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## Evolving From Value Chain to Value Grid

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Breaking free of linear chain thinking and viewing value creation from a multidimensional grid perspective provides the greatest opportunities for innovation.

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**M**ention the term value chain, and most managers will have visions of a neat sequence of value-enhancing activities. In the simplest form of a value chain, raw materials are formed into components that are assembled into final products, distributed, sold and serviced. Frequently, these activities span multiple organizations. This orderly progression allows managers to formulate profitable strategies and coordinate operations. But it can also put a stranglehold on innovation at a time when the greatest opportunities for value creation (and the most significant threats to long-term survival) often originate outside the traditional, linear view.

Traditional value chains may have worked well for landline telecommunications and automobile production during the last century, but innovation today comes in many shapes and sizes — and often unexpectedly. (See “About the Research,” p. 75.) This argues for seeing value creation as multidirectional rather than linear.<sup>1</sup> Given the constant tension between opportunity and threat, companies need to explore opportunities for managing risks, gaining additional influence over customer demand and generating new ways to create customer value. Mobile phone giant Nokia Corp., for example, is legendary for having had the foresight to lock in critical components that were in short supply, allowing it to achieve significant market share growth. However, Nokia suffered a setback a few years ago when competitors used that very same strategy to take advantage of shifts in the demand for LCD displays.

Protection against such fickle reversals calls for a more complex view of value — one that is based on a grid as opposed to the traditional chain. The grid approach allows companies to move beyond traditional linear thinking and industry lines and map out novel opportunities and threats. This permits managers to identify where other companies — perhaps even those engaged in entirely different value chains — obtain value, line up critical resources or influence customer demand.

In a value-grid framework, there are a variety of new pathways to enhanced performance. They can be vertical (as companies explore opportunities upstream or downstream from the adjacent tiers in their existing value chain), horizontal (as companies identify opportunities from spanning similar tiers in multiple value chains) or even diagonal (as companies look more integratively across value chains and tiers for prospects to enhance performance and mitigate risk). Successful companies increasingly develop a multifaceted value-Grid perspective as they leverage new opportunities and respond to new threats.<sup>2</sup> (See “Value-Grid Dimensions and Strategies,” p. 74.)

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players in the chain. Thus, companies need to focus on three areas: (1) opportunities to influence customer demand both upstream and downstream, (2) opportunities to modify information access in either direction, and (3) opportunities to explore penetration points in multiple tiers that are not immediately adjacent. These types of opportunities emerge from thinking nonlinearly within the traditional value chain, which constitutes the vertical dimension of the value grid.

**Influencing Demand** Companies try to control demand both downstream (in the direction of the end-user or customer) and upstream in their value chain (in the direction of their suppliers and their suppliers' suppliers). In controlling downstream demand, companies essentially control who drives the purchase decision in the supply chain. Customers typically generate demand for some intermediate products. Intel Corp., for example, tries to increase demand and shore up its prices by making computer buyers more aware of its chip sets, while Nokia works hard to get its logos affixed to the cell phones it sells to wireless service providers. According to a Nokia executive, the company sees its brand image as the primary driver of customer retention — even more than its reputation for technology leadership. Mobile service providers such as Verizon and Sprint in the United States, Japan's DoCoMo and UK-based Orange push back by giving preferential treatment to handset providers who agree to remove their logos and customize handsets for the service provider.

The value-grid approach recognizes that companies cannot always control or influence the customer directly, so it takes a broader perspective on how to control where the purchase decision is made. Companies can explore the full value chain, identifying — and sometimes inserting — levers that will shift decisions from one point to another. The pharmaceutical industry offers a case in point. Clearly, the end-user in this industry is the patient who takes a drug, but who drives the decision on which drug to purchase is less obvious. To deal with this ambiguity, pharmaceutical companies often take a three-pronged approach in targeting key decision points. The first prong is aimed at consumers. The industry invests more than \$2 billion annually on direct-to-consumer marketing (almost 10% of what it spends on research and development). But focusing on consumers is only partly effective. The National Institutes of Health estimates that only about one in 10 consumers who see advertisements for medicines request a specific drug from their physician. While this figure may seem unimpressive, the advertising prompts a larger group of patients to discuss their concerns with their healthcare provider, thus increasing the overall demand for a particular class of drugs.

