test groups, and if there is no control group, it is impossible to know that improvements are due to planned interventions. Testing is most feasible when there are many stores (or other business units with independently-measurable results), so that results are statistically generalizable, and so that multiple tests can be performed at any given time.
Exemplars of Trend:	<p><b>Food Lion</b>, a North Carolina food retailer that is a unit of <b>Delhaize</b>, is a frequent user of testing to try out new retailing approaches and uses of capital. They are sometimes as substantial as new store formats, and at other times quite tactical—such as tests that managers performed to determine whether lobster tanks actually sell more lobsters, or whether a fresh paint job in a store leads to significantly higher sales. The company also tests the impact of different customer segmentations using loyalty card data.</p> <p><b>Famous Footwear</b>, a unit of <b>Brown Shoe</b>, has testing built into the fabric of the business. The company has a small, centralized group to do testing, which primarily focuses on store location issues. Managers feel that store location contexts change quickly, so they typically retest key formats and merchandising approaches each year.</p> <p>Fast food retailers <b>Subway</b> and <b>CKE Restaurants (Hardee’s and Carl’s Jr.)</b> employ the test-and-learn approach to assess a variety of marketing and new product development questions. Subway’s marketing arm, the Subway Franchisee Advertising Fund Trust, employed extensive testing of the “\$5 footlong” campaign, which has been highly successful for the company. CKE has tested a variety of new products that have been successful in the marketplace, including the “meat as a condiment” products, the Philly Cheese Steak Burger and the Pastrami Burger. CKE has a well-established process for new product development, which includes brainstorming and judgmental screening before formal testing. CKE has attained an enviable “hit rate” in new product introductions – about one in four new products is successful, versus one in 50 or 60 as an average for consumer products.</p>

**Sears Holdings**, which includes **Kmart** and **Sears**, is aggressively testing a variety of store concepts that combine elements of the two chains. CEO Edward Lampert wrote in a 2006 letter to shareholders, "One of the great advantages of having approximately 2,300 large-format stores at Sears Holdings is that we can test concepts in a few stores before undertaking the risk and capital associated with rolling out the concept to a larger number of stores or to the entire chain." The retailer has tested, for example, various formats for including Sears merchandise in Kmart stores, and vice versa, as well as other formats, such as the arrangement of merchandise in Sears stores by rooms in a consumer's home (kitchen, laundry room, bedroom, and so forth).

The online retailer **eBay**, like many successful online firms, is a firm believer in testing. eBay has conducted thousands of experiments with different aspects of its website, and because the site garners over a billion page views per day, it is able to conduct multiple experiments concurrently and not run out of treatment and control groups. Simple A/B experiments (comparing two versions of a website) can be structured within a few days, and they typically last at least a week so that they cover full auction periods for selected items. Larger, multivariate experiments may run for more than a month.

Online music equipment retailer **The Musician's Friend** tested several web pages with different affiliate mentions and free shipping offers. The preferred site generated a 35% increase in conversions over the original home page with a 97% confidence level. The company was able to easily measure the ROI on the change.

#### Managerial Implications:

Most retailers with large numbers of stores can benefit from a testing program, and should incorporate it into many decisions about store formats, capital spending, and marketing programs. A well-defined testing process is critical to the success of this approach. The process always begins with the creation of a testable hypothesis. Then the details of the test are designed, which means identifying sites or units to be tested, selecting the control groups, and defining the test and control situations. After the test is carried out for the specified period – which sometimes can take several months, though it's usually done in less time – the data is analyzed to determine the results and appropriate actions. The results are ideally put into some sort of "learning library" (although, unfortunately, many organizations skip this step). They might lead to a wider rollout of the experiment or further testing of a revised hypothesis.

