

# Chapters *To Go*



## The New Science of Retailing: How Analytics Are Transforming the Supply Chain and Improving Performance

by Marshall Fisher and Ananth Raman  
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## Chapter Six: Store-Level Execution—Increasing Sales Through Better Availability of Products and Store Associates

### Overview

We've all shopped, and we know that we can have a wide range of experiences, from exasperation to delight, in a store. How we evaluate our shopping experience depends on many things, including what we are shopping for. Most people would use different criteria to evaluate the weekly slog of shopping for groceries than they do for the occasional purchase of a diamond ring or a Rolex watch. But all store visits have several things in common. The customer arrives with a desire to buy something. She may seek a specific item, or she may have a need but not know the best way to satisfy it. Or maybe she's just browsing, in the hopes that something will excite her enough to buy. She may find what she wants and then pick up additional items on the way to the checkout line. Or she may end up exiting empty-handed. She may need help, and whether she finds it may determine whether she has a good experience. She may like the aesthetics of the store, or she may hate them.

Certainly, different things matter to different people. But a retailer must know what matters most to most of its customers. What are the vital few factors that will have the biggest impact on whether a potential customer turns right at the end of her driveway and heads to your store or turns left and heads to the competitor's location? And if the customer comes to your store, what makes her buy a lot, a little, or nothing at all?

Retailers need to know what matters to their customers so they can focus their energy and resources on it. Sam Walton, founder of Wal-Mart, believed that hospitality mattered. So he hired official greeters at his stores, and when he visited locations, he encouraged associates to take a pledge: "I want you to promise that, whenever you come within 10 feet of a customer, you will look him in the eye, greet him, and ask him if you can help him." This concept persists today as Wal-Mart's "10-foot rule." <sup>[1]</sup>

Another retailer requires its checkout personnel to greet customers by their last name if they present a credit or loyalty card. It enforces this policy with mystery shoppers. Do store associates increase customer satisfaction and sales by greeting customers? Answering questions like this is vitally important for a retailer, but also challenging, so let's now consider a method for determining how the myriad of activities that occur within the four walls of a store impact sales and customer satisfaction.

<sup>[1]</sup>See "10-Foot Rule," Wal-Mart Stores, <http://walmartstores.com/AboutUs/285.aspx>.

### What Most Impacts Sales and Satisfaction?

Over the last decade, we have worked with six leading retailers to help them determine which of the many things that happen within their stores most raise sales and satisfaction. <sup>[2]</sup> Our partners in this effort have been three former students of ours—Nicole DeHoratius, now at the University of Portland; Jayanth Krishnan, now at the International Monetary Fund; and Zeynep Ton, now at Harvard Business School—and our Wharton School faculty colleague Serguei Netessine. The six retailers asked to remain anonymous, but they represent these segments: department stores, books, fast food, groceries, office products, and home furnishings and small appliances.

All of them track sales by store and by day, and collect data on a wide range of variables that might affect sales and satisfaction. Four survey their customers. Four also send mystery shoppers into their stores to assess performance on everything from in-stock levels to the friendliness of store associates.

To understand their store challenges, we had extensive discussions with their executives as well as executives at other retailers. We assembled data for each one on sales, as well as a host of factors that might influence sales, and mined this data to discern the primary drivers of their sales and customer satisfaction. We'll use our analysis of the home furnishings and small appliances retailer to illustrate the process. <sup>[3]</sup> We analyzed monthly data, stretching for seventeen months, on store sales and potential sales drivers for each of about five hundred locations. The information available to us included gross store sales for each month and the results of customer-satisfaction surveys.

An offer to join in the survey was printed on the bottom of customer receipts—if they participated, they were entered into a lottery to win a significant cash prize. Customers called an 800 number and answered automated questions using their phones' keypads. The surveys included an overarching question—"On a 10-point scale, how satisfied were you with your store visit?"—as well as a series of more specific ones. (For yes/no questions, the monthly variable recorded for that store

was the percentage who answered yes. For questions requiring a 10-point rating, the monthly variable recorded was the average score.) These were the other questions:

- Were you greeted?
- Was assistance provided if needed?
- Rate the knowledge of any store associates you interacted with on a 10-point scale.
- Did you find everything you were looking for?
- Were any items out of reach?
- Were you able to find prices OK?
- Were the aisles free of debris?
- Was checkout quick and easy?

We also incorporated managerial metrics such as in-stock rate—that is, the percentage of items that the corporate computer shows have positive inventory at the end of the month—planned payroll, actual payroll, and the number of terminations.

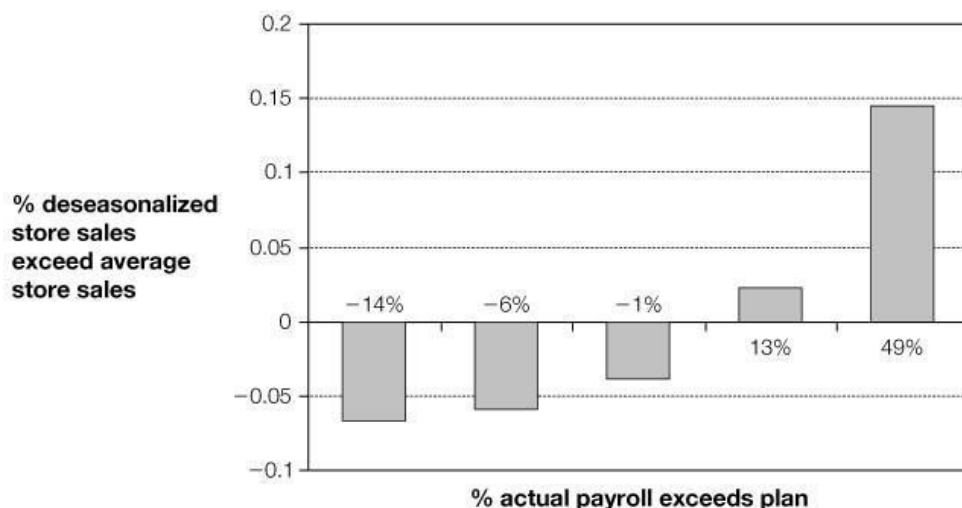
Making sense of all of this data required sophisticated statistical analysis, but the conceptual approach is intuitive. You just ask yourself, “If sales in a store are higher than you would have expected, given its past average sales, adjusted for seasonality, what might have caused that?”

While conceptually simple, the approach does have pitfalls. Determining the impact of payroll on sales is a good example. Most retailers, including the ones we analyzed, set a store’s payroll budget for next month as a fixed percentage of expected store sales for next month. So if both sales and payroll are relatively high in a month, it’s hard to know whether the increased store labor drove increased sales, or a forecast by the retailer of high sales caused it to increase staffing. To illustrate, consider an extreme case in which a retailer can perfectly predict next month’s sales in each store, and it sets payroll to 10 percent of forecast sales. Then sales would be perfectly correlated with payroll, but this would be caused by sales driving payroll, not payroll driving sales. Consequently, it would tell you nothing about the impact on sales of a change in staffing levels.

If you therefore wanted to understand the impact of payroll on sales, you might instead do an experiment. You might raise payroll by 10 percent in fifty stores and lower it by 10 percent in another fifty stores and then see what happened. If you saw increased sales in the stores where you added payroll and decreased sales where you reduced payroll (again, adjusting for seasonality), then you could conclude that the payroll level had spurred additional sales.

Retailers inadvertently conduct experiments like this all the time because actual payroll deviates from planned payroll somewhat randomly. Actual payroll can be less than planned because of lack of availability of people. In a given month, a retailer may be unable to hire as many new associates at some stores as it would like. (Because of the high turnover of store associates—typically around 100 percent per year—stores need to constantly hire to maintain staffing.) Or perhaps the retailer can’t get its part-timers to commit to work as many hours as it needs them to. Whatever the reason, if lack of labor results in less payroll being used in a month than was planned, the store may be able to bank those hours for use in a future month. That results in actual payroll exceeding planned payroll for some months in the future. Thus you see the random ups and downs.

