

Special Report

CREATING THE
OPTIMAL SUPPLY CHAIN





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Creating the Optimal Supply Chain

As global competition and advancing technology render borders irrelevant and link companies more closely, supply chains — the network of suppliers, plants, distributors, retailers and others that participate in the sale, delivery and production of goods and services — are growing increasingly complex. No longer simply the domain of the warehouse manager or logistics director, supply chain management is viewed by most companies as a mission-critical element. In this special report, experts from Wharton and Boston Consulting Group (BCG) discuss strategies for maximizing the value of supply chains, avoiding inefficiencies, managing the omnipresent risk of disruption, and evaluating the pros and cons of supply chain enterprise systems.

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Low-cost country sourcing, outsourcing, customization, globalization and more are adding tremendous complexity to supply chains across the globe. But even as companies are rapidly adopting supply chain management strategies in an effort to keep up, experts from Wharton and BCG report that many still lag when it comes to measuring how well they are doing, and balancing the trade-offs involved in keeping service levels high and costs low.

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The process of getting the right product to the right place at the right time at the right price — the traditional touchstones of supply chain success — remains a challenging and often elusive goal. According to experts from BCG and Wharton, two key supply chain elements that are often taken for granted — coordination and collaboration — can mean the difference between the merely functioning and the profitable when it comes to procuring goods and services from vendors around the world and delivering them to global consumers as fast and inexpensively as possible.

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When it comes to global supply chains, the potential for disruption comes in many packages, from large-scale natural disasters and terrorist attacks to plant manufacturing fires, electrical blackouts, and operational contingencies such as shipping ports too small to handle the flow of goods coming into a country. Experts from BCG and Wharton say that managing supply chain disruptions revolves around two goals: first, to thoroughly understand the potential of identified risks; and second, to increase the capacity of the supply chain — within reasonable limits — to sustain and absorb disruption without serious impact.

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Supply Chain Enterprise Systems — information, communication and management technologies that support supply chain functions — have quickly become a central element of supply chain management strategy. But, implementing these systems is often a difficult undertaking with an uncertain outcome. For application of supply chain technology to be successful, experts from BCG and Wharton argue that certain elements need to be in place: namely, a clearly defined need based on supply chain strategy, as well as clear expectations about what such technologies can and cannot do for a company.



'You Can't Manage What You Can't Measure': Maximizing Supply Chain Value

In the face of increasing complexity

in global supply chains, more companies are realizing that supply chain management (SCM) is a mission-critical element, and no longer simply the domain of the warehouse manager or logistics director. But even as companies adopt SCM strategies in an effort to keep up, experts from Wharton and Boston Consulting Group (BCG) report that many still lag when it comes to measuring how well they are doing, and balancing the trade-offs involved in keeping service levels high and costs low.

"The major trends in business right now — low-cost country sourcing, outsourcing, customization, globalization and more — all create tremendous complexities in a supply chain," says Steve Matthesen, vice president and global leader for supply chain at BCG. "In most cases, however, companies have not changed how they manage this critical part of the business."

According to Matthesen, that's largely because most company executives don't have a supply chain background, and they tend to view the supply chain function as "a black box" that they don't understand or have limited visibility into. "CEOs feel that their supply chain costs too much and doesn't work very well. They're quick to ask, 'How hard can it be to get the products to the right place at the right time?' Well, it can be pretty hard," he says, citing three major factors that have dramatically increased the stress on supply chains:

- Fragmenting customer needs, resulting in a broader selection of SKUs (stock keeping units) aimed at specific consumer segments, different price points, shorter product life-cycles, and less predictable demand patterns;
- Increased cost pressures based on global competition and shareholder demands to reduce working capital;

- A new level of complexity brought on by more complicated distribution models, increased outsourcing, and "new technologies that promise efficiency but can increase complexity."

While supply chains are getting more difficult to manage, the competitive environment means that most companies need to further reduce costs. In such an environment, successful SCM "means getting better results with the same, or fewer, resources," according to Gerald P. Cachon, Wharton associate professor of operations and information management. "It's like squeezing more juice from a lemon, or maybe blood from a stone."

"The major trends in business right now...all create tremendous complexities in a supply chain."

—Steve Matthesen, vice president and global leader for supply chain, BCG

Knowing What to Measure

"You can't manage what you can't measure," says Morris A. Cohen, Wharton professor and Co-Director, Fishman-Davidson Center for Service and Operations Management. "And that's as true for supply chain management as it is for other parts of a business' operations."

He says that many SCM metrics, like inventory turnover, are already built into a typical accounting system. But some of the more sophisticated benchmarks, including measuring the level of customer satisfaction, take some work to develop.

And a key issue is simply knowing what to measure.

Matthesen agrees that the challenge is measuring the right things. “Most operations groups track a ton of metrics. The issue is whether they are tracking the metrics that will identify how they are meeting the strategic needs of the company and what is relevant to their customers.”

“When I asked a major car manufacturer if it considered customer satisfaction levels, executives advised me that they measured their customer service by the fill rate of the vehicles they sent to dealers,” relates Cohen. “Based on that, they said they had a high rate of customer satisfaction. But when I asked them to survey the ultimate customer, the buying public, they were shocked to find that consumers were not satisfied with the quality of the vehicles.”

Cohen says, however, that more companies are beginning to realize that they need end-to-end visibility in their supply chain management efforts. “SCM is about more than just sensing and responding,” he explains. “Companies need to anticipate demand, since it takes time to respond to demand-side changes. They’re learning, but there’s still plenty of room for improvement.”

Matthesen notes there is an inherent trade-off in meeting that demand: “How much service level can I give my customers before everyone screams about what it costs?” he asks. “If I have a retail store, and I want to deliver every day instead of twice a week, that will cost me more money. It’s all about service levels: how fast do I get you your product compared to when you want it, when you ordered it, when you need it. And what will it cost?”

But cost is only one lens, Matthesen argues. “The goal is to maximize overall value. You want to have low costs, but first you need to have a strategy that will let you win in the marketplace. Sometimes that strategy requires spending more cost to get a much higher margin.”

To determine this, Matthesen says companies need to make sure they have a “crystal-clear view” of what their customer really wants — what minimum service level is required to meet their needs, and what they will be willing to pay for superior service. Service level here includes all attributes of the supply chain as experienced by customers: in-stock rates, delivery time, product assortment, etc.

In general, higher performance means higher costs, Matthesen notes. “Your company needs to make sure those costs are justified.”

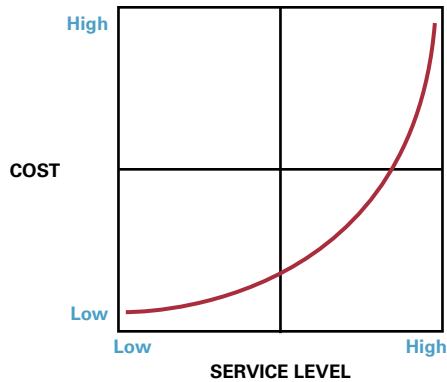
While the concept of understanding what performance level customers want sounds simple, in practice it is not. Companies have two gaps, he says: a true understanding of their current performance, and a deep understanding of what their customers need — and are prepared to pay for.