Trend Name:	<p><b>Workforce Analytics</b> Optimization of staffing with regard to cost, customer shopping patterns, and locations</p>
Type of Trend:	Analytical process
Description of Trend:	<p>Workforce management and optimization applications help to align labor schedules to store traffic, required fixed activities and other variables driving store activity. They can substantially improve schedule effectiveness and labor-to-sales productivity, as well as customer service levels. These applications optimize the match between the supply of labor and forecasted demand. The best systems address employee preferences for when they can and cannot work, and when they prefer to work. Analytical tools are also used for workforce acquisition, both in identifying the most effective employee attributes, and in scoring potential employees as hiring candidates. Analytics can also be used to select store managers with attributes correlated with high performance.</p>
Status of Trend:	<p>Mature; most large retailers have explored workforce analytics, and most have some sort of scheduling optimization system in place. There are several software firms that specialize in this set of applications.</p>
Underlying Rationale:	<p>After cost of goods, labor is the most significant expense for most bricks-and-mortar retailers, and labor scheduling is one of a store manager's knottiest and most recurrent problems. Tools for labor scheduling can not only reduce management time spent on this task, but can do a better job of scheduling workers with the right skills when customers are most likely to visit their stores. The most advanced systems employ other variables in labor scheduling, including upcoming promotions, arriving inventory, and local macroeconomic data. Workforce acquisition systems can be used to determine which employee and manager attributes are most highly correlated with high performance, and then score job candidates based on the degree to which they possess the desired attributes. In addition to increased sales, from better matching labor supply with demand, significant cost savings are often realized via workforce efficiency and reductions in labor law violations.</p> <p><b>Tools for labor scheduling can not only reduce management time spent on this task, but can do a better job of scheduling workers with the right skills when customers are most likely to visit their stores.</b></p>
Exemplars of Trend:	<p>The giant discounter <b>WalMart</b> implemented a workforce management system that schedules workers based on predictions of when customers will be most likely to shop. The approach is being widely adopted by other retailers, but has been criticized for forcing workers to split shifts and adopt work hours that they don't want.</p> <p>Outdoor retailer <b>Recreational Equipment, Inc. (REI)</b> adopted a workforce management application that supports labor forecasting and workforce optimization. The company estimates that the resulting improvements in customer service have led to 1% higher sales. Employees generally feel that the system leads to greater equity in scheduling. REI has consistently ranked in the "100 Best Companies to Work For in America" survey in Fortune magazine.</p>

As a part of a broader workforce management application, apparel retailer **Limited Brands** has given managers the tools to optimize and simulate labor scheduling. The tool allows managers to use data about customers, employees, employee behavior, and store performance to optimize employee scheduling and management. The labor scheduling system allows managers to schedule the highest-performing employees at times when there are the most customers in the store, e.g., on weekends. The employees are generally satisfied with the schedules, because the system produces a higher level of commission income for them.

**Farm Fresh**, a unit of **SUPERVALU**, uses an online system for workforce acquisition. The system scores potential employees on their experience level, a psychological assessment, and fit for the job. It then assigns candidates to one of three categories for the store manager to make a final decision. Farm Fresh estimates that it has saved over a million dollars in reduced turnover.

Managerial Implications:

This is a politically-laden topic, and some retailers won't even admit that they use workforce management systems. However, their use is clearly growing. One key way to limit the political fallout is to use employee preferences as a key variable in scheduling algorithms. Previously-expressed general preferences may be used as an input, or qualified employees can bid on work times that they prefer (as in labor scheduling for airline flight crews). This may make the system somewhat less efficient, but it is usually far superior in fostering employee satisfaction. Accurate demand forecasts are also critical to enabling labor schedule accuracy. Ideally these forecasts should be synchronized with merchandising and marketing sales plans.

Trend Name:	<p><b>Adoption and Use of Analytics</b> Attempts to increase the adoption and effective use of analytics by managers and employees</p>
Type of Trend:	Organizational
Description of Trend:	<p>The effective use of analytics in retail depends not only upon the availability of data and analytical tools, but also upon the ability of retail managers and employees to use them effectively. Retailers are employing a variety of methods to improve the number and capabilities of analytically-oriented personnel in their organizations, including hiring, developing, and deploying them more effectively, and relying on external partners.</p>
Status of Trend:	<p>Mature but evolving; companies have needed more analytical skills for many years, but the gap between available technology and the ability to use it is increasing. The most dramatic new trend is the emergence of analytical outsourcing.</p>
Underlying Rationale:	<p>Since analytics are not part of the traditional arsenal of most retailers, in order to use them effectively retail firms need to somehow acquire or develop personnel with analytical skills and motivations. Not only do retailers need analytical professionals to analyze data and develop models, they also require semi-professionals who can do some analysis in analytically-focused functions such as marketing and merchandising, and “analytical amateurs” at the customer front lines who understand the basis behind analytical segmentation and recommendations.</p> <p>The problem is magnified in areas where analytics have been newly applied. Web analytics, for example, is a relatively new application domain that many companies have adopted, but where skills are difficult to find. As one analyst firm put it, “A fundamental impediment precluding many companies from building a successful analytics program is a lack of skilled employees required to manage, distribute and analyze web analytics.”</p> <p><b>The effective use of analytics in retail depends not only upon the availability of data and analytical tools, but also upon the ability of retail managers and employees to use them effectively.</b></p> <p>Even when skills with individual analytical techniques can be found, it is more difficult to find analysts who understand a variety of techniques. This is increasingly necessary as retailers attempt to integrate overlapping analytical technologies.</p>
Exemplars of Trend:	<p>Online flower and gift retailer <b>1-800-Flowers.com</b> now makes an understanding of analytical business approaches a key criterion for being hired or promoted as a manager. The company also cycles employees from different functions through its Customer Knowledge analytical group so that they can build skills and then apply them in other functions and units when they move back out of the central analytics group.</p> <p>Department store chain <b>Dillard’s</b> has introduced a variety of new analytical tools for buyers and merchandisers, and some employees in those functions have adopted the tools more rapidly than others. To try to speed adoption, Dillard’s IT function has sponsored training programs and visits by early adopters to try to build understanding and motivation for more rapid general adoption.</p> <p>Electronics retailer <b>Best Buy</b> went through an initiative to count and classify its analytical personnel across different parts of the company. It inventoried analysts in the field, operating</p>

groups, supply chain, marketing, finance, services, and human resources. For each analyst it noted whether they were capable of dealing with standard reports and rule based alerts, multidimensional and ad hoc analysis, or predictive modeling and statistical analysis. After the inventory, it redeployed some analysts to increase their effectiveness.