In exactly this way, the retailer we were studying was performing a natural experiment to measure the impact of payroll on sales. What were the results? With more than five hundred stores and seventeen months of data for each store, we had more than six thousand store–month observations. In some months, actual payroll exceeded planned payroll. In other months, it was below planned payroll. We sorted the store–month data by the ratio of actual payroll to planned payroll and grouped the outputs into quintiles. In the first group, actual payroll averaged 14 percent below planned payroll, and in the fifth group, it averaged nearly 50 percent above planned payroll. For the other three groups, it ranged between these limits. The key question was what happened to sales: was it depressed when payroll was low and elevated when it was high? Figure 6-1 provides the answer. It shows the amount by which a store’s deseasonalized sales exceeded its average sales for each quintile. As is obvious, actual sales soared relative to average sales in months when actual payroll was above planned payroll.



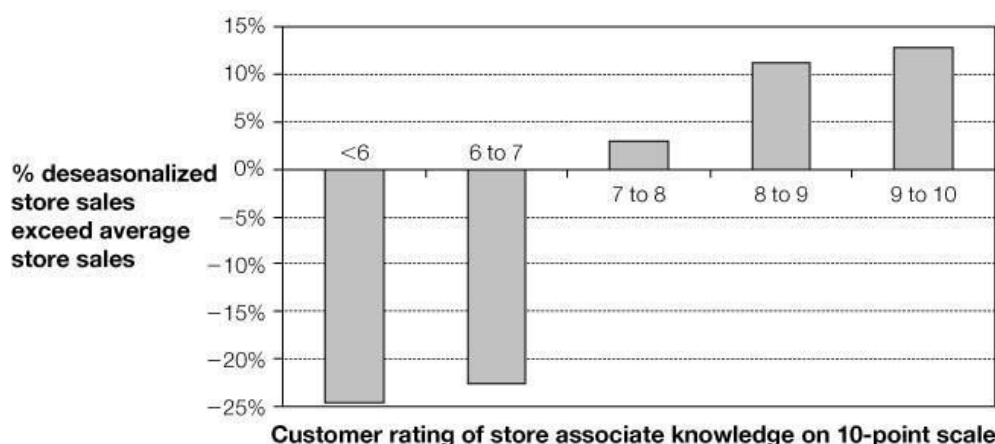
**FIGURE 6-1 :** Store staffing has a big impact on sales

More employees in a store can improve all of the key execution metrics. More staff at the registers reduces checkout times. More people checking the shelves and moving goods from the back room increases the number of customers who find what they were looking for. And more folks offering help on the floor raises the chances of customers' getting assistance when they need it.

So it's no surprise that increasing payroll would increase sales and satisfaction. But later in this chapter, we'll also show that it's a great deal for the retailer because the incremental gross margin earned on the additional sales dwarfs the extra cost.

In our study, payroll was the single biggest driver of sales. The next biggest drivers were customers' average rating, on a 10-point scale, of store associates' knowledge and the percentage who answered yes to the question "Did you find everything you were looking for?" [Figures 6-2 and 6-3](#) show the sales impact of these factors. <sup>[4]</sup>

High-performance retailers compare sales in a set of stores that have been open at least a year with sales in the same stores in the same period a year earlier. This metric is called *comparable store sales* (*comp sales* for short) and is closely watched by Wall Street as an indicator of customer acceptance. Retailers love to see increases in comp sales of 5 percent or more, though they often see negative comp sales. The sales increases in figures 6-1 to 6-3 are for a consistent set of stores and hence show what comp sales could have been with better execution. The data suggests that getting store execution right can produce double-digit rises in comp sales. A favorite retailer trick for jump-starting comp sales is to remodel a store. But that's a one-time stimulus. Imagine how much more powerful it would be for customers to consistently find what they came for with the help of knowledgeable store staff.

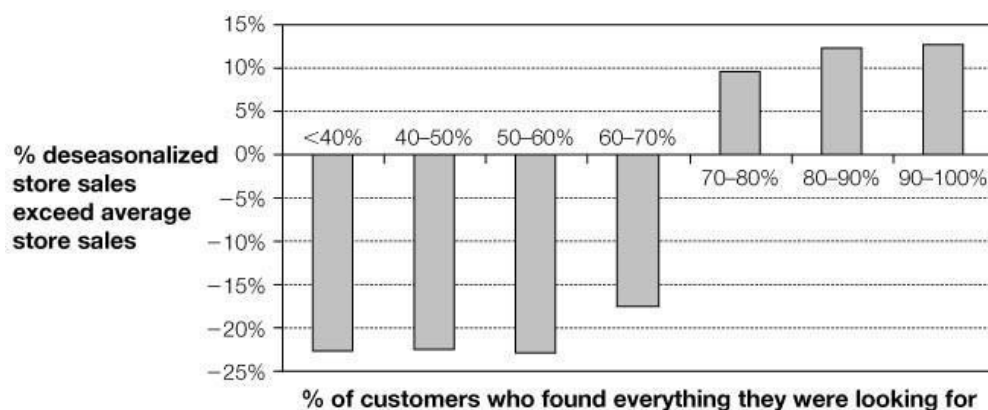


**FIGURE 6-2:** Knowledgeable store associates increase sales

We've described a process for mining customer survey data to identify what matters most to your customers and shown that, for one retailer, the answer was knowledgeable store associates and enough of the right kinds of inventory. Another retailer, applying the same method, might find different answers, so we'd urge you to do the surveys needed to identify

your customers' priorities. For example, when Staples examined their customer satisfaction survey results they found the four things their customers most valued were (1) fast checkout, (2) in-stock on the basics, (3) easy to find what you want, and (4) courteous and helpful associates.

While these four factors are not identical to the top-three list for the retailer we've just described, they're similar. They, too, involve store associates and finding products. That makes sense. After all, the key components of a retail store are products and people, and we've found that, at most retailers, customers rate these factors as critical to their shopping experience. Therefore, we'll devote the rest of this chapter to improving the quantity and quality of your store associates and achieving better in-stock rates for the customer.



**FIGURE 6-3:** When customers find what they want, sales rise

[2] Results for specific retailers are reported in Nicole DeHoratius and Ananth Raman, "Inventory Record Inaccuracy: An Empirical Analysis," *Management Science* 54, no. 4 (2008): 627–641; Marshall Fisher, Jayanth Krishnan, and Serguei Netessine, "Retail Store Execution: An Empirical Study" (working paper, Wharton School, Operations and Information Management, Philadelphia, PA, January 2007); Marshall Fisher, Jayanth Krishnan, and Serguei Netessine, "A Cross Sectional Study of Retail Store Performance" (working paper, Wharton School, Operations and Information Management, Philadelphia, PA, October 2007); Zeynep Ton and Ananth Raman, "Cross Sectional Analysis of Phantom Products at Retail Stores" (working paper, 2000); Zeynep Ton and Ananth Raman, "The Effect of Product Variety and Inventory Levels on Retail Sales: A Longitudinal Study," *Production and Operations Management Journal* (forthcoming); Zeynep Ton, "The Effect of Labor on Profitability: The Role of Quality" (Harvard Business School working paper, 2009); and Zeynep Ton and Robert S. Huckman, "Managing the Impact of Employee Turnover on Performance: The Role of Process Conformance," *Organization Science* 19, no. 1 (2008): 56–68.

[3] The results described for this retailer are based on Fisher, Krishnan, and Netessine, "Retail Store Execution."

[4] Fisher, Krishnan, and Netessine, "Retail Store Execution," describes two statistical analyses done to determine the most important driver of sales: one using a technique called *stepwise regression* that adds explanatory variables sequentially in order of importance, and the other using *variable normalization* so that a variable's coefficient represents its importance in explaining sales.

## Putting People First

Figure 6-1, which we discussed earlier, shows that store staffing levels matter mightily. Recall that the figure is based on extensive data on sales and potential sales spanning seventeen months and five hundred stores. As part of our analysis, we measured the impact of payroll on sales and found that for an average store in an average month, the sales increase per dollar of additional payroll added was \$9.52. [5] This retailer earned gross margins of about 40 percent, which meant that spending an additional dollar on payroll would produce incremental gross margin of 40 percent of \$9.52, or \$3.81.

## Labor Leverages Versus Cost Minimizers

Spending a dollar to earn \$3.81 is a great deal, so an obvious question is why this retailer wasn't employing more people.