The second prong is aimed at physicians, getting them to become more aware of conditions that specific drugs are intended to treat. For example, GlaxoSmithKline Inc. lends

### Thinking Nonlinearly Within the Chain

Companies seek competitive advantage with value chains by managing an orderly flow of goods and services across supplier and customer relationships. In theory at least, reducing the lead time at each link in the chain allows companies to reduce inventory and deliver the end products using concepts such as just-in-time manufacturing and supply, continuous replenishment and quick-response manufacturing. Doing away with decision-making tiers in turn cuts coordination costs and improves information flow. As the entire chain tightens, the company becomes more competitive.<sup>3</sup>

However, there is a catch: How benefits are distributed across the value chain depends heavily on the balance of power between suppliers and manufacturers. This is where nonlinear thinking comes in. The strategy focus needs to shift from lead-time reduction to the power dynamics between the company and other

spirometers to primary-care practices so that physicians can conduct breathing tests themselves rather than referring patients to pulmonologists for testing. GlaxoSmithKline uses this opportunity to provide doctors with information on inhaled corticosteroids. The hope is that greater use of spirometry tests will result in increased identification of subtle respiratory problems, which in turn will generate more demand for medications such as those that the company produces.

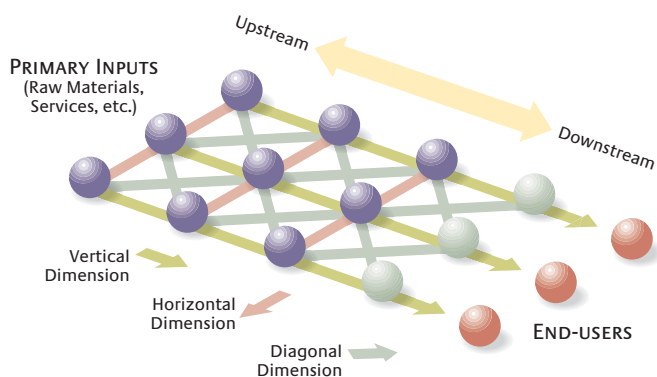
When medications from multiple pharmaceutical companies can be used to treat a condition, drug companies face obstacles in shifting demand to their particular drug. The last prong involves incentives for physicians and pharmacies. By strategically manipulating discounts and exclusivity arrangements, pharmaceutical companies try to persuade physicians to prescribe their products. Failing that, they attempt to redirect prescriptions to a drug that they produce, going as far as to insert pharmacy benefit managers strategically into the value chain. (Pharmacy benefit managers act on behalf of insurance companies to negotiate discounts for their plan participants.) Merck & Co., Inc., for example, acquired

### Value-Grid Dimensions and Strategies

The grid perspective highlights three dimensions for identifying ways to enhance company performance: the vertical, horizontal and integrative diagonal dimensions. Within the vertical dimension, companies explore nonlinear opportunities in their traditional value chain by looking beyond those directly connected to them upstream or downstream.

Within the horizontal dimension, companies explore opportunities in parallel value chains. Within the diagonal dimension, companies take an integrative approach as they explore more widely in other tiers and value chains for opportunities to create value.

For ease of exposition, the value grid figure here is simple and rendered in two dimensions. It should be noted that companies undertaking a thorough mapping of the value grid will find many more cross-linkages and relationships. After initial opportunities have been exploited, the potential landscape for identifying opportunities can be continuously enlarged.



Medco Health Solutions in 1993 for this precise purpose. Medco, which was spun off in 2003 amid complaints about its role pushing Merck products, currently manages prescription drug plans representing more than 60 million patients. To qualify for discounts, participants must select from a preferred list of medicines. In exchange for getting their products on the preferred list, pharmaceutical companies provide additional rebates to the pharmacy benefit managers. Pharmacy benefit managers effectively limit the number of channels and avenues by which patients can obtain their medications and frequently cut out traditional pharmacies. For example, Medco negotiates with clients such as General Motors Corp. to have plan participants purchase maintenance drugs from a mail-order unit. Indeed, the GM plan no longer permits plan participants to fill their prescriptions through pharmacies such as Walgreen Co.'s Walgreens.

