

2 Operations-based Strategy

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Strategic planning tends to be thought of as a high-level game of chess: a 'grand plan' is formulated in the executive suite, and then the implementation of the different moves (the 'easy part' of the job) is down loaded to the operations organization. However, the world of strategy from the perspective of operations is usually much messier. The 'strategy' is seldom evident until *after* its implementation is well along. Instead, people throughout the organization are continually identifying opportunities, developing new knowledge and capabilities, and testing out their ideas. Initiatives are undertaken, changed in mid-course as new information becomes available and better ideas surface, and sometimes abandoned so that energy can be focused on a different approach. The battle is won not in the boardroom but in the laboratories, on factory floors, at service counters, and in computer rooms. Operations' role is larger than just that of implementer of strategy; it is the foundation for – indeed, the driver behind – successful strategic attacks and defenses. The important implication for company leaders: companies that fail to exploit fully the strategic power of operations will be both hampered in their own attacks and vulnerable to those of competitors that do exploit this power.

Nowhere is this clearer than in cases where large companies that have established a powerful, well-entrenched competitive position (possibly by following a clear strategy) are

attacked successfully by competitors that lack both position and strategy. Indeed, again and again we observe small companies that – although lacking the advantages of size, experience, established position, and proprietary technology – take on big companies and in a relatively short time push their way to industry dominance. Why were the former leaders so vulnerable? Why didn't they react more promptly and vigorously to such attacks – even after extended periods of time? And how are some companies, in contrast, able to defend themselves successfully?

Most studies of this phenomenon focus on cases where the key to the attacker's success was the development of a new technology and/or the identification of an emerging market. Strategy then becomes primarily a matter of finding the right 'position' in that market and then moving there. But there are many other examples where radical new technologies and markets play a minor role: the attackers exploit technologies that are available to all and compete for customers who already are being served by established competitors.

In such cases, the key to success is often an operations-based advantage.¹ Superior operations effectiveness not only serves to buttress a company's existing competitive position, but, when based on capabilities that are embedded in the company's people and operating processes, is inherently difficult to

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imitate. For this reason it can provide the basis for a sustainable competitive advantage even when the company adopts the same competitive position as one or more of its competitors. Moreover, this sort of competitive advantage tends to be less visible to competitors than one that is based on staking out a differentiating competitive position. As a result, they are not prompted to respond as quickly. The sustainability of a competitive advantage that is based on superior operating skills is enhanced, therefore, both because it is difficult to duplicate and because competitors may not perceive its potential effectiveness, or even its existence, until too late.

THE CASE OF AUSTRALIAN PAPER MANUFACTURERS

Consider, for example, the case of Australian Paper Manufacturers.² In 1986, APM (a subsidiary of Amcor, Ltd.), which previously had confined itself to producing paperboard for packaging purposes, decided to enter the Australian market for fine paper. In so doing, it entered into direct competition with giant Australian Pulp and Paper Mills (APPM), the papermaking subsidiary of another Australian conglomerate. Up to that point, APPM had been the only domestic producer of fine papers. Not only did it produce 75% of the fine papers then consumed in Australia (imports accounted for the rest), but it owned two of the country's three largest paper merchants, which together distributed almost half the country's fine papers. To compound the risk that APM took on when it mounted its attack, up until then it had never before made fine paper, which is technologically more challenging than paperboard.

Yet not only was APM able to elbow its way into the markets for fine papers, over the next seven years it rapidly expanded its beachhead until it accounted for almost half the total market – which itself had grown by 50%. In October 1993, APPM's parent company capitulated, selling all its paper manufacturing and distribution operations to Amcor at far

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below their replacement price. Why didn't APPM – which had the benefit of size, experience, market control, and access to its parent's financial and managerial resources – react sooner and more effectively to APM's challenge? Why didn't it mount an aggressive counterattack while APM was still relatively weak, and its own position still dominant?

CROWN EQUIPMENT CORPORATION

It is possible to attribute the inadequacy of APPM's response simply to management complacency and myopia, to the distractions created by problems in its parent company's vast array of other businesses, or to a competitive spirit that had been tamed by many years of market dominance. But such reasons would not explain the longer story of the Crown Equipment Corporation, which was a tiny U.S. producer of TV antenna rotators in 1957 when it decided to enter the low end of the fork lift truck business.³

The success of its first fork lift truck – despite a crowded field of competitors – was due to a then-revolutionary idea: that the tough, no-nonsense people who bought and used fork lift trucks would be attracted to equipment that was not only easy to use, but good-looking. Emboldened (and perhaps a bit surprised) by its initial success, Crown decided to try that approach again. Working with an outside design consulting firm, they introduced a medium-duty, hand-controlled pallet truck that not only again gained rapid market acceptance but also won a design excellence award from the Industrial Design Institute.