“Every company has metrics that track performance,” he says. “The key question is whether these metrics really provide visibility to performance as viewed by the customer. For example, one company measured itself by the percentage of orders received that day that were successfully fulfilled on time. Their performance against this metric was very high (over 99%). However, they didn’t track the time between a customer placing the order and receiving their goods. When measured this way, the performance was much lower than expected. The reason was that often orders were shipped from the wrong distribution center — resulting in longer delivery times and higher freight costs.”

Measuring customer needs is perhaps even trickier, he notes. “How do you know whether you would lose business or gain business if you change your service level? In most cases, there isn’t much hard data to work with. It’s also hard to ask your customers, since they are likely to respond that they want higher service levels at lower costs. You need to dive more deeply into how your customers think about your business and what role you play in their lives. [Companies] may also need to run some experiments in the field to validate their assessments.”

The Trade-offs Between Service and Costs

If the essence of supply chain management is to provide the right products in the right amounts to the right place at the right time — all at the right cost — then a concept called the “efficient frontier” is a useful way to gage capability. For any business function, an efficient frontier can be found by plotting points along a trade-off curve between two or more performance metrics. Applied to supply chain performance, “the efficient frontier is a two-dimensional space, with service level and costs along the two axes,” says Mark D. Lubkeman, a senior vice president in BCG’s Los Angeles office. “At one end, you have terrific, wonderful service at a huge cost. Or you could have lower costs and slow delivery times. The question is, where do you want to fall on the graph?”



A company's strategy should guide its supply chain design, he notes. In addition, many companies need to further segment based on the specific markets and customers they are addressing.

As an example, Lubkeman points to appliance retailing stores. "Retailers who compete from a broad SKU base have high levels of in-stock goods where the goal is 'to walk in and get it right there,'" he says. "But what about other appliance retail stores with narrower SKU mixes that don't have a lot in stock? They may provide service and attention, and will do what needs to be done to get customers just what they want."

Those two businesses and the supply chains they require are very different, notes Lubkeman. That means the efficient frontier for each is very different, too. The goal of any company, then, is to maintain a position on the efficient frontier that protects both its own interests and acknowledges the interests and needs of its customers.

"It's dangerous for any company to say, 'We have one frontier,'" Lubkeman advises. "That doesn't make sense in any business, so why should it in a supply chain?"

The key, he says, is really to "de-average" the efficiency frontier, to take apart the average and look at the individual customer segments. "For most, the efficient frontier is the point on the curve where you provide the service — no more, no less — that makes the customer happy at minimal cost," he details. "That's your frontier."

Cachon and others note that the trend toward supply chain product segmentation "generally means more complexity, which makes getting to the efficient frontier harder."

Providing different levels of customization and variety is tricky for supply chain management says Cohen. How do you ration your resources and prioritize when facing streams of demand from

different customers for the same item, customers who have paid a different price and to whom you have made different promises? "It is inefficient to chop up the supply chain for different customers, but exploiting those things keeps you on the efficient frontier," he counsels. "Keeping the supply chain flexible is key."

The efficient frontier is a helpful framework, but BCG's Matthesen is quick to point out that most companies are not getting the full value from their supply chain investments. "Your infrastructure investments will have been made based on a trade-off between service level and cost, but in many cases, companies are actually off the efficient frontier — meaning they are getting lower performance and higher costs — because of how they operate. For example, one of my clients found that they often shipped from non-optimal distribution centers based on a number of factors. This meant that they incurred extra freight costs as well as delivered a lower service level to their customers. By addressing this problem they realized improved performance at lower cost — the elusive free lunch!"

Getting to the efficient frontier is not a simple task, notes Cohen. "You may not be managing processes correctly, not using the right technology; there are a variety of reasons to explain why some companies are not on it and others are."

"If you give me a set of parameters, a particular supply chain structure and an assumed forecast, we can find the efficient frontier," says Cachon. "But no firm ever has all the information they need. What are all the costs? What are the demand distributions? What are the uncertainties in terms of weather, union strikes, and fires?"

He adds that as supply chains become more complex, they have more participants, more locations, and are geographically more dispersed. The amount of information needed to find the efficient frontier appears to grow exponentially.

One important development, the burgeoning array of technological tools and software applications, can make it easier for companies to find their efficient frontier.

"Making it to the efficient frontier involves the application of optimization techniques which require careful data collection and generally customization to the firm's particular environment," said Cachon, who studies how new technologies can improve supply chains and consults for companies that provide optimization solutions for retail customers.

“I have directly seen how the smart application of optimization technology can improve a retailer’s inventory performance, with higher service and higher turns.”

Lubkeman believes that incorporating new efficient frontier software programs can be a plus. “They basically help you optimize transactional decisions,” he said. But he adds a warning: “Unless you’ve got the underlying understanding of the customers and articulated the strategies you need to serve those customers, you run the risk of having the technology drive the strategy instead of the other way around.”

Companies on the Frontier

Hal Sirkin, a BCG senior vice president in Chicago and leader of its operations practice globally, believes that most companies are operating below the efficient frontier, and don’t realize how to make the tradeoffs that are required to get to it.

“I don’t think they understand it,” he says. “I think they want to improve their supply chain, but I don’t think they know that there is an optimal operating capability and an optimal way to operate their business.”

To improve their position on the efficient frontier, Sirkin suggests that companies take such steps as reviewing out-of-date technology and substituting more efficient programs that provide better data and analysis; reviewing their warehouse locations and designs and changing them as needed to gain greater efficiencies; and reviewing their supply chains for costs. He also says to consider staffing requirements and to look at outsourcing as a way to save money or increase service.

Matthesen adds, “While there are improvements possible within the four walls of the supply chain function, the bulk of the benefit comes when you break down the functional silos and better coordinate across the entire business, and your suppliers and customers.” Key priorities are aligning the supply chain with company strategy, aligning incentives across functions and with external parties, arming people with the right data “so they can make holistic decisions,” and building flexibility to quickly respond to demand, rather than relying on forecasts.

“CEOs need to engage with their management teams to understand how their supply chain works today — how it supports the business and how it prevents success. Together, they need to evolve the strategy and supply chain to move the business to a position where the supply chain supports and enables a winning strategy. This cannot be accomplished by the head of supply chain alone,” he says.

The pay-off is substantial. “A fully aligned supply chain and strategy delivers a superior business model,” Matthesen adds. “Given the difficulties of achieving this, the benefits are often sustainable and create real advantage. Your competitors are likely to want to copy pieces of your strategy without realizing how the entire strategy and supply chain work together — and they will not be able to match your performance.” ☉

Avoiding the Cost of Inefficiency: Coordination and Collaboration in Supply Chain Management

It's no secret that supply chain

management has moved out of the shadows when it comes to business strategy. Organizations that once focused primarily on distribution networks, profit differentiation and improved marketing for their success have now embraced integrated supply chain management as a pivotal strategy component for growth and profitability in the global economy.

