Rocket Science Retailing Is Almost Here – Are You Ready?

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ILLUSTRATION BY ALICIA BUELOW

Offering the **right product** in the **right place** at the **right time** for the **right price** is retailing's formula for perfection. The ideal remains elusive, but an elite rank of retailers is getting closer to it every day. There's much to be learned from what they do.

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THE HOLY GRAIL OF RETAILING – being able to offer the right product in the right place at the right time for the right price – remains frustratingly elusive. You would think we'd have captured it by now, particularly given the enormous amount of data that retailers and e-tailers can gather about points of purchase, buying patterns, and customers' tastes. But many retailers still have a long way to go.

Witness the much-publicized problems that e-tailers have had delivering the products that customers order on their Web sites. And who hasn't gone to a store only to find that it doesn't have the right item – even though the place is loaded with inventory, mostly discounted goods? Department store markdowns have grown from 8% of store sales in 1971 to 33% in 1995. These numbers include promotional markdowns as well as the forced markdowns that are the result of manufacturers' oversupply. But the increase is so large that most observers take it as a sign that retailers are having a hard time matching supply with demand.

That's not to say progress hasn't been made. Some retailers (we'll refer to retailers and e-tailers henceforth with the broader term) have dramatically improved their performance in ordering, distribution, and merchandising. But those companies are still a small, elite rank. The next step? An industrywide move toward something we call rocket science retailing – the act of blending traditional forecasting systems, which are largely based on the intuition of a handful of employees, with the prowess of information technology. Rocket science retailing fuses data and instinct with computer models and analysis to create a high-tech forecasting system supported by a flexible supply chain.

The model is not as far-fetched as you might think. Wall Street went through just such a transformation in the 1970s. (See the sidebar "It Happened on Wall Street.") And we've seen many retailers come quite close to achieving rocket science status during the past three years, as we've studied how they gather and process information, how they forecast demand, and how they manage their supplier relationships.

We recently completed an in-depth, multiyear survey of 32 generally cutting-edge companies in which we tracked their practices and progress in four areas critical to achieving rocket science retailing: forecasting, supply-chain speed, inventory planning, and gathering accurate, available data. In this article, we'll illustrate what some companies are doing best in these four areas, with the hope that other retailers can use their insights and practices to gain ground on the grail.

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Forecasting

For many of the retailers in our study, forecasting product demand is a right-brain function that relies on the gut feel of a few individuals and not on the systematic use of sales data. But it's a big mistake to overlook the opportunity to mix art and science. Retailers can significantly improve forecast accuracy simply by updating their predictions based on early sales data, tracking the accuracy of their forecasts, getting product testing right, and using a variety of forecasting approaches. Let's discuss each of these practices.

Update forecasts based on early sales data. Early product sales, appropriately adjusted for variations in price and availability, are an excellent predictor of overall sales (see the exhibit "No Need for a Crystal Ball"). In fact, retailers that exploit these data for production and inventory planning can more than double their profits – especially retailers of products with short life cycles, such as clothing, consumer electronics, books, and music.

But despite the potentially high payoff – and a commonly accepted belief among retailers that early sales are a good indicator of future sales – many of the companies we surveyed had no systems in place to exploit early sales data. One retailer, for example, ordered garments and committed specific quantities of each stock-keeping unit (SKU) to each of its stores 11 months before the product was even available to the public. Even retailers that paid attention to their early sales data updated their forecasts in an ad hoc manner when sales greatly exceeded or fell far short of original predictions.

Several companies have retailing practices worth emulating, however. Japan-based World Company and Spain-based Zara are fashion retailers whose merchants systematically examine early sales data to estimate future demand for various products. They conduct this analysis for every product at predetermined periods in its sales cycle. And the merchants follow through, immediately reordering items that look as though they may end up in short supply. Not surprisingly, World Company has achieved a gross-margin return on inventory investments of more than 300% – a substantially higher return than any other retailer we are aware of.

Dallas-based CompUSA, which sells computers and associated merchandise, has found that even one or two days of early sales data can be very useful to predict sales and replenish its inventory for PCs. Buyers monitor the sales of a certain product line soon after it is launched and update their forecasts based on those observations. They expedite orders for PCs that are selling better than expected

and, when possible, they decline items that have not been shipped. This process of reading and reacting to market signals has improved CompUSA's ability to match supply with demand.