This dual success established the strategy that Crown was to follow for the next 30 years: it would identify a segment of the fork lift truck market where the dominant design was stale or inadequate in essential ways. Then, working with professional designers, it would carefully design – from scratch – a more attractive and ergonomically superior truck that it would market at a premium price (about 10% above those of competitive products). Competitors at first derisively referred

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to Crown as 'the pretty truck company,' and deluded themselves into thinking that Crown's success would not be transferable to bigger trucks, where larger competitors controlled the market.

But in the early 1970s, Crown Equipment (which by then was selling over 100 different models of trucks in 80 countries) introduced its first 'rider truck,' which had a lift capacity of 4500 pounds and brought it face to face with a competitor that held a 75% market share. Within four years, Crown's revolutionary new design had captured 40% of that market, and Crown soon followed that success into still larger products. By 1990, Crown was the third largest fork lift truck producer in the U.S., and 10th in the world – even though it produced only electric trucks, compared with competitors that generally offered gas and diesel models as well.

Why didn't Crown Equipment's competitors react to its long series of product introductions – even though the larger ones had monitored its steady growth over at least two decades? Worse, given the market success of its 'pretty trucks,' why didn't competitors simply copy its strategy of employing outside design firms to help them redesign their own trucks before Crown's new designs made theirs obsolete? Crown's strategic weakness was, after all, its very consistency.

SOUTHWEST AIRLINES AND WAL-MART

Such apparently irrational behavior is not confined to manufacturing companies. Southwest Airlines, for example, began operations with little more than 'a wing and a prayer' in 1971.⁴ Its headquarters were in Dallas, Texas, the home base of giant American Airlines. During the 1970s, Southwest grew steadily and, after the deregulation of the airline industry, began to expand its operations outside Texas. Following a quite clear and consistent strategy, it has steadily expanded its route structure ever since, until today it is the seventh largest airline in the United States. Moreover,

it has consistently been among the most profitable U.S. airlines; in 1992, in fact, it was the only one among the top 10 to show a profit.

Not until the 1990s did any of its competitors attempt to imitate Southwest's strategy, and both attempts failed. By then Southwest's approaches to customer service, gate operations, and human resource management had made it so efficient, and its reputation and drawing power were so established, that it no longer appeared vulnerable either to competitors' counterattacks or their attempts to imitate its way of doing business. In late 1996, in fact, the headline for the *Wall Street Journal's* page one story about Southwest's latest initiative read: 'Competitors Quake as Southwest Air Is Set to Invade Northeast.' Why did its competitors wait so long to react, and why were they so ineffective when they did so?

Similarly, when Wal-Mart became a public corporation in 1972, it operated only 30 discount stores in rural Arkansas, Missouri, and Oklahoma.⁵ It had to go public to get the money needed to build its first warehouse. Then, following an unwavering strategy it steadily expanded from that base. A little over ten years later it had about 650 stores and almost \$4.7 billion in sales. By the early 1980s (even though most Americans had never seen a Wal-Mart store, or even a Wal-Mart advertisement), one would think that larger rivals like Sears and Kmart would have been aware of its stunning progress and alert to the potential threat it posed. By 1987, only five years later, Wal-Mart had almost 1200 stores, just over half as many as Kmart (its \$16 billion in sales were now about 60% of Kmart's), and the industry's 'country bumpkin' had taken the lead in applying computer technology to track sales and coordinate the replenishment of its stores. Yet, as Wal-Mart steadily approached the large cities where Kmart was entrenched, rather than prepare for the predictable head-to-head confrontation, Kmart turned its energies to diversification and building a more 'up-scale' image.

By 1993, the battle was essentially over. Wal-Mart's sales had surpassed Kmart's two years earlier and now, with \$67 billion, was over half again as large. Over 80% of Kmart's stores now faced direct competition from Wal-Mart's (while only slightly over half of Wal-Mart's stores competed directly with Kmart's), and Kmart – so financially strapped that it could barely cover its annual dividend – was hamstrung in its attempts to renovate its old stores. By then, of course, it was a case of too little, too late. Why didn't it react sooner? What should it have done while it still had a chance to change the course of events?

AN EXAMPLE OF A SUCCESSFUL COUNTERATTACK

That such inertia – verging on paralysis – is a *choice*, not an inevitability, is illustrated by the very different competitive response of the American Connector Company in the early 1990s.⁶ ACC learned that DJC, a Japanese competitor, which up to then had confined itself to serving only the Japanese and nearby markets, was preparing to enter the U.S. market. Moreover, it apparently was planning to base this assault around a new, highly automated U.S. factory modeled after one that it had been operating in Japan for over five years. That new Japanese factory had been able to reduce the equivalent manufacturing cost of comparable products to almost a third less than ACC's cost.

ACC reacted immediately, on a number of fronts. It hired a consulting firm to investigate the approaches to manufacturing that had been adopted in DJC's Japanese factory. It also began learning whether and how some of these approaches might be implemented in its own factories and initiated an integrated set of marketing moves – including closer communication with customers, more emphasis on customized designs, and selective price cuts. As a result, DJC's U.S. factory is still barely profitable, over four years after starting up.

