The Supply-Chain Management Effect

Over the last decade, increasingly sophisticated supply-chain management has engendered six key shifts in the way managers think, in general, about their businesses and their partnerships.

Laura Rock Kopczak and M. Eric Johnson

Ten years ago, supply-chain thinking was limited to the managers of a few global companies struggling to coordinate internal information and materials. Their early success led to an exciting boom in cross-business coordination based on supply-chain-management concepts. Today, such approaches are applied widely by managers in diverse industries and are a focus for leading business schools and consulting firms. Yet as the field has broadened and shifted over time, and as the term has been coopted and redefined by various interests, many views of supply-chain management have emerged. Some are detailed and operational; many focus on information technology. Executives are often uncertain about what falls within the field and how to use the key concepts to enhance their businesses. They want to know, "What is supply-chain management, really, for me and my company?" We have been researching that question for the past 10 years, working with executives in many different industries to understand how supply-chain management is applied in each context and how it is changing the way managers think about their businesses. (See "About the Research.")

The best way to understand the impact of a long-term trend is to examine how the trend has changed the way executives view their businesses and what issues they choose to focus on. Supply-chain management has led to six major shifts in business thinking. It is those shifts that have guided and will continue to guide companies in choosing which supply-chain-management initiatives and enablers they should implement internally and with their partners. By considering the impact of the field in terms of business focus

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rather than programs and results, executives get a feel for how supply-chain management plays strategically in their businesses.

Supply-Chain Management

Supply-chain management addresses the fundamental business problem of supplying product to meet demand in a complex and uncertain world — from the point of view of the entire supply chain. Business trends of the 1990s created the need for supply-chain management, and advances in information technology created the opportunity. Shorter product life cycles and greater product variety increased supply-chain costs and complexity. Outsourcing, globalization and business fragmentation made it imperative that the issue be tackled from the point of view of the entire supply chain, rather than the more limited view of an individual company. And advances in information technology fostered real-time information sharing, coordination and decision making among companies.

Supplying product to meet demand goes well beyond the question, Did we ship what the customer wanted today? It includes more-strategic questions, such as, How well do we work with our partners? Are we first to market with our new products? Do we embrace product variety, or do we limit it because we can’t handle it? Are our sales promotions creating chaotic demand patterns that wreak havoc in our factories? Do we seek breakthrough business models based on supply-chain management that we can use to create strategic advantage?

The term supply-chain management conveys the idea of looking at the supply issue at the multicompany level. It draws on the value-chain concept popularized by business strategist Michael E. Porter. The breadth and power of supply-chain management comes across in the process view of supply-chain management. (See “Simple Supply Chain vs. Process View.”) When the multicompany nature of the supply-chain diagram is combined with a process-flow diagram, one can see that supply-chain management is not just about order fulfillment; it must be part and parcel of product design, introduction, promotion, fulfillment and recycling. Furthermore, to achieve its full impact, it must be embedded fully in business strategy and considered throughout the product life cycle.

How Supply-Chain Management Has Shifted Business Focus

Supply-chain management has resulted in six major shifts in business focus. Each shift has redefined management’s view of what business question is being asked, as well as what information will be collected and shared and how it will be disseminated. Each of the new questions is asked from the point of view of the company’s supply chain. It is not that the old questions no longer matter, but that either the old question is encompassed by the new one or there are greater opportunities in addressing the new question.

Several enablers have facilitated the shifts. Advances in information technology, new accounting and financial measures, and industry initiatives all have fostered supply-chain management. Examples include efficient consumer response (ECR), collaborative planning, forecasting and replenishment (CPFR), RosettaNet and Web-based industry exchanges. Although enablers have had vast impact on supply chains, focusing on them can lead managers to make investments that yield little real supply-chain improvement. Much of the disappointment with industry initiatives (such as ECR) and major software projects (such as ERP, enterprise-resource-planning implementations, or supply-chain planning software) can be traced to a managerial focus on enablers rather than on the business problems.

Shift No. 1: From Cross-Functional Integration to Cross-Enterprise, Too

OLD QUESTION: How do we get the various functional areas of our company to work together to supply product to our immediate customers?

NEW QUESTION: How do we coordinate activities across companies, as well as across internal functions, to supply product to the market?

Companies have shifted focus from integrating within their companies to integrating across companies as a way to coordinate and improve supply. Although connectivity (say, through electronic data interchange or the Internet) and new applications software (such as ERP systems and supply-chain-optimization software) have acted as enablers, the rethinking of how organizations align goals and make decisions is the essence of cross-enterprise integration.