Finally, book and music retailer Borders Group uses historical sales data to customize the product assortment in each of its stores. Borders tracks sales at each store by product category. It uses its merchandise planning system to automatically adjust the inventory at a store based on sales in each product category. Thus, a store in Anchorage, Alaska, would carry a wide assortment of books about small planes because sales for such books tend to be high at that outlet, while the Boston store might stock relatively few items in this category because demand is lower there. Why don't more retailers customize their inventories? The answer, as we explain later on, lies in slow supply chains, inadequate or inaccurate data, the inability to measure stockouts and forecast error, and planning software that is inappropriate for the retailer.

Track and predict forecast accuracy. Only nine of the 32 retailers in our study said they analyzed the accuracy of their forecasts. And yet, tracking forecast errors, and understanding when and why they occur, is fundamental to improving accuracy. Even more important, knowing the margin of error on a forecast is vital to being able to react when the forecast is wrong. For example, if past forecasts for a certain product have been wrong by plus or minus 50%, when a merchant says you'll sell 10,000 of that item, that really means you'll sell between

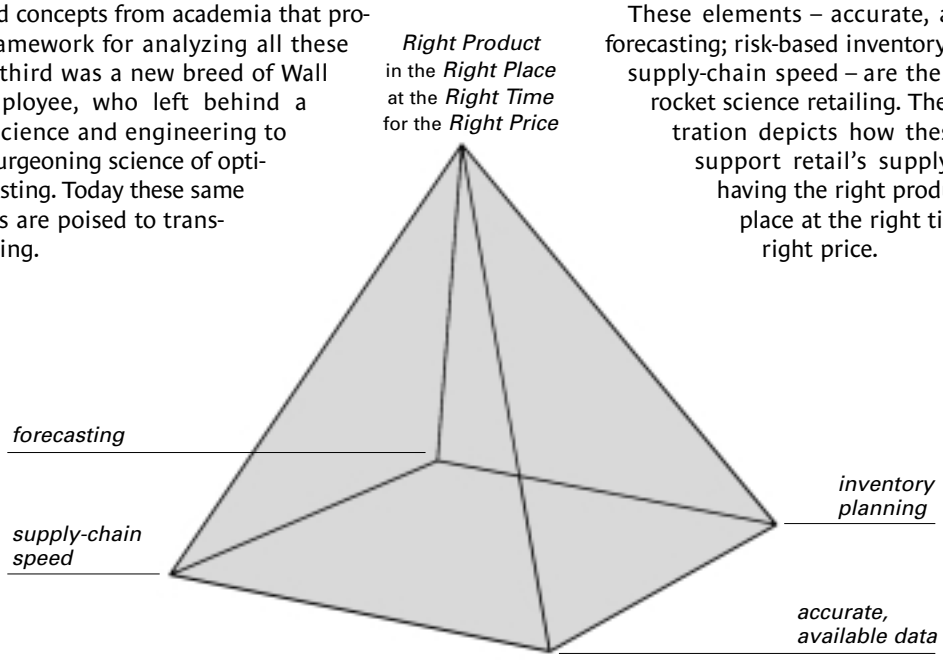
It Happened on Wall Street

To those immersed in the day-to-day operations of a retail organization, the movement toward rocket science retailing may seem overwhelming and the challenges insurmountable. But consider a similar movement on Wall Street in the late 1970s, when several ingredients came together to transform the act of investing from an art to a science.

The first ingredient was information technology that had the power to capture, store, and analyze trade data, even to the point of programmed trading in which computers traded against other computers to exploit any arbitrage opportunities that might remain open for just a few seconds. The second ingredient was new models and concepts from academia that provided a framework for analyzing all these data. And third was a new breed of Wall Street employee, who left behind a career in science and engineering to man the burgeoning science of optimized investing. Today these same ingredients are poised to transform retailing.

It may seem like a stretch to draw a parallel between a retailer and a Wall Street investment firm, but consider that both must analyze transaction data – be they stock trades or product sales – to predict the next high-flying stock or hot product. (If you think predicting the performance of stocks is fundamentally different from predicting the sales of fashion products, ask yourself whether the lofty valuation of Internet stocks has been any less a fad than consumers' infatuation with Pokemon toys.) Both must invest resources – either stocks or product inventory – in the face of risk and uncertainty. And both need to react quickly to signals from the marketplace.

These elements – accurate, available data; forecasting; risk-based inventory planning; and supply-chain speed – are the foundation of rocket science retailing. The pyramid illustration depicts how these capabilities support retail's supply challenge of having the right product in the right place at the right time and for the right price.