ATTACKING THROUGH OPERATIONS

All these successful attacks were based primarily on the kind of operations-based advantages alluded to at the beginning of this article. Indeed, that operations advantage was the key to the sustainability of the attacker's success. None were built around a new product or service, a unique technology, or a marketing or financial advantage. Nor did the attackers do anything that could not have been copied by any of their competitors, had they reacted in time. But, over time, the attackers became so effective at implementing their strategies, and extending them into new areas, that the approaches they employed were no longer easily replicable. Analogously, anyone can buy the same tennis racket that Pete Sampras uses, wear the same brand of clothes and sneakers, and adopt a 'big serve and volley' strategy. You might even have had a chance at beating him when he was 8 years old – but no longer.

There are two ways in which these successful attackers created and exploited their operating advantage. First, they adopted an operations strategy that gave them a competitive advantage along dimensions or in locations that, although valued by certain subsets of their customers, were not being emphasized by competitors; this is what is sometimes referred to as a 'differentiating' competitive position. Often, the operating capabilities they developed were cultivated in other countries or different industries. Second, they reinforced this alternative way of appealing to customers with the development of a tightly integrated system of supporting values, skills, technologies, supplier/customer relationships, human resources, and approaches to motivation that were neither easily copied nor transferable to other organizations.

The key to the successful counterattacks was that the incumbents either persuaded customers that their own competitive advantage was more desirable than the attacker's; they exploited the inherent weaknesses in the attacker's specialized operating

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systems; and/or they emulated its strategy so quickly that the attacker never had enough time to develop a superior operating effectiveness.

POSITIONING: APPEALING TO A DIFFERENT CUSTOMER NEED

Given the multitude of choices that customers face today, how do they decide which product or service to buy? Different customers are attracted by different attributes. In order to appeal to those who are interested primarily in the cost of a product or service, some companies attempt to offer the *lowest price* (as did DJC, Wal-Mart, and Southwest Airlines). Others prefer to appeal to those customers who want *higher quality* (in terms of performance, features, or appearance) even though this might necessitate a higher price, as did Crown Equipment. Still others seek to differentiate themselves through superior *flexibility, dependability, speed* of response, or *innovativeness*, as had the American Connector Company prior to being attacked. A given company may try to match (or stay within some specified range of) its competitors on several competitive dimensions and thereby offer the 'best value' or other form of compromise between competing attributes. But when it comes down to the final attempt at persuasion, the company hopes the customer's choice will be swayed by its product's (or service's) specific form of superiority.

Therefore, a positioning advantage must begin with a decision as to how the company wants to differentiate itself in its chosen marketplace. However, it cannot gain any long-term advantage over its competitors by focusing on a different customer need if it continues to use the same manufacturing or service delivery process as its competitors do. After having decided what kind of superiority it wants to achieve, the company must configure and manage its operations organization in such a way that it can provide that form of advantage most effectively.

Just as an engineered product reflects the combined influence of a variety of design parameters (such as electronics, mechanics,

chemistry, or biology), an operations organization reflects the influence of its own set of design parameters. Some of these represent decisions regarding the organization's physical attributes, such as the amount of production (or service delivery) capacity that it provides. Others represent the policies and practices that determine how the physical aspects of the organization are to be managed.

Some of the competitive attacks described above were clearly based on a decision to address a critical (and sometimes latent) customer need that the company's competitors had not given a high priority. Such opportunities often emerge when customers' needs evolve over time. For example, Australian Paper Manufacturers clawed its way into the Australian fine papers market primarily by offering superior quality (its reconditioned paper machine was able to make much smoother paper) and by providing better responsiveness to its customers. Although APM could not match its competitors' range of products or the variety of sizes and packages they offered, an unexpectedly large segment of the Australian market, as it turned out, was more interested in high quality and rapid, dependable delivery than a broad range of products and package sizes.

Similarly, Crown Equipment's ability to design radically new fork lift trucks was reinforced by its ability to design and manufacture its own components. Its competitors were constrained from being too innovative because they relied on outside suppliers to provide most of their components. Crown's ability to customize its products to meet the specific needs of individual customers was due to a flexible production process whereby batches were assembled using small teams of broadly skilled workers. Crown's larger competitors, in contrast, were constrained by their use of assembly lines that were set up for long runs and staffed by workers having limited skills.

These examples also provide another explanation for the inadequate response to such attacks by entrenched competitors. Once a company has configured its operating system with the goal of achieving superior performance along certain competitive dimensions,

it becomes very difficult for it to try to match the performance of a competitor that uses an operating systems designed to excel along quite different dimensions. A company can't adapt effectively to a new set of competitive priorities simply by making a single change in its operating systems. A whole series of interlocked alterations is required, and this takes time as well as money. Faced with the prospect of such wholesale restructuring, companies often delude themselves with the notion that the competitive advantages that new competitors are offering will appeal only to a small segment of the market, cannot be scaled up, or are just a 'passing fancy' that customers will soon tire of.