We gleaned insight into this question when we spent a day touring stores with a group of grocery CEOs. One store that we visited belonged to a regional operator that had been acquired a couple of years earlier by a large national chain. Several

of the CEOs had seen the store before the acquisition and remarked on the differences. Staffing had fallen, the employees looked dispirited, and the few customers in the store didn't look happy, either. Our group conjectured that the acquirer had aggressively cut costs by reducing head count and wages, leading to a minimum number of minimum wage employees in the store. And members of the group speculated that while this may have improved short-term profits, it had obviously done long-term damage to customer satisfaction and sales.

Thinking we had found philosophical allies, over dinner that night we told of the retailer that we'd studied that appeared to understaff its stores, and added that we'd measured the sales impact of more payroll and it turned out to be nearly \$10 for each additional dollar spent.

To our surprise, the group's reaction was cool, even negative. One of the CEOs emphasized that labor cost was something to be minimized, not increased, and commented, "I spend my days saying no to a long line of people suggesting ways to spend money, including adding store staff. I don't need a couple of Ivy League professors with their fancy statistical analysis giving them more ammunition!"

This conversation underscored for us that most retailers view labor as a cost, not an asset. Our payroll results were specific to a particular retailer—another firm might see a different result—but this conversation and others like it convinced us that the tendency is for retailers to understaff their stores. And that's understandable. Decisions about staffing trade off a known present cost—paychecks written to employees—against an unknown future benefit, namely, the incremental sales that would result from better staffing. Not surprisingly, the short-term cost is going to be weighted higher than the unknown future benefit.

What's more, store labor is an easy cost to cut quickly, because many store employees work part-time and turn over frequently. In this situation, it's tempting to make your end-of-quarter numbers by shaving a few hours off each store's payroll, arguing that the negative impact will probably be minimal. Unfortunately, this lower staffing level tends to become the baseline for the next quarter's budget. After doing this repeatedly, many retailers find themselves with just a handful of minimum wage associates in each of their stores.

A retailer in this situation probably faces a downward spiral: cost-cutting efforts, aimed at plumping the bottom line, end up sapping the top line because of poor customer service. Given that store labor is the second-biggest cost for most retailers, after the cost of goods sold, we'll concede that wantonly adding staff is equally risky. Add too much or add jobs in the wrong place or time, and your results can be equally bad. But if you use the analytic methods that we're advocating, you can tailor the size of your workforce to your needs.

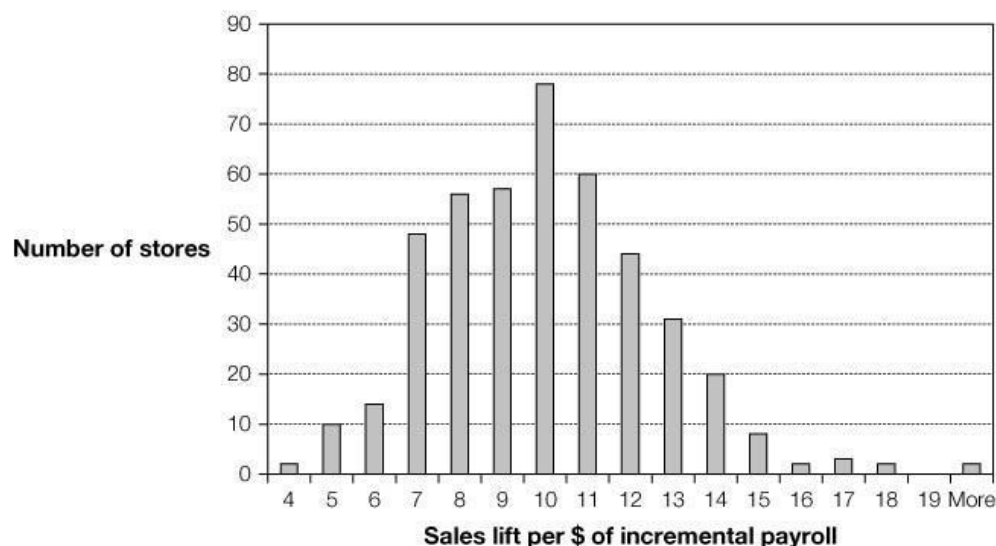
### **Rightsizing Your Store Staffs**

As mentioned above, we found that for an *average* store at one retailer, the sales increase per dollar of additional payroll was \$9.52. However, the particular numbers varied considerably among all of the five hundred stores, ranging from \$3.91 to \$27.78. [6] Clearly, adding a dollar of payroll to a store to earn a 40 percent margin on a \$3.91 sales lift is a marginal call—you'd have to worry about possible estimation error on the \$3.91 estimate. But a 40 percent margin on a \$27.78 sales increase is more than \$11 of incremental profit for \$1 of incremental expense. In other words, a great deal—with an ample margin for error.

Figure 6-4 is a histogram showing how the sales rises varied across stores. We pondered what could cause so much variation. Imagine a curve that shows how sales changes as payroll for a store increases. What would you expect this curve to look like? Logically, revenue should increase as store labor is increased, but we would expect diminishing returns.

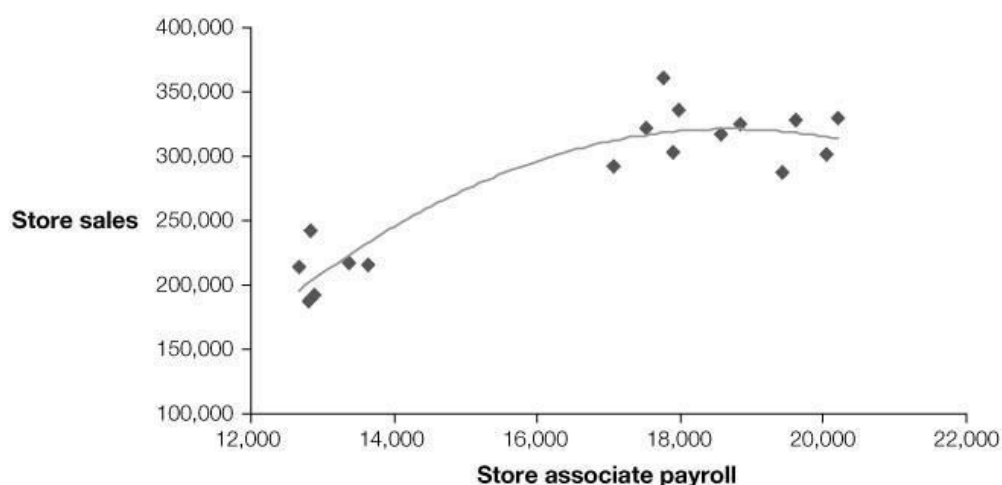
Figure 6-5 shows revenue as a function of store staffing level for one store in our data set that had considerable variation in staffing levels, and you can see the diminishing returns in the impact of payroll on sales. This makes sense. If you have two associates working in a store and add a third, you might not be surprised to see a 50 percent improvement in results, but you'd never expect a tenfold increase by going from two to twenty store associates. This same pattern will hold for any aspect of store performance. Reducing the wait time at checkout from ten minutes to one minute should significantly increase customer satisfaction. But reducing it from one minute to six seconds would have much less impact. As a retailer works on fixing a problem, eventually it reaches the point of satisfying the customer, and additional improvements provide no more gain.





**FIGURE 6-4:** Sales lift per incremental \$1 of payroll varied greatly across stores

Figure 6-5 also makes it easy to see why the sales lift from adding payroll would differ by store. For the store depicted in figure 6-5, payroll varied considerably, ranging from around \$13,000 per month to over \$21,000 per month.<sup>[7]</sup> But most stores had a relatively constant payroll. If this store's payroll had hovered around \$13,000, where the sales–payroll response curve is steep, then the sales lift from incremental payroll would be high. But if its payroll were in the \$17,000 to \$21,000 range, where the curve is flat, the incremental payroll would have no impact. We found this to be the case when we examined differences in impact of payroll on sales across stores. The stores with a relatively low level of staffing relative to sales had the highest sales lift from incremental payroll, and those that were adequately staffed relative to sales showed a lower lift.