Cross-company coordination has taken many forms. There have been private initiatives led by industry-dominant brand companies, such as the just-in-time programs that auto companies implemented in the 1980s, and Wal-Mart and Dell Computer’s vendor-managed inventory programs. There have been public, or industry-level, initiatives, such as ECR and CPFA...
Simple Supply Chain vs. Process View

Supply-chain management is far more than just order fulfillment. It encompasses all the processes from product generation through end-of-life recycling and disposal.

The traditional, linear, functional view of the supply chain shows materials, information and finances flowing toward the customer with the focus on order fulfillment between each player in the supply chain.

However, a process view focuses on the product life cycle — with each of the players (say, retailers or manufacturers) involved with many different processes.

A more comprehensive view suggests the accomplishment of each of these processes is not just a sequential handoff of materials, information or finances from player to player in the supply chain but involves a collaborative effort among all the players in the supply chain. Furthermore, the roles and responsibilities in this networked chain may vary from the traditional view — manufacturers may ship directly to customers, or retailers may become more involved with product design.

in the grocery and fast-moving consumer-goods industries, in which the leading companies within an industry embarked in a common direction. And there have been semipublic or shared, initiatives, such as third-party logistics, in which networks of companies, potentially from different industries, have attempted to create cost benefits through scale economies.

Although a few companies have developed new, superior business models based on supply-chain management and cross-enterprise integration, for many companies there is an unanswered question of how supply-chain management can be used not just in

a "me, too" fashion, but as a basis for competitive differentiation. On the one hand, enhanced coordination can lower supply-chain-related costs and improve responsiveness within a chain of companies. On the other hand, because industry structure is generally based on networks, not chains, innovation and benefits may transfer to competitors and potential competitors, and so weaken a particular company's competitive position. That occurs particularly with public or semipublic initiatives, which by their nature require participation from multiple companies that compete with one another. It is one reason that initiatives in supply chains with clear channel leaders (dominant companies) go forward quickly, whereas industry-level initiatives based in networks of companies progress more slowly. Furthermore, the benefit of public initiatives tends to be competed away and flows to customers through reduced prices.

Regardless of the type of initiative, companies are now realizing that to derive real benefit, they must address the competitive risks and trade-offs associated with integration. Each company should ask:

- To what extent are we being driven to participate in initiatives as a basis for entry to stay in business?
- How can we create a unique advantage and avoid leveling the playing field?
- To what extent are we strengthening competitors or potential competitors?

Answers to such questions can be found only through a strategic analysis of the company's position in the marketplace, one that examines both its competitors and its customers.

Shift No. 2: From Physical Efficiency to Market Mediation

OLD QUESTION: How do we minimize the costs our company incurs in production and distribution of our products?

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NEW QUESTION: How do we minimize the costs of matching supply and demand while continuing to reduce the costs of production and distribution?

Companies that excel at supply-chain management effectively manage two aspects of supply. The first is physical supply: the production and distribution of physical goods through suppliers, manufacturers, distributors and resellers to end customers. Costs of physical supply include manufacturing, transport and cycle stock costs. The second is market mediation: the matching of the quantity and variety of product supplied through the chain to that which is demanded. Costs of market mediation include safety stock, safety capacity, markdowns, price protection, returns and lost sales. As a result of the more demanding business environment, both physical costs and market-mediation costs have risen for many companies. In industries for which demand is fairly predictable, the costs of physical supply dominate. In innovative industries that are highly responsive to changing fashions and for which demand is unpredictable, market-mediation costs dominate.

Although supply-chain management deals with both aspects, many recent innovations have focused on measuring and addressing market-mediation costs. There are three reasons why companies have been slow to address market-mediation costs. First, the costs of physical supply have been more visible than those of market mediation. Second, the goals and measurements of the organizations (within or across companies) that need to be involved to address physical efficiency are more easily aligned. Third, industries that are truly innovative (and not yet mature) are more concerned with innovation than with matching supply and demand. Only when they mature and face margin erosion do they focus on supply issues.