CAPABILITIES: BEING BETTER AT 'THE SAME GAME'

Another way that a company can use operations to create a competitive advantage is simply by executing that strategy more effectively than its competitors. By aggressively building experience (often characterized as 'getting down the learning curve') and developing unique organizational capabilities, some companies have been able to achieve an enduring advantage over their competitors – even those that addressed the same customer needs and configured their operations similarly. This kind of operations-based advantage draws its power from the fact that companies succeed in the long run not just by equipping themselves with the latest technologies or facilities, but by being able to *do* certain things better than their competitors can. A decision to move production to a low-wage area, for example, can provide only a temporary advantage at best; unless a company is exceptionally good at setting up and managing such facilities, its competitors can do the same. Similarly, a company might be able to acquire access to a certain technology but not the ability to mass produce products embodying that technology, to sell them effectively, or to improve that technology over time. Such skills can only be developed with conscious effort, experience, and time. This is where the competitive power of operations

really becomes important. Strategic planners often assume that it is easy to replicate other companies' operations. Indeed, while it is usually straightforward to duplicate a mediocre operation, there are enormous – and competitively significant – differences between mediocre and outstanding performers. Catching up quickly to become as effective as a first-rate operation is extremely difficult.

For example, when Kmart finally attempted to react to Wal-Mart's attack by pouring money into new computerized scanners and new product procurement and inventory control systems, it found that its employees lacked the skills necessary to use the new systems effectively and that the data being entered into them were full of errors. Instilling the organizational discipline required to ensure the accuracy of data and then providing the training required in order to make the most effective use of its sophisticated systems had taken Wal-Mart many years. Kmart could find no shortcut.

Even though Southwest Airlines initially based its low-cost strategy on its 'no frills' (including no meals, reserved seats, or baggage transfers) approach, its use of secondary airports, and its operation of only a single type of aircraft (Boeing 737s), it soon developed organizational capabilities that created further cost advantages. By the time competitors such as United Airlines and USAir decided to react by setting up subsidiaries utilizing similar strategies and operating structures, they found they simply couldn't match Southwest's fast turnaround times, its aircraft utilization rates, or its friendly, personal service. Just as important, Southwest had attracted and developed a customer base that was willing and able to board and exit its planes just as fast as it would let them. One recent study, for example, found that Southwest's turnaround times were upwards of a third less than those of its major competitors (even after adjusting for such things as its lack of meals and smaller airplanes) and its staffing costs were less than half of its competitors.⁷ Yet the quality of its service, as measured by such variables as late arrivals and number of customer complaints, was 75%

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better than the average of its nine major U.S. competitors. It is easy to eliminate meals and baggage services, add more direct routes to secondary airports, and buy Boeing 737s, but it is hard to 'buy' fast turnarounds, on-time arrivals, and cooperative customers. Such capabilities have to be built, and nurtured, step by step. In thinking about how to develop such capabilities, it is useful to break them up into three types:

- *Process-based capabilities* are derived from activities that transform material or information and tend to provide advantages along such standard competitive dimensions as low cost and high quality. McDonald's meticulously researched and documented procedures for producing fast food have been its primary defense against hordes of attackers, who have found themselves unable to replicate the incredible consistency of product and service that McDonalds has sustained throughout its network. While process-based capabilities are usually associated with manufacturing industries, service companies now are using new technologies to achieve operating advantages in comparable ways. Fidelity Investments, for example, has invested millions of dollars in developing state-of-the-art image and audio capture technology, so that transactions made by its customers can be rapidly and accurately entered and checked. This accuracy allows it to provide consistent, superior service to its customers by being able both to enter information into its systems accurately and to retrieve that information instantaneously when customers inquire about previous transactions. Even when its investment performance lags competitors, Fidelity has been able to retain customers because of the outstanding service it provides.
- *Systems (coordination)-based* operating capabilities underpin such competitive advantages as short lead times, a broad range of products or services, the ability to customize on demand, and fast new product development. Such capabilities

require broad involvement throughout the entire operating system. For example, Allegheny Ludlum Steel Corporation became one of the most profitable U.S. producers of specialty steel through a long process of steadily improving the way it coordinated the complex series of steps involved in making small batches of customized steel.⁸ Over the course of six years, it was able to reduce substantially the percent of defective steel it produced, double the effective capacity of its melt shop (with the same equipment), and increase its net output (in tons per worker) by 40%. Moreover, it developed an intricate cost accounting system, based on its own carefully monitored experience, that allowed it to estimate precisely the cost of any grade, width, and gauge of steel. The 'system' that Allegheny built gave it capabilities that enabled it not only to survive an industry bloodbath (in 1980 it had 10 competitors; now it has three), but to show a profit every year.

