

All companies compete in logistically distinct businesses serving distinct customers.

Tailored Logistics: The Next Advantage



by Joseph B. Fuller, James O'Connor, and Richard Rawlinson

If in managing the whole one discovers the parts, the part most in need of discovery these days is logistics. This will strike many managers as an odd claim. We often say, "That is just a logistical problem," as if certain vexing details of delivery may be left to relentless, mathematical people, long after "creative" product designers and market strategists have had their say. And to judge by hours of senior management attention, logistics problems seldom make it past the triage screen. How many top executives have ever visited with managers who move materials from the factory to the store? How many still reduce the costs of logistics to the rent of warehouses and the fees charged by common carriers, without ever asking whether they serve their customers best by means of these warehouses or trucks or routes?

In fact, logistics have the potential to become the next governing element of strategy as an inventive way of creating value for customers, an immediate source of savings, an important discipline on marketing, and a critical extension of production flexibility. Customer needs vary, and companies

Joseph B. Fuller is a founding director of Monitor Company, a strategy consulting firm. James O'Connor is a consultant in Monitor's Cambridge, Massachusetts office, specializing in the firm's logistics work. Richard Rawlinson heads Monitor's Tokyo office.

can tailor logistics systems to serve them better—and more profitably. Indeed, whether they know it or not, senior managers of every retail store and diversified manufacturing company compete in businesses that are distinguished by their logistics, in effect, "logistically distinct businesses," organized, or potentially organized, around the delivery characteristics of logistics pipelines: the channels of transport, warehousing, handling, and control through which manufactured goods flow.

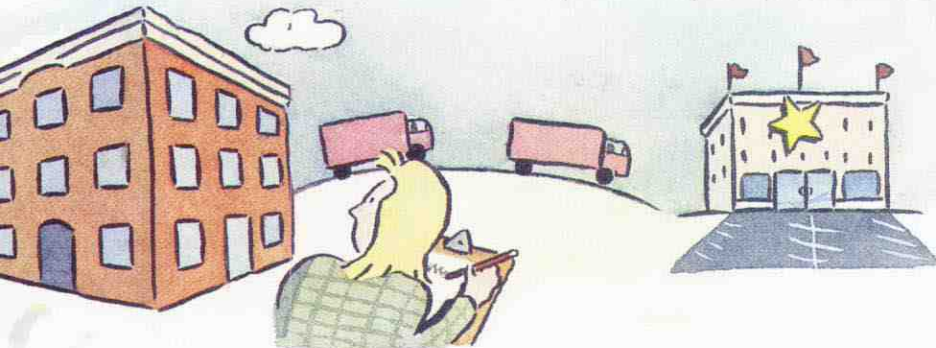
In each of these businesses, at every step in the creation of value, competition is fierce. Managers develop strategies for their logistics businesses by design or by default.

Services: An Envelope Around the Product

Logistics have become central to product strategy because, it is increasingly clear, products are not just things-with-features. They are things-with-features *bundled with services*. Companies do not create value for customers and sustainable advantages for themselves merely by offering varieties of tangible goods. Rather, they offer goods in distinct ways, presuming that consumers value convenience, reli-

ability, and support. They are in an implicit and complex *relationship* with customers. The challenge is to manage the whole of it.

Think about quality. Robust designs and precise conformance to customer specifications are, more and more, just the price of admission. So, indeed, is price itself. Increasingly, one hears about the ease of doing business with a company, not about the quality of its products per se. One hears about the dependability with which the furniture store's truck arrives to deliver your sofa or the responsiveness of a car manufacturer to a dealer's request for spare



parts. All these services form an envelope around the product. Companies make markets by pushing the envelope.

And the driver of service differentiation is logistics. It is well-known, for example, that Coca-Cola has increased its offerings in many ways during the past decade or so: diet Coke, cherry Coke, caffeine-free Coca-Cola. What is less well-known is that the company has also been in the process of differentiating its products along important service dimensions during this time, based on a continual rethinking of its logistics pipelines. The process has gone furthest in Japan. By now, consumers of The Coca-Cola Company's products in Japan are subtly segmented, not only according to their product choices or preferences but also according to the logistics needs of the stores and vending machines that they find convenient: a store's need for timeliness, for example, or help with billing, or frequency of delivery.

