

考試科目	經濟學	41P-41P 所別	科管所學士後甲組	考試時間	3月18日 星期日	第 / 節
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經濟學 (96)

國立政治大學圖書館

- 一、(10) 影響「市場價格」的因素有哪些？為什麼？請分別說明之。
- 二、(10) 請以圖形、符號與文字，說明
 - (1). 何謂「規模經濟」？(2). 何謂「學習曲線」？
- 三、(10) 說明為何當工資上漲時，速食產品（即溶奶粉、方便麵、微波食品等）的需求會增加的原因。
- 四、(20) 請自行設計一個賽局報酬矩陣來說明「囚犯困局」的現象。並藉此說明「為何人人都不喜歡污染，但是自利的人卻還是會丟垃圾？」
- 五、(20) 已知便當的邊際成本為 50 元，市場需求為 $P = 100 - Q$ ：
 - (1) 若便當為某廠商獨占生產，試求獨占者利潤最大的「產量」、「價格」、「利潤」、「消費者剩餘」與「社會福利」。
 - (2) 若便當市場為完全競爭市場，試求社會福利的最大「產量」、「價格」、「消費者剩餘」與「社會福利」。
 - (3) 由 (1) 與 (2)，可知獨占下的「社會福利淨損失」為何？
- 六、(20) 假設某廠商在 A、B 兩個市場銷售，其市場需求如下：

A 市場： $P = 360 - 2Q$ ；B 市場： $P = 240 - Q$

已知廠商的邊際成本是 40。請問

 - (1) 兩市場採單一價格時，兩市場的銷售量分別是多少？總利潤為何？
 - (2) 兩市場採差別價格時，兩市場的價格、銷售量分別是多少？總利潤為何？
- 七、(10) 假設一個產品的需求彈性是 2，請問該產品應不應該漲價？為什麼？請以儘量以數字及方程式來說明。

備	考	試	題	隨	卷	繳	交
命題委員：				194	(簽章)	96	年 3 月 5 日

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考試科目	微積分	所別	4191 科管所學士後甲組	考試時間	3月18日 星期日	第 3 節
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國立政治大學圖書館

1. 求拋物線 $y = x^2 - nx + 1$ 與直線 $y = nx$ 的交點在 $n \rightarrow \infty$ 時的位置。(10分)
2. 若 $\cos(x - y) = y \cdot \sin x$ ，則 $y'(x) = \underline{\hspace{2cm}}$ 。(10分)
3. 試證方程式 $x^3 - 3x - 7 = 0$ 只有一實根，並求此根之近似值至小數第一位。(10分)
4. 求函數 $f(x) = \frac{x^2 + 4}{x}$ 之漸近線。(10分)
5. $\int xe^x \sin x dx = \underline{\hspace{2cm}}$ 。(10分)
6. 求由極座標方程 $r = 2$ 之外部及 $r^2 = 8 \sin 2\theta$ 之內部所圍之面積。(10分)
7. 假設人口的成長速率與現有人口成正比，某鎮在民國 70 年的人口為 10000 人，至民國 80 年增加為 14000 人，則該鎮在民國 100 年的人口數為： $\underline{\hspace{2cm}}$ 。(10分)
8. 樟腦昇華的速率與其表面積成正比。今有半徑為 1 公分的球形樟腦丸，經過 12 天後變成半徑為 0.9 公分的樟腦丸，問該樟腦丸全部昇華殆盡，需時若干？(10分)
9. 請舉出四個微積分可應用在工商業界的不同例子，並同時分析出可能會用到的函數或方程式(亦即要說明為什麼)。(20分)

備 考	試 題 隨 卷 繳 交
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命題委員： 195 (簽章) 96 年 3 月 2 日

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考試科目	企業管理學	所別	研究所 乙組	考試時間	3月18日 星期日 第3節
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- 一、
1. 你不同意作者的論述，為什麼？和「管理學」有什麼關係？ 15%
 2. 若進步與成長有問題，廿一世紀應以何為目標才能讓人類文明得以持續發展？ 15%