But the process of getting the right product to the right place at the right time at the right price — the traditional touchstones of supply chain success — remains a challenging and often-times elusive goal. Although supply chains have undoubtedly become more sophisticated in the past few decades, a recent study in the Harvard Business Review found that improved performance hasn't always followed: "Despite the increased efficiency of many companies' supply chains, the percentage of products that were marked down in the United States rose from less than 10 percent in 1980 to more than 30 percent in 2000, and surveys show that consumer satisfaction with product availability fell sharply during the same period."

And over time, the real value of efficient supply chains and the true costs of inefficient supply chain management have been clearly documented. In a paper titled "What Is the Right Supply Chain for Your Product," Marshall L. Fisher, professor of operations and information management at Wharton and co-director of the Fishman-Davidson Center for Service and Operations Management, cited a study of the U.S. food industry which estimated that "poor coordination among supply chain partners was wasting \$30 billion annually. Supply chains in many other industries suffer from an excess of products and a shortage of others owing to an inability to predict demand. One department store chain that regularly had to resort to markdowns to clear

unwanted merchandise found in exit interviews that one-quarter of its customers had left its stores empty-handed because the specific items that they had wanted to buy were out of stock." A recent BCG study about supply chain integration for merging companies noted that "any weakness in the system on day one of the new organization's life can quickly translate into excess inventory, stockouts, or even lost customers. And the damage can be severe. In some industries, a flawed integration can drive inventory levels as much as 40 percent higher within a few short months. It can have a similar or even a greater impact on distribution costs, timeliness of deliveries, and a variety of other metrics."

"The days when business was done three doors down from the supply room are over."

—Steve Matthesen, vice president and global leader for supply chain, BCG

Supply chain experts from Boston Consulting Group (BCG) and Wharton agree that a careful coordination of supply chain elements and a high level of collaboration are among the primary criteria for creating successful supply chain management. Indeed, in a world of heavy competition, these two supply chain elements — so often taken for granted — can mean the difference between the merely functioning and the profitable when it comes to procuring goods and services from vendors around the world and delivering them to global consumers as fast and inexpensively as possible.

“The days when business was done three doors down from the supply room are over,” said Steve Matthesen, a vice president in BCG’s Los Angeles office and a supply chain expert. “Everyone is pushing for more demanding performances against stronger competitors.... My clients are going to broader ranges of SKUs [stock keeping units] in a finer and finer segmentation of customer needs, in order to meet the demands of a growing general consumer trend that says, ‘I want what I want; I want it cheaper; I want selection; and if you don’t have it, I’ll go somewhere else to find it.’ The more of this kind of complexity you have in a supply chain, the more difficult it becomes for things to work.”

“A complex chain or network of resources has to be managed so that when you go to squeeze your toothpaste in the morning, it’s there,” said Morris A. Cohen, professor of operations and information management and systems engineering at Wharton and co-director of the Fishman-Davidson Center for Service and Operations Management. “The goal is to match supply with demand at every stage, at every value-added point, so that at the end of the day there is a customer who has a demand and the supply chain figures out how to get the product to that customer at a time and place and a price that they are willing to pay.”

The elements of coordination and collaboration in supply chain management range from the very basic concepts of communication to the most sophisticated technology and electronic data interchange available, as well as managing or tracking everything from purchase orders to physical logistics of inventory and tracking the flow of funds among business partners.

‘A Huge Competitive Lever’

“The whole supply chain management job is not an easy one,” said BCG’s Matthesen, noting that the trend toward globalized outsourcing adds layers of complicating factors. “I get calls from companies who say, ‘I’ve moved my sourcing to China and my supply chain is all screwed up’ — as though this is a surprise. They may not know why, but they won’t have the right product in the right place at the right time. And they start yelling at their supply chain guys — ‘Why are you doing this wrong?’ Usually, the right product is in the wrong place, and too much of the wrong product is everywhere.”

For instance, Matthesen said, a company may have placed a similar number of ski parkas in both of its Miami and Denver stores. The Denver store is likely to sell out quickly, while the Miami store will sell

few. This forces the company either to dramatically mark down the items in Miami or ship the parkas to Denver. Either situation incurs substantial costs, for no benefit. When a company factors in other expenses — misplaced inventory taking up valuable retail space for items that would sell, for example — you have “a lot of waste built in when you make an error in your supply chain. In many cases, the underlying cause of the inefficiency lies in decisions made outside the supply chain organization, but the consequences tend to show up there.”

“That said, if you have the right process, procedures, knowledge and strategy there, you can make it work. You might never get to nirvana, but you can be smoothly functioning. And the part to me that is very interesting is that if you get this to work right, it is a huge competitive lever. Your competitors will see that you have an advantage, but it’s hard for them to replicate it. They will pick up on a few things, but they simply won’t get there.”

Matthesen pointed to Dell Computers and its supply chain model of mass customization — a computer isn’t made until there’s a custom order for it. “Dell’s whole model is based on a supply chain advantage. You have Hewlett Packard trying to keep up with them, but it has a different model, and it’s hard to catch up. For a number of legitimate reasons, HP is not willing to do everything that Dell has done, even though Dell’s particular supply chain requires all the pieces to work together. If you just take a few pieces, you end up not accomplishing a lot.”

Taking the Holistic View

The experts agreed that any supply chain has its particular “pain points,” or stumbling blocks that prevent the organization from realizing its financial and growth goals. When a pain point is coordination and collaboration, there are many different elements that should come under scrutiny, cautions supply chain authority Marin Gjaja, BCG’s vice president and director in the firm’s Chicago office.

“The first hurdle to coordination and collaboration is within the four walls of your company,” said Gjaja. The basic principle behind supply chain organization, namely, “getting the right product to the right place at the right time at the lowest possible cost, is not something that most companies are organized to do well. You are cutting across organizational boundaries, where individuals may be more interested in local optimization than global supply chain issues.”

In fact, a recent report by Supply Chain Redesign LLC in Raleigh, N.C., defines a lack of internal collaboration and business intelligence as one of the top supply chain pain points. The researchers note that, typically, “Poor communication between business units and disjointed legacy systems prevent coordination and alignment of sourcing and logistics strategies,” and, moreover, “internal business performance plans are not aligned with external customer demand requirements.”

To understand how these issues play out, Gjaja suggested a quick review of the role of the customer service center. “The main job of the customer service center is to keep customers happy. They take calls from customers who are irate, and their job is to make sure the customer gets off the phone satisfied. They will place an emergency order to have something FedEx-ed to a customer, which means you have a customer service officer who makes the customers happy but is costing the company a lot of money. I have clients who have incurred millions of dollars in shipping and freight, whose customer service departments should perhaps be reminded that they shouldn’t ship a \$3 item in a \$20 package.”

To avoid this, Gjaja suggests that the business take a more holistic view of its procedures, “We talk a lot about holistic, end-to-end supply chains looking to both meet demand and serve the customer. That is as much an art as it is a science. Most organizations are not managing the supply chain holistically, and how you coordinate every day is a real challenge. If you look at the customer service center example, you have a mix of business rules, operating processes and incentives that are set up as an individual function, and [meeting those] optimums will come at the expense of the company’s global optimums. This is at the heart of a lot of internal dysfunction in a supply chain, and it really comes down to establishing cross-functional coordination and collaboration.”