- *Organization-based* operating capabilities involve the ability to master new technologies, design and introduce new products, and bring new plants on line significantly faster than one's competitors. Since they are even more difficult to replicate, such capabilities are among the most powerful in the operating arsenal. The classic example of such a capability was provided by the Lincoln Electric Company during World War II.⁹ At the beginning of the War, it had become the leading and lowest-cost producer of arc welding equipment and supplies in the United States. During the War, in a patriotic attempt to increase the capacity and reduce the costs of such equipment for the war effort, Lincoln voluntarily offered to share its proprietary manufacturing methods and equipment designs with its competitors. As a result, industry production rose to meet demand without any investment in additional capacity. By the end of the War, those competitors had reduced their manufacturing costs to levels that were close to Lincoln's.

But soon, using the same organizational capabilities that had given it cost leadership before the War, Lincoln was able to regain its cost advantage, which it has maintained to this day. In another example, both Boise Cascade and Union Camp began to install new paper plants at about the same time (Boise in International Falls, Minnesota, and Union Camp in Eastover, South Carolina). Despite the fact that its plant employed similar off-the-shelf technology, Boise's skill at bringing new plants on line allowed it to get its plants up to full capacity in just over a third the time it took Union Camp. Despite operating the largest paper plant in the world (in Franklin, Virginia), Union Camp had less experience bringing new operations on line. The delays at Eastover left Union Camp at a significant competitive disadvantage when demand for paper products exploded in 1992.

THE SUSTAINABILITY OF AN OPERATIONS-BASED COMPETITIVE ADVANTAGE

None of the successful attacks described above was based on programs of indiscriminate 'continuous improvement.' Instead, the attackers methodically developed certain operating capabilities and consciously sought out opportunities to exploit them. Some of the attackers clearly intended to stake out a differentiating competitive position. All understood that trade-offs had to be made among various dimensions of performance and that such trade-offs could be altered by operations-based innovations.

But they also exploited the fact that those being attacked tended to underestimate the power of the attacker's operating superiority. Not all industries, of course, are populated with competitors that are so slow to react. In more dynamic environments, one could argue, any advantage a company might gain from new operating abilities would be quickly eroded away as defenders and new attackers replicated the operational

techniques of the attacker. Therefore, that advantage would be expected to be quite transient.

Even in such environments, however, operations-based advantages turn out to be surprisingly robust for two reasons. First, innovations in operations are inherently difficult to replicate and slow to diffuse. They often demand substantial organizational change and sometimes even a complete realignment of management philosophy and corporate culture. The fact that operations effectiveness is difficult to imitate or transfer, indeed, is what makes it so valuable. To the extent superior operating capabilities are organizationally specific, the competitive advantage provided by them is much more sustainable than that provided by something one can easily copy or buy. Japanese auto makers, for example, were able to offer a product quality/reliability advantage while maintaining very competitive (and often lower) prices because of their adoption of 'lean production' techniques. These techniques, although based on simple principles, required such radical changes in worker training and management practice that it took other auto producers more than a decade to implement them successfully and bring their defect rates down to levels approaching those of their Japanese competitors. Similarly, even though Total Quality Management (TQM) began sweeping through U.S. industry almost twenty years ago, there is still a thriving business in TQM consulting. If such techniques were rapidly and easily diffused, the demand for such consultants would along since have disappeared.

Second, and just as important, operations-based strategies have a dynamic quality. Ongoing invention is at the core of today's most effective operations organizations; they do not stand still while their competitors try to catch up. Those that can consistently create new, more effective ways of delivering value to customers will stay ahead of the pack. In the cases described earlier, the innovations in operations were both competitively important and relentless; as a result, the advantage gained was powerful and sustainable.

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Indeed, the ability to develop new and valuable abilities – to push out the frontiers of your operating performance faster than your competitors can – is the most difficult of all to master.

The ability to learn and adapt quickly underpinned Microsoft's astonishingly rapid about-turn with respect to the Internet. After years of neglecting the development of Internet software, while it focused on its Operating System and Applications products, Microsoft belatedly realized that it stood to lose much of its desktop market to upstarts like Netscape and Sun Microsystems. Unlike so many others before it that had been dismissive of new computer technologies (e.g. mini-computers, engineering workstations, personal computers) when they first appeared, and then astonishingly slow and inept in trying to develop competing products, Microsoft was able to realign itself quickly around the imperatives of the new technology and forge its way back to rough parity with its new competitors.

While some individuals learn and adapt easily, organizations rarely do. They must be structured and shaped in a way that facilitates learning and change. For example, even during the time their company apparently was oblivious to the threat of the Net, a few zealots within Microsoft were developing a deep understanding of its potential importance. Microsoft not only encouraged these mavericks to develop their Internet expertise, it allowed their heretical voices to be heard and to influence the path of the company. Being able to quickly transform individual learning into organizational learning is an enviable operating capability.