Retailers **Tesco**, **Kroger**, **Macy's**, and **Home Depot** have all worked with dunnhumby, an external (to all but Tesco, which has majority ownership of dunnhumby) consultant who provides data management and analytical skills to the retailers. Tesco, at least, has also built up its own internal capabilities in other analytical domains such as supply chain and merchandising.

Online retailer **Amazon.com's** CEO Jeff Bezos was reportedly unhappy with the tendency of the firm's early web designers to rely on fad and fashion in web design, rather than web metrics and analysis. Bezos fired 10 of 12 web designers and replaced them with more analytically-oriented designers.

Office products retailer **Staples** has augmented its internal analytical capabilities with both onshore and offshore consulting assistance. In its projects staffed by offshore analysts, it follows a "4-1-1" model: 4 offshore analysts, one consultant at the Staples site, and one Staples employee on the team. Managers there feel that the presence of an employee on the team helps to transfer the ideas to Staples and helps inject the results of analysis into decisions and actions.

#### Managerial Implications:

In order for retailers to be able to attract and retain qualified analytical personnel, they must work along multiple fronts. They need to cast their recruiting net broadly. They need to work with existing personnel to develop their capabilities. In order to retain valuable analysts, they need to develop a culture and organization that values analytics and puts analysts to work on important problems. Compensation plans must be adjusted to attract the required talent. Finally, they need to work with external providers (see "[Analytical Ecosystems](#)" trend) to acquire skills they cannot build or develop internally. Of course, if the skills will be needed by the retailer over the long term, it may be more helpful to build them internally or slowly transfer them over from external providers.

<b>Trend Name:</b>	<p><b>Analytical Ecosystems</b> Structuring collaborations with external partners to increase analytical maturity</p>
<b>Type of Trend:</b>	Organizational
<b>Description of Trend:</b>	<p>Individual retailers rarely succeed with analytics by “going it alone.” Instead, they collaborate with multiple partners in an analytical ecosystem. The partners may include suppliers, channel partners, external providers of data and analytical services, and software and hardware providers. Retailers have traditionally provided data to external syndicators, but are now themselves providing reports and analysis to their suppliers and other partners. A few external providers are exclusive to particular retailers; most, however, make their products and services available to the entire retail industry or segment.</p>
<b>Status of Trend:</b>	<p>Mature but evolving; new providers are always emerging, as are new categories of provider (e.g., offshore analytical firms). The trend for retailers to provide analytics to trading partners is still emerging.</p>
<b>Underlying Rationale:</b>	<p>Retailers often lack the capabilities to do all the analytical work that they require. They will almost certainly need software from external providers, and may need external data as well. They may supplement staff with either onshore or offshore analytical consultants. In addition, many providers of software and data to retailers are also now providing analytical assistance. Their expertise on key data sources and analytical techniques makes them uniquely qualified to help with analysis. Use of external providers often provides speedier access to analytics at a lower cost compared to a “do it yourself” approach.</p> <p>Another rationale for the ecosystem approach is that retailers must work closely with consumer product goods (CPG) manufacturers to market the goods effectively. CPG firms have long partnered with grocery and mass retailers on category management, for example. Since marketing and promotion approaches are increasingly analytical, some retailers and their CPG firm suppliers naturally share data and analytics across organizational boundaries.</p>
<b>Exemplars of Trend:</b>	<p>Software firms <b>SAS</b> and <b>Teradata</b> often work with retailers not only to implement their solution offerings, but also to help solve particular analytical problems and create applications. Teradata worked closely with <b>Hudson’s Bay Company</b>, for example, to implement a new approach to reducing fraud in the merchandise returns process. SAS has worked with the same company to provide software and services for Hudson’s Bay’s broad “Precision Retailing” initiative.</p> <p><b>Alliance Data</b> works with retailers to establish and manage loyalty programs, some of which are connected to a private label credit card offered by Alliance as well. Alliance manages, for example, the credit/loyalty programs at <b>Limited Brands</b> and <b>Pottery Barn</b>. The company also owns <b>LoyaltyOne</b>, a loyalty program manager that runs the AirMiles loyalty program that is offered by several retailers within certain countries, including Canada and the UK.</p>

UK-based retailer **Tesco** has worked closely with **dunnhumby**, a provider of customer analytics services, since 1995, and eventually bought control of the company. dunnhumby also works with a single retailer in other geographies and industry segments, such as **Kroger** in the US grocery segment, and **Macy's** in US department stores. dunnhumby manages both loyalty program data for its clients and consults on the analyses that should be performed on the data.