**FIGURE 6-5:** Sales versus associate payroll at one store shows diminishing returns

Figure 6-5 suggests a natural way to think about how to set a store's staffing level. As you increase staffing, you get less and less sales return for each incremental dollar spent. If payroll is currently at \$16,000 and you raise it to \$17,000, your sales will increase from about \$290,000 to \$312,000. At a 40 percent gross margin, the profit on the \$22,000 sales bump is \$8,800, far exceeding the \$1,000 incremental cost. Increasing payroll still further, to \$18,000, raises sales by \$8,000, to \$320,000, and generates another \$3,200 in gross margin—still profitable, but less so. Raising payroll above \$18,000 appears to produce little gain and would not be profitable, so about \$18,000 would be an optimal level, according to figure 6-5.

Note, too, that the sales–labor curve in figure 6-5 is based on the current store layout and level of training. You could shift this curve upward by enhancing training and improving the store layout to make it easier for customers to find what they want.

We've also presented this analysis at a store–month level, but it's best done hour by hour for each department within a

store. A recent *Wall Street Journal* article described how several retailers, including Wal-Mart and Payless ShoeSource, are planning labor by the hour and making one of their hiring criteria the willingness of people to work flexible hours and be available when they're most needed. <sup>[8]</sup>

Best Buy provides an example of best practices by a retailer that views store labor as an asset. <sup>[9]</sup> Best Buy's journey to store labor excellence began by conducting, for a different purpose, an activity-based-costing measurement of the time it took to perform store activities. It used the analysis to tabulate the time required for store associates to perform their regular duties as well as those related to special one-off corporate programs, and to compare that with the available time. The company's analysts discovered that the required time was about double the available time. In response, store managers were choosing their favorite 50 percent of their assigned activities to perform, resulting in random execution of the special corporate programs. As Best Buy's executives considered this situation, they also noticed that they had fifty people managing the \$1 billion annual ad budget, while two managed the \$10 billion payroll budget. This had to change, and it did. Best Buy significantly increased the time and attention paid to labor management.

Let's consider how Best Buy set staffing levels. A store is an amalgam of a factory and a sales office. "Factory" tasks include receiving product deliveries, moving product from the back room to shelves as needed, putting items moved by a customer back where they belong on the shelf, and clearing debris from the aisles. Sales office tasks include managing product location and adjacencies to drive add-on purchases, and all interactions with customers, such as greeting them, asking whether they need help, and, when requested, providing advice to enable them to make a purchase decision and to find the products they have decided to buy. Store associates are thus involved in both taking care of the store (factory functions) and taking care of customers (sales functions). But by taking care of the store, employees are indirectly taking care of the customer by ensuring that fixtures are well stocked, the store is neat and tidy, and checkout is fast and pleasant.

To set staffing levels for factory tasks like unloading delivery trucks, Best Buy used a technique employed by industrial engineers to determine the time required to perform various duties. This gave the company a standard time, which could be multiplied by the number of trucks to be unloaded on a given day to determine the staffing required.

This approach doesn't work for sales. There is no standard time to sell something. To a point, the more time you spend with a customer, the greater your chances of making a sale. So to set staffing levels for the sales function, Best Buy conducts experiments, varying the staffing levels in different stores and observing how sales change. On the basis of these experiments, it can create curves like the one in [figure 6-5](#) and can set payroll, as we described above, to a level that maximizes gross margin, net of payroll cost.

Best Buy also invests heavily in training. One of its most successful innovations has been the use of the Internet to enable store employees to share knowledge. This started with installation of car audio systems, which is complicated because of the variety of car-radio combinations and risky because it involves drilling holes near sensitive areas such as gas tanks. Best Buy set up a Web site on which store employees who had figured out how to deal with challenging car-radio combinations could write instructions for their colleagues at other stores. Soon, the company allowed employees who had read an installation guide to rate its usefulness. And eventually, Best Buy decided to base employee bonuses on the number of readers and the quality ratings of these radio installation guides. Use of the Web site then took off. It has since spread beyond radios to many other areas of store operations.

As Best Buy strove to leverage its store labor, its main competitor, now-defunct Circuit City, was rushing to slash store labor costs. Circuit City announced on March 28, 2007, that it had cut 3,400 store sales-people who were paid "well above the market-based salary range for their role." <sup>[10]</sup> The *Baltimore Sun* reported that these workers made fifty-one cents more per hour than what Circuit City regarded as the average market wage. The associates cut tended to be the most experienced and knowledgeable, so Circuit City ended up reducing the average knowledge level of its personnel as it was struggling to survive.

This is as close to a controlled experiment as one could hope for in the business world: Best Buy worked to improve its employees, while Circuit City simultaneously slashed staff and pushed knowledge out the door. What were the results?

An answer can be found in a study that interviewed customers to compare the two chains' customer service. <sup>[11]</sup> One customer's comment captures well the main finding: "They [Circuit City] often don't have what I want. Best Buy just seems a little better. The salespeople actually know what they're doing." The financial impact of this has been vivid. For the first quarter of 2007, Best Buy reported an 18.5 percent profit increase, significantly beating analysts' estimates. <sup>[12]</sup> In contrast, on September 20, 2007, six months after it cut its most experienced associates, Circuit City reported a comparable-store sales decline of 7.9 percent and a loss for the quarter, and finally closed its doors completely in March 2009. <sup>[13]</sup> Can there



be a more vivid link between top-line results and the quantity and quality of store associates?

The Circuit City–Best Buy comparison is dramatic, but also presents a puzzle. The managers of Circuit City were smart, hard-working, well-intentioned folks. Many of them came from Best Buy. So the question is, “Why do smart people sometimes do apparently dumb things?”

Paul Gaffney, former chief information officer and head of supply chain of Staples, argues that retailer executives fall into two categories: (1) those who see the need to invest for future gain via increased revenue and (2) those who tend to take revenue as a given and focus on expense reduction. <sup>[14]</sup> Accordingly, Gaffney believes that retailers can fail in two ways: (1) they can invest too liberally and overexpand; or (2) overly zealous cost cutting can lead to a downward spiral of the top line forever, as happened with Circuit City. How can you walk the tightrope between over- and underinvestment? One way is to conduct experiments to measure the benefits of potential expenditures, as Best Buy does as it strives to rightsize its workforce.

Experimentation vexes most retailers because they lack the analytic sophistication to control for factors that can confound their results. (That’s why the experiment methodology described in chapter 3 can be useful.) But Staples’ efforts over the last five years to improve its store execution offer important lessons. <sup>[15]</sup> The company’s executives believe that the right level of labor investment makes a difference, but even more important, in their view, is what you do with that labor. Customers want store associates who are courteous and helpful. Staples found it can’t train courteousness, so it hires for this and for a willingness to help.

Staples provides aids that enable its store associates to excel in these areas. It first identified functions and products, such as selling technology goods like expensive printers, where customers needed the most help. Then it provided the tools that its staffers needed. For selling technology, this took the form of a Web site that compared features of various products and the relative importance of those features given what the customer wanted to do. Staples then tested this and other ways of delivering product information in the stores and found that many customers preferred old-fashioned brochures over the Internet, so this has become the main means of providing product information. Interestingly, only in the last ten years has it become practical to print large volumes of timely information in the stores. People tend to think of IT advances as silicon-age stuff like RFID, but even economical color printing can have an impact.

The cheapest way to increase the quantity of store labor is to reduce the work to be done. Staffers spend most of their time catering to customers and taking care of the store. If the time required to take care of the store can be reduced, that frees up more time for customers.

The simplest way to reduce workload is to stop doing tasks that don’t add value. A pet food retailer, for example, used to change its promotional displays weekly. Then it realized that the average customer visits once a month, so a monthly rotation of promotional materials was enough. Kohl’s department store employs a staff of industrial engineers to simplify its store processes.

Staples did a number of things to better deploy its associates. It restricted jobs like receiving goods to nonpeak hours. It also reengineered tasks, removing work that didn’t add value to the customers’ experiences. It now has a smaller number of specialists doing operational tasks like accounting reporting.

In the tension between caring for the store versus caring for customers, the former can get overweighted because most store managers are operations oriented. Talk with them, and you’ll commonly hear sentiments like “I can’t have my associates spending time with customers. They have jobs to do.” But you can influence their orientation by the questions you ask during your store visits. If you quiz them about shrink reduction and unprocessed receipts, you’ll elicit a focus on operations. But if you inquire about customer contacts and sales per associate, you’ll see their focus switch to customers and helping them find what they want.