Informally, the bottlers of Coca-Cola in Japan have extended services for years. The drivers of their delivery trucks have distinguished The Coca-Cola Company products by performing an important merchandising function in supermarkets, setting up displays and keeping shelves attractive. In mom-and-pop stores, drivers have often helped process billing or even helped clean up the back room. Consumers may not have known about these services, but they *experienced* them, if only in the way their favorite corner store looked, or in the fact that it was able to stay in business at all.

But Coca-Cola bottlers in Japan are now attempting to segment customers much more precisely along service dimensions of this kind. The point is profit. Bottlers spend \$600 million annually on logistics and have major plans for growth; we estimate that by tailoring their service delivery channels to the needs of distinct groups of customers, bottlers can save an average of \$80 million to \$90 million a year for the next ten years. Nor, in this context, does "precisely" mean that each group of customers will get a separate channel. In many cases, service characteristics (dependability, frequency, merchandising, order processing, and so forth) intersect; overlapping customer desires generate such a high number of permutations and combinations that segmenting customers into cost-effective channels can be a daunting task.

The Coca-Cola bottlers' major customers in Japan, Ito Yokado and Daiei supermarkets, 7-Eleven convenience stores, and so on, want predictable delivery above all, which is hard to achieve

during Tokyo's daytime traffic. At the same time, predictable delivery during the day is less important than merchandising for mom-and-pop stores. Operators of vending machines want support refilling their machines. They depend on communications systems that regularly update the bottler on levels of stock so that trucks are not dispatched to replenish full machines; they do not want to absorb the costs of trucks that also carry products and packages their machines do not sell.

By far the biggest challenge in managing logistics strategically, then, is developing target segments of customers that can be served profitably by distinct, rationalized pipelines—a critical point we'll return to later. For now, it is enough to see that in services, too, one size doesn't fit all. A can of Coca-Cola makes a distinct journey. A particular can of Coca-Cola might well be called a can of Coca-Cola going to a vending machine, or a can of Coca-Cola that comes with billing services. There is a fortune buried in this distinction. (See the chart "A Product Is Also Its Services.")

Creating Value Beyond the Factory

A more comprehensive product strategy that includes the value created by logistics can change a company at its roots—that is, at its marketing. So seasoned a brand manager as Procter & Gamble, for

example, has determined that the company could provide a more consistent price to consumers, and create greater value for them, by moving to "everyday low prices," shifting away from the in-store sales and price promotions that had been an industry convention. The logic here, which has precipitated a quiet revolution in the grocery industry, is that minimal variations in demand—and fewer of the pricing errors that result from a proliferation of special deals—make things easier on logistics systems. Simplicity confers overall benefits that are greater than the presumed financial gains from running up volume with price cuts and rebates.

Edwin L. Artzt, chairman and chief executive of P&G, put the matter succinctly in his 1992 keynote address to kick off National Quality Month: "Look beyond our own internal processes and see the total value chain...consumers will not pay for our sloppiness." Artzt continued: "Swings in price create variability and massive inefficiency in the manufacturing and distribution system. To meet heavy short-term demand, manufacturers must build raw material inventory and design peaks and valleys in production schedules, which entail excessive warehousing costs, excessive shipping rates, and new handling costs. As an industry, we've estimated annual grocery sales in the United States to be about \$300 billion. Out of that, there's between \$75 billion to \$100 billion of inventory, much of it unproductive, caught between the manufacturer, the manufacturer's supplier, and the retailer—up to a third of total sales just trapped in the pipeline."

Artzt is right. And once demand is leveled, manufacturing companies and their retailers would be positioned to reap even greater gains by—to take only the most salient approach—splitting pipelines the way a soft-drink company can: nighttime delivery for supermarkets and convenience stores, a separate channel for vending machines. Still, it would be wrong to infer from the categorical way Artzt argues the case that many other managers have acted on his conclusion. So few have, in fact, that companies taking an initiative in this area stand to gain a very important source of competitive advantage.

In fact, logistics are a potentially decisive hinge of product strategy because of the success managers have had in recent years with what goes on upstream of delivery: the flexible manufacturing

systems, the just-in-time and quality strictures they've put on suppliers, the new precision they've exacted from design and manufacturing, and the interfunctional teamwork they've required from marketing and product development all have made high standards in production not an advantage in

With manufacturing improved, remaining sources of value creation stand out.

competition but a precondition of it. Managers have, on the whole, brought intense scrutiny to what comes into and goes on in the factory. They have come to think in an integrated way about the whole stream of value-adding activities and quality losses that the word "manufacturing" connotes. Most of all, they have created flexibilities in factories that allow them to produce cost-effectively for increasingly differentiated customer segments. With manufacturing generally improved, remaining sources of value creation, such as logistics, now stand out.