5,000 and 15,000 units. Instead of buying 10,000, it might be smarter to buy 5,000 finished units and materials for an additional 10,000 units to be assembled quickly if early sales are strong.

World Company tracks and predicts forecast accuracy by item using the "Obermeyer method": new products are displayed in a room at corporate headquarters just as they would be in a retail store, and about 30 store employees, who are chosen to represent the company's target customers, estimate the likely success of each product. World has found that the products that generate greater disagreement among the employees are likely to have less-accurate forecasts.

Get the product testing right. An impressive 78% of the retailers in our study test new products in a few stores before the actual product launch. But almost all the buyers said their test methods are highly unscientific and that any results that indicate that certain products will be *unsuccessful* are often ignored. Merchants often believe their products will sell well despite unfavorable test results; they blame the weather (bad or good), the poor choice of test sites, the inferior execution of tests, and other factors for suboptimal sales.

When a product testing method is developed with care and refined on a regular basis, the results can substantially improve forecasts. We helped develop a testing method at one apparel retailer that predicts the sales of a product based on the early sales at a few carefully selected test stores. We found that the selection of stores greatly affected the quality of the forecasts. By using historical sales data to pick a diverse group of test stores that matched varying customer preferences, we reduced forecast errors for each style and color from 30 % to 9%.

Use a variety of forecasting approaches. Most companies we surveyed limit themselves to just one type of forecasting. Generally, a single forecast for each item is generated by the buyer or by a small group from merchandising. But generating multiple forecasts can be very valuable because in seeking to understand the differences in those forecasts, managers can explore the assumptions implicit in their forecasting techniques.

Take Old Navy, a division of the Gap. The company blends bottom-up and top-down forecasting approaches and then considers the results in a way worth emulating. Bottom-up forecasts are developed by merchandisers and planners who predict demand for each product based on factors such as current trends in the market, the product's "fit" with the target customer, and the complementary products that will also be offered. Top-down forecasts are developed by planners and occur independent of the bottom-up process. They are based on macroeconomic factors such as the economic growth rate and corporate growth objectives. The two approaches typically yield different results, which are reconciled during a meeting of managers from both groups. Old Navy finds that the different processes, and the ensuing discussion, lead to substantially better forecasts.

No Need for a Crystal Ball

Early sales data can help to predict demand for the life cycle of a product – particularly a fashion item. The information at right is from an apparel catalog company. The graph on the left plots actual life cycle demand against the forecasts made by a committee of four merchandisers. The graph on the right plots actual life cycle demand against forecasts based on sales observed during the product's first two weeks on the market, which accounted for 11% of the season's demand. The latter results in a forecast margin of error that is significantly less than the experts' forecast.

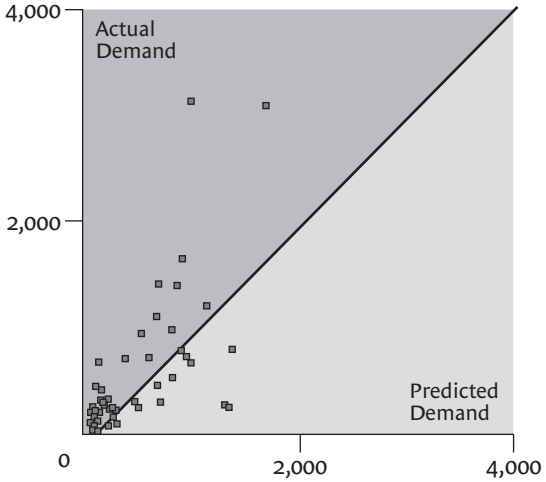
Supply-Chain Speed

Many products today have such long lead times that retailers can't call for a change in production – even if they have tracked early sales, have paid attention to product testing, and know without a doubt that a change is warranted. As one merchant told us, "We do pay attention to our tests. The problem is we already own the product; the test merely reveals that it will be a dog once it gets to the stores." Another retailer maintains an 11-month lead time from placing an order to receiving apparel at the distribution center – even for products with a life cycle of only three months. Consequently, buyers have to commit to ordering from a single vendor before any sales data are obtained. They must also specify how much of each product will be delivered to each store 11 months before the material is received at the distribution center.