But sometimes placing highest priority on taking care of the store is appropriate. Zeynep Ton, one of our former doctoral students and currently a professor at Harvard Business School, worked with the Borders book chain to measure the relative importance of the time store associates spend on production functions to take care of the store, such as restocking and organizing the shelves, and the time they spend on customer service, talking to and helping customers. <sup>[16]</sup> She identifies metrics to measure the effectiveness of each type of activity at Borders. Customer service is measured by mystery shoppers who visit the store monthly and complete a fifty-question survey about their interactions with store associates. Two metrics are used to measure how well the store performs production activities. First, a store-conditions score is given quarterly based on an inspection of a wide range of store conditions by a senior manager. Second, the percentage of books a store is asked by corporate to return to vendors that it actually returns is important in its own right and also an indicator of how well the store executes.

Professor Ton finds that increasing the amount of store labor improves both conformance and service quality, but only the improvement in conformance quality is associated with an increase in profitability. She argues that this makes sense because of the self-service nature of the Borders format. A customer is used to looking for a book on their own, but is not very happy if they can't find that book because it's in the back room.

In collaboration with Professor Rob Huckman of Harvard Business School, Professor Ton also measured the impact of employee turnover on store performance. <sup>[17]</sup> They find that, on average, more turnover leads to a reduction in store profitability and customer service scores, but stores that rate highly on the two execution metrics described above see no reduction in profitability due to turnover, while stores that execute poorly see a big reduction. This makes sense—if there is a good operating routine and culture of discipline in a store, then it's easier for a new employee to get up to speed.

<sup>[5]</sup>The exact methodology used to measure the impact of store labor on sales is described in detail in Fisher, Krishnan, and Netessine, "Retail Store Execution"; but briefly, we had over six thousand observations in our data on store-month sales, planned payroll, and actual payroll, and we were able to analyze this data to measure the impact of payroll on sales.

<sup>[6]</sup>A detailed description of how store-specific payroll sales lifts were computed is given in Fisher, Krishnan, and Netessine, "Retail Store Execution." A store that had high sales variation that correlated with a relatively low payroll variation would have a high sales lift, whereas a store that had high payroll variation but little sales variation would have a low sales lift.

<sup>[7]</sup>Obviously, there will be variation in sales and payroll due to seasonality, but the numbers in [figure 6-5](#) have been deseasonalized.

<sup>[8]</sup>K. Maher, "Wal-Mart Seeks New Flexibility in Worker Shifts," *Wall Street Journal Online*, January 3, 2007.

<sup>[9]</sup>This discussion is based on conversations with Kevin Freeland, chief operating officer, Advance Auto Parts, and former senior vice president of inventory management, Best Buy.

<sup>[10]</sup>As reported in "Short-Circuited: Cutting Jobs as Corporate Strategy," *Knowledge@Wharton*, April 4, 2007.

<sup>[11]</sup>May Wong, "Best Buy Service Trumps Circuit City," Associated Press, April 8, 2007.

<sup>[12]</sup>"Best Buy Reports 18.5% Increase in Profit," *New York Times*, April 5, 2007.

<sup>[13]</sup>RTT News Global Financial Newswires, "Circuit City Slips to Loss in Q2: Sees Continued Weakness in Q3," September 20, 2007.

<sup>[14]</sup>Gaffney is now executive vice president of operations at AAA Northern California, Nevada, and Utah.

<sup>[15]</sup>The discussion on Staples is based on an interview with Paul Gaffney.

<sup>[16]</sup>Ton, "The Effect of Labor on Profitability."

<sup>[17]</sup>Ton and Huckman, "Managing the Impact of Employee Turnover."

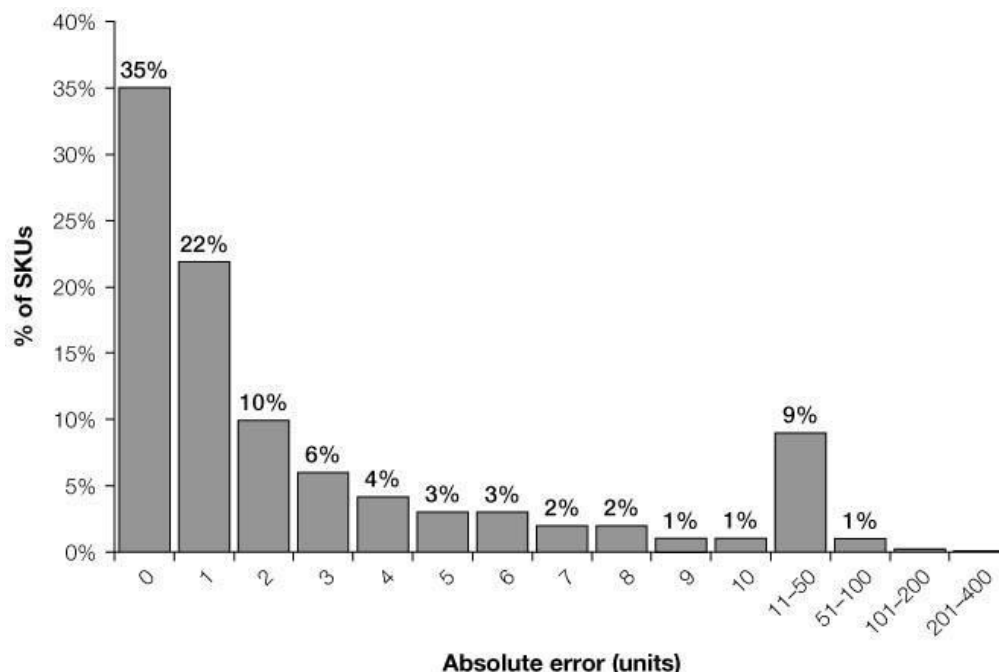
## The Keys to Customers Finding What They Are Looking For

We saw earlier in this chapter that customers finding what they came to buy was a key sales driver. Here we'll discuss some ideas retailers can use to increase the chances customers will find what they are looking for.

## Things Go Wrong in a Store

Products face a perilous journey from delivery to the back room of a store to their exit at the front door in the hands of a customer. In chapters 2 and 3, we discussed mathematical methods for creating optimal assortments and inventory levels. But mishaps in the store can undercut, even destroy, even a highly optimized plan. Your distribution center may deliver the wrong products. Your staffers may misre-cord the deliveries or forget to shelf goods. And once products make it to the floor, customers move, damage, or even swipe them.

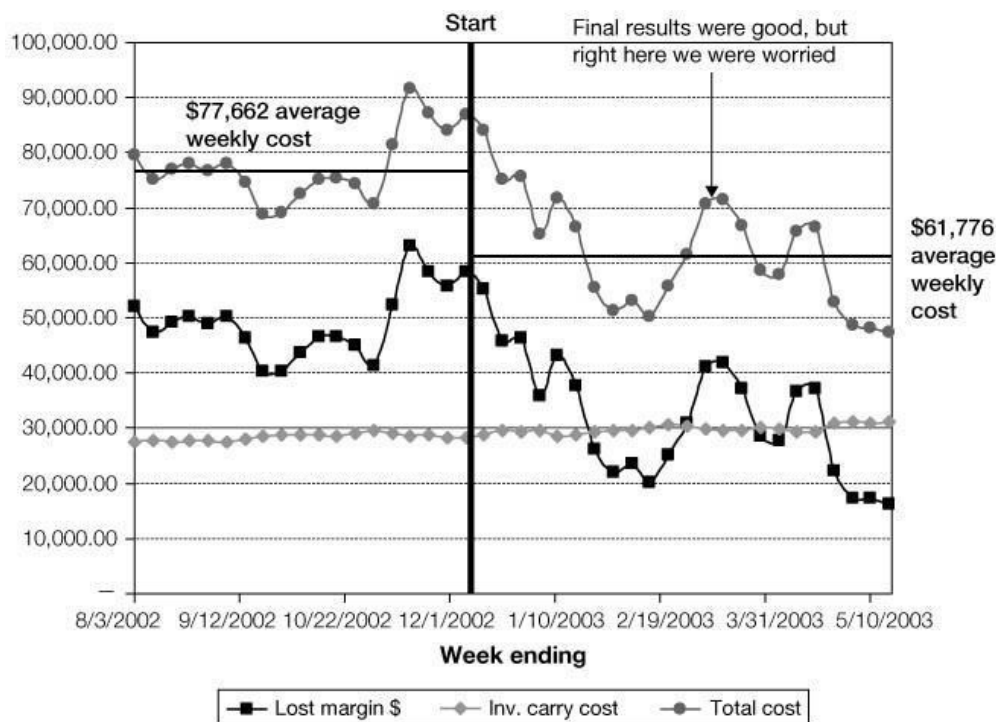
All of these problems show up as a discrepancy between what customers see when they visit and what the home office's computer says is on the shelves. Several studies that investigated store-level inventory records found that one retailer (see [figure 6-6](#)) had errors in 65 percent of its recorded store-SKU inventory levels, with an average error equal to 35 percent of inventory level. [18] Many of its SKUs were really stocked out, though the computer recorded inventory on the shelves. Likewise, a survey at the Borders book chain found that in 19 percent of the instances in which a customer requested a specific book from a sales associate and the Borders computer system said a book was in stock, it could not be found in the store. Of course this does not imply 19 percent lost sales since most customers did not enter the store seeking a specific book, but rather made a selection from the available assortment in the category in which they had an interest. We have heard similar statistics from retailers that have made store-level inventory data available over the Internet so customers can check availability before coming. They find that roughly 20 percent of the time, when the computer says an item is in stock, it cannot be found hours later when the customer arrives. Sure, someone could've bought these items in the interim. But most retailers believed that these instances were rare given the sales rates of the particular items.