And yet, while the costs of flexible manufacturing, of conversion processes themselves, have been dropping dramatically in virtually all businesses, the costs of logistics have been dropping hardly at all, and few managers see logistics as a way to create distinct value for distinct customers. Between 1987 and 1991, for example, the cost of manufacturing a clothes washer in one company dropped 25%, from about \$200 per unit to about \$150, largely as a result of production reforms. Yet the procedures for delivering the same washer to the stores have

A Product Is Also Its Services



A company does not create value for customers and sustainable advantage for itself by offering varieties of products but by attaching services to those products.

not changed during this period, and the cost structure of the product reflects this inertia.

In short, logistics are undermanaged. That is the opportunity.

Averaging: A Diseconomy of Scale

Why have so few major companies realized the value inherent in their logistics? There is no simple answer to this question, but there does seem to be a pattern. Again and again, logistics fall between the cracks in companies that have enjoyed a dominant market position for a generation or more and have meanwhile operated on the increasingly faulty assumption that there are natural advantages to functional specialization (such as a separate logistics function) and economies of scale.

One large telecommunications company, which we will call "IMATEL," is a multibillion-dollar manufacturer of telecommunications equipment: central telephone office switching systems, cellular networks, copper and fiber-optic cables, plug-in circuit boards—thousands of parts and pieces of hardware. Fully 10% of its total costs, roughly \$900 million, goes to transporting, handling, warehousing, and managing inventory. Over the years, IMATEL had accumulated myriad logistics assets: warehouses, trucks, distribution centers, and so forth. The managers who had been assigned to handle the company's logistics had been supported by brilliant

Customers who need specialized products are often underserved, while customers for commodity-like products are overcharged.

technicians and engineers, many of them with Ph.D.s in operations management, masters of quantitative techniques (most developed originally in the military), which have not changed profoundly for a half-century.

Yet among the ambient pressures on logistics managers, the varying needs of customers had always been the least substantial. Product managers had traditionally been intent on preserving high levels of service to all customers. Premiums, so the argument went, came from serving niche markets: "just what customers want, just when they want it." So logistics managers had come to operate un-

der uniform standards and policies developed to meet the company's most demanding customers. Given these standards, logistics managers had aimed to make excellent use of the physical assets the company put at their disposal, which generally had high fixed costs.

Understandably, IMATEL's logistics managers had come to assume that the more goods flowed through consolidated logistics channels, the more efficient they had been. But *had* they been efficient? Perhaps, but only when their functional imperatives, gaining economies of scale and satisfying many different customers with a single standard for service, had been viewed separately from the evolving strategic interest of the company as a whole. Actually, their assumptions had become a rationale for making IMATEL's huge logistics pipeline carry an overly complex burden. Cost was incurred and value was destroyed in the management of this complexity.

And the worst and most characteristic result of so much complexity was "averaging": things flowed through consolidated channels at an average speed and were charged out at average cost. Thus customers who needed specialized products quickly but unpredictably tended to be underserved, while customers for more commodity-like products were overcharged. Factories have dealt with the problem of averaging by introducing cellular manufacturing. Logistics managers must address the problem by reconfiguring pipelines.

Until IMATEL addressed its averaging problem, IMATEL's customers, mostly regional Bell operating companies, had often waited an unacceptably long time for critical components, while installers found that parts that needed to be assembled at the same time did not arrive at the same time.

Meanwhile, inconsequential items such as screws and nuts had arrived in separate boxes and bubble pack, overwhelming technicians with packaging and raising costs all around. Low-volume goods, which generally produced high margins, tended to slow down or even block the path of high-volume products and components, though high-volume items generated most of the company's profit. In consolidated channels, generally, charges are reckoned by some common standard—dollar value, perhaps, or weight and volume—and the pace of responsiveness is governed by the speed of the slowest common denominator.