Supply-chain speed is clearly a critical component of rocket science retailing, particularly for products that have short life cycles. A company

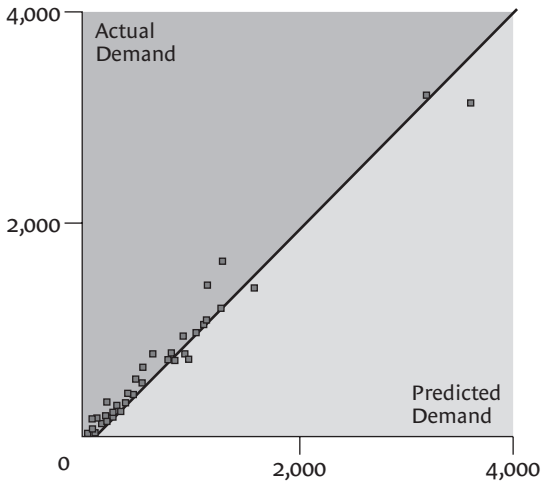
Merchandisers' forecast

Average Forecast Error is 55%



Forecast based on the first two weeks of sales

Average Forecast Error is 8%



that can observe early sales and respond quickly with any appropriate additional merchandise can obviously reduce the likelihood of selling out of hot items. It can also reduce markdowns because its ability to respond with more products during the season means the retailer can order less initially and cut its losses on products that turn out to be failures.

World and Zara use similar exemplary practices in this area. Consider how World manages its supply chain. It can manufacture and deliver an existing product to stores in two weeks. It can design a new product and supply it to stores in as little as three weeks. How does the company achieve such short response times? First, World does a considerable amount of work with supply chain partners before it even places an order. The company stores fabrics and findings (buckles, zippers, and so on) and reserves production capacity at factories in anticipation of demand. At the beginning of a sales season, World, like most retailers, finds it difficult to predict the sales of each product. It knows that carrying an inventory of finished products is risky. But the company does find it relatively safe to hold raw-material inventory and reserve production capacity, since forecasts for those materials tend to be more accurate than forecasts for finished products.

Second, World's factories troubleshoot production problems – separate from the main manufacturing area. The employees in the "debug area" work closely with designers at World's corporate office, changing the product design to enable easier manufacturing and, at times, replacing hard-to-find raw materials with more easily available materials.

Third, World has empowered its employees in product design, merchandising, operations, and its stores to make some decisions on their own, thus avoiding the bureaucratic delays that can accompany the decision-making process. For example, the decision to design, price, procure materials for, and manufacture a new product at World usually involves a meeting of five or six division managers who work in adjacent offices as a cross-functional team. At other retailers, such a meeting might involve convening managers located in different cities and might mean getting approval from executives at various levels in the organization – a more time-consuming process.

Why aren't other retailers as responsive as World? One common problem at many companies is an "efficiency mentality." The apparel retailer with the 11-month product lead time, for example, insisted on placing orders for individual stores instead of buying in bulk for all the stores and then strategically allocating goods to different stores once materials arrived at the distribution center. The retailer reduced its transportation costs and its inventory carrying costs at the warehouse, but it limited its ability to react quickly to market signals.

One distribution center manager told us about a video his company had produced illustrating how distribution efficiency could be improved. The video showed how fast warehouse personnel

could gather garments for shipment if they collected and packed the reorders in the same mix of sizes – regardless of how many large, medium, and small items an individual store needed. The video also showed how much longer it took the warehouse staffers to collect the orders when the size mix for each store varied according to its need. The distribution manager and his peers were confident that the few-seconds-per-garment time savings would convince store managers that all reorders should be shipped in identical size mixes. Which begged our question to the manager: "How long does it take you to process garments that come back from the stores unsold because you haven't shipped what they need?"

Rocket science retailing involves a marriage of left-brain (scientific) and right-brain (intuitive) thought and work processes. For some retailers, that means developing a data-focused planning organization to complement their traditionally creative buying and merchandising operations.