In the 1997 article, “What Is the Right Supply Chain for Your Products?” Marshall Fisher argued that for industries with high market-mediation costs, supply chains should be set up to respond quickly to unpredictable demand. Market-responsive supply chains use strategically placed buffer inventories and capacities to achieve responsiveness. They also invest heavily in lead-time reduction, and they design products so that their differentiation can be postponed for as long as possible. That allows inventories to be kept as generic products. In addition, they invest in improving their understanding of demand and managing it. For example, coordinating a timely and complete delivery to the customer site is a challenge for companies such as Sun Microsystems that bring together many pieces of computing hardware from both their own factories and suppliers to create a complete customer solution. Sun used to bring together all the solution components in a Sun staging facility, where they were repackaged and reshipped to the customer. To reduce lead times and inventory costs associated with assembling all the different products, Sun recently partnered with logistics providers such as FedEx to merge the various pieces of the order while in transit, reducing time and mediation costs.

Hau Lee has expanded Fisher’s framework to consider the important issue of supply risk. For instance, industries such as agriculture have stable demand but uncertain supply, requiring particular management techniques. Some innovative products have relatively stable supply (apparel), but high-technology products in, say, the semiconductor and telecom industries have both uncertain supply and demand.

Shift No. 3: From Supply Focus to Demand Focus

OLD QUESTION: How can we improve the way we supply product in order to match supply and demand better, given the demand pattern? NEW QUESTION: How can we get earlier demand information or affect the demand pattern to match supply and demand?

While companies have continued to work on improving their supply processes, they also have renewed their efforts at demand management. Under supply-chain management, operations people have been challenged to quantify the impact of poorly understood and poorly managed demand on supply-chain performance and on sales. With the costs on the table, marketing can align its efforts with the supply chain. In many companies, marketing and sales departments now see supply-chain management as a means to enhance their relationships with customers and so increase sales. They have become champions of supply-chain management.

Three prominent breakthroughs in this area are mitigation of the bullwhip effect, investment in better demand information and demand-based management.

Mitigation of the bullwhip effect. The bullwhip effect describes a phenomenon that occurs in many supply chains whereby the
variability of demand increases at each stage of the supply chain. The bullwhip effect has been observed by managers in a vast array of industries, and in every case it has increased both physical distribution and market-mediation costs.

Procter & Gamble was stunned by the impact the bullwhip effect had on its Pampers diaper business. Although babies are consistent in their use of diapers, the demand at retailers such as Wal-Mart was variable, and demand variability increased as orders were passed up the supply chain from Wal-Mart to P&G to P&G’s suppliers. P&G found that the variability was self-imposed through the supply chain’s pricing structures, incentives, and planning and ordering processes.

Companies have sought to reduce the bullwhip effect in several ways: by eliminating price promotions that cause demand spikes, synchronizing planning cycles, sharing forecast and demand information, streamlining replenishment through programs such as vendor-managed inventory, and changing allocation schemes when product is in short supply. Each approach requires increased information sharing and coordination in the supply chain. Each, by reducing variability, alters the demand pattern seen by upstream stages of the supply chain.

Investment in better demand information. Capturing shifts in consumer demand and using that information to drive supply-chain decisions is important in any supply chain. Yet investments in demand information alone, such as point-of-sale data, are not enough. That information must be coupled with a reactive supply chain — one that can respond rapidly to updated demand information by adjusting supply. For example, 7-Eleven Japan captures point-of-sale data along with basic shopper demographics to improve its understanding of what drives demand for its 3,000 stock-keeping units (SKUs) throughout the day. Coupling that information with a reactive supply chain that resupplies stores three times a day allows 7-Eleven Japan to match supply with changing customer preferences closely — and to achieve the highest sales per square foot in Japan’s convenience-store industry and to turn inventory 55 times a year!

Many apparel makers also are finding success in coupling demand information with a reactive supply chain. Consider the designer-ski-wear company Sport Obermeyer. The company increased its profitability dramatically by understanding the costs of discounts, markdowns and lost sales — and working to improve problem areas. It also invested in obtaining better (earlier) demand information from retailers to reduce the forecast error and so reduce the mismatch between supply and demand.

Demand-based management. Under demand-based management, marketing efforts and demand-management initiatives (such as pricing policies) are integrated with supply-chain initiatives. That leads not only to cost savings, but also to sales and profit increases, as what is offered to the market is aligned with what is available as supply.

The airline industry’s yield-management approach, in which ticket prices within and across channels are manipulated to match supply and demand better, have served as models for price-based, demand-management initiatives in other industries. For example, Dell has found it difficult to predict which product features will sell well and therefore which component parts will be consumed (what size disk drive, what speed microprocessor). Yet component parts have long lead times, so they must be bought on the basis of forecasts. Dell reacts to supply-demand imbalances by changing prices on product options to steer demand to components that are in stock but haven’t been selling well. That is easy for Dell to do because it updates prices at only one sales point — the Web site. The approach, which Dell calls “Sell What You Have,” allows Dell to increase sales by steering demand and avoiding the costs of supply-demand mismatches.