In addition to influencing demand downstream, companies have opportunities to influence price sensitivity and volume demand upstream. Consider Pfizer Inc. Its statin drug Lipitor, which is designed to reduce levels of so-called “bad” cholesterol, is the world’s top-selling medicine and accounted for sales of \$12.2 billion in 2005. However, in anticipation of the loss of its patent protection in 2010, Pfizer is testing a new cholesterol drug, torcetrapib, which is intended to increase the amount of “good” cholesterol and potentially complement Lipitor’s role in slowing the development and progression of atherosclerosis.

Pfizer is assessing torcetrapib’s effectiveness and safety — not as a stand-alone intervention but as used in conjunction with Lipitor. The company is not testing torcetrapib with the other well-known statins, which are produced by its competitors. If the clinical trials are successful, torcetrapib will be available only as part of an integrated combination pill with Lipitor.

This provides a good example of how companies can look upstream, in this case to R&D efforts, to identify ways to narrow customer choice downstream. In this particular instance, there is also a potential bonus for end-users: By having Lipitor and torcetrapib in one pill, they may be able to obtain two drugs for a single copay.

**Modifying Information Access** Real opportunities for shifting the buying decision occur when companies are able to link information with control. (See “Knowledge-Retention Strategies by Network Role.”) For example, a company needs to understand its suppliers’ flexibility and pricing structure. Companies can do a better job in this area by monitoring the market conditions faced by suppliers. For example, American Honda Motor Co. Inc., unlike some of its Japanese competitors, offers contracts to suppliers that specify which second-tier suppliers will furnish components for the sub-assemblies integrators provide. The greatest value comes when suppliers view this level of control as being in their own interest as

well. In 2002, the U.S. government's steel safeguard program imposed tariffs of up to 30% on certain types of imported steel. This caused prices of U.S.-produced steel to jump dramatically, which in turn made it difficult to procure certain grades of steel. Most automakers now purchase steel in volume, which they resell to their suppliers at a discount. The benefit to automakers is not just lower cost but also the ability to learn more about their suppliers' material costs and control a key input for direct suppliers.

For companies such as Nokia that cannot directly control the product offering, having information about end-users is critical. It is standard for mobile network operators to provide phone service with handsets, tying the price of the phone to the service contract. In reaction, Nokia developed a mechanism for communication with its users in Europe, the Middle East and Africa — a Web site called Club Nokia, where customers get priority support and exclusive offers and services if they register their phones. Nokia went so far as to offer special ring tones directly through this site, a practice it discontinued only after service providers complained.

**Exploring Multitier Penetration** As companies find ways to control over-demand, they often assume multiple positions in the value chain in order to diversify demand and limit a particular buyer's power. For example, Bosal International NV, headquartered in Lummen, Belgium, manufactures original equipment exhaust systems for auto manufacturers. However, it also sells extensively in the aftermarket. The company sees its business holistically: By examining the multiple points in the value chain where it can participate, it can explore scale economies in design and production. In the late 1990s, for example, there was intense pressure from original equipment manufacturers to reduce costs and

## About the Research

This article is based on a structured investigation of value chain strategies in a range of industry sectors, supported by the Cambridge-MIT Institute's Centre for Competitiveness and Innovation, the International Motor Vehicle Program at MIT and the Sloan Foundation. Our initial impetus for undertaking the research was a comprehensive mapping of the value chains and value creation strategies of nine vehicle manufacturers, their suppliers and their logistics operations. The automotive industry is widely noted for its operational effectiveness, and our initial efforts provided us with a comprehensive picture of the value chain strategies at each tier. This enabled us to assess the effectiveness and the risks inherent in the linear thinking associated with current value chain strategies.

In a second step, we turned toward the fast-moving telecommunications sector, where we conducted a series of structured and semistructured interviews with executives of hardware manufacturers, software providers and national telecommunications operators. Contrasting the automotive and telecom sectors, we developed our basic framework articulating the three core dimensions of value-grid thinking.