**Catalina Marketing** works with more than 200 grocery chains in the US, and several in Europe, to manage loyalty program data and target promotions based on shopper behavior. The company's primary approach is to make coupon offers available at checkout; in 2007 it provided over 4 billion such offers.

**Information Resources** and **Nielsen** purchase scanner data from retailers and resell it to consumer package goods firms. The companies also increasingly offer data analysis services on both their own and other forms of data.

**CVS** provides reports and analysis of data from its ExtraCare customer loyalty system to the suppliers that sponsor targeted promotions to ExtraCare members. A "Partner Portal" for the suppliers generated over 28,000 reports in 2007.

**WalMart's** suppliers have been required to use its Retail Link portal since 2002. The portal provides reports and some analytics on suppliers' sales by store, promotional activities, and inventory levels.

**Accenture** provides consulting and outsourcing services to a variety of retailers, including **Best Buy**. Accenture assists with analytical strategy and with particular analytical applications, and in Best Buy's case also manages major components of its IT function.

**Mu Sigma**, a medium-sized offshore analytics firm based in Bangalore, India, provides analytical services to WalMart and other retailers. The company works with marketing and strategy functions on such projects as evaluating promotional effectiveness, determining the optimal locations for new stores, and assessing the optimal marketing mix.

#### Managerial Implications:

Retailers should have a strategy for which analytical capabilities they want to build for themselves, and which they will source from partners. They should consider which partners provide analytical efficiencies for the entire industry (e.g., Catalina), and which work with particular retailers to attempt to gain competitive advantage (e.g., dunnhumby). They should ensure that they are able to combine external data sources with their own transaction data so it can be analyzed in an integrated approach. Retailers should also consider which partners could benefit from access to their data and analyses, and selectively make them available. Any decisions about collaboration with external providers of data and analytics should consider not only the retailer's immediate need, but also the trajectory of capabilities needed over time. Some partners may build short-term technical capabilities; others can help to build long-term organizational capability with analytics.



Trend Name:	<p><b>Centralizing Analytics</b> Centralizing analytical resources to support the entire enterprise</p>
Type of Trend:	Organizational
Description of Trend:	<p>Analytical activity has traditionally been siloed within particular functions and units in retail organizations (as well as in other industries). Firms that are serious about building analytical capability, however, are centralizing key analytical resources to serve the entire enterprise. The resources include data, people, and technology. Along with the centralization moves, sophisticated retailers are also linking individual analytical initiatives under a broader umbrella concept.</p>
Status of Trend:	<p>Emergent for areas outside of forecasting (see <a href="#">“Integrated Forecasting”</a> trend); most retailers don’t yet have a centralized group, although there are several cases in which dispersed analytical groups are beginning to communicate and coordinate with each other.</p>
Underlying Rationale:	<p>Most analytical initiatives grew up in particular functions or departments, e.g., merchandising, marketing, or supply chain. They had their own data, analytical people, and software tools. However, the nature of analytical strategy increasingly demands that analytical initiatives and applications be integrated, or at least coordinated. Pricing optimization, for example, affects assortments, supply chain, marketing, and financial processes.</p> <p>In order to create and manage this integration, retailers are forming centralized groups at corporate headquarters to oversee analytical projects and to coordinate the management of enterprise data warehouses and analytical software. In some cases the groups are in IT organizations; they may also be in strategy or planning functions. The group may not perform all analytical activities; in fact, some of the same organizations that are creating centralized groups are also fostering store-level analytical empowerment (see <a href="#">“Store-Level Empowerment”</a> trend).</p> <p>Consistent with this organizational trend, several retailers have created overarching initiatives for multiple analytical projects. These provide a vision and a project planning umbrella for individual projects that need to be coordinated and integrated.</p>
Exemplars of Trend:	<p>Electronics retailer <b>Best Buy</b> has created a Project Management Office (PMO) for analytics to coordinate the company’s various analytical initiatives. It is organized into three teams: one for customer initiatives, one for operational and human resource initiatives, and one for financial initiatives. The PMO focuses on cross-functional initiatives; the current focus is on enterprise performance management, for example. Best Buy had earlier completed a two-year overarching analytical initiative it labeled “Scientific Retailing.”</p> <p><b>Starbucks</b>, the coffee chain, centralized most of its analytical activities in the corporate Strategy organization. The central group is responsible for business and marketing analytics, as well as supply chain, international, product management, store development, finance, and</p>

operations. The group founded database analysis of the Starbucks card, and developed the business case for business intelligence and “test and learn” software.