New operating capabilities often arise in ways and from sources that are difficult to predict. Putting too much reliance on competitive benchmarking, or on monitoring the innovations of one's direct competitors, can easily misdirect a company's attention away from the new operating capabilities that are developing in apparently unrelated arenas. This is particularly true in the case of *capability pairing*, where previously unconnected

(and/or insufficiently developed) capabilities are developed and combined in a unique way.

It is not necessary that any of these capabilities be proprietary or even uncommon. They may have been developed for different purposes and different markets, so entrenched competitors are unlikely to perceive any danger in them. But when they are combined and focused on a new market segment or competitive approach, those being attacked often find it difficult to respond. They might be able to develop or acquire some or all of those capabilities but, in the short term, rarely can master them all – or learn how to mesh them together.

US Robotics (USR), for example, became the leading modem producer following this approach.¹⁰ During its early years, it moved from business to business, almost haphazardly, picking up new capabilities along the way. During the late '70s and early '80s it manufactured modems, then turned to distributing other companies' products while its largest rival was growing its market share to over 75% in the United States. As a distributor, USR learned that its customers prized transmission speed above everything else, and so its managers and engineers focused on ways to make modem communications both faster and easier to upgrade. They decided this could be done only by developing a new kind of data-pump: the heart of the modem. Resurrecting the manufacturing expertise it had developed during its early years, and combining that with its new engineering capabilities and understanding of consumer needs, USR began manufacturing modems in earnest again in 1982. Its new mission: to develop and build the world's fastest modems. Hayes Modem, the giant incumbent, eventually was able to match USR bit-for-bit in terms of transmission speeds, but could not emulate the *combination* of manufacturing and engineering skills that allowed USR, time after time, to introduce the fastest products. Hayes could not recover its technological leadership in time, and in late 1994 it filed for Chapter 11 protection – while USR's sales were approaching \$1 billion.

Similarly, Japan's Hitachi-Seiki began developing capabilities in electronics in the 1950s, when it was still a tiny producer of standard machine tools and mechanical engineers ruled the industry.¹¹ But over the years, step by step, Hitachi-Seiki mastered controllers, sensors, and software – creating in the process a new engineering discipline: 'mechatronics' – until by 1985 it was recognized as a world leader in the design and production of Flexible Manufacturing Systems.

DEFENDING THROUGH OPERATIONS

The foregoing suggests that a company can defend itself against these kinds of operations-based attacks using one or more of the following three approaches.

- *First*, a company can exploit its own strengths, pouring resources into improving its competitive advantage and marketing that advantage more aggressively to customers. (This may appear to be more of a marketing-based defense than an operations-based defense, but for the marketing to be successful, it must be built on a foundation of true operating superiority.) The danger with this approach is that sometimes companies pursue their target competitive advantage(s) beyond the point of diminishing returns – in effect, 'overshooting' their customers' real needs.¹² For example, one of the ways the American Connector Company defended itself against the attack of DJC was to go to its customers and convince them of the value of purchasing customized products instead of the standardized products that DJC was offering. This would have been very difficult given the huge cost advantage that DJC would have possessed if its new U.S. plant were able to produce products at a cost comparable to that achieved in its Japanese plant. In light of this, ACC also embarked on a program to reduce its manufacturing costs. The smaller its cost

disadvantage, the easier it would be for its customers to justify buying ACC's higher-performing products.

- *Second*, a company can attack its attacker's operating-based weaknesses. Recall that in configuring its operations organization so as to offer superior performance along certain dimensions (e.g., low cost, flexibility, fast response), the attacker had to make structural and software choices that constrained its performance along other dimensions. These present points of vulnerability. Again using ACC's response as an example, it was very clear to them that one of the keys to DJC's low costs was its strategy of operating its manufacturing facility close to its theoretical capacity (three shifts a day, 330 days a year) and scheduling long runs so as to minimize changeovers. Therefore, ACC set out to prevent DJC from attracting the sales, particularly of high-volume products, that would allow it to take full advantage of its production process. It did this not only by aggressively selling its ability to design higher-performing customized products, but also by cutting its prices on the products that were the most attractive ones for DJC to produce.

John Crane's counterattack against Far-Eastern competitors that were invading its markets with low-cost derivative products provides another example of this kind of response.¹³ Although it had gained industry leadership by inventing many of the most popular mechanical seal technologies, Crane's proprietary advantage had dissipated as its seals became commoditized. By consciously developing an ability to build customized seals on very short notice – and thereby offer consistently shorter leadtimes to European customers who demanded fast response in order to avoid plant shutdowns caused by a faulty seal – Crane was able to beat back many of its low-cost, but distant, competitors. In the process of developing this capability, it had to reinvent the way it coordinated material flows through its factory as well as introduce and master the operation of a

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new CAD-CAM system that it customized to meet the unusual needs of mechanical seal production. Subsequently, Crane was able to use this new capability in strengthening many of its other businesses.