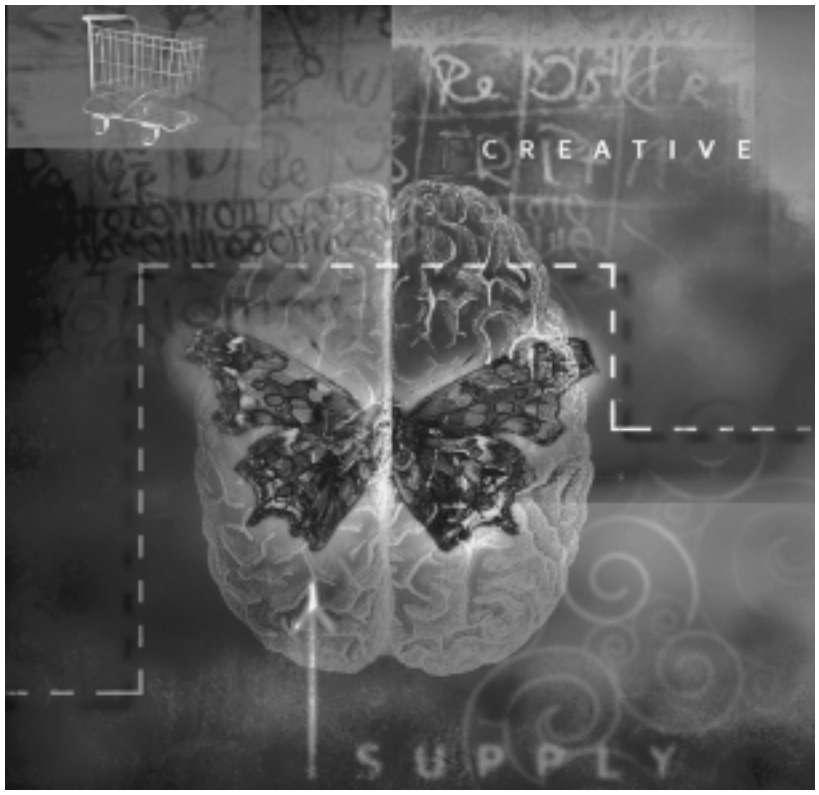
Many retailers fall into a vicious cycle. Logistics and procurement officials argue that reducing lead times for products won't help the retailer because the company lacks good sales data and the tools to analyze that data. Merchandise-planning officials argue that being able to store and analyze sales data won't help the retailer since logistics and procurement can't respond fast enough to those signals. The problem is that companies can't quantify the value of a short lead time in reducing stockouts and markdowns. But as retailers adopt new software tools for forecasting and planning supply, they can use these tools to measure the impact of a shorter lead time and to better match supply with demand.

Inventory Planning

Inventory planning involves deciding when and how much to order, or how much to produce, of various raw materials, components, and finished goods. Inventory planning differs from forecasting because a planner might find it beneficial to stock more or less than predicted demand. In planning inventory for a household, for example, you might decide to stock far more medicine than you anticipate needing in case you become sick. Or you might buy certain items – batteries, for instance – many months' demand at a time while other items – bread and milk, for instance – might be ordered every week. Inventory planning at most retailers suffers from several shortcomings. One of the most glaring is that many retailers don't track stockouts and the resulting lost sales. Only 13 of the 32 companies in our study said they track stockouts, and 11 of the 13 used this information to estimate the resulting lost sales.

Lost sales are endemic among retailers, especially for products with short life cycles. Tracking stockouts could help retailers set optimal inventory levels and could help them see the value in improving supply-chain responsiveness. So why aren't these metrics studied carefully? One reason is that it's hard to know how much of a product would have sold if supply had been plentiful. The figure can be estimated using sophisticated statistical techniques, but retailers generally can't find such capabilities in commercial software, especially in the case of short-life-cycle products.

There is a way over that hurdle. We developed a method to estimate lost sales. Our procedure works in two steps. First, it calculates the underlying demand rate for a product based on the sales patterns that occurred when the product was in stock. Second, it combines the estimated demand rate with the duration of the product stockout at a particular store to derive the lost sales. To estimate demand rate and lost sales, the technique has to be modified for factors such as the variation of demand on different days and at different times within a day. In our experiments with real retail data, our technique estimated lost sales to within 2% at the store level and with higher accuracy at the chain level or for a category of products.



The benefits of tracking lost sales, and increasing inventory levels systematically to reduce those losses, can be substantial. One retailer found that sales could be improved by roughly 10% simply by increasing inventory at the stores, suggesting that lost sales – before the inventory boost – would have accounted for at least 10% of sales. At Rome-based jewelry manufacturer Bulgari, stockouts on a single item at one store had been high enough to reduce the store's revenue by 3.5%. As a result, Bulgari is seeking ways to improve its planning processes.

Accurate, Available Data

All the retailers in our study have point-of-sale (POS) systems and have used them to capture sales data electronically. But contrary to popular perception, most retailers have considerable difficulty capturing and maintaining sales data that are accurate and accessible to their employees.