**FIGURE 6-6:** This retailer found that 65 percent of its store-SKU inventory records were wrong

[Figure 6-7](#) shows the graph presented previously in chapter 3 to depict the results of testing the replenishment algorithm developed by 4R Systems and described in chapter 3. As discussed previously, [figure 6-7](#) shows that use of this algorithm significantly reduced lost margin due to stockouts and cut inventory carrying cost. Over the full nine months, the information in the graphic moves in the right direction, with the retailer improving its performance. But keep in mind that we were seeing these results week by week. So imagine how we felt in mid-March. Costs had been heading steadily down since the new algorithm had been introduced, but suddenly in mid-February, they shot up. If that rate of increase continued, the retailer's costs would have soon risen beyond where they were when the test began. We found ourselves wondering whether we'd been lucky during the first ten weeks of the test.

Then we learned that during three weeks beginning in mid-February, the retailer had taken its annual physical inventory in this department, counting every SKU in every store. It found many instances where the computer showed positive on-hand inventory, but no product could be found on the shelf. In all of these cases, it reset the computer-recorded inventory to zero. All of these newly found stockouts contributed to the lost margin estimate, causing the line representing lost margin to climb from \$20,000 to \$42,000 during the audit. Lost margin didn't truly soar; rather, these stockouts that had existed for some time were just then discovered, which caused recorded lost margin to more than double.



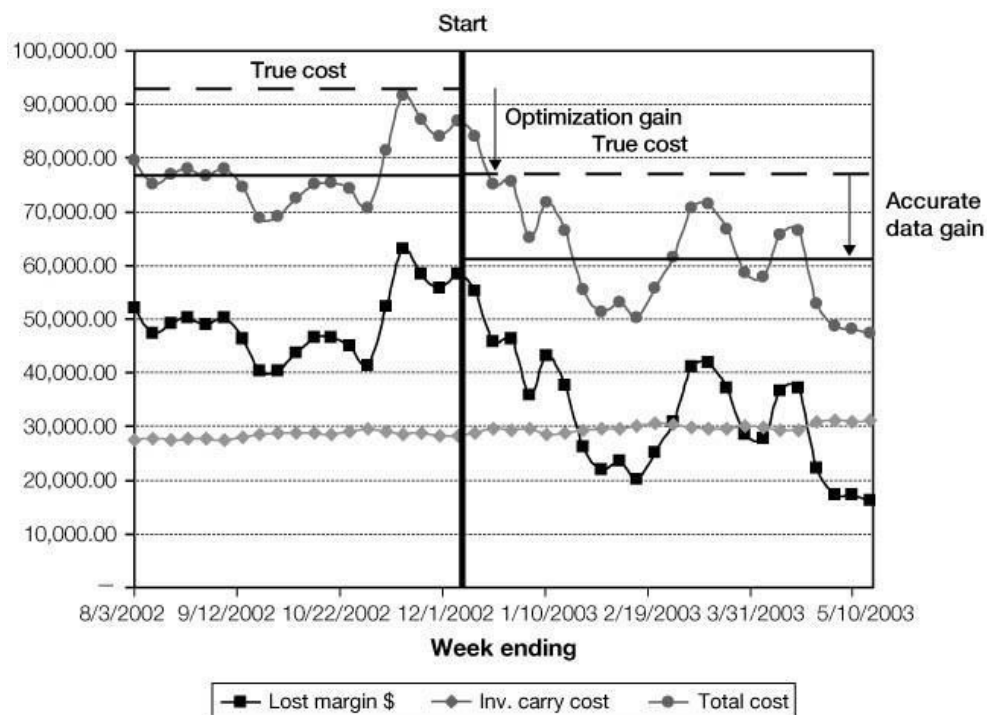
**FIGURE 6-7:** In mid-March, cost was going up, not down

Once the audit ended, the replenishment algorithm optimized against accurate data and drove cost to an even lower level than where it had been before the audit. We wondered whether our method had really produced a benefit, given the inaccuracy in the data. In the end, we concluded that the undetected stockouts had probably existed for some time before the audit. Thus the true average cost before and after use of the algorithm was higher by the \$22,000 of recently detected lost margin, as shown in figure 6-8. And the weekly benefit of inventory optimization remained about \$16,000 per week in this department. But once the better data was available, costs could be driven to an even lower level, and this “accurate data gain” shown in the figure is of a similar magnitude as the optimization gain obtained on imperfect data.

Experts often debate the relative importance of optimization versus data accuracy. We think that this debate is misguided. You’ll make your business better—and your customers happier—if you strive for both.

### What Causes Inventory Discrepancies?

A store’s contents necessarily equal the deliveries that enter through the back door, minus what leaves through the front door. If a customer can’t find an item that the computer says is in the store, there can be only three reasons: (1) errors in recording receipts; (2) errors in recording sales (or rather, in recording exiting products, which can also result from theft); or (3) the item is actually in the store, but not where it is visible to the customer (e.g., it is in the back room). Sometimes, you’ll see a combination of causes. If a customer, for example, returns a medium for a small and the salesperson simply makes the exchange without recording a return and a sale, then you’ll have both a receipt error and a sale error.



**FIGURE 6-8:** Taking physical inventory identified hidden stockouts

The Borders survey which found that in 19 percent of the instances in which a customer requested a specific book from a sales associate and the Borders computer system said a book was in stock but it could not be found in the store provides an example of the third problem— items that end up in places where customers can't find them. This firm found that a common cause of its problem was books lost in the back room. [19] Two copies of a book would arrive at a store, and an associate would shelve one and store the other in the back room. When the shelf copy sold, whoever had placed the extra in the back room would have forgotten about it (or had left the chain, since, like most retailers, this outfit had more than 100 percent annual employee turnover), so the shelf was not restocked. Because the book wasn't on the shelf, no more sales could occur, and the computerized replenishment algorithm, seeing no sales and one available copy, ordered no more. Thus sales of this title at this location would stagnate until an audit discovered the problem.

Kevin Freeland, chief operating officer for Advance Auto Parts, related a similar experience from when he was senior vice president of inventory management at Best Buy. Seeking to understand the causes of stock-outs, he hired an audit firm, which found that for 30 percent of the stocked-out items, the computer showed positive inventory. His team then did root cause analysis on these stockouts. What did they find?

Most goods that Best Buy sells are in rectangular boxes that stack neatly in the back room. But a few items have odd shapes, such as surge protectors, which hang on pegs at the checkout aisle. These irregularly shaped items caused most of the undetected stockouts. If more surge protectors were shipped to a store than would fit on the display pegs, store staffers often tossed the extras into a box in the back room and often forgot them. Just as with the books, the computers, seeing no sales and inventory on hand, would ship no more units to the store.