There is another way of looking at this. Without quite realizing it, IMATEL had found itself competing in a number of distinct businesses governed by distinct logistics requirements, and in each one of these, it had been hampered by the inappropriate

way it had come to exploit its scale. For example, it had wound up competing with more focused hardware distributor companies offering IMATEL's customers buckets of nuts and bolts for a fraction of IMATEL's price. When unique components needed to be expedited more urgently than the company's big pipeline could handle, IMATEL would, in effect, outsource business to a competing (and more expensive) delivery company, such as Federal Express.

The problem of averaging is just as serious for retailers. Sears found that its product managers had long been locked into reporting mechanisms that systematically ignored the cost of complexity in a unified logistics pipeline. As a result, managers focused on gross margins but had lost sight of full-stream costs. Senior managers encouraged stores to offer items such as table-mounted tools and ladders that seemed to promise high margins but, in fact, were very difficult to move around. Meanwhile, more easily handled merchandise like power tools

Upscale stores promising better service have lured away difficult-to-ship items like exercise equipment.

and automatic garage-door openers, items whose comparatively less complicated logistics promised a higher net return, were gradually being forced out of the system.

Obviously, this kind of product management gives an opening to competitors. Stores focused on high-volume, low-margin, easy-to-ship items like t-shirts (or cutlery, or consumer electronics) have been luring customers away for years. More upscale stores, promising higher standards of service, have lured away specialized, higher margin, difficult-to-ship items like exercise equipment (or custom machinery, or rowboats). And the circle can become vicious. Some department stores respond with reflexive and self-defeating actions, like job-shop expediting or price cutting, that causes new surges like the ones Artzt describes. Senior managers looking over financial data may mandate a strict reduction in pipeline inventory only to discover that squeezing costs at the front end just raises the costs of handling at the other, like a child squeezing one end of a balloon.

In extreme cases, department stores, and manufacturers, for that matter, may feel compelled to narrow their product line radically. This is not always the wrong thing to do. A more focused company will have to cope with narrower differences in

customer requirements, and supporting information systems can be better tailored to the task. But focus is hardly a panacea. For manufacturers of consumer durables and electronics, especially, cutting back on products to accommodate a unified logistics system is dangerous to the brand. Retail buyers prefer to reserve shelf space for full-line producers, whom consumers will naturally come to think of as technology leaders. As for department stores, what is their competitive advantage if not the promise of one-stop shopping?

The general managers of large companies are understandably frustrated: they have size, reach, brand recognition, and a reasonable share of every market segment for which they produce. They think they should be serving customers by providing the lowest costs and highest standards of service. They are giants, after all, but to no avail. In virtually every market segment, giants are being challenged by dwarves.

In this atmosphere, top managers are loath to restructure fixed assets or disrupt the status quo among functional areas. They may fear being overwhelmed by a bewildering amount of data or may cherish the traditional commitment to ways of doing business that, they suppose, made their companies great: "making" deliveries when they might in fact be "buying" delivery services, or maintaining an imposing network of warehouses, which they consider sunk costs.

But radical measures are unavoidable. The problem lies in what so many general managers mean by "business as usual." They are, more and more, competing in a variety of services. One key to their companies' overall competitiveness is a division of customers into target segments, differentiated by service needs that appropriate logistics pipelines can support.

Logistically Distinct Business Methods

The goal of logistics strategy, then, is to organize companies to compete *across the span of their markets* without having to overcharge some customers or underserve others. It means building distinct approaches to different groups of customers. Ironically, big companies have a potential advantage here, though they are often the ones to get into the greatest difficulty. Unlike smaller companies, IMATEL is in the enviable position of contemplating more specialized channels, each one of which is likely to be big enough to be cost-effective: a separate channel for nuts and bolts, for instance. We estimated

A Menu for Establishing Customer Needs

Potential Variables for Segmenting Products

Product Strategy and Economics

- 1) Unit value (*Low margin? High full-stream cost?*)
- 2) Sales volume (*Unit sales per year?*)
Nature of relationship
(*Long-standing? Transactional?*)
Capacity to draw in others

Special Interaction Requirements

- 3) Degree of order coordination
(*Independent line items? Complete systems?*)
Accuracy of delivery timing
(*15-minute window? Plus or minus 3 days?*)
On-site service (*Dump? Installation?*)
- 4) Merchandising (*Product displays? Promotions?*)
Order taking (*EDI? In-person? Involved?*)
Product preparation (*Standard? Custom?*)