First, let's consider the accuracy of the data that retailers collect. Store-level sales data are often inaccurate for several reasons. In the apparel industry, a common source of data inaccuracy arises from improper handling of returns. When a customer buys a medium sweater and then wants to exchange it for a small, the returned garment should be scanned into the register as a return, and the requested garment should be scanned in as a new purchase. In reality, the salesperson, trying not to inconvenience the customer, exchanges the medium garment for the small garment without scanning both items into the POS system. As a result, the inventory levels of both items are inaccurate.

In the grocery business, the sheer volume of transactions confounds the grocer's ability to maintain accurate sales and inventory information. Most consumers can recount a situation in which they bought multiple units with the same price (for example, a container of lemon yogurt and a container of vanilla yogurt, both the same brand) and the checkout clerk scanned one of these items multiple times. Clearly, this would cause the inventories of both the lemon and the vanilla yogurt to be inaccurate. One grocery chain found that sales of medium tomatoes have consistently been 25% higher than the actual shipment of medium tomatoes to their stores. Checkout clerks frequently entered into their registers the price lookup (PLU) code for "medium tomato" even if the customer was buying organic, vine-ripe, or other specialty tomatoes. "If it's red and soft, it's a medium tomato at the checkout counter," remarks the CIO at this supermarket chain. Most checkout clerks are reluctant to spend extra time to check the PLU code accurately and risk upsetting the customer and their manager, who, in many cases, is tracking the average rate at which the checkout clerks scan units.

Not all data inaccuracy is caused at the checkout register, of course. One retailer in our study found that inventory records were inaccurate for 29% of the items at a store that had been stocked but that had not yet opened for customers. The retailer traced the problem back to its distribution systems; warehouse employees often shipped the wrong item (for instance, sending small shirts instead of medium shirts, or sending one flavor of yogurt instead of another). Similarly, errors were caused when changes in vendor case-packs – the number of items shipped per box – weren't promptly entered in the retailer's merchandise replenishment system. In one instance, a vendor changed the dimensions of its case-pack from 144 units to 12 units; the merchandise replenishment system, unaware of the change, asked the warehouse to ship only one case-pack.

Many retailers don't know if their information is inaccurate because they don't track data accuracy. Other retailers track data accuracy, but the information discovered is not widely disseminated. At one apparel retailer, the merchandisers and planners had no idea their POS data were inaccurate even though the vice president of planning had, through periodic audits, concluded that the error in inventory data was close to 30% at the store level.

Some retailers have taken steps to ensure the accuracy of sales and inventory data. One interesting approach, the "zero balance walk," is practiced at office-supply superstore Staples. In this system, an employee walks through the store each day looking for SKUs that are out of stock. For each item that is out of stock, a stockout card is generated and a sticker is placed in the space reserved for the item. Other employees verify the events – sudden surges in consumer demand, computer data error, merchandise stocked in the wrong aisle, and so on – that caused the sellout. If the stockout was due to faulty data in the computer, the inventory level in the computer system is corrected. Performing the zero balance walk each day helps measure and improve data accuracy at Staples.

Now let's consider the availability of data. The retailers we surveyed varied in their ability to store and access their sales data. The median retailer in our study kept two years of sales data accessible on-line. One company kept only six weeks of data for its employees to use; at the other extreme, another company kept ten years of sales data accessible on-line.

People often wonder why it's valuable to keep a history of sales for so many years given how quickly trends change. In fact, the data contain some useful information about sales patterns that remain stable from year to year, such as seasonality, consumer reaction to a promotion, and differences in sales patterns at different stores. We have also found that the average forecast error tends to be reasonably similar from year to year, even if the products have changed almost entirely.

Forecasting product sales is much more difficult for the merchants at companies that lack sufficient on-line data. At the retailer with only six weeks' worth of on-line data, merchants referred to heavy stacks of paper copies of sales data from previous years when estimating future product sales. Given that the cost of computer storage space has fallen sharply, there's no reason for retailers not to store sales data electronically and make it easily accessible to their merchants. Those who don't either don't see how the data could be useful in their decision making or made the decision several years ago when computer storage space was extremely expensive.

Some retailers don't make even recent sales data available at the detailed level. For example, some apparel retailers track their sales according to style, color, and size (each has its own bar code) but they store only the data regarding style and color in the central computer. So a merchandiser might know how many red blouses in a certain style were sold at a particular store on a particular day but not if those units were sold in small, medium, or large. Is it any wonder that a recent survey found that one out of three consumers who enter a clothing store intending to buy something leave without buying because he or she can't find their size in stock?