In a third step, we explored how nonlinear strategies are used in other sectors. We drew on interviews in health-care and pharmaceutical-related settings and a host of other industries to refine and validate our value-grid model and identify a set of generic strategies for leveraging value-grid thinking.

## Knowledge-Retention Strategies by Network Role

Dimension	Description	Exemplar Strategies
Vertical	Companies think nonlinearly about their value chain when they look downstream to end-users and upstream to supply and service providers to find ways to better understand end-users, enhance demand for products and capitalize on information accessible to other tiers of the value chain.	<ul style="list-style-type: none"> <li>Influencing customer demand, both upstream and downstream</li> <li>Modifying downstream information access</li> <li>Exploring multitier penetration</li> </ul>
Horizontal	Within a tier, companies move across value chains to leverage existing competencies, manage risk, seize value embedded in other chains and develop novel value propositions that are not accessible to actors operating in single value chains.	<ul style="list-style-type: none"> <li>Seizing value</li> <li>Integrating value</li> <li>Creating new value propositions</li> </ul>
Diagonal	Companies operate diagonally when they operate across tiers and parallel value chains. They take an integrative approach to gaining access to critical information, and they identify additional opportunities to ensure and enhance demand.	<ul style="list-style-type: none"> <li>Pursuing pinch-point mapping</li> <li>Defining demand enablers</li> </ul>

increase the steel quality of exhaust systems. Although supplying OEMs was important for credibility, the aftermarket offered Bosal more attractive margins.

The balance is now shifting. Because exhaust systems are built to last longer, they are replaced later in a vehicle's life cycle. This has led to greater price sensitivity in the aftermarket and fewer sales. However, tighter emission standards and other factors now favor OEM suppliers such as Bosal that offer integrated solutions. To leverage its aftermarket experience, Bosal has shifted investment away from aftermarket exhausts to less-price-sensitive accessories such as tow and roof bars and the emerging catalytic converter aftermarket. By supplying more than one tier in the value chain, Bosal is less vulnerable to specific changes in demand and more able to capture high-margin opportunities as they emerge.

Thinking nonlinearly about demand also helps companies identify customer solutions that fall outside the traditional value chain. In the auto sector, for example, steel providers typically ship steel coils to vehicle manufacturers, which stamp them into auto

body components that get welded and painted. Prior to painting, the assembled auto body receives an electrocoat to protect it against corrosion. Dusseldorf, Germany-based steel producer ThyssenKrupp AG has developed a new coating that protects steel against both chipping and corrosion. This coating has the potential to eliminate a significant chunk of the painting process at assembly plants, thereby allowing manufacturers to operate smaller, more flexible factories and produce finished vehicles at lower cost. In the automotive market, where product life cycles are getting shorter and product variety continues to increase, this change has the potential of offering a considerable advantage.

### Exploiting Parallel Value Chains

Within the value grid's vertical dimension, companies often look for new opportunities within a single value chain as they seek new ways to influence demand, obtain critical information or penetrate the value chain at multiple points. By contrast, the opportunities for change in the horizontal dimension typically

## Integrating Value in the Telecom Sector

By moving beyond the linear value chain, companies can generate value for the customer by joining or integrating additional value chains. There are several ways in which this type of integration is playing out in the telecom sector. (See "The Convergence of Voice Services.")

Although mobile phone use has taken off, mobile calls are traditionally much more expensive than landline calls. Landline manufacturers are working on mobile handsets that link into the landline at home and into the global system for mobile communication (GSM) network outside the home, thus providing a novel value proposition for consumers. BT Group's BT Fusion, offered in collaboration with mobile provider Vodafone Group, is a mobile handset that functions as a normal mobile phone but links at home to a landline, using Bluetooth short-range radio (see option A in the figure). The customer needs only one handset and pays low landline charges in addition to mobile network charges.

Voice over Internet Protocol (VoIP) companies like Luxembourg-based Skype Ltd. and New Jersey-based Vonage offer Internet telephony to households by providing voice communication between users of the Internet and landline telephone infrastructure — seizing part of the landline infrastructure's value in the process. Corporations have embraced VoIP as a way to save on landline phone calls, but they are still faced with the high cost of cell phone calls.