**WalMart** still maintains several different analytical groups, including in the supply chain function. But it is increasingly coordinating and centralizing analytical activity. The Information Systems Division has created an Analytics Center of Excellence to coordinate analytical data and software initiatives. The Strategy group is leading many of the marketing and operational analytical projects, and coordinating the use of external suppliers of analytical capabilities (see [“Analytical Ecosystems”](#) trend).

**Sears Holdings** has created a central group of analysts, most of whom were recruited from leading MBA programs, to oversee the implementation of such initiatives as assortment planning, test-and-learn, and price optimization.

Home improvement retailer **Home Depot** has two major centralized groups to coordinate analytical work across functions and stores. There is an analytics group in Operations that has visibility into major analytical projects across the organization. One analytical person is allocated to each region. The Planning and Analysis group, which reports into the Strategy function, evaluates strategic analytical project proposals, and determines and allocates resources to them.

#### Managerial Implications:

Retailers with a considerable degree of analytical activities underway should, at a minimum, begin to network and coordinate them. Retail companies that wish to be on the cutting edge of analytics should probably establish a central function to manage and facilitate analytics somewhere in their organizations. With any centralized function, there need to be mechanisms in place to ensure that analysts work on projects that are core to the needs of the business and that they remain close to business decision-makers. If there is both a centralized analytical activity and bottom-up empowerment of stores and regions, there needs to be considerable coordination about who is taking on what responsibilities. In addition, retailers that do establish a central function should consider a coordinated “umbrella” concept for analytics to drive the vision of integrated analytical retailing.

Trend Name:	<p><b>Store-Level Empowerment</b></p> <p>Giving store managers and employees the ability to analyze their businesses</p>
Type of Trend:	Organizational
Description of Trend:	The general trend in retail analytics is to move in a more centralized direction, but some retailers are also increasing store-level capabilities at the same time. They are providing store managers and employees with the ability to analyze store results, predict key operational variables, and optimize store-level resources.
Status of Trend:	Emergent; most retailers are primarily centralizing analytical activity, and only a small percentage have implemented store-level empowerment through analytics.
Underlying Rationale:	Full centralization of analytical capability may mean that store-level managers and employees are unable to understand or predict the performance or resource levels of their own stores. In addition to being a demotivating force for store personnel, centralized systems may not be able to address store-level issues. It is impossible for any centralized system or model to anticipate all contingencies. If managers and employees can analyze key store data, they can input local factors into models, and explore alternative approaches to performance improvement.
Exemplars of Trend:	<p>Electronics retailer <b>Best Buy</b> provided district, territory, and store teams with tools to analyze store traffic levels, activity by zip code, sales close rates, customer satisfaction, segment activity, and market share by segment. Store managers were also given simulation tools to analyze how different variables contribute to store revenue and profitability. With the use of these tools, Best Buy was able to move to more granular predictions of chain-wide revenue and profit growth, which proved more accurate than centralized forecasts.</p> <p>The convenience store chain <b>Wawa</b> was one of the first convenience retailers in the US to implement a full-fledged ERP system. While many transactions were centralized under the new system, Wawa managers were concerned about reducing store managers' and associates' abilities to improve store operations. The company adopted new handheld terminals for store users who could use them to check store-level inventory, understand and predict store-level profitability, and order new inventory and made-to-order ingredients if needed.</p> <p><b>If managers and employees can analyze key store data, they can input local factors into models, and explore alternative approaches to performance improvement.</b></p> <p>Apparel retailer <b>Limited Brands</b> has given managers of its stores a simulation tool for labor scheduling. It allows managers to use data about customers, employees, employee behavior, and store performance to optimize employee scheduling and management. It used its operations engineers to develop the tool, which models scenarios for risk and revenue/profit optimization. Its labor scheduling system also allows managers to schedule the highest-performing employees at times when there are the most customers in the store, e.g., on weekends.</p> <p>The retailer <b>Sears</b>, during a major turnaround in the mid-1990s, developed a new set of performance measures around employee engagement and customer service that it called</p>

Sears Total Performance Indicators. The company used the metrics in an econometric model that predicted store-level performance. After the model was developed, Sears devoted considerable efforts to training store managers and personnel on the model and its implications, and then provided information to managers on the metrics and their store-level performance predictions.

Managerial Implications:

Retailers should consider whether store-level empowerment through analytics has the potential to improve performance. If the general idea of empowerment makes sense, it will then be necessary to determine what analyses and information should be provided to whom. It may be possible to test this approach (using randomized testing approaches) on a sample of managers and stores before rolling it out extensively. Any implementation of store-level empowerment through analytics will require substantial training for managers and/or employees on available data and the use of tools.