Managers at these retailers claim there is little value in knowing sales by size since their vendors and distribution centers can ship only in standard size packs, which precludes customizing the size assortments by store or region. Meanwhile, it is difficult to

Research Methods

Our formal research on rocket science retailing began after discussions with retailers that had collected large amounts of consumer and sales data but were struggling to use them effectively. We decided to launch a study to document current merchandising and supply-chain practices among retailers. We felt that once we understood the retailers' supply chains well, we could identify ways in which they could be improved.

Our vision of scientific or rocket-science retailing was shared by the Sloan Foundation, a large number of retailers that supported the study, and numerous students and academics at various schools who contributed substantially to the project. For our survey, we selected mostly retailers of innovative, short-life-cycle products such as fashion apparel, shoes, toys, jewelry, books, music, entertainment software, consumer electronics, and PCs. We thought the unpredictable demand of these products would make them the hardest cases for retailers. We interacted with the retailers through site visits, written surveys, and annual conferences to understand their processes for forecasting and managing supply. The following retailers participated.

Apparel and Footwear – David's Bridal, Footstar, Gap, G.H. Bass, Maurice's, Nine West, the Limited, World Company, and Zara.

Consumer Electronics and PCs – CompUSA, Office Depot, Radio Shack, Staples, the Good Guys, and Tweeter etc.

Books, CDs, Jewelry, Toys, Theme Stores – Borders Group, Bulgari, the Disney Store, Tiffany & Company, TransWorld, Warner Brothers, and Zany Brainy.

Other Product Categories and Multiple Product Categories – Ahold, Christmas Tree Shops, CVS, Federated Group, HE Butt Grocery Company, Iceland Frozen Foods, JC Penney, Marks & Spencer, QVC, and Sears.

justify changes to their transportation and warehousing systems that would let them customize their shipments, because they don't have the appropriate sales-by-size data that would tell them how to do that. It's the perfect example of the vicious cycle these retailers fall into: an inflexible supply chain justifies bad data, which justify an inflexible supply chain.

Costs, Customer Satisfaction, and Morale

We've outlined the current best practices – and the current best-case scenarios – for the four areas that are fundamental to achieving rocket science retailing. But there are other areas of improvement for retailers who seek to get closer to the grail.

Many of the issues we've touched on have dealt with metrics like forecast accuracy, stockouts, lost sales, gross margins, markdowns, and inventory carrying costs. But retailers also need to track the variables that drive those measures. For example, which products and market segments tend to have inaccurate forecasts, and how does forecast accuracy change over time? Only then will retailers have the information they need to get at the root cause of retail problems, solve them, and improve performance.

Some retailers also focus too much on the short term. The pressure to immediately improve profits can spur cost-cutting that leads to customer dissatisfaction and low employee morale. The senior managers at one retailer in our study were challenged by the board to achieve double-digit profit increases every year. Management achieved this goal by cutting costs through reducing the number of sales-people in the stores. The board was pleased with the short-term profit growth, but the reduced headcount pretty quickly created lower customer satisfaction, and employees were unhappy.

Many retailers don't know if their information is inaccurate because they don't track data accuracy.

To prevent this kind of problem, retailers need to visibly and accurately track customer satisfaction and employee morale. At least one retailer in our study has engaged an outside audit firm to measure those factors, and the company is even considering reporting the results in its annual reports. That approach makes sense; without hard numbers on customer satisfaction and employee morale, those factors would take a backseat to cost reduction. In the long run the retailer would be worse off.

Marriage of Art and Science

It's useful to consider the long-standing conflict between left-brainers, the technical types who either produce or rely on information supplied through technology, and right-brainers, those who rely more on intuition. The core of rocket science retailing, as we've said, involves a marriage of the two. And many retail executives do acknowledge the need for blending left- and right-brain capabilities, particularly in planning.

Consistent with this view, their organizations have a left-brained planning organization to complement the traditionally right-brained buying or merchandising organizations. The planner typically looks at sales data – in the absence of software systems – to determine stocking quantities at the store and SKU levels. The buyer tries to look beyond numbers and history and focuses on right-brain tasks such as identifying changing patterns in consumer demand and developing new products.