Standard Delivery and Order Requirements

- 5) Order response time (*Hours? Days? Weeks?*)
Frequency (*Times per day? Irregular?*)
Order quantity (*Individuals? Truckloads?*)
- 6) Product shipment norms (*Parcel? Truckload?*)
Destination locations (*Clustered? Scattered/Rural?*)
Packaging (*Returnable? Custom?*)
Demand patterns (*Seasonal? Derived or "pulled" demand?*)

Handling Requirements

- 7) Product handling characteristics
(*Binnable? Bulk? Liquid?*)
Demand variability (*Predictable? High variance?*)

Inventory Requirements and Potential for Defection

- 8) Product substitutability
(*Unique? Highly interchangeable?*)
Cost of no stock/no delivery
(*Lost sale? Customer plant closure?*)

that the company stood to gain a minimum of \$50 million in profit by managing its logistics pipelines more sensibly.

Moreover, companies the size of IMATEL have manufacturing groups with long experience in reckoning the costs along what Artzt calls the

"total value chain." It turns out that many of the management principles that have made a company's factories more flexible and designs more robust can be applied to the improvement of logistics systems: interfunctional planning, just-in-time delivery, separation of work flow, and so forth. How should a company proceed?

The first step. Senior managers begin with the organization of teams led by themselves and including representatives from product management, sales, manufacturing, transportation and warehousing, and anyone else in the downstream directly affected by actions upstream, such as store managers, installers, or retail buyers. The benefits of simply putting the team together are always unexpected. For some managers, the act of sitting down

For some managers, meeting with people from another function is a revelation.

with people from another function is a revelation, a first taste of a more integrative style of management, a first exposure to the dynamic interactions among functions and people along the stream.

Without general management leadership, efforts at improvement are futile. Specialists in logistics management have long understood the dangers of averaging. But what the company needs to understand and seldom troubles to find out is the range of customer needs that stand in danger of being averaged. By themselves, certainly, logistics managers can no more reckon the full-stream costs of serving customers inappropriately than quality control inspectors, however conscientious, can reckon the losses resulting from products not designed for manufacturability.

Once formed, the team proceeds through a number of definitive stages:

- segmenting customers exactly by means of, in some cases, highly original buyer purchase criteria related to logistics;
- establishing appropriate, hence differential, standards of service for different customer segments;
- tailoring, that is, disaggregating and reconfiguring, logistics pipelines to support newly mandated standards of each segment;
- exploiting economies of scale among different logistics pipelines, but only where these permit competitiveness in chosen customer segments;
- sustaining multifunctional cooperation in the creation of an integrated reporting system so that the flow through each pipeline is balanced.

We'll call these stages of analysis "logistically distinct business methods" (or "LDB methods"), for the term neatly captures how serving distinct customers actually amounts to competing in distinct businesses. Each of these stages answers discrete questions, and taken together, they constitute an original methodology.

What do customers want? Teams explore optimum service targets, the standards particular groups of customers need if the company is to compete effectively for their business. This analysis is made without regard to justifying existing investments in logistics assets. The assumption is that companies can realize significant advantages simply by undertaking to target customers' needs more closely; the ideal is to approach customers with a fresh eye. Some customers are in a position to state and rank their needs directly, other customers have needs they perceive only dimly, and still others have needs that are implicit. In this last case, the manufacturer's internal customers, patterning their needs for service on the assembly, storage, and handling characteristics of the product, act as proxies for end users.

Teams, in other words, need to engage customers and find ways of translating their needs into logistics-related criteria that can be managed and measured. In Japan, The Coca-Cola Company has endeavored to satisfy the *expressed* wishes of customers: retailers in Japan's evolving retail sector assign distinct weights to Coca-Cola's timing of delivery, frequency of delivery, in-store merchandising, or delivered cost. Similarly, Canada's Ready Bake Foods, Inc. has segmented its customers initially into urban supermarkets and rural grocery stores, each with expressed differences in the need for delivery volumes, frequency, and price. At IMATEL, in contrast, the characteristics of product assembly or configuration may insinuate distinctions among customer needs. Orders for complete telephone switching systems involve long planning cycles; individual parts are useless without a full complement of assembly components. Customers for switching systems expect orders to arrive in a sequence that permits orderly installation; customers for basic repair parts expect reasonable prices and predictable delivery; while "mission critical" repair parts should be easy to order, quickly available, even close by.