- *Third*, a company can recognize the seriousness of the attack quickly and emulate its attacker's strategy before it is able to get too far ahead of it down the learning curve. Microsoft, as noted earlier, was initially caught flat-footed by Netscape's approach to developing its browser software. Netscape exploited the sophistication of its Internet-based users by employing the same rapid design-build-test cycles that had been used to construct the Internet itself over a period of 30 years. Customers and users were an ongoing part of this development process. Microsoft, accustomed to longer projects and more rigorous pre-launch testing, simply was not organized to operate in this more volatile world. Fortunately, it *had* built a software development group (analogous to an operations organization in traditional companies) that was capable of adapting to such changes. Even more important, it took its fledgling competitor seriously long before it posed a serious threat to its own sales and profitability. It recognized that Netscape's technology could be applied not only to Internet browsers but also to a vast range of other network computer-based products. By mid-1995, less than a year after Netscape introduced its first browser, Microsoft had sounded the call to battle via video, e-mail, and live broadcasts throughout the company. Not only did it swallow its pride in admitting it had fallen behind, Microsoft was clear-headed about the capabilities it didn't have and the amount of time it would take to develop those capabilities internally. Realizing that developing a browser from scratch would take too long, it based its new browser on software developed by tiny Spyglass corporation. Then this browser was quickly and elegantly incorporated into its new Windows 95 operating system. Despite the Justice Department's concerns, Microsoft's ability

to weave the open standards of the Internet into its most traditional, complex, and important products so quickly demonstrated unusual operating capabilities. In addition, Microsoft recognized that it had to do more than respond simply to the threat posed by Netscape's *initial* browser. Understanding the potential threat the Internet posed to its core business, it changed the way it developed new products – emulating Netscape by releasing early versions of its new browser across the Internet. While skeptics often accuse Microsoft of using its sheer size to bully or bundle its way into markets, it also was surprisingly quick on its feet and willing to abandon some of the practices that had made it so successful up to then. Navigating its way between loyal pools of existing corporate customers (who were accustomed to debugged software that didn't require a lot of technical support) and hordes of Internet-savvy netniks (who were clamoring for new products) was an immense challenge. In just two years after its introduction in November 1995, however, Microsoft's web browser grew its market share to almost 40%, on its *own* merits.

CONCLUSION: LESSONS IN ATTACKING AND DEFENDING THROUGH OPERATIONS

Companies that base their attacks, or their defenses, on operations capabilities all have one thing in common: they understand that such capabilities rarely can be developed quickly or bought off-the-shelf. People must be trained and given experience, new equipment and procedures must be developed and honed, new approaches to management must be tested, shaped, and given time to insinuate themselves into the organization's culture. Sometimes companies are not even aware of the full potential of the capabilities they are developing until a sudden insight or fortuitous incident reveals how they can be exploited. In this sense, strategies based on operating capabilities are at least as likely to be 'emergent'

(recognized after the fact) as they are the product of traditional strategic planning.

Indeed, the fact that such capabilities take such a long time to develop, and can 'come together' quite suddenly, gives them much of their competitive power. Entrenched incumbents tend to delay developing similar capabilities because they view them through the distorting prism of their own approach to structuring operations. If they are used to large-scale facilities, that is, they tend to consider smaller operations as inefficient; if they have invested massively in automation, they dismiss more worker-intensive operations as unreliable and outdated. They also tend to put too much faith in the power of their own size, asset base, and market position, and they assume that they can replicate anything a competitor can do, at a reasonable cost and on demand. Case after case, however, shows none of these assumptions to be valid.

Wal-Mart perfected its innovative approaches to retailing for a dozen years in the rural areas of the American south before attacking large urban areas. Southwest Airlines patiently built its skills – and its confidence – for years in Texas and adjoining states before growing to blanket the United States. During decades in which it produced only motorcycles, Honda became a world leader in the design and manufacture of small, highly efficient, gasoline engines before it suddenly transferred those skills into auto production. And other Japanese companies spent decades improving the precision of their manufacturing processes, reducing defect levels to parts-per-million levels, speeding up their process throughput times using just-in-time techniques, and instilling a climate of continuous improvement before attacking the U.S. steel, auto, consumer electronics, machine tool, and office equipment markets. For example, producing the personal camcorder was the culmination of impressive skills in design, automation, mechatronics, and miniaturization that Japanese consumer electronics companies had been cultivating for over a quarter of a century, first in miniature radios, then in television sets, pocket calculators, and VCRs. When all those highly-honed skills came together, the U.S.

manufacturers of consumer electronics and photographic equipment found that they were simply incapable of making comparable products.