The division of skills and responsibilities between buying and planning appears to work well at most retailers. But in other areas, there is vast room for improvement; a good example is the relationship between the management information systems group, which maintains computer systems at the company, and other departments such as merchandising. One retail CEO reports "The only time [the MIS managers] communicate with me is when they ask me for a $30 million write-off on some previous project that now has to be abandoned." Another CEO chastised us for not appreciating the MIS-merchandising divide: "You guys don't get it, the merchandising-MIS relationship is broken."

Most MIS specialists aren't experts in products or merchandising. They are experts in information technologies such as database management and computer networks. Prior to joining the retailer, they may have worked at nonretail companies. Consequently, they don't always understand the needs of the merchandising organization. In many cases, even the language is substantially different between the two groups. One MIS group at a leading retailer found, much to its surprise, that when merchants in the company say "always," as in "I always follow this procedure," they mean 75% of the time. This shocked the literal-minded MIS group for whom "always" means 100%. It is not clear how the rela-

tionship between MIS and merchandising will evolve. But we don't see how merchandising can become scientific without the two factions understanding each other.

The Systems at the Core

If rocket science retailing is ever to happen across the industry, retailers must pay more attention to the logic that is embedded in their planning systems.

Most retailers, for example, realize that inventory levels should be reduced toward the end of a product's life cycle and that forecasts should be updated based on early sales data after adjusting for product availability and price fluctuations. But most inventory-planning software is designed for products that have long life cycles and is thus inappropriate for products that have an economic life of just a few months.

Consider, for example, a catalog retailer that recently bought a new software package for planning inventories of short-life-cycle products. The company was advised to set the system's parameters to stock four weeks' worth of projected demand for each SKU. For these products, however, sales usually peaked in the first week and then declined exponentially. This meant that the four-week supply ordered by the system was based on inflated sales. It was inevitably too much inventory and often generated obsolete goods at the end of the products' life cycles.

What's more, most inventory planning systems typically require two or three years of demand history on which to model forecasting and stocking parameters. This is a problem for the many products whose life cycles are measured in months. Some software vendors are starting to address this problem, and we're confident an appropriate system will be developed soon.

Rocket science retailing will require the development and use of decision support tools. In the past, many retailers that have attempted to develop such systems in-house or purchase them from third-party vendors have been disappointed; the systems did not use the appropriate mathematical techniques and hence produced poor results. The mathematical techniques underlying such decision-support systems are not straightforward for a number of reasons.

Consider a task as simple as using early sales data to guide replenishment; see what's selling well and get more of it if you can. But implementing this concept requires careful attention to detail. For example, it's important to know not just how much has sold of a particular product but the conditions under which it sold, including price and inventory availability. This point is well illustrated by one retailer that had developed a replenishment model based on early sales data. The model showed that a product in one style and color was selling almost twice as well as had been originally forecast. Based on this, a large replenishment order was placed. The vice president of merchandising who had placed the order was dismayed to see sales in the next three weeks fall to 60% of what the model had predicted. She was convinced that the model was flawed. But careful examination revealed that sales were slow because a delivery of the product that had been expected at the time the order was placed, and that had been assumed by the model, was delayed by three weeks. Hence, stores were stocking out of many sizes. Once the fresh product arrived, sales rebounded to the level predicted by the model. The underlying principle is simple – you can't sell it if you don't have it in inventory. But retailers often overlook this principle when they interpret sales data.

Nature abhors a vacuum, and the retailing situation today is an economic vacuum that cannot persist. Retailers can't continue to suffer growing markdown losses yet disappoint a significant portion of their customers who can't find what they want. They can't continue to ignore billions of bytes of unused sales history that could help solve these problems. Somehow this vacuum will be filled.

Every decade sees a retailer that innovates so powerfully that it rewrites the rules for other retailers and for all companies in the retail supply chain. In the 1980s, it was Wal-Mart. In the 1990s, it was Amazon.com. We believe the next retail innovator will be the one that best combines access to consumer transaction data with the ability to turn that information into action.

Recommended Reading

Marshall Fisher and Kumar Rajaram, "Accurate Testing of Retail Fashion Merchandise: Methodology and Application," *Marketing Science,* No. 3, Summer 2000.

Marshall Fisher, Ananth Raman, Janice H. Hammond, and Walter Obermeyer, "Making Supply Meet Demand in an Uncertain World," HBR May–June 1994.

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"Sport Obermeyer Ltd.," HBS Case Study #9-695-022.

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