As wireless Internet access becomes more ubiquitous, the solution will be to integrate VoIP and wireless fidelity (WiFi). A voice signal sent over IP is transmitted through a WiFi connection (VoWiFi). With current collaborations between VoIP and

WiFi providers, individuals can make calls wirelessly much more cheaply than over traditional mobile networks. Dublin-based Cicero Networks combines a VoWiFi capability in hotspots coupled with a GSM capability for its business customers, as most mobile phone calls originate from business premises (see option B in the figure). Using dual-mode GSM/WiFi handsets or pocket PCs, customers can make calls over the cheaper WiFi base stations when these are available and not congested by other WiFi users, and over GSM otherwise. WiFi networks increasingly threaten mobile network operators in urban areas, where WiFi density is high. A further boost to voice service convergence may occur with WiMAX, a variant on WiFi, which spans several square miles.

Yet another opportunity to integrate value is found by linking the fixed and VoIP communication value chains to enhance options and cost propositions. The USB DUALphone, made by wireless communication supplier RTX, based in Noerresundby, Denmark, is a cordless phone for home use that can be used either as an IP or a traditional public switched telephone network (PSTN) phone (see option C in the figure). Still absent from the market is a handset that integrates VoWiFi, GSM and landline access (see option D in the figure). With GSM capability now integrated in a single chip and increasing coverage of WiFi base stations, however, this is a viable proposition. Instant text and video messaging, interactive gaming and other interactive applications, cash equivalency storage, streaming Internet access, browsing and data sharing further enrich the potential to integrate value in this particular arena.

reside in multiple value chains. This dimension provides opportunities for companies to leverage economies of scale across multiple sources of demand. Consider the case of an auto supplier that makes flexible printed circuit boards. If the supplier is able to sell its circuit boards to companies making medical and office automation equipment, it can generate greater sales across which to spread its costs. The potential of the value grid's horizontal dimension goes beyond economies of scale and scope in that it enables companies to manage risk, seize existing value, integrate sources of existing value and explore novel ways to create value.

**Managing Risk** In most industries, demand patterns tend to be cyclical. Fluctuations are fairly common, which might cause companies to underuse capacity or fail to supply demand, thus prompting customers to look at competing products.

Looking across value chains provides companies with an opportunity to explore countercyclical demand patterns. For example, Honda is famous for its high-quality engines, but demand for some motor vehicles, such as motorcycles, is seasonal. To stabilize demand for motorcycle engines, Honda uses those engines in counterseasonal products, such as lawnmowers, go-carts and snowblowers. Similarly, the engines that power the Honda Accord, CR-V and Element also power Honda's 135HP outboard motors. Honda leverages its core expertise in engine design and benefits by achieving economies of scale in engine production and design. It spreads the demand and development risks for a component across multiple value chains and level demand by operating in value chains with orthogonal (for example, offsetting) demand and risk patterns.













**Seizing Value** In order to build more value, companies are becoming more aggressive about moving horizontally into the value chains of other companies in their industry. This entails using a similar production or service stage in other value chains as a penetration point into those chains. Toyota, for example, is the world leader in hybrid powertrain technology, yet it has chosen to license this technology to Ford and Nissan — two direct competitors — even though demand for its own hybrid vehicles outpaces its production capacity.

According to traditional linear thinking about value, Toyota is unwise because its engines are key to differentiating some of its products downstream and enabling the company to charge premium prices. From a horizontal perspective, however, the engine is a product in its own right. Toyota is more than a vehicle purveyor; it is an influential supplier to other vehicle producers. By supplying others, Toyota not only gains economies of scale but also helps to establish and control the technological framework for future hybrid vehicle development across the industry.

The greatest opportunities — and perhaps the greatest threats

## The Convergence of Voice Services

Breaking free of linear mind-sets is enabling the telecommunications sector to identify a number of novel opportunities for delivering value to its customers. By integrating the value proposition across the three basic value chains associated with the landline telephone, the cell phone and the Internet, companies are developing a number of permutations of service and price bundles for end-users.