Other companies, such as Long Drug Stores, have learned the value of fine-tuning relative prices for competing brands offered at a particular retail store, using an understanding of price elasticity of demand and profitability for the two brands. Coupled with careful measures of supply-chain replenishment costs, prices of each SKU in a category are adjusted to drive consumers toward the most profitable mix of purchases.

Shift No. 4: From Single-Company Product Design to Collaborative, Concurrent Product, Process and Supply-Chain Design

OLD QUESTION: How should our company design products to minimize product cost (our cost of materials, production and distribution)?

NEW QUESTION: How should collaborators design the product, process and supply chain to minimize costs?

In the early 1990s, companies began to recognize the influence that product design has on defining the supply chain and its
performance. That understanding has led product designers to consider supply-chain-management issues during the early phases of product development. At the same time, companies have increased supply-chain collaboration, the better to incorporate their partners’ perspectives into product design. The new approach to product design is termed design for supply-chain management.

Such ideas are especially important for high-clock-speed industries, in which product and process technology evolves rapidly and product lives are very short. With each new generation of product, the components and process technologies that are specified may change dramatically. That generally leads to significant changes in the supply base and in the structure of the supply chain, as supplier-selection decisions define production locations and lead times.

Information systems such as Web-centric product-content-management tools can be powerful enablers of collaborative product development. Software centered on industry verticals, such as Agile Software for electronics or Freeborders for apparel, allows designers, marketers and supply-chain managers across the supply chain to collaborate on product decisions. Retailer Dillard’s found that collaborating with its manufacturing suppliers on the design of its private-label apparel sped its products to market, increasing revenue and reducing product shortages.

Because high-clock-speed industries produce innovative products that have high market-mediation costs, postponement strategies also can be effective. Under a postponement strategy, the task of differentiating a product for a specific customer is delayed until the latest possible point in the supply chain (factory, distribution center, distributor or retailer). That allows safety stocks of product to be generic rather than customized. Thus, the safety stock supports all the product options. The pooling of demand over all the product options reduces demand variability and so reduces safety-stock requirements. Companies such as Hewlett-Packard have found postponement to be particularly successful for products such as printers and PCs.

The biggest success stories in supply-chain management are companies that combined new and innovative supply chains with new market approaches resulting in breakthrough business models.

The company and chain focus initially on reducing cost. At some point, however, they discover that there is a bigger opportunity related to addressing a market need. They may conceive of a different way to go to market — to interact with customers — that drives them to implement a new supply chain that, together with the new go-to-market strategy, creates better value for the customer. They also may find that as they improve supply-chain information sharing and coordination, they have new access to information that either has value in the marketplace or can be used to change their business model.

GMAC has followed such a progression in creating a recent breakthrough in its business model and supply chain for off-lease vehicles. Because the leases on nearly one million vehicles expire annually, GMAC must decide what to do with these cars and trucks. In the past, GMAC shipped the cars to non-GMAC auction houses for sale. GMAC realized that, in addition to bearing the cost of moving the cars, the company was missing an opportunity to learn about the marketplace and interact directly with customers through the auction process. GMAC now sells the cars through five digital auctions, run by GMAC, for five geographic markets. As the world’s largest vehicle auction house, GMAC has established a new business that includes revenues from vehicle sales, from services such as vehicle inspection and certification, and from detailed information about the weekly value of vehicles in each region of the country. GMAC now has its own direct source for vehicle-value information that is more detailed and timely than Kelley Blue Book. The data can be fed back into the company’s ongoing new-vehicle marketing, promotions planning and product planning.
Shift No. 6: From Mass-Market Supply to Tailored Offerings

OLD QUESTION: How should we organize our company’s operations to serve the mass market efficiently while offering customized products?

NEW QUESTION: How should we organize the supply chain to serve each customer or segment uniquely and provide a tailored customer experience?

Breakthroughs in information technology have made it possible to communicate with, understand and provide tailored service to individual customers or segments on an ongoing basis as a means to increase loyalty, revenues and profits. (Tailoring doesn’t necessarily mean segments of one. The customer could be a large

By linking CRM, pricing and supply-chain information, companies can create tailored sales opportunities that increase revenues, optimize the use of resources and maximize profits.

chain.) Companies have long realized that not all customers or SKU’s are equally profitable, that individual customers or segments have different product and service preferences, and that those preferences will change over time.