### Learning from the Best

Which companies stand out to you as having succeeded because of outstanding execution? [20]

We hope that Toyota and the Toyota Production System sits at the top of your list. The Toyota Production System has proved over the last half century to be a crushingly dominant system for efficiently producing affordable, high-quality cars and, thanks to its Prius hybrid, also an innovator. The Prius wasn't the first gas-electric hybrid to hit the market, but it's been the most successful, by far.

Using an auto company as a model for retail management might seem odd, but consider the similarity of the two operations. Store-level execution is about having the right product in the right place at the right time, and, for a big chain, the sheer number of stores and SKUs adds massive complexity. Now what about an auto plant? A typical one makes a car per minute, or nearly one thousand cars in a two-shift day. The assembly line will have about six hundred workstations at which a worker or a robot installs one or more parts, so the plant must have the right parts in the right place at the right



time about a million times a day. That's a lot of things that have to go right within a complex environment.

Given that stores and auto plants face similar challenges, let's consider the elements of the Toyota Production System and how they might be adapted to a store. [21]

Make problems instantly self-evident and create pressure for their resolution. *Just-in-time (JIT)* production and delivery of parts is one way that Toyota accomplishes this. When people first hear of JIT, they usually think that it aims to cut the cost of carrying inventory. In fact, one of its big efficiency gains springs from removing inventory that causes confusion and hides what is really happening.

For example, consider the experience of an auto plant we worked with that implemented JIT delivery of steering columns. Soon after, it saw the defect rate on steering columns increase significantly, which led to the plant management berating the supplier in a meeting. One of the plant manager's direct reports then sheepishly explained that the defect rate had not actually increased. Rather, the two-week supply of steering columns the plant had carried prior to JIT had given workers in the plant time to fix defects in steering columns. So inventory had been hiding from the plant manager's eyes the true defect rate, as well as the man-hours spent by his employees, who thought they were being diligent in fixing the defects.

Provide tools for identifying and solving problems. Toyota's shop-floor employees use *statistical process control charts*, made famous by Edwards Deming, the father of the quality movement in management, to track metrics critical to quality. [22] They investigate when they see a metric deviate from expectations. Any process metric fluctuates randomly to some extent. Thus Toyota has a method for determining when a deviation is too large.

Engage people in problem solving. *Quality circles* in which workers meet to discuss and resolve problems are the best-known way of engaging staff in problem solving. Employees have tons of street smarts that can help a plant run better. Allowing them to apply that knowledge makes their jobs more satisfying than the traditional "check your brain at the door" approach ever could. You might wonder why we don't see more of this. A possible reason is that involving employees in this way makes life harder for managers. While employees have tons of good ideas, they have tons of bad ones, too. Distinguishing between the two without dimming employee enthusiasm takes time and tact.

### Applying the Toyota Production System to a Retail Store

As you read through our description of Toyota's approach, you probably already identified ways in which you could apply it to reducing stockouts at your stores. But fully integrating the Toyota Way into retailing will take hard thinking over time by the entire retail industry. Below are our thoughts on how to begin that process.

Make problems instantly self-evident and create pressure for their resolution. The underlying principle of JIT is that while inventory is needed to provide product availability, too much inventory sows confusion. We saw this in both the Best Buy and the Borders examples. When a store received more inventory than would fit on the floor, it was kept in the back room, where it frequently got lost.

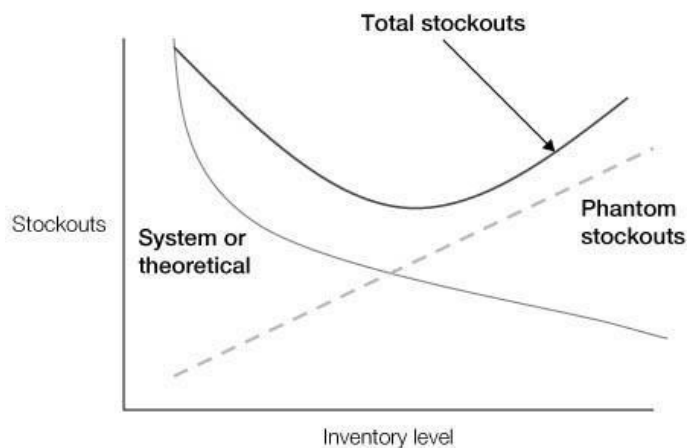
Two of our former students, Nicole DeHoratius and Zeynep Ton, mentioned previously in this chapter, worked with one of us to study the impact of inventory levels on data accuracy and store execution. [23]

The paper "Inventory Record Inaccuracy: An Empirical Analysis" studies the retailer referenced in [figure 6-6](#) and finds that more inventory results in more errors in store-SKU inventory records. The paper "The Effect of Product Variety and Inventory Levels on Retail Sales: A Longitudinal Study" examines the impact of inventory levels on sales and on the incidence of "phantom products," products that are in the store but not in a place where customers can find them—for example, lost in the back room. The authors find that more inventory increases phantom products, which reduces sales, but this reduction in sales is greatly outweighed by the direct positive impact that more inventory and product variety have on sales. An implication of this finding is that given the current store processes, it's better for overall results to tolerate a little chaos in the store via more phantom products, although the obvious question the paper raises is whether some change in store operations could reduce the phantom products caused by more inventory and variety. JIT is just such an improved process.

JIT can help retailers improve store execution. At Best Buy, once Kevin Freeland discovered the cause of phantom stockouts, he implemented a rule of shipping no more irregularly shaped items to a store than would fit in its display place. Borders adopted similar principles, including a policy called "Door to floor in 24." New stock had to be placed on the shelves within twenty-four hours. Bob DiRomualdo, former CEO of the Borders Group, expressed this principle in a graph he drew (see [figure 6-9](#)) for students while visiting one of our classes. [24]



The ultimate in application of JIT to a store would be to ditch the back room altogether. We've asked several groups of retail executives to consider how this might work. The common response is that it would solve a lot of problems. But then they offer up some reasons why it can't be done. They point out that case-pack quantities don't fit on store shelves or that a typical day's supply of product doesn't fit on the shelf. But when we press them, it often becomes apparent that they could remove these obstacles through process changes such as changing the case-pack sizes and making more frequent deliveries. In the auto industry, implementing JIT required smaller production batches, which required reengineering to reduce the time required to set up for production of a given model.



**FIGURE 6-9:** Less is more: Too much inventory increases stockouts

Can you do this at the store level? Absolutely. We know two companies that have managed to.

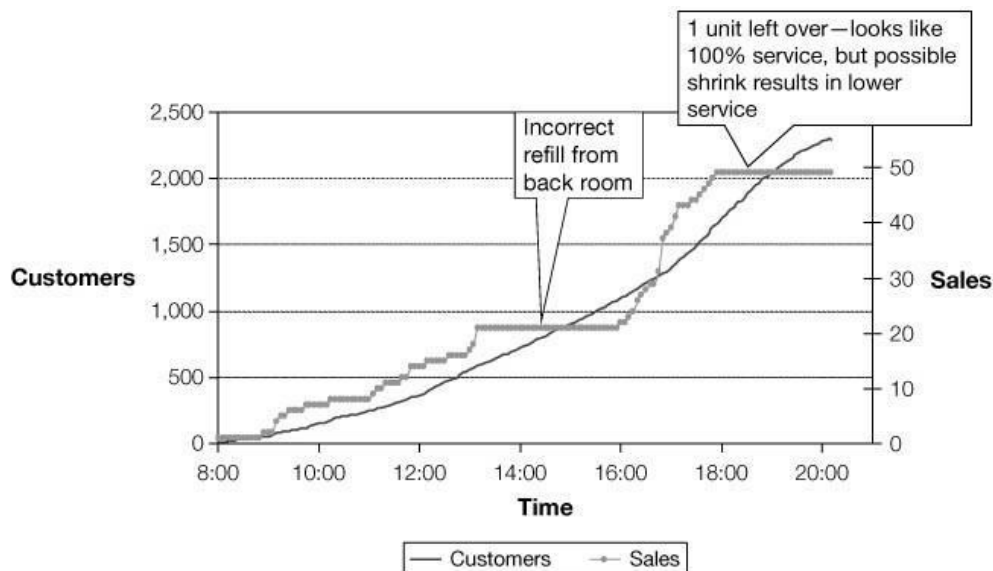
Brantano is a fast-growing shoe seller based in Belgium, and it's rapidly becoming Europe's leading shoe retailer. Jan Louagie, the chain's buying director, described its approach to supply chain management at a conference of the Consortium for Operational Excellence in Retailing held at the Harvard Business School. Brantano has tried to avoid the mistakes of other retailers. It stocks exactly one pair of each style-color-size shoe in each store. All of its stock sits on the selling floor; the stores have no back rooms. At the end of the day, an employee identifies which SKUs have sold, and reorders. This is easy to do because the shelves have space for only one pair of each SKU, making stockouts obvious. The redelivery arrives the next morning, before opening.