NETWORK INFRASTRUCTURE	COMBINATORY OPTIONS AT THE CUSTOMER INTERFACE			
	A. Bluetooth & GSM	B. VoWiFi & GSM	C. VoIP & Landline	D. VoIP, Landline & GSM
<b>LANDLINE (PSTN)</b> Switched Signal →  Landline				
<b>CELL PHONE NETWORK</b> Packet Signal →  Cell phone				
<b>DATA LINE (VOICE OVER IP)</b> Packet Signal →  PC				

— occur when companies think horizontally in an attempt to control value. This often takes place when a company identifies a component or service that yields disproportionate profitability and then introduces that element into other companies' value chains. Disposable printer cartridges are a good example of this. Many printer manufacturers sell their printers at or near cost in the hope that ink, toner cartridges and paper will generate a revenue stream later on. Like the proverbial razor company, they count on being able to sell disposable cartridges at regular intervals. However, this scenario was threatened when small businesses began offering refilled cartridges at substantial discounts.

Traditional printer manufacturers, including Hewlett-Packard Co. and Lexmark International Inc., took defensive steps to combat the challenge. Lexmark added to its toner cartridges an electronic chip that can communicate with the printer as a way to ensure that the replacement cartridges would be Lexmark products. The company offered discounts on cartridges with embedded chips, believing that only Lexmark would be able to refill or remanufacture them. However, the company was wrong, and independent companies succeeded in supplying compatible cartridges. After pursuing legal challenges that ultimately failed, Lexmark changed its strategy and began supplying printer cartridges for other brands of printers.

Lexmark's solution raises an interesting point about horizontal thinking: When companies in or across industries modularize a particular component or service in the value chain, other com-

**Expertise in one value chain may be a source of advantage in another. For example, UPS has evolved from providing transportation services to offering a range of value-added, logistics-intensive services.**

panies may begin to act in a similar fashion and provide competitive components or services.

**Integrating Value** Breaking free of linear mind-sets helps companies see opportunities to create value for customers by participating more actively in new value chains. The telecom industry provides an excellent example. Landline telephone services and mobile networks historically have been viewed as separate enterprises, leading large telecom operators like AT&T Inc. and BT to spin off their mobile components into independent companies. However, as more consumers are abandoning their landlines in favor of mobile service, fixed-line operators are coming up with novel ways to integrate value with other value chains. As a first step, the companies are integrating the value of landline and mobile services by linking voice communications across data and voice networks. (See “Integrating Value in the Telecom Sector,” p. 76.)

**Creating New Value Propositions** Horizontal thinking allows companies to create value propositions that would be impossible with a traditional linear view. For example, airlines and hotels want to be able to distinguish price-sensitive budget travelers seeking a last-minute deal from business travelers looking for convenience and comfort. Which customers are willing to pay a premium to stay in a specific hotel, and which would be happy with any accommodation? Priceline.com Inc. and Hotwire.com (owned by Expedia Inc.) allow customers to choose travel dates and destinations, but the airline carriers and hotels are not identified until the flight or room has been paid for. Thus, large airlines and hotel chains are able to identify bargain hunters without undermining their pricing structure for customers who value them. By spanning value chains within an industry, these companies create a service that generates new value for companies in each chain.

Although Priceline.com started out by spanning value chains within the airline industry, the travel reservations industry has evolved into the sale of integrated (and discounted) hotel, airline and car-rental packages. This is based on a strategy of spanning the value chains of multiple industries. Companies like Cendant Corp., which owns Orbitz, make money on bundling packages from their own car-rental and hotel chains (Avis, Budget, Days Inn, Ramada Inn, etc.) with airline tickets. By integrating the value chains from these industries, they can offer package and price combinations that would not be possible within a single value chain. They also foil the efforts of companies looking to

gain market share in electronic price gathering and comparison across distribution channels, such as Yahoo! Inc.’s FareChase. Expedia Inc., Travelocity.com LP and other companies have used similar strategies, often through agreements rather than direct ownership of hotel, airline or car-rental agencies.

The resulting rapid proliferation of potential sales channels has created new opportunities for eking value from crossing multiple value chains. Cendant, for example, is trying to leverage its software development to provide turnkey software solutions for inventory and rate management to hotel chains.