Effective defenders are quick to recognize such latent threats. They understand that new operating capabilities take time to develop, and they are constantly scanning the horizon of their markets and technologies on the lookout for companies that might combine hitherto unconnected skills to march into their territory. Small companies, particularly those in other countries or different industries, are especially dangerous. Being relatively invisible, the operating capabilities they are developing – and the way these capabilities are being translated into competitive advantage – can escape the detection of companies whose attention and competitive energies are focused primarily on their large, immediate competitors. Many such threats are emerging today from small upstarts that combine their knowledge of the new information technologies with other operations expertise to attack long-established firms. The eventual winners may well be not the incumbents, many of whom have yet to put more than a toe in the networked water. Companies like Amazon (www.amazon.com) and InPart Design (www.inpart.com) are important heralds of what may happen in many businesses. Each is using its growing experience in the new technologies either to link to new customers or to build new kinds of partnerships between companies. In so doing, each is inventing difficult-to-replicate operating capabilities.

Federal Express is one company that responded early and very effectively to the possibility of such attacks. Parenthetically, it had risen from obscurity to dominate the overnight delivery business using what we referred to earlier as a 'capability pairing' strategy: combining a 'hub-and-spoke' route structure (which its competitors knew about but thought inefficient) with continuous package tracking using state-of-the-art bar code, computer, and transmission technologies. While other companies were ignoring the internet because of its lack of commercial success and the technical problems being

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encountered, Federal Express was running experiments with it as early as 1994. It recognized the importance of *time* when building new operating capabilities and was determined to keep would-be rivals from approaching it from a blind spot. Accepting the risk that the Internet might be a dead end, it was more interested in developing skills that could give it a new source of competitive advantage. By the end of 1996, FedEx's Web site was averaging nearly 1.4 million hits per month, including 360,000 tracking requests. This provided customers with faster and better information, while helping FedEx manage its customer service and other resources more effectively.

General Electric is another company that recognizes the need to develop internally – rather than attempt to buy – new operating capabilities. GE Lighting, for example, combined its strong manufacturing skills with knowledge about new networking technologies (gained from its corporate siblings) and became part of GE's experimental Trading Process Network. It set up a secure Web site and automated purchasing with a diverse group of partners. Since starting the pilot project in mid-1996, the unit has cut its average purchasing cycle in half, to seven days. But it also received another payoff: the openness of the Web has enabled a much larger group of companies to bid on jobs, resulting in delivered prices that are 10% to 15% lower than before. The division now lets customers track their orders through its shop in real time in the hope that it can thereby build a formidable new barrier against competitors.

As this example shows, strategies that combine existing and new operating capabilities in novel ways can be surprisingly powerful. However, the most sustainable advantages are those based on an organization's ability to *learn*: while companies often can replicate a competitor's equipment and operating policies within a few years, learning to use them effectively usually takes much longer. A company that has been shielded from tough competition for several years (as in the Australian Paper case) tends to have a particularly difficult time defending itself against sudden attacks. It both waits too long before taking a

threat seriously and, when it finally does respond, finds that it has forgotten how to move – and learn – quickly.

Finally, companies must avoid confining their improvement activities to finding and emulating '*best practice*.' Rather, they should search out *new practice*, continually asking themselves: 'How would a competitor that possessed those new capabilities and understood our own company's weaknesses go about attacking us?' and 'If we were subjected to such an attack, how could we respond?' In addition, they should seek out and study fast-growing competitors to learn about the innovative operational methods they have developed. If you're successful and growing, even though small, you probably are doing something different than the 'big guys.' A company's size tells little about the quality of its ideas or its potential to become a competitive juggernaut in the future.

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NOTES

1. For an opposing view, see Michael E. Porter, 'What is Strategy?' *Harvard Business Review* (November/December 1996), where he argues that 'operational effectiveness is not strategy.'
2. See 'Australian Paper Manufacturers (A),' Harvard Business School Publishing, Case #9-691-041.
3. See 'Crown Equipment Corporation: Design Services Strategy,' Harvard Business School Publishing, Case #9-991-031.
4. See 'Southwest Airlines: 1993 (A),' Harvard Business School Publishing, Case #9-694-023.
5. See 'Wal-Mart Stores, Inc.,' Harvard Business School Publishing, Case #9-794-024.
6. A disguised name; see 'American Connector Company (A),' Harvard Business School Publishing, Case #9-693-035.

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7. Jody Hoffer Gittel, 'Cost/Quality Trade-Offs in the Departure Process? Evidence from the Major U.S. Airlines,' *Transportation Research Record*, 1480.

8. Recently renamed Allegheny-Teledyne, Inc. See 'Allegheny Ludlum Steel Corporation,' Harvard Business School Publishing, Case #9-686-087.

9. See 'The Lincoln Electric Company,' Harvard Business School Publishing, Case #9-376-028.

10. See 'U.S. Robotics, Inc.,' Harvard Business School Publishing, Case #9-692-061.

11. See 'Hitachi Seiki (Abridged),' Harvard Business School Publishing, Case #9-690-067.

12. See, for example, Clayton Christensen, 'Patterns in the Evolution of Product Competition,' Harvard Business School working paper #97-048, 1996.

13. See 'John Crane UK Limited: The CAD-CAM Link,' Harvard Business School Publishing, Case #9-691-021.