Several retailers at the conference challenged this system as unworkable because carrying just one of each SKU per store would lead to an unacceptable level of stockouts and thus lost sales. But Louagie argued that he could get product from his distribution center to a store faster than other retailers could get it from their back rooms. Besides, the sales rate per SKU for shoes is sufficiently low to make the lost sales negligible compared with the improved process control due to the transparency of Brantano's system.

Destination Maternity, the retailer of maternity apparel introduced in chapter 4, also stresses tight control of its inventory and frequent resupply. It makes deliveries to its stores two to seven times per week and retrieves any excess stock for return to its distribution center once a week.

Each day, before a Destination Maternity store manager can open her cash register, she verifies the count on a randomly chosen SKU number. Of course, getting the count right on just one SKU doesn't ensure inventory accuracy, but the exercise instills in the store manager an ethic of error avoidance.

Provide tools for identifying and solving problems. **Figure 6-10** provides an example of how the idea of a statistical process control chart might be adapted to reducing stockouts. Frank Jansen, director of retail R&D at Albert Heijn, the Dutch food chain, provided the information for the chart. (Albert Heijn's parent is Ahold, one of the world's largest food retailers.) The graphic shows cumulative customer traffic together with sales of a bread SKU in one store on one day. Flat regions on the sales curve correspond to times when none sold. The intervals from 13:00 to 16:00 and from 17:30 to 20:00 are long enough to suggest that stockouts prevented sales in these periods. Albert Heijn investigated and found that store-level stockouts had occurred, for the reasons shown in the figure.



Source: Frank J. Jansen, managing director, R&D, Albert Heijn.

**FIGURE 6-10:** One store's sales of a bread SKU reveals stockouts

This is exactly the idea of statistical process control (SPC)—investigate for problems when the value of a key metric, in this case the length of a period of zero sales, falls outside of reasonable limits. But what are reasonable limits? Notice that no sales also occurred from 10:15 to 11:00. Given that sales vary minute by minute, we might wonder whether those forty-five minutes of zero sales were due to a stockout or simply that no customers during this period wanted the product. In other words, how long does a period of zero sales need to be before we investigate for a problem? SPC provides a way to answer this question by specifying a method for setting control limits for a process parameter, such as a key dimension of a part being produced, such that under normal operation, the likelihood of observing a value outside of the control limits is at most one in a thousand. Thus if we see a value outside the control limits, we can be 99.9 percent sure something is amiss.

We can apply this concept to the data in figure 6-10 by using something called the *Poisson distribution*, which is a formula, discovered in 1838 by Siméon-Denis Poisson, for calculating the probability of a specified number of events (such as arrival of customers wanting to buy bread) in a fixed interval, provided that these events happen at a fixed known rate. Looking at the data in figure 6-10, we can see that twenty sales occurred from 8:00 to 13:00 and another twenty-nine from 16:00 to about 18:00, so that's forty-nine sales in seven hours, or seven per hour on average. At this rate, the Poisson distribution would assign a probability of 0.0009 to zero sales in a one-hour period, almost exactly one out of one thousand. So following SPC, we would not check for problems in the forty-five-minute period from 10:15 to 11:00 (or any of the shorter periods of zero sales), but Albert Heijn's investigation and discovery of problems in the two longer periods was consistent with SPC principles.

A simpler variation of sales-based control is what some retailers call a *zero balance walk*—that is, having employees walk the store periodically to check for stockouts. The reasoning is that while a physical audit of inventory is challenging, it's easy to count zero. If an employee finds a stockout, he investigates, including verifying computer inventory record accuracy, and remedies it. [25]

Engage your people in problem solving. Zara, the Spanish clothing retailer, also introduced in chapter 4, exemplifies the effective engagement of store personnel to enhance performance. You'll recall that, at Zara, when a customer fails to buy an item that she has been considering, a store associate will ask what she didn't like about it. Is it the color or the silhouette, or was the size wrong? Store managers collect this frontline intelligence at the end of the day and feed it to country managers and, through them, to category managers at the headquarters. There, it augments the market picture created by traditional POS data. POS data captures only what customers bought, not why they didn't buy. This is the void Zara aims to fill.

[18] Nicole DeHoratius and Ananth Raman, "Building on Foundations of Sand?" *ECR Journal* 3, no. 1 (Spring 2003); Ananth Raman, Nicole DeHoratius, and Zeynep Ton, "Execution: The Missing Link in Retail Operations," *California Management Review* 43, no. 3 (Spring 2001); Ananth Raman, Nicole DeHoratius, and Zeynep Ton, "The Achilles Heel of Supply Chain Management," *Harvard Business Review*, May 2001, 136–152; DeHoratius and Raman, "Inventory Record Inaccuracy"; and Ton and Raman, "Cross Sectional Analysis of Phantom Products." For additional information on the status of in-stocks

in the grocery industry, see Daniel Corsten and Thomas Gruen, “Stock-outs Cause Walkouts,” *Harvard Business Review*, May 2004; and Daniel Corsten and Thomas Gruen, “Desperately Seeking Shelf Availability: An Examination of the Extent, the Causes, and the Efforts to Address Retail Out-of-Stocks,” *International Journal of Retail & Distribution Management* 31, no. 12 (2003): 605–617.

[19] For additional details, see Ton and Raman, “Cross Sectional Analysis of Phantom Products”; and Ton and Raman, “The Effect of Product Variety and Inventory Levels.”

[20] This section is based in part on Marshall Fisher, “To You It’s a Store; To Me It’s a Factory,” *ECR Journal—International Commerce Review* 4, no. 2 (Winter 2004).

[21] See K. Mishina, “Toyota Motor Manufacturing, U.S.A., Inc.,” Case 0-693-019 (Boston: Harvard Business School, 1995) for an excellent description of the Toyota Production System.

[22] See W. A. Shewhart, *Economic Control of Quality of Manufactured Product* (New York: D. Van Nostrand Company, Inc., 1931); and W. Edwards Deming, *Out of the Crisis* (Cambridge, MA: MIT Press, 1986).

[23] DeHoratius and Raman, “Inventory Record Inaccuracy”; and Ton and Raman, “The Effect of Product Variety and Inventory Levels.”

[24] DiRomualdo is currently founder, chairman, and chief executive officer of Naples Ventures, LLC.

[25] See DeHoratius and Raman, “Inventory Record Inaccuracy,” for additional details.

## Conclusion

The dominant retailers of the future will be those that can harness the talent of their store associates to improve the speed and accuracy of execution and thus delight their customers by always having the right product in the right place at the right time. One way of doing that is borrowing Toyota’s techniques. If that happens, it would be fitting pay-back: one of the original inspirations for the Toyota Production System was a supermarket. As described in a company history, “[Taiichi] Ohno went to the United States to visit automobile plants, but his most important U.S. discovery was the supermarket . . . Ohno admired the way the supermarkets supplied merchandise in a simple, efficient, and timely manner. In later years, Ohno often described his production system in terms of the American supermarket.” [26] We hope that retailing will so perfect the art of store execution as to once again become a beacon that other companies in other industries look to, as Toyota did in the 1950s, for wisdom on execution and human resource management. [27]

[26] See <http://www.toyotageorgetown.com/history.asp>.

[27] See W. J. Salmon, “Retailing in the Age of Execution,” *Journal of Retailing* 65, no. 3 (1989): 368–378, for an excellent overview of the importance of execution in retailing.