Wharton’s Cohen agreed. “I would argue, in fact, that if you haven’t figured out the internal problems — collaboration, coordination and information sharing — you are probably out of businesses,” he said.

A second hurdle comes when a company approaches this problem outside the company’s walls. “You have fewer levers that you can pull from an incentive standpoint when it comes to working on collaboration and coordination with suppliers and others outside the firm,” Gjaja noted. “What is the coordination cost of trying to work with someone outside the firm? With technology, we’ve

gotten better information. For instance, Wal-Mart can provide information to Procter & Gamble about their store because their incentives are aligned here — P&G doesn’t want its products to be out of stock any more than Wal-Mart does — but there is also a level of trust. Wal-Mart is entrusting P&G with a fair amount of operational information. Information is one thing; trust is another. Information has facets — data, understanding of intent, communication around that, and many sub-dimensions. But trust is fundamentally different. It is based on an expectation that you need to fulfill your obligations to me as my partner in this work. I think we forget that collaboration and coordination require that. And when you lose that trust, the friction and the transaction costs go up, and you start to experience more difficulty in working together.”

The ‘Right’ Supply Chain

For Wharton’s Fisher, the essence of supply chain management problems boils down to “shortages and failure to get the product, and having too much of the product. Prevent that from happening at a reasonable cost, and that’s supply chain management. Having too much of any supply is problematic. Think about apparel at the end of the season, or cars at the end of the model year. You can give back a lot of money at the end of the season in order to reduce inventory and cut losses.”

As a supply chain consultant, Fisher has worked with an internationally-known and prestigious jewelry maker, whose single biggest issue was total availability of product. “Everyone in the stores told us, ‘Just give us the product. There’s too little product. We can’t sell what we don’t have.’ And the most popular items were frequently unavailable.” The jewelry maker’s supply chain challenges? Reliable, accurate forecasting; better understanding of new product demand; and improved inventory planning at individual store levels.

Fisher’s answer to coordination and collaboration problems within supply chain management is to make sure a company finds the right supply chain for each product. “The root cause of the problems plaguing many supply chains is a mismatch between the type of product and the type of supply chain,” Fisher wrote in “What Is the Right Supply Chain for Your Product?” In the paper, he argued that products fall into one of two categories: primarily functional or primarily innovative.

According to Fisher, functional products, which include products like milk and food that satisfy basic needs and can be sold in a wide range of

retail outlets like grocery stores, are characterized by: predictable demand and easily matched supply and demand patterns; low profit margins; an average stockout rate of 1% to 2%; virtually no forced end-of-season markdown; and low product variety. A functional product requires a supply chain that delivers what Fisher calls a “physically efficient process,” one designed to “supply predictable demand efficiently at the lowest possible cost.”

But, said Fisher, innovative products like new computer systems, video entertainment products and some fashion trends (like jewelry) have unpredictable demand; an increased risk of shortages or excess supplies; a potential for higher profit margins; high product variety; an average stockout rate of 10% to 40%; and an average forced end-of-season markdown of 10% to 25%. Innovative products require a “market-responsive process” supply chain, designed to “respond quickly to unpredictable demand in order to minimize stockouts, forced markdowns and obsolete inventory.”

Using sophisticated mathematical analysis and extensive data collection, Fisher helped create a company called 4R Systems, Inc., an analytical software business designed to improve supply chain forecasts and help companies make better decisions about their inventory dollars, particularly for short life-cycle products. One of the company’s programs, for instance, takes point-of-sale and inventory data from retail venues in the home fashion industry and converts that into information that enables the company to optimize stock levels from its distribution centers to client retail locations.

Cohen cautions, however, that coordination of information doesn’t always solve supply chain problems, particularly in certain industries where “the information is always changing, due to the nature of the beast when an industry supports so much inherent uncertainty.” He cited a study he worked on regarding the semi-conductor equipment industry and its relationship with suppliers. “One of the things we found is that due to their business cycle, there is rapid obsolescence in the product, no matter how much information coordination they experience. If they don’t have enough capacity, it’s very expensive, but if they have unused capacity, it’s very difficult to balance, too. With the uncertainty so great, they will never arrive at the best equilibrium just by collaborating. In fact, it is difficult to see equilibrium when everyone is acting in a collaborative fashion.”

Which begs the question: Despite increasing attention paid to supply chains, why are very few firms successful at integrating processes and aligning incentives?

Says BCG’s Gjaja: “My suspicion is that the complexity of product-based companies where supply chain is relevant is expanding at a faster rate than information technology can keep up with. By that, I mean that the number of products and different options and customers is expanding — say it’s 100 products times 100 customers times 100 different ways of getting there. You can see that you get this multiplied effect of complexity. The tools you have to deal with it can only evolve so quickly. It will always be a very difficult challenge — it’s one of those perennial issues in management, one of those evergreen topics that you just have to stay one step ahead of.”

And Fisher adds that no matter how “synchronized and seamless you think your supply chains are, you are left with the uncertainty of consumer demand. People don’t like the fact that demand is unpredictable. Even if you have maximum coordination and a high degree of communication, the one person you can’t coordinate with is the consumer.... With supply chain management, you have to accept uncertainty.”

The optimum answer, according to BCG’s Matthesen, is to “design a supply chain that is based on a sound strategy, ensure all parts of your supply chain — both internally and externally — have access to good and consistent data, and empower people to make decisions quickly. Build a supply chain that is comfortable with uncertainty and quick to react by taking down the barriers that prevent success.” 🌐



Flexibility in the Face of Disaster: Managing the Risk of Supply Chain Disruption

When it comes to global supply chains, the potential for disruption comes in many packages, from large-scale natural disasters and terrorist attacks to plant manufacturing fires, widespread electrical blackouts, and operational contingencies such as shipping ports too small to handle the flow of goods coming into a country. Today's leaner, just-in-time globalized supply chains are more vulnerable than ever before to natural and man-made disasters — a reality that creates greater demands on companies to keep supply chains flexible and integrate disruption risk management into every facet of supply chain operations.

"So many companies are trying to get their piece of the global advantage that the operational risks and possibilities of disruption are pretty high," said Dave Young, senior vice president in the Boston office of the Boston Consulting Group (BCG). And one of the biggest challenges in managing these disruption risks "has to do with the fact that global supply chains are in a state of continuous evolution."

Like Murphy's Law, disruptions in supply chains seem inevitable — a principle that Paul R. Kleindorfer, Wharton professor of operations and information management, argues "should be a high priority topic for senior management and shareholders."

"Disruption risk has received increasing attention in the last few years," Kleindorfer, co-director of Wharton's Risk Management & Decision Processes Center, wrote in a recently published paper, "Managing Disruption Risks in Supply Chains." "The reason is undoubtedly that, with longer paths and shorter clock speeds, there are more opportunities for disruption and a smaller margin for error if a disruption takes place."