Are there logistics or logistics-driven criteria for segmenting customers that are truly generic in character? Not really, not any more than there are generic criteria for segmenting customers for marketing purposes. There is no formula, in other words, that relieves teams of the burden of descend-

ing into the details of their customers' needs and their own competencies, of making rough-cut decisions about the services customers want and the overall profitability of serving hypothetical segments for particular products. There are *always* trade-offs to make.

Still, perhaps the most original LDB method is the posing of eight (though there may be more) elementary questions about any product that, taken together, make up a logistics decision menu. These questions cover the range of logistical issues that customers have been concerned about.

Start with basic strategic information: (1) Is the product, let us call it a "stock-keeping unit" (SKU), a high-margin item or a low-margin item when full-stream costs (including carrying and handling) are reckoned, and (2) Do we sell many or few of these SKUs during the course of a year, or does this SKU prompt the sale of others? SKUs that are high margin and high volume may be called "key" for the logistics system; SKUs that are high margin and low volume would be "mainline"; SKUs that score low on both counts might well be candidates for outsourcing to distribution providers, but that decision would still be premature.

Now we are ready to canvass customers to determine their need for coordinated timing of arrival of stock: (3) Is the SKU simple, that is, complete in itself, or is it complex insofar as it needs to arrive along with other SKUs in a kit? Must delivery be reliably tied to that of others? There may, of course,

There is no formula that relieves teams from descending into the details of customers' needs.

be intermediate complexities. Related to this, (4) Must the people delivering the product perform a service along with delivery? Think again of Coca-Cola delivery people in Japan, who stock and clean shelves for retailers, set up displays, and clean up the storeroom.

All of which leads to obvious questions about the characteristics of particular orders: (5) Does the customer need rapid response for the delivery of the SKU, routine response, or a response during an extended period of time, and (6) Does the customer typically buy the SKU in small or large quantities? And what about the nature of inventory? (7) What are the handling and storage characteristics of the SKU? Is it meant for a bucket, a pallet, a box, a refrigerated container? How much needs to be on

hand? Which leads finally to, (8) Is the product substitutable by another product?

The order in which these questions are asked does not really matter. The point is to create an appropriate list of variables, some a proxy for customer requirements, some a proxy for cost-to-serve data, and then classify SKUs by the resulting taxonomy, which allows the team to begin looking for distinct groupings (see the chart "A Menu for Establishing Customer Needs").

What would make customers defect? Many of the criteria represented by these questions will seem obvious. But the last criterion, substitutability, is not. It is a particularly elegant criterion surfaced by

If a customer would cheerfully substitute a box of "H" pencils for a box of "HB" pencils, inventories can be lowered.

LDB methods and is worth exploring separately because it deals with the subtle connection between inventory and customer satisfaction.

A chief driver of logistics costs is inventory, the level of stock that needs to be maintained to meet customer expectations for timeliness, responsiveness, and so on. Acceptable levels of inventory depend in part on how substitutable a product is in customers' eyes, that is, how reasonable it is to assume that a customer would cheerfully substitute another available product for the out-of-stock item he or she intended to buy, a box of "H" pencils for a box of "HB" pencils, for example. If an SKU is highly substitutable, inventories can be lowered; inventories for nonsubstitutable SKUs must be raised.

So before LDB teams can establish what SKUs may be assigned to which logistically distinct business segments, they hold intensive conversations with customers (or, in the case of retail stores, with merchandise buyers) to ascertain customers' concepts of quality, price alternatives, and so on. The goal is to determine how willing customers would be to accept a substitute SKU. The answers radically influence how much of a logistics investment managers ought to commit to the cost of maintaining inventories. If it can be determined that inventories can be lowered without affecting customer satisfaction, the company can realize initial savings almost overnight.

Consider the case of air conditioners at a department store. The logistics team determined that

profitability would be highest in strategic SKUs if the store aimed for a service level of 98%, that is, inventory levels that were high enough so that customers who wanted a specific model could get it 98 times out of 100 requests. But what exactly does "want" mean in this context? If we are dealing with an SKU that is not at all substitutable, then a 98% service level means that the air conditioner must be available for purchase 98 times out of 100 requests. But if three-quarters of the people who come to order it would happily accept an equivalent one, then a simple mathematical calculation would warrant having the air conditioner on hand only 92% of the time. This would give the *effective* service level of 98%, that is, three-quarters of 8 potentially disappointed people would substitute. Moreover, if overall service levels could be justified at 90%, an acceptable level for nonstrategic products at the department store, the gains are even more striking. In that case, an SKU that is substitutable 3 times out of 4 can actually be on hand only 60 times out of 100 requests.