Trend Name:	<p><b>Analytical Performance Management</b> Predicting financial performance from nonfinancial and intangible performance factors</p>
Type of Trend:	Strategic initiative
Description of Trend:	<p>Almost all retailers would like better insights into what factors drive their financial performance. But some have taken the lead by performing analyses that relate nonfinancial factors to financial performance, usually at the store level. Among the factors typically driving financial performance are employee engagement (satisfaction with and involvement in the job) and customer satisfaction.</p>
Status of Trend:	<p>Still nascent; while some retailers such as Sears did this type of analysis in the 1990's, it has yet to be widely adopted—typically because of a lack of good data on nonfinancial performance factors.</p>
Underlying Rationale:	<p>Performance management is typically pursued through reports on past financial performance. However, it is possible to predict and explain financial performance by relating it statistically to the business factors that drive financial performance. The statistical techniques for this type of analysis are straightforward, but many retailers lack consistent measures of nonfinancial performance.</p> <p>A popular theory that lies behind many such analyses is the “service profit chain,” which posits that employee engagement drives customer satisfaction, which in turn drives customer purchases and financial performance. Most actual analyses have focused on employee and customer measures in retail environments. Analyses are typically done at the store level to directly relate factors driving performance at the store level to sales and profits at a store.</p>
Exemplars of Trend:	<p><b>Sears</b> embarked upon a major analytical reporting initiative in the mid-1990's, a period in which it experienced a major turnaround in performance. The company tested what it called the “employee-customer-profit chain” model at the store level. Developing the statistical relationships among nonfinancial and financial performance variables proved to be among the easier tasks at Sears. More difficult, according to the leaders of the project, was building management alignment around the model and the measures, and educating front-line service personnel about the model and its implications.</p> <p><b>Best Buy</b> embarked upon analytical performance management and discovered that for every 10th of a point (on a five-point scale) increase in employee engagement at a particular store, it increased operating income at the store by \$100,000. As a result the company concluded that it needed to measure employee engagement every quarter.</p> <p><b>Limited Brands</b> and its lingerie unit <b>Victoria's Secret</b> found that raising its average conversion rate (the percentage of customers who enter the store and actually buy something) by 1% brings more than \$35 million in sales and more than \$15 million in operating profit. The company began to carefully measure conversion rates even down to the individual employee level.</p>

Performance management is typically pursued through reports on past financial performance. However, it is possible to predict and explain financial performance by relating it statistically to the business factors that drive financial performance.

**Starbucks** has begun to explore what it calls “linkage” among associate (employee), customer, and financial performance indicators. The company has already found that associate engagement is significantly correlated with financial performance at the store level.

**Store 24**, a convenience retailer in New England that was eventually acquired by another convenience chain, engaged several academics to statistically analyze the relationships of key performance factors in its business strategy. The company had a balanced scorecard and a strategy map, so the strategy variables were clear and had supporting data. The academics discovered two years into the strategy that it was not working, though one year of data would have proven its ineffectiveness.

Managerial Implications:

Retailers who want to have a better understanding of and ability to predict financial performance should explore analytical performance management. To begin, they need to achieve agreement on key nonfinancial factors in their business and begin to measure them. If they have balanced scorecards in place and are collecting data to support them, it may already be possible to analyze the data in statistical terms. It is also easier to do this type of analysis if the relationships among performance factors are explicitly stated, as in a strategy map. Analytical performance management can determine whether strategies are working, can give managers a set of priorities for the key nonfinancial performance factors to manage, and can give early warning on potential performance issues.

Trend Name:	<p><b>Multi-Channel Analytics and Data Integration</b> Integration of data and analytics across multiple customer channels or touchpoints</p>
Type of Trend:	Strategic initiative
Description of Trend:	<p>It is increasingly a multi-channel world for retailers. Regardless of the customer channel with which they were founded, retailers have little choice but to connect with their customers through every possible channel, including online, call centers, mobile, email, direct mail, and physical stores. Firms that want to prosper in multi-channel environments need to collect and store data on customer interactions across channels, and develop analytics to understand and predict customer behavior across channels.</p>
Status of Trend:	<p>Emergent and evolving; a few leading retailers track all customer interactions across channels, but many firms still lack knowledge of customers' preferred channels and often do not even have a valid email address. Few retailers have predictive analytics across multiple channels.</p>
Underlying Rationale:	<p>There is little doubt among most retailers that customers want to use multiple channels. Most even agree that customers who use multiple channels tend to buy more—up to 61% more in Homescan studies. Other studies suggest that more than half of the bricks-and-mortar store customers that used online sites for research said that they bought from the retailer on whose site they spent the most time researching. 80% purchased from the retailer whose site they had visited first. However, many retailers have little ability to track customer relationships</p>
	<p><b>Firms that want to prosper in multi-channel environments need to collect and store data on customer interactions across channels, and develop analytics to understand and predict customer behavior across channels.</b></p> <p>across channels, and often have to re-establish customer identities when they change channels. Many retailers optimized customer relationship management activities for one channel, and find it difficult to adapt relationships to multiple channels. Many retailers created separate organizations for each channel, which makes integration of data and analytical approaches across channels more difficult.</p> <p>Multi-channel analytics require first that retailers have a customer data warehouse that captures activity across channels, and that records all channel activity. Then they can begin to create behavioral targeting models by channel, "next best offer" predictions for particular channels, attrition models relative to particular channels, and so forth. It's conceivable that in the future, retailers could mine multi-channel qualitative interactions—as one analyst put it, "every digital comment made by consumers anywhere—in a product comment, an IM, on a social network site, in email and via, exchanges with a live chat tech support person, coupled with Web traffic analysis"—to reveal a detailed set of attitudes and emotions about retailers, brands, and products (see "<a href="#">Sentiment analysis</a>" in <a href="#">Emerging Analytical Trends in Retail</a> section).</p>
Exemplars of Trend:	<p>Multi-channel flower and gift retailer <b>1-800-Flowers.com</b> has an integrated customer data warehouse for all its brands and channels. The customer "path to purchase" is coded for all interactions, and multivariate testing is done across channels. The company also has a predicted preferred channel for each type of interaction with each customer. It also tracks the effectiveness of offline promotions with coupon codes tied to the offline channel.</p>