Given the high stakes, experts from BCG and Wharton generally agree that managing supply

chain disruptions revolves around two goals: first, to thoroughly understand the potential of identified risks; and second, to increase the capacity of the supply chain — within reasonable limits — to sustain and absorb disruption without serious impact.

Disruptions in supply chains "should be a high priority topic for senior management and shareholders."

—Paul Kleindorfer, professor of operations and information management, Wharton

Identifying the Risks

Kleindorfer has identified three main categories as the primary sources of supply chain disruption risk: operational contingencies, which include equipment malfunctions and systemic failures, abrupt discontinuity of supply (when a main supplier goes out of business), bankruptcy, fraud, or labor strikes; natural hazards such as earthquakes, hurricanes, storms; and terrorism or political instability.

Which category would a company consider the most threatening? "Companies generally focus on the risks that they can see," said Steve Matthesen, a vice president in BCG's Los Angeles office. "And, to be honest, most of us focus on those risks that someone would hold us accountable for. So when you get to [a risk such as] political instability or terrorism, most people don't worry about it that much, or they worry but they don't focus on it. For instance, you generally are not going to get fired for not having a plan if a terrorist blows up your building."

In a report on “Risk Analysis and Risk Management in an Uncertain World,” Howard Kunreuther, co-director of Wharton’s Risk Management Center, explains why. “When it comes to developing a strategy to reduce the risks of future terrorist activities,” Kunreuther argues, “we do not know who the perpetrators are, their motivations, the nature of their next attack and where it will be delivered. Hence it is extraordinarily difficult to know what protective actions to take.

“We know from behavior following natural disasters, such as Hurricane Andrew or the Northridge earthquake, as well as technological accidents, such as the Bhopal chemical explosion or the Chernobyl nuclear power plant meltdown, that individuals and companies are not very concerned about these events prior to their occurrence,” he continues. “Only after the event when it is often too late do they want to take protective action. Over time this concern dissipates. Thus it is very common for people to cancel their flood or earthquake insurance policies if they have not experienced losses from one of these events in several years.”

But it’s a different story when the supply chain disruption is highly visible and forecast by worldwide trends. For instance, what happens if a company ships products into the ports of Los Angeles, the entry point for almost half of the goods coming into the United States, and gridlock hits just before Christmas (as it did in 2004)? George Stalk, Jr., a BCG senior vice president in Toronto, noted in a recent BCG paper on volatile supply chains that when this very real scenario played out at the Los Angeles-Long Beach ports last winter, “nearly 100 cargo ships floated around cooling their keels and waiting to be unloaded — a process that was taking up to twice as long as normal.” In a case like this, says Matthesen, “the CEO of a company might say, ‘This is your job, Supply Chain Person.’ And that person would get flak.”

Discovering Vulnerabilities

Supply chain experts suggest that the key to first mitigating and then managing disruption risks is understanding a company’s vulnerabilities.

“Your turn the problem on its head,” says Kleindorfer. Businesses determine and review the consequences of various sources of disruption to a global supply chain “through the process of discovering vulnerabilities. Whatever the source of those might be — hazards, strike, terrorists’ bombs or some unforeseen event — the first thing you

do in the risk assessment process is to look at vulnerabilities in general, and then you have to have supply-chain-wide visibility of vulnerabilities.”

Experts note that vulnerabilities need to be analyzed throughout the supply chain — from critical processes and equipment to manufacturing and warehousing sites, from technology and transportation to distribution and management. Granted, this is not always easy, Kleindorfer noted, because it “requires information sharing across supply chain participants.” Typically, a company with “special vulnerabilities may have every incentive to hide these from other supply chain participants.” While current communication and information technologies such as ERP (Enterprise Resource Planning) systems and CPFR (Collaborative Planning, Forecasting and Replenishment) methods allow for improved information integration and supply chain visibility, “vulnerabilities to disruption are, by their very nature, more difficult to identify.”

At the Wharton Risk Management & Decision Processes Center, supply chain experts and industry leaders have over the last decade developed a multi-step approach to disruption risk management. It addresses ways to help companies identify vulnerabilities, and includes the following four initial steps:

- “Obtain senior management understanding and approval, and set up organizational responsibilities for managing the disruption risk management process.
- Identify key processes that are likely to be affected by disruptions and characterize the facilities, assets and human populations that may be affected. Key processes typically include new product development, supply chain operations, and manufacturing. Key assets include both tangible assets (property and inventory) as well as intangible assets (brand image, public perceptions).
- Traditional risk management is then undertaken for each key process to identify vulnerabilities, triggers for these vulnerabilities, likelihood of occurrence, and mitigation and risk transfer activities. This is the heart of the traditional industrial risk management process for disruption risks.
- Reporting, periodic auditing, management and legal reviews of implementation plans and ongoing results (e.g., of near-miss management and other disruption risks) complete the business process for disruption risk management. The audit process . . . is essential to providing on-

going feedback to management and supply chain participants on the performance of their facilities and their compliance with agreed, supply-chain wide standards.”

By taking these four steps, Kleindorfer argued, a company defines its own “risk architecture — which is a way of looking at the world that allows you not to be generally worried all the time.”

Contingency Planning and the ‘Triple-A’ Threat

What happens when a company that understands its vulnerabilities as well as its overall risk architecture confronts disaster? Consider the following example.

In March 2000, a Philips manufacturing facility in Albuquerque, New Mexico, was destroyed by fire; the facility supplied radio frequency chips (RFCs) for cellular telephone giants Nokia and Ericsson, and the way the two companies responded has become a textbook case for the dos and don’ts of disruption risk management, and a lesson in how the proper approach can turn into a competitive advantage.

When the fire wiped out the plant, both companies instantly lost a key link in their supply chains. As reported in *Business Week*:

“Nokia’s response was two-fold. The company immediately created an executive-led ‘strike team’ that pressured Philips to dedicate other plants to making the RFCs that Nokia needed. Nokia engineers also quickly re-designed the RFCs so that the company’s other suppliers in Japan and the United States could produce them.” The plan worked: “Through quick action, Nokia was able to meet its production goals, and even boost its market share from 27% to 30% — a level more than two times that of its nearest rival.”

“Ericsson, however, reacted much more slowly. The company did not become aware of the supply problems for weeks, by which time its ability to meet customer demand had been seriously compromised. And because Ericsson relied exclusively on the Albuquerque plant for the RFCs, Ericsson — unlike Nokia — found itself with nowhere else to turn for these vital components. . . . Ericsson posted a nearly \$1.7 billion loss for the year, and ultimately had to outsource its cellular handset manufacturing business to another firm.”