Sometimes substitutability is just a lost opportunity. At one heavy-equipment manufacturer, managers estimated that hundreds of parts were functionally interchangeable. But engineers never created a roster of parts reflecting this advantage. The result was unreasonably high inventory for each part number and millions more in working, or rather, unemployed, capital.

What businesses are we in? Once the team specifies buyer purchase criteria, the next challenge is to establish how service levels may be competitively maintained for strategically grouped customers. What the team does, then, is *cluster* products with respect to customer satisfaction targets that could best be met by new, hypothetical pipelines. The point is to look for opportunities for various segments to share a pipeline that serves both customers and the profitability targets of the company. Where the value of serving unique segments is less than the value realized by merging them, these segments are consolidated, eventually into distinct target "businesses."

Typically, this initial research produces many more product clusters than can be served realistically by dedicated pipelines. And, again, clustering is more an art than a science. In some cases, logistically distinct business segments correspond neatly with market segments. For Canada's Ready Bake Foods, for example, the clear division between rural and urban markets could be sustained: rural groceries, where margins were fairly high, needed a full line of products and a good deal of technical support; urban supermarkets, where margins were

slim and volume was high, needed predictability and a low-priced, narrow line.

But when criteria are more complex, teams have to explore many possible commonalities before arriving at reasonable target businesses serviced by optimum pipelines. In theory, the pipelines that handle IMATEL's nuts and bolts could be shared by commodity-like telecom products, as long as these are not big and clumsy components like cables and customers do not need them to be delivered at unpredictable intervals. The department store's pipeline for lawn mowers might be shared by rowboats, if not by underwear.

If there is a principle here, it is that each target business, each corresponding pipeline, should be broad enough to realize the benefits of scale but small enough to avoid the averaging we mentioned earlier. One is always working to trade off customer satisfaction and system cost. If the department store finds that 90% of customers in one target segment could be satisfied by a particular pipeline investment but that the next 9% of customers could be satisfied only by doubling that investment, then the store should settle for the 90% target. (See the sidebar "IMATEL: Deriving Six Logistically Distinct Businesses.")

How can we get products to customers? Logistically distinct businesses are formed around groups of customers whose logistics requirements are similar to one another and yet distinct enough from another group's requirements to be served through tailored pipelines: configurations of assets, policies, and operations meant for distinct customers. The next step in developing a logistics strategy is disassembling existing pipeline assets and reconfiguring them to support the distinct businesses that have been demarcated. Sometimes this means making new investments, but often it means using old assets more effectively.

Teams look at the number and dispersion of destinations required or the number and dispersion of sources of supply (e.g., factories and warehouses). They also look at the costs of process capabilities: inbound and outbound transportation rates, variable handling costs, fixed costs, and facility capacity adjusted for demand prompted elsewhere. Here the research is focused solely on cost, for the voice of the customer has already been incorporated into the demarcation of distinct businesses. And again, LDB methods presuppose total costs from factory to purchase, not just the expenses of transport.

Teams determine the costs of, for example, inventory management, storage, handling, order processing, and transportation. They consider how to trade off within differentiated pipelines. They con-

sider pipelines in terms of performance specifications. No single pipeline can be free of decisions about costs and benefits: inventory versus in-stock position, responsiveness versus transportation costs, holding versus handling costs. At IMATEL, the LDB team established that some 75% of sales were from roughly 4% of the product line: basic, fast-moving goods of various sizes, with varying levels of substitutability. This raised the searching question of whether slow-moving items in the product line needed to be handled at all.

Moreover, it cannot be emphasized enough that splitting and reconfiguring existing pipelines are the means to an end, not the end in itself. The point is to take a strategic approach to any service business, organized around an appropriate logistics pipeline. A manufacturing company may, for instance, choose to turn one of its pipelines into a joint venture with a customer or groups of customers. P&G and Wal-Mart may decide to develop a special pipeline just for sales. The Coca-Cola Company in Japan could develop a distinct business around deliveries to vending machines, whose range of products would be determined by frequency of calls. Or a retail chain may reconfigure several pipelines to its roster of wholesalers.