Electronics retailer **Best Buy** analyzed customer data and discovered that purchasers of iPods tend to return in about two weeks to purchase accessories, so the company includes literature about accessories with the iPod and sends well-timed emails to buyers about available accessories.

Television shopping channel **QVC** gives out coupon codes on television that allow tracking of customer activity at its website. The company also includes online customer ratings in its TV broadcasts.

Online retailer **eBay** does considerable online and offline research before making any change to its web page. It does thousands of online randomized experiments using its internally-

**Multi-channel flower and gift retailer 1-800-Flowers.com has an integrated customer data warehouse for all its brands and channels. The customer “path to purchase” is coded for all interactions, and multivariate testing is done across channels.**

developed eBay Experimentation Platform. Its offline testing approaches include lab studies, home visits, participatory design sessions, focus groups, and iterative tradeoff analysis—all

with eBay customers. eBay also conducts quantitative visual design research and eye-tracking studies, and diary studies to see how users feel about potential changes.

Catalog and physical store retailer **Cabela’s**, which sells outdoor clothing and equipment, keeps all customer interactions in one data warehouse, and targets promotions and catalog mailings based on rapid propensity scoring. Targeted mailings achieve 60% greater response rates. High-value customers across all channels are given special treatment in stores and call centers. Cabela’s has also used multi-channel analysis of customer behavior to discover that online promotions drive offline customer behaviors, and vice-versa. The retailer also identifies the customer’s most likely preferred channel in delivering promotions.

#### Managerial Implications:

Retailers should acknowledge that they are permanently in a multichannel environment, and establish channels they haven’t yet exploited. They should integrate the organizations that manage data and analytics across channels. They should also track and analyze the impact of promotions in each channel on other buying channels. If possible, they should quantify the additional value that multi-channel shoppers provide so as to justify marketing efforts for that segment.



## Emerging Analytical Trends in Retail

There are several analytical trends that have not yet been broadly applied in retail environments, but which offer considerable promise. In this section I will describe some emerging trends and their potential application to retail business environments. They include:

*Clienteling analytics*—Clienteling systems are already used by high-end retailers such as Brooks Brothers and Nordstrom to store details on the preferences and purchases of particularly good customers. Thus far, however, the systems are used only to

**What remains to be done by retailers is to connect detailed information on product availability with the models that predict demand, so the interaction between demand and supply can be better understood.**

record information about customers, and there is no analytical or predictive activity involved. Clienteling analytics could be used to analyze past purchases and recommend future products, or to recommend marketing and sales approaches that are likely to be successful with a customer. Given the way in which clienteling systems are typically used, however, a human salesperson would likely be the intermediary between the system's recommendations and the customer.

*Demand shaping analytics*—It is already clear that marketing promotions and pricing have a strong effect on demand. What remains to be done by retailers is to connect detailed information on product availability with the models that predict demand, so the interaction between demand and supply can be better understood. Retailers who know, for example, that

certain goods are available in excess either in their own warehouses or from manufacturers could stimulate sufficient demand to clear the excess volume. Dell has done this for several years in computer manufacturing and retailing, but there are few if any examples of systematic demand shaping in retail.

*Real-time offers*—Targeted offers and promotions in retail today are largely the result of batch processes. The promotion a consumer receives at a kiosk or on a register tape is not the result of items in today's shopping cart or items just purchased. However, with better real-time availability

of shopping cart information, and with automated rule engines or rapid scoring of purchase behavior, it is possible to offer products and promotions in real time. Some online retailers come close to real-time targeting of offers and pricing, but even there most customer decisions are made on batch data. Other countries and regions (Asia, Australia and Europe) have been doing vicinity messaging to mobile devices for some time, and retailers there can send notes to remind consumers of birthdays, holidays, and special offers. Consumers in the US don't have sufficiently advanced mobile technologies to make vicinity messaging widely available, although they are emerging.