Contingency planning — the act of knowing secondary sources to turn to for supplies, manufacturing, or transportation needs when primary

sources are interrupted — has recently received a lot of attention and research from supply chain experts. Highlighting the value of contingency plans, the story of Nokia and Ericsson was incorporated into a recent *Harvard Business Review* article called “The Triple-A Supply Chain.” Arguing that supply chains can no longer afford to be merely fast and cost-effective, author Hau L. Lee argued that “great companies create supply chains that respond to sudden and unexpected changes” by building “Triple-A” supply chains that are agile, adaptable and aligned. Lee outlined objectives and methods that companies should follow to achieve all three Triple-A goals — a veritable blueprint for disruption risk management through the pursuit of flexible supply chains:

- Agile supply chains “respond quickly to sudden changes in supply or demand.” What methods can companies use to incorporate agility in supply chains? “Continuously provide supply chain partners with data on changes in supply and demand so they can respond promptly; collaborate with suppliers and customers to redesign processes, components, and products in ways that give you a head start over rivals; finish products only when you have accurate information on customer preferences; keep a small inventory of inexpensive, non-bulky product component to prevent manufacturing delays.”
- Adaptable supply chains “adjust supply chain design to accommodate market changes.” Methods to use? “Track economic changes, especially in developing countries; use intermediaries to find reliable vendors in unfamiliar parts of the world; create flexibility by ensuring that different products use the same components and production processes; create different supply chains for different product lines, to optimize capabilities for each.”
- Aligned supply chains “establish incentives for supply chain partners to improve performance of the entire chain.” Methods to use? “Provide all partners with equal access to forecasts, sales data and plans; clarify partners’ roles and responsibilities to avoid conflict; redefine partnership terms to share risks, costs and rewards for improving supply chain performance; align incentives so that players maximize overall chain performance while also maximizing their returns from the partnership.”

Redundancy and Other Strategies for Flexibility

When it comes to maintaining flexible supply chains that can respond to disruption, BCG's Young suggests that companies plan for the inevitable by incorporating a few simple steps. "A lot of this is good old-fashioned block and tackling, but it takes discipline and segmentation," he said.

First, companies should carefully segment their products and product lines in order to understand which ones are more time sensitive and critical than others. "If I'm going to spend time thinking about how I can bullet-proof the supply chain or make it more resilient, I'm going to do it around products or processes where time is most critical," said Young.

Second, once these areas have been identified, "you want to create a highly detailed assessment of all elements of the supply chain. Identify along that path the sources of greatest risk and look for ways to manage that — hedging inventories, looking at redundant carrier options, for instance. You want to build in redundancy for these critical items."

BCG's Matthesen notes that when planning for redundancy, companies have to ask, "How much protection can you take?... It will depend a lot on what your business margins are and what the costs of failure are."

But, Young cautions, "you can only have time and money to build in so much systems' redundancy." Because building in redundancy isn't cheap. In a recently published newspaper article, BCG's Stalk and Young wrote that offshore operations often expect and therefore plan for the unexpected by "building redundancy into the system, and probably back home. If such redundancy is included in the initial 'cost-advantage' calculation, the company may find it will take 2 to 2½ years to recoup all the start-up costs associated with offshore sourcing and manufacturing."

BCG's Matthesen notes that when planning for redundancy, companies have to ask, "How much protection can you take? It's like insurance — only some things are worth insuring against. It will

depend a lot on what your business margins are and what the costs of failure are. For instance, I work with a pharmaceutical company that maintains two different plants. Either one would serve the entire world of demand for their products. But one plant is located in an earthquake zone; the other is only 25 miles from an airport, and they worry that an airplane could conceivably crash into it. So they maintain both plants. In their case, they justify the expense due to high margins and the human lives at stake."

When it comes to redundancy planning, transportation options or redundant carrier options are often high on a company's list. To figure out why, look no further than the shipping backlog in Los Angeles last winter. But building in transportation redundancy or shipping flexibility is tricky. "If your shipment is on one of 50 ships waiting to unload, your choices are a bit limited," said Matthesen. Often, companies can only hedge these risks by making sure their shipments are last on and first off.

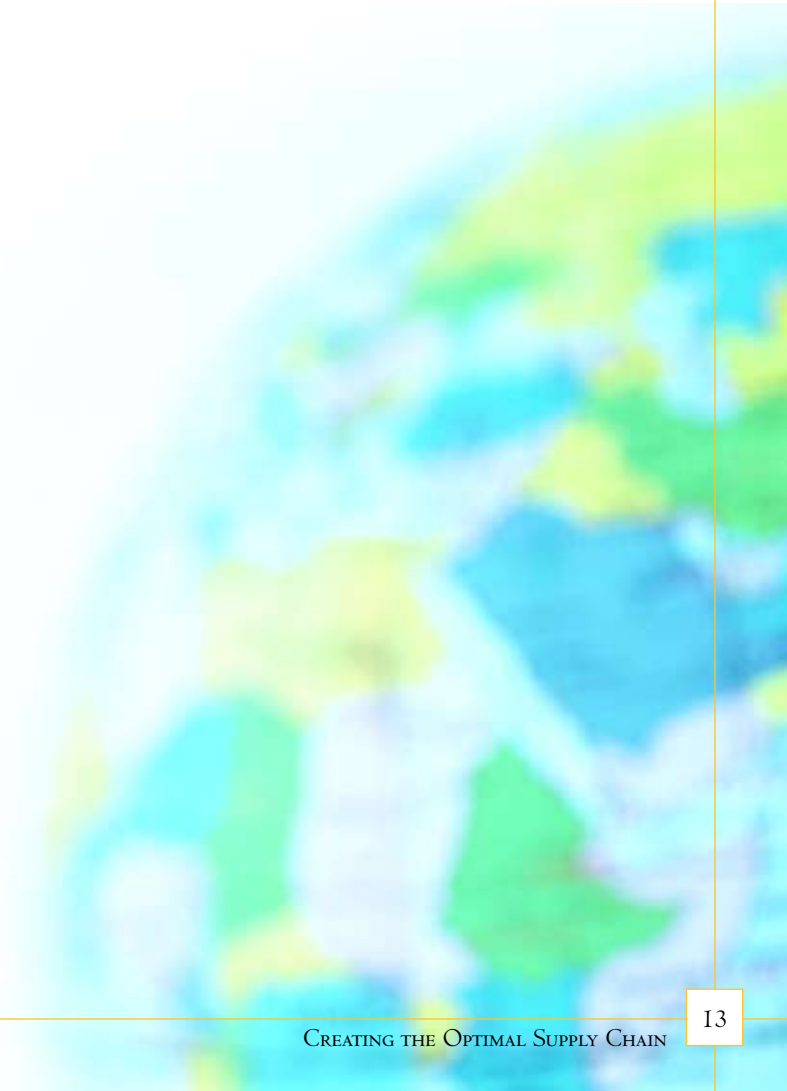
In anticipation of rail or trucking strikes, companies often split their shipping business in order to build transportation relationships with more than one company. "People do this a lot. They offer 80 to 60 percent to one supplier, and 20 to 40 percent with the other. But how important are they if they are only doing 20 percent of their business with a company? Do you really achieve anything? I have one client who is a distributor, and we were looking at the level of redundancy they had. We discussed what would happen if you gave all of the business to one carrier, and then that carrier had a strike? Shouldn't you keep two carriers? But the CEO said, 'Our margins are low. It makes business sense to sole source, and if we get into a strike situation, well, that will have to be the cost of doing business.' And I think that this was the right call in that situation."