### **Exploiting Value Chains Across Tiers**

In addition to the value grid’s horizontal and vertical dimensions, further opportunities for increasing control over inputs and customers can be found by exploring the grid in an integrative fashion. This includes exploring means of controlling the supply of critical components and uncovering new ways of boosting customer demand by looking upstream and downstream in other value chains. Two strategies that take advantage of this diagonal, integrative approach are pinch-point mapping (which involves identifying potential bottlenecks and threats) and demand enabling.

**Pursuing Pinch-Point Mapping** In theory, at least, most companies recognize the importance of knowing which suppliers produce the key upstream inputs for their products. For example, automotive companies that produce diesel engines rely heavily on a ceramic particulate filter that is supplied by only two companies in the world: Ividen Co. Ltd., headquartered in Ogaki, Japan, and NGK Insulators Ltd., headquartered in Nagoya, Japan.

When Ividen experienced quality problems in early 2005, Ford Motor Co. and PSA Peugeot Citroen were unable to produce thousands of vehicles. To avoid such problems, it makes sense for companies to monitor key component supplies and negotiate alternative sources of components that, if unavailable, could shut down significant parts of the operation.

Arranging alternative sourcing within one industry is rela-



tively straightforward, but it is more complex when the components are used across different industry sectors. Pinch points that span different industries are particularly tricky to monitor because it is difficult to anticipate demand or use for a component or service in another industry. Companies should pay special attention to components that take time to come on stream and where the producer can allocate capacity across a variety of applications. For example, producers of memory chips have reorganized production to meet the dramatic increase in demand for flash memory for camera cell phones, digital cameras and personal music players; in the process, the supply of other types of memory chips has dwindled, posing threats to computer manufacturers and other companies that rely on those chips.

Companies that fail to follow and manage pinch points can run into serious problems. For example, a fire at a key Philips semiconductor factory in 2000 caused a worldwide shortage of the radio frequency chips used by both Nokia and Ericsson. Nokia immediately lined up another source and redesigned other chips so they could be produced elsewhere. However, Ericsson responded more slowly and lost an estimated \$400 million in mobile phone handset sales. By acting quickly, Nokia was able to gain a stronger position in the handset market, at least for a time.

History shows that such advantages can be short-lived. Recently, for example, Nokia failed to monitor developments in the market for color screens. Because producers of the film-transfer screens were already committed to supplying makers of computer monitors and television displays, Nokia was caught short. This enabled Samsung Group, which produces its own screens, to achieve significant gains in the market: Samsung's global market share in 2004 surged from 4% to 14%, while Nokia's share dropped by 2%.

In addition to helping companies avoid supply problems, monitoring other value chains can help them identify potential rivals. This is evident in the video games industry. As video game players seek high-end graphics processors, wireless and wired Internet capabilities, Windows XP and full multimedia drives, consoles like the Xbox 360 and PlayStation are becoming well suited to audio-video management. Indeed, the consoles could serve as hubs for home entertainment, displacing traditional audio-video devices (MP3, CD and DVD players) and perhaps becoming gateways for audiovisual entertainment sales in their own right.

**Defining Demand Enablers** Examining value chains in other industries can reveal new opportunities to leverage key competitive advantages. Companies that have a particular expertise in a given value chain may find that that source of advantage is also relevant in other value chains. For example, United Parcel Service of America Inc. has evolved from providing transportation services to offering corporate clients a range of value-added services that are logistics intensive. One such client is Toshiba Corp. UPS man-

ages Toshiba's laptop computer service business, which includes overseeing the availability of parts, transporting broken equipment to a service center, repairing the equipment and expediting it back to the customer. By bundling repair with logistics, UPS can provide a cost-effective solution, within a time frame that is half what Toshiba could otherwise offer.

By reaching outside their established value chains, companies can create new threats. In entering the computer repair business, for example, UPS poses a new threat to companies such as Unisys Corp. that have played an important role in this market.

Companies often can find new opportunities to leverage other value chains to enhance the appeal of products that originate within their own chain. Such was the case with Apple Computer Inc., which in 2002 negotiated an unprecedented agreement with major and independent music labels to sell music over the Web. Most music labels had tried to launch similar ventures but had been unsuccessful, in part because their musical selection was limited and prices were high. Apple went with low prices in hopes of locking users into its iPod music players. The company now has the opportunity to develop new products that use its proprietary software and designs. Apple drew on the music industry as a demand enabler for its hardware, and currently it is looking to video and other content services to further lock in that demand.