As we implied earlier, moreover, the linked elements of the pipeline may *themselves* be divided into a series of logistics services, each with competitors whose services one might buy rather than produce in-house. Indeed, the make-versus-buy decision for logistics services is all the more pressing

A department store's pipeline for lawn mowers might be shared by rowboats, if not by underwear.

today with the emergence of integrated providers—CSL Logistics (part of CSX), Caterpillar Logistics Services, and so forth—that offer turnkey logistics services from order processing to delivery. These businesses have been growing very fast—by the mid-1990s, they are expected to surpass \$20 billion in volume—and are often supported by dedicated assets, technologies, and methods of organization equivalent to those in very large companies. Some have already split pipelines the way we have advocated here. National Freight Consortium, the largest independent distribution company in the United Kingdom, is really four distinct businesses:

1. See Donald J. Bowersox, "The Strategic Benefits of Logistics Alliances," HBR, July-August 1990.

industrial and refrigerated distribution, services to retailers, high value-added consumer goods, and supply to confectionery and small retail outlets.

New economies of scale: Opportunities to share logistics assets? The last task is to create new economies of scale, to see what assets from various pipelines can be shared. Usually, this task is a check on the one before; teams ask themselves if they have gone overboard.

The most likely opportunities for consolidation would naturally be found upstream rather than downstream. Teams may reduce the number and dispersion of originating warehouses, create marshaling centers (centralized clearing houses that organize parts into usable kits in advance of delivery), or develop ways to piggyback commodity-like parts on other, routine deliveries. But there are growing opportunities downstream, too. The mastery of timing within logistics channels—allotting truck space, say, or scheduling routes—can produce new, more coordinated uses among logistics channels of old assets that used to be clogged regularly. Imagine how many more cars, traveling at just 30 miles an hour, would be able to pass through the Lincoln Tunnel if an information system signaled them all to arrive at an appointed minute and so not jam up at the entrance during rush hour.

The principle here is one borrowed from just-in-time management: when information precedes the flow of physical stock, that is, when the arrivals and departures of products can be made to coincide with unprecedented precision, companies can achieve more and more consistent *throughput*. It is throughput, not speed per se, that minimizes cost, and costs determine which assets should be shared. Because of advances in information technologies, businesses built around logistics can make more creative use of their assets than before. The truck drivers that stock Coca-Cola vending machines can now be informed of precisely what goods have sold during the day and thus need to be restocked before they pull out of the warehouse.

Again, the principles that improve the flow of manufactured goods through logistics pipelines are quite similar to those improving the flow of work-in-progress through the factory. Just-in-time approaches to inventory management, focused flows of materials (corresponding to focused manufacturing cells), electronic tracking, data interchange, and computerized master scheduling all enhance a logistics pipeline's ability to carry physical stock. They also enhance a company's ability to gain advantages of scale through a more creative sharing of physical assets.

Incidentally, much of what drop there has been in major companies' expenditures on logistics can be accounted for by a cheapening of transport costs and interest payments on inventory carrying costs. Productivity gains in the transportation services normally absorbed into logistics systems have actually grown faster than in any other sector; railroad and trucking services show compounded gains of 7.6% and 3.3%, respectively.

The costs of the information technology relevant to inventory and materials management, including

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the costs of telecom links, have fallen dramatically. And if the costs of some assets in logistics systems have risen, such as average costs for land, warehouses, and some transportation equipment, those costs could be contained by reconfiguring pipelines. In most cases, logistics costs rise because of inappropriate efforts at managing complexity along the chain, not because of the costs of the individual links.

Like most truly creative exercises, LDB methods will seem like common sense. They are governed by a familiar strategic goal: an improved knowledge of customers integrated with a reorganized means to satisfy them. And integration, in this context, means seeing the elements of the value chain at the same time as coordinating the tasks of the functional managers who preside over its links. It is no good trying to manage the whole without reconciling the interests of the people who constitute its parts. It is in the context of team discussions that managers reach closure on what good choices are available to them.

LDB methods are *not* a recipe that will serve every company in the same mechanistic way. Indeed, there is no obvious end to analysis of the conflicting priorities and full-stream valuations that, in this case, the question of logistics management prompts. The importance of logistics has come into relief because integrative strategic management has come into its own. Strategy is a continuing openness to change and be changed; the real achievement is creating an organization capable of envisioning and re-envisioning the whole.

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