Matthesen allows that the essence of risk management boils down to adequately appreciating the risks that a company is exposed to for different areas of business; identifying the 'choke points' along the supply chain that would completely harm a business if disruption occurred; and then taking the right set of preventative measures to allow for some protection, remembering to periodically review your supply chain plans and risk assessment priorities.

"But the real story is that you don't have to run faster than the bear; you just have to outrun the folks you are with," said Matthesen. "If you can

figure out that there has been a disruption faster than others in your industry, you have a lot more options. If you are the first person to come to a Federal Express and say, 'UPS is going to have a problem and I need your help' — you get a good response. If you are the fifth guy to come over, now they have a problem because their capacity is full. This is the case with many disruptions, and this is the part to me that's most interesting about the Nokia and Ericsson example. It's not that Nokia had all these backup plans, but that they identified something was up and they acted on it before anyone else identified the issue."

The bottom line? "You can't protect against every risk," said Matthesen. "But if you can be quick to identify that there is a problem emerging and you've thought about it a little bit in advance and mobilized your options, that's the essence of risk management." ☺



Supply Chain Enterprise Systems: The Silver Bullet?

Contemporary supply chains stretch

around the globe — a complicated matrix that reflects the easing of international trade barriers, an increase in global trade, and dramatic growth in business outsourcing and offshoring to low-cost suppliers. Needless to say, the trends toward globalization have significantly increased the number of players involved in bringing a product to a consumer.

“If you were looking down on planet Earth, you would see a lot of ships moving from China to India, from Europe to the United States, along with a huge set of domestic activity with truck and rail and also internationally with air and cargo to support the sheer volume of international trade,” said Paul R. Kleindorfer, Wharton professor of operations and information management.

While there’s no doubt that technology has moved front-and-center in today’s supply chain, the application of technology has emerged as a leading “pain point” in the field of supply chain management.

But, Kleindorfer acknowledges, there is something “going on simultaneously with this huge set of activity that you may not see.” Namely, an equally dramatic, “absolute revolution” in information, communication and management technologies that support supply chain functions and are known as supply chain enterprise systems. “The fabric

beneath this increased trade is a fantastic ability to manage large volumes of data.”

Virtually nonexistent a decade and a half ago, supply chain enterprise systems affect numerous processes, ranging from scheduling orders, managing production, controlling inventory and purchasing to sales support and customer relations management. These systems are represented by a seemingly endless alphabet soup of technology acronyms, such as ERP, SCM, CRM, and RFID. Supply chain enterprise application vendors such as SAP, Oracle, Sage Group and Microsoft, along with supply chain support vendors like i2 Technologies, 4R Systems, Manugistics and MCA Solutions, have worked to create technological and software solutions that are designed to help improve not only supply chain performance but also corporate financial returns and customer satisfaction. According to AMR Research, corporate investments in enterprise systems totaled more than \$38 billion in 2001, with an expected increase of 9 percent by the end of 2004.

While there’s no doubt that technology has moved front-and-center in today’s supply chain, the application of technology has emerged as a leading “pain point” in the field of supply chain management. According to supply chain experts from the Boston Consulting Group (BCG) and Wharton, applying enterprise systems technology to supply chains is often a difficult undertaking with an uncertain outcome; in reports and cases cited by both BCG and Wharton, companies that have implemented supply chain technologies often fail to leverage the new systems for a competitive advantage. A recent study from the Georgia Institute of Technology analyzed the impact on corporate performance of three commonly used technological enterprise systems: Enterprise Resource Planning (ERP) systems, which integrate data required to

manage a business and automate all of the transactions needed to support an entire enterprise; Supply Chain Management (SCM) systems, implemented as “add-ons” to existing systems that “look beyond enterprise transactions and out into the supply chain to provide supply-chain-wide planning and execution support;” and Customer Relationship Management (CRM) systems, which “help track and manage customer information and relationships with the goal of increasing customer loyalty and retention.” The authors found that with the exception of SCM systems, the enterprise systems simply do not “positively affect shareholder value and operating performance.”

For application of supply chain technology to be successful, the experts agree that certain elements need to be in place: namely, a clearly defined need based on supply chain strategy, as well as clear expectations about what such technologies can and cannot do for a company. When facing the typically high cost of these systems, in many cases the question is not which system to purchase, but whether or not a company will benefit from investing in one.

Though the questions are often clear, the answers are not. “Once you get into technology,” admitted Steve Matthesen, a vice president in BCG’s Los Angeles office and a supply chain expert, “it is a ridiculously huge space.”

Support for the ‘3Bs’

As international trade tops \$8 trillion in imports and exports, effective and efficient supply chain management translates into improved return on assets and a distinct competitive advantage. In a chapter on global supply chains in a recently published book called *The Wharton-INSEAD Alliance on Globalizing: Strategies for Building Successful Global Businesses*, by Cambridge University Press, Kleindorfer identifies technology as one of the three main pillars that support the burgeoning supply chain.

“A supply chain is essentially a network consisting of suppliers, manufacturers, distributors, retailers and customers,” wrote Kleindorfer. “The network supports three types of flows that require careful design and close coordination: 1) material flows, which represent physical product flows from suppliers to customers as well as reverse flows for product returns, servicing and recycling; 2) information flows, which represent order transmission and order tracking, and which coordinate the physical flows; and 3) financial flows, which represent credit terms, payment schedules and

consignment arrangements. These flows are sometimes referred to as the ‘3Bs’ of supply chain management; boxes, bytes and bucks.”

The coordination of these three flows within the supply chain, Kleindorfer argues, is supported by three pillars: processes, organizational structures, and “enabling technologies, encompassing both process and information technologies.” When applied correctly, technology has helped businesses conquer what Kleindorfer calls “arguably the central problem in supply chain management” — efficient coordination of supply and demand.

And companies seem to recognize the potential of technological tools in managing their supply chains: According to AMR Research, the enterprise applications market (especially ERP and SCM systems) will continue to expand, from \$20.7 billion in 1999 for both ERP and SCM markets to nearly \$42 billion in 2004. And what do these systems promise to deliver? A lot, judging by the following three examples:

- SAP, a leading supply chain management vendor, allows that its supply chain management system called “mySAP SCM” helps companies build “adaptive supply chain networks” through planning, execution, coordination, and collaboration. The collaboration function alone promises to enable companies to “share information and set and achieve common supply chain goals through collaborative planning, forecasting, and replenishment (CPFR), support for vendor-managed inventory (VMI), and support for supplier-managed inventory (SMI).”
- MCA Solutions, founded by Wharton operations and information management professor Morris A. Cohen, promotes its Service Planning and Optimization (SPO) software as a product that helps companies “determine the most profitable and efficient supply chain design,” forecasting “parts demand and determination of optimal stocking lists and stocking levels” and providing parts tactical planning “to meet service level objectives at lowest possible order cost.”
- And then there’s 4R Systems, Inc., an analytical software company designed to improve supply and demand forecasts and help companies make better decisions about their inventory dollars, particularly for short life-cycle products. Created by Marshall L. Fisher, Wharton professor of operations and information management, 4R promises that its products “take the guesswork out of product forecasting, replenishment and allocation.”