*Sentiment analysis*—Retailers would find it helpful to know what customers are thinking about particular foods,

clothing styles, or other products. Analysis of qualitative content on the Internet—web pages, blogs, social media—makes it possible to determine consumer sentiments about particular topics. Both the strength and direction of the sentiment can be determined. Several consumer products and financial services firms are exploring sentiment analysis, and it is likely that retailers will eventually do so as well.

*Video analytics*—Retailers already use video to prevent shoplifting and associate fraud, and to understand the movement of consumers through stores. Yet for human observers to continuously watch video is far too labor intensive. Video analytics make it possible to summarize patterns and activities in video images, and to create alerts for particularly undesirable (or desirable) behavior where human viewing would be warranted. Video analytics are already used in intelligence and law enforcement situations; it is probably only a matter of time before they are applied in retail contexts as well.

## Realizing the Potential of Retail Analytics

In this last section I'll describe how retailers can realize the vast potential of these analytical tools and business approaches. In addition to focusing investments, as I discussed earlier, executives who seek competitive advantage from retail analytics must take an enterprise-wide perspective on them. Retail analytics historically are embedded in a set of organizational silos. But the only way to make a difference with analytics is to take a cross-functional, cross-product, cross-customer approach.

It's also necessary to establish bold goals for what analytics can do in retail organizations. Sir Terry Leahy, the CEO of the analytically-focused grocery retailer Tesco, says that the mission of the company is to earn and grow the lifetime loyalty of its customers. Their core aim, he says, is "to understand customers better than anyone." Analytics have a purpose and a context in visionary statements like these.

Leahy's comments also suggest that senior executives must lead the analytical charge. Building and applying analytical capabilities can't be left to middle managers and professional analysts; only senior leaders can mobilize the entire

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organization. At the retailer Sears Holdings, for example, Chairman Eddie Lampert is aggressively driving an attempted turnaround in part through much greater use of analytical and fact-based decisions. He's even a frequent user of analytical tools himself.

Some large retailers have captured their analytical aspirations in an overarching strategic program. Several years ago, Best Buy had an initiative it called "Scientific Retailing," embodying a number of different analytical projects. Hudson's Bay Company in Canada currently has a "Precision Retailing" program including price optimization, integrated forecasting, and assortment optimization. The company describes the initiative as a "strategic framework" that will lead to

new levels of customer satisfaction. Such a conceptual umbrella for analytical projects can lead to greater integration and give participants a non-technical language for discussing the projects.

Of course, the current economic environment will inhibit some retailers from making major investments in analytical capabilities. As I have noted above, some analytical investments can pay off rapidly and even lower costs; many analytical applications discussed in this report paid for themselves fully in less than a year, and ultimately many times over. As was true in earlier recessions, leading retailers are not stopping their efforts to harness data and

processes, and to become more analytical. The willingness to make business investments in difficult times is one key factor that separates great business enterprises from ordinary ones.

Given the current retail environment, it may take a bit longer for retailers to transform themselves into precision analytical machines. However, the overall trends are clear: retail is a data-intensive industry, and taking advantage of all that data to operate and manage the business better requires analytics. The good news—and the bad—for retail analytics is that most retailers have only scratched the surface of what is possible. The food on the analytical table for retailers is both bounteous and delicious; all that remains is for retail executives to revive their appetites, and eat heartily!

## List of Retail Analytics Experts Interviewed

David Diamond  
 Ed Dupee and Aaron Raines, Teradata  
 Emmett Cox, GE Money  
 Elliott Cundiff  
 Dan Finkelman, Alliance Data  
 Nicholas Garbis, InfoHRM  
 Jeanne Harris, Accenture  
 Josh Herzig-Marx, Promotion Targeting  
 Jim Manzi and Scott Setrakian, Applied Predictive Technologies  
 Giles Pavey and Paul Hunter, dunnhumby  
 Tim Pozzo  
 Rama Ramakrishnan  
 Tapan Rayaguru, Raj Gopalswamy, Ram Krishnamurthy, Mu Sigma  
 Alexi Sarnevitz and Stan Polanski, SAS  
 Len Schlesinger, Babson College  
 Kevin Shaw and Grace Koh, Cadence Quest  
 Wanda Shive and Michael Thompson, Waterstone Analytics  
 Jayson Tipp  
 Eric Williams, Catalina Marketing  
 Gang Yu

*This independent research study was conducted by Tom Davenport and the Babson Working Knowledge Research Center, and is co-sponsored by SAS and Teradata. To learn more about these companies, visit their websites at [www.sas.com/teradata](http://www.sas.com/teradata) and [www.teradata.com/sas](http://www.teradata.com/sas).*

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