## Life Within the Grid

Shifting from a value chain focus to a grid focus requires managers to rethink the organization's value proposition and associated structures from three perspectives: the impact on existing operations; innovations outside of existing operational spheres; and dynamic shifts in the value grid landscape. At the operational level, a company uses the value-grid to leverage information that directly benefits its existing operations.

Understanding the anatomy of purchasing decisions, for example, empowers a company to adjust its provision of services or products to more accurately match customer needs. This directly benefits existing operations and thus ensures minimal resistance because it does not threaten existing modes of thinking and operating. With a deep understanding of what drives a purchasing decision, a company can make better decisions about ways to shift control over the demand and manage risk.

Starting from an operational standpoint also makes sense for pinch-point mapping because tracking and manipulating pinch points ensures an uninterrupted flow of critical components and services. Further, companies can leverage their understanding strategically to lock out competitors.

Operating with a grid perspective also makes it easier for companies to explore innovative strategies that do not directly benefit operations, such as demand enablers. Such exploration is best done through new organizational initiatives. It requires a more systematic and conscious effort because it lacks a natural operational

champion, such as a purchasing director or operations manager.

Value grids are inherently complex and dynamic, enabling a nearly limitless web of opportunities. Because of this, vigilant monitoring of the value-grid landscape must become an integral part of ongoing corporate decision-making processes. This includes both identifying new opportunities as well as monitoring emerging dangers from other players in the value grid. Some early warning signs of shifting opportunities and potential threats are straightforward, such as the simplification or standardization of information, which often comes with the decision to modularize a product or service. But many more opportunities and challenges are idiosyncratic and far more difficult to identify. Thus, on a dynamic level, companies must continually explore, evaluate and map the broad competitive landscape, rethinking the value grid in terms of their critical activities.

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1. Jay W. Forrester provided one of the first systematic explorations of the complex dynamics underlying information and material flow in multiechelon systems; see J.W. Forrester, "Industrial Dynamics" (Cambridge, Massachusetts: MIT Press, 1961). It set the stage for exploring the linkages across parts of the value chain from an operations standpoint. Among other things, it provided an early look at the root cause for dynamic distortions in value chains, which was later expanded and relabeled as the bullwhip effect; see, for example, H.L. Lee, V. Padmanabhan and S. Whang, "The Bullwhip Effect in Supply Chains," *Sloan Management Review* 38, no. 3 (spring 1997): 93-102. Since then, value chain dynamics have become widely explored, as researchers try to understand value creation and the sources of value. The "value chain" concept gained prominence in the mid-1980s as researchers looked for cost optimization and new sources for competitive advantage; see J.B. Houlihan, "International Supply Chain Management," *International Journal of Physical Distribution and Materials Management* 15, no. 1 (1985): 22-38; and M.E. Porter, "Competitive Advantage: Creating and Sustaining Superior Performance" (New York: The Free Press, 1985). The efforts to understand value chains' dynamics as a source of core competence and competitive advantage continue to this day. A key concern in our previous research has been, from an operations standpoint, how holistic value chain strategies can be leveraged to enhance responsiveness to customer needs; see M. Holweg and F.K. Pil, "Successful Build-to-Order Strategies Start With the Customer," *MIT Sloan Management Review* 43, no. 1 (fall 2001): 74-83; and M. Holweg and F.K. Pil, "The Second Century: Reconnecting Customer and Value Chain Through Build-to-Order" (Cambridge, Massachusetts: MIT Press, 2004).
2. Martin Christopher observed that competition increasingly occurs between entire value chains, not individual companies; see M. Christopher, "Logistics and Supply Chain Management" (London: Pitman Publishing, 1992).
3. An approach that was developed jointly with Audi AG and Daimler-Chrysler Corp., currently under pilot testing. For a more general discussion on the advantage of small-scale operations in the value chain, see F.K. Pil and M. Holweg, "Exploring Scale: The Advantages of Thinking Small," *MIT Sloan Management Review* 44, no. 2 (winter 2003): 33-39.

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