Technology in the Future

When it comes to emerging supply chain technologies, experts point to advanced technologies for retailers, including hand-held scanners; products that manage inventory and forecast demand while communicating this information to the supply chain; vendor-managed inventory or VMI, where a vendor or supplier manages inventory for a retailer (one successful example is Procter & Gamble, which manages its inventory in Wal-Mart stores); and improved technology for CPFR.

But perhaps the technology that's getting the biggest buzz along the supply chain right now is RFID (Radio Frequency Identification), a method of remotely storing and retrieving data using devices called RFID tags. The new technology is being touted as the ultimate positioning device (is the item on the shelf or in the back room? On a truck or inside a ship?), and one poised to replace bar codes to measure the flow and location of goods.

To date, RFID has proved useful in tagging and tracking large containers of goods. But so far, the expense of the individual tags prohibits their use on individual stock items, "and that's where the benefits and savings are, from knowing where the item is on the shelf," said Serguei Nettissine, Wharton professor of operations and information management. Wharton colleague Fisher agreed: "The quality of data that retailers have on inventory levels in their stores is far from perfect. And that's where RFID could come in."

However, RFID illustrates a problem that is at the crux of adopting such technology: BCG and Wharton experts note that one of the real challenges associated with RFID — in addition to the cost — is actually using the information it produces, and turning that information into a business advantage. "The people promoting the technology are talking about how valuable it is to know all of this information and have it in real time," Wharton's Cohen said. Just having better information is worth something, he adds, but "figuring out what to do with it should be worth even more."

Garbage In, Garbage Out

For those companies that do know what they want from their data, BCG's Matthesen as well as Boston-based BCG vice president Massimo Russo both cautioned that every technology system is only as good as the data it has access to. "There is the issue of garbage in, and garbage out," said Russo.

Matthesen outlined this example, using a retail supply chain that has access to forecasting and demand planning technology. "Let's say I have 800 stores and point-of-sales systems, so in theory I have quite a bit of data to use, and I need IT help to use that data and forecast with lead times of up to six months out. But IT needs more input than just raw data. I may look at the data for the prior season and see that there is a big spike in a certain week of sales. Is that due to the fact that I ran a sale? Or due to the fact that we had a snowstorm and we sold more snow shovels? Is that a normal seasonability spike, or a Mother's Day sale?"

"You need a lot of human intervention for the forecasting technology to work," Matthesen continued. "My experience is that companies put a lot of money into IT systems and then need help figuring out how to use them better. For instance, how do you feed good data into the system? How do you update the information, so the system can recalculate the real math that is in there? A lot of these systems are set up and not tuned up on a regular basis, yet the software doesn't know that. Where you get into real problems is when it has been years [since you updated the data], or if several functions have since merged."

And data intervention, he said, is dictated in part by the operation. Pharmaceutical supply chains — which exhibit "extremely high margins, and people will die if you don't deliver the product" — are managed "differently, with second sourcing and buffers. If you have a business with a vendor base that is quite stable, it's pretty simple. If you have a business that specializes in fashion items where vendor bases move around and there is a lot of change in off-shore production, you may need to be on this much more — maybe monthly would be required. Otherwise, all hell breaks loose."

Russo agreed that when it comes to data configurations, it is important to "constantly refocus, but not reconfigure. The more you get to real-time plans, the more you have to update."

Matthesen also notes that there are common "mistakes people make in the IT space when managing their supply chain. On one extreme, they do everything manually with Excel spread sheets, and it's hard to have good, reliable data delivery that way. The other extreme is that they put in too much technology — and expect it to do too much. In some cases, people have added layers of systems — sometimes connected, sometimes not. If you have 15 systems and they have to talk to each other at once, the systems can get a little crazy."

Even worse, he adds, “people don’t like to believe the machine. Even when the system tells them to buy 10 units, they say, ‘I don’t think I’m going to sell 10 units,’ and they over-ride the system with higher or lower numbers. Even if you can see that the math is right, people aren’t willing to listen to it. I’m not sure of a single company who lets the system do its thing. They are always tweaking.”

This tweaking can wreck havoc, particularly in systems where the architecture doesn’t give you the visibility to the math inside the proprietary model. “You don’t know exactly what the software is doing, what settings work better than others,” said Matthesen, “so changing the variables can make matters worse. If the outputs don’t seem right, it’s important to identify why, and fix it, rather than just changing the answer. If you set up the system right, hopefully it is giving you better answers than you can get on your own. Otherwise, why have it?”

Touchstone to Technology Success: Know your Supply Chain and more

In answer to Matthesen’s question, Russo says the first step in choosing the right supply chain technology is to fully understand your own supply chain and strategy.

“It should be the business that drives you to get one of these tools; otherwise you could end up with a stranded asset that you cannot use. Let’s say you have a dependent demand supply chain: I order a car and all the parts that go into that car, and I can define all the demand that I need in that supply chain. Then there is a service supply chain for an airline, and I have to put inventories in the field to use to service my airlines. Those are two very different supply chains that require different algorithms. How do I set my supply chain strategy? Where should I have a warehouse? It’s less a tool and more of a model that you need to understand.”

And before investing in new technology systems, BCG and Wharton experts suggest that companies review IT systems that are already in place. “If it turns out that there is a big need, we always start from looking at the data, and understanding how we want to function,” said Matthesen. “If a lack of IT is getting in the way, we look at how to address that. It’s not rocket science, generally, but the standard process of looking at what is in the market, the size of the company and what IT they already have.”

Russo adds: “Rather than buying new technology and new tools, I suggest that clients make better use of the technology and the tools that they already have, to digest and really build on the supply chain network. There is a lot of discussion now about ‘shelf-ware,’ where companies only use a little of the functionality that is available to them. I think there is a lot of pent-up capability that needs to be tapped.”

For those in the market for new supply chain technologies, Wharton’s Nettissine cautions that despite vendor claims, it is “very hard to calculate how much a particular technology helps.”

Consider ERP software, which a large company would use to centralize its data management: “This software offers an accounting system, financial system, operational systems, some supply chain management and production management modules. It is expensive, and implementation takes years. No one knows if they pay off or not.”

Implementation time for supply chain technology is key, Nettissine notes. “As far as I know, supply chain management software provides some benefits because the software is much smaller, more narrowly focused [than ERP systems], and the implementation schedule is much shorter. With SCM systems, it typically takes you about nine months to a year to implement a system. After a year, you can start to track benefits. But ERP may take two, three, five years to implement. So it becomes much harder not only to implement but to track any benefits.”

Some experts have suggested that as supply chain technological applications get more complicated, failing to deliver improved performance will result in firms cutting back on technology and IT spending. But Matthesen disagrees.

“I don’t see people cutting back on IT spending,” he said. “They still look for the silver bullet. It’s part IT, part supply chain. To do this right, you have to get a lot of pieces to work cross-functionally. Let’s say I spend a lot of money on IT in the shipping department; that’s not fixing the IT problem in other areas. But if you adjust all processes with IT in mind, it is a beautiful thing. If you just buy something off the shelf and expect it to fix all your problems, you will be disappointed.” ☺

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