Thus, where possible, companies seek to give customers not only what they want or need, but what they deserve. Dedicating scarce resources to loyal, profitable customers is a powerful way to enhance loyalty and profitability over the long term. Maintaining close contact with and cherishing input from such customers steers the company to invest wisely as well. Colgate-Palmolive found that building a strong relationship with Wal-Mart required careful attention to availability of all of its SKU’s on Wal-Mart shelves. Sometimes that meant making a simple but out-of-the-ordinary effort. Typically, products, such as gel toothpaste made in England or toothbrushes made in China, are shipped by ocean and then trucked to distribution facilities in the United States. Once, when toothbrush shortages developed, Colgate realized it was worth the expense of airfreight to protect the entire Wal-Mart business.

Improved information technology has changed the nature of products in two important ways that support tailored offerings. First, digitization of the information content of products has made it possible to deliver the physical product (if there is one) separately from the information content and to tailor the information content for individual customers. Second, self-adapting electronic products adjust their performance in response to changes in their environment or the way they are being used. They may change their settings, suggest upgrades or report that they need maintenance. In this way, they can significantly enhance the customer experience over the entire life of the product.

Tailoring of the offering also involves providing real-time information and allowing customers to make trade-offs among price, features and product availability. The auto industry does that by telling customers what vehicles are available in the pipeline, with prices and delivery dates, and letting the customer choose. The same thing may be done implicitly for a set of customers, by understanding elasticities of demand and then changing relative prices of various products for individual market segments on the basis of those elasticities and relative profitability and availability of the products.

Tailoring also may mean using information technology to provide custom bundles of products. Whirlpool has developed a Web-based configurator (product-selection tool) that allows housing developers to work with Whirlpool to create custom bundles of products that are appropriate for a specific housing development. Customers buying a new house then can select their kitchen appliances from a group of custom-bundled and -priced offerings directly from a Web site dedicated to the housing development.

Information as a Basis for Tailored Offerings

Providing a tailored customer experience increases customer loyalty and growth. Companies moving toward tailored offerings must integrate their ERP, CRM and SCM systems.

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The basis for intelligent, profitable tailoring of service to individual customers or segments is the use of marketing and supply-chain information to find new offerings that can be provided cost-effectively by the supply chain and meet the needs of the enterprise's most loyal customers. Information from ERP, customer-relationship-management (CRM) and supply-chain-management systems is combined to make those decisions. (See “Information as a Basis for Tailored Offerings.”) Information from CRM and pricing systems enables salespeople to understand demand elasticities and individual customer preferences better, thus allowing them to make more-appropriate sales proposals and increase both sales revenues and customer loyalty. Information from supply-chain-management systems allows the company and its supply chain to optimize the use of resources to support demand. By linking information from those two sources, companies can create tailored sales opportunities that increase revenues, use resources well and maximize profits. They also can make resource-allocation decisions within the supply chain that support the sales force in creating profitable long-term relationships with the company's most loyal customers.

**Prognostication**

The field of supply-chain management will continue to influence companies in years to come on two levels. On one level, we can expect more of the same. Current supply-chain trends — differentiation, outsourcing, compression and collaboration — will be used to restructure supply networks and improve coordination, and more companies will integrate with their networks. As capabilities improve, the levels of product customization and business complexity may increase still further. And supply-chain management will be used in new ways to create uniquely defined customer relationships.

On another level, supply-chain management will affect industry structure in exciting, unforeseen ways — and so create a new set of winners and losers in the competitive game. Two things will happen:

First, re-intermediation will occur. The companies that function as intermediaries in the supply chain will seek to reestablish their roles, business models and value propositions. Companies, such as contract manufacturers, logistics-service providers and distributors, will encounter one another as they compete to provide customers with assortment on the basis of product, place and time. They will increasingly need to balance the leveraging of processes and assets across customers with the creation of differentiated solutions for individual customers.

Second, rebranding and repositioning will occur. Companies along and across the chain will vie for control of the customer relationship. They will find that when value propositions derive from supply-chain capabilities, new cobranding and copositioning strategies may be most effective. For example, as IBM cobranded with an Intel or as L.L. Bean cobranded with a FedEx, many supply-chain partners may find cobranding an exceedingly effective way to present products and services to the customer.

A decade from now, when we again look back, we will see that supply-chain management in its first 10 years shifted business focus and, in doing so, set up the opportunity for the second 10 years, the opportunity to dramatically redefine the competitive landscape.

**REFERENCES**


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