地球正加速暖化，如果我們能在外太空用輻射望遠鏡觀看，地球因為熱輻射，會像是個大火球燃燒著自己。地球持續耗用石化能源，終將有涸竭之日，森林覆蓋的逐步縮小，物種將加速滅絕，這也讓地球復原的能力衰退。此外，存在於許多不可知地方的病毒與細菌，也將重現人間，近代各類病毒變種所造成的問題日趨嚴重。至於大地之母的海洋，則會因變暖而使得她的含氧量降低，魚類與其他海洋生物也將日益減少，已有專家預測，到了二〇五〇年，人類大概不會再有海洋魚類可供食用。地球的這些活動，似乎意謂著人類根據貪婪意志而追求的成長，終將大筆反噬人類本身。最悲觀的學者甚至認為在二十一世紀結束前，人類將大筆滅亡。科幻文學創始作家威爾斯(H. G. Wells, 1866-1945)在《時光機器》裡看未來，認為所謂「文明」，「只是一堆終將不可避免地，摧毀其創造者的愚蠢行為之累積」。英國另一文豪王爾德(Oscar Wilde, 1856-1900)用這樣的話來

反諷人類：「如果人是被人所造，那麼人類當為此而覺得羞恥。」做為萬物之靈的人類，到底應受獎勵呢？或是被咀咒？

地球因日益暖化而氣候異變，成為地球末日的元凶。追根究柢，這乃是人類持續追求無止境成長的附贈品。自從十七世紀理性啟蒙以來，人類即形成了一種以人類本身利益為中心的世界觀；而從十八世紀以降，它更以「科技」、「進化」、「理性」這樣的觀念來合理化人的一切作為。及至二十世紀後半，這一切又被狹義的統攝到「成長」這個名目之下。人類對自然的掠奪終於完成了終極理論之建構。成長即進步，進步即成長，「成長」與「進步」這種以物質慾望的滿足為核心的概念是如此的強固，它甚至成了一种魔咒，驅動著人類像失控火車般一往直前，奔向那不可知的未來。

因此，由今天回頭看，十七世紀的「理性」、十八世紀的「工業化」、十九世紀的「進步」、二十世紀的「成長」，這一連串相似詞間，其實有著一種愈來愈狹義的走向。十九世紀的人們談論「進步」，還不忘對「進步」的內涵及表現提出質疑，並在二十世紀兩次大戰後，更對「進步」充滿了悲觀。但二十世紀後半所出現的「成長」，卻因為資本主義體制的強化，而逐漸佔領了全人類的心靈，終於在進入二十一世紀的此刻，開始向人類追討欠債。

備 考 試 題 隨 卷 繳 交

命題委員：

802

96年3月5日

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考試科目	企業管理學	所別	研究所碩士後進修班	考試時間	3月18日 星期日	第3節
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國立政治大學圖書館

- 二、
1. 開發這些產品的廠商，需不需要為消費者的使用行為負責？ 15%
 2. 從這篇文章你看到哪些利害關係人(stakeholders)？誰的獲益最多？誰付出的代價最大？ 15%

今天，你開機了沒？

拿起這本書，你多少曾經試圖反省自己的開機習慣，或是關心身邊的人的開機行為。因為不知不覺，開機，現在是你我每天必然的動作。早上到辦公室，下班踏進家門，可能都是從「開機」開始。

電腦、電視、電玩，加上手機、收音機、mp3機，今天你可以從一個人每天要開多少台機器，了解他忙碌（或無聊）的程度；你也可以從自己開機的頻率與方式——例如每天開機多少次？是否二十四小時持續開機？——看見自己的生活形態。

這些機器，如今不僅佔據人類生活，也形成了龐大的產業。企業界使盡渾身解數，都在搶分這塊大餅。管理顧問與職場專家樂觀的說，開機可以為我們帶來更好的生活，大家工作更有效率、娛樂更多元、訊息更豐富、朋友交往更方便、賺錢更容易、時間更好打發。

不過，我們雖然迷上開機，享受著「機機相連到天邊」所帶來的一切方便與選擇，卻也開始心生疑慮：老在上網，會不會不健康？看這麼多電視，是否會變得膚淺？迷上電玩，算不算蹉跎生命？開機之後，從螢幕那頭排山倒海而來的大眾娛樂文化，成人也好，孩子也好，該用怎麼樣的態度與方法面對？

文化與教育界近乎一面倒的，對於透過電腦、電視與電玩深入辦公室與家庭的大眾文化，展開毫不留情的抨擊，強烈主張現代人應該減少開機。

首先，是電腦。批評者警告，假如沒有正確的方法與自律，盲目穿梭在一張又一張的網頁，進出於一個又一個膚淺的網站與聊天室，會嚴重排擠有意義的閱讀時間。其次，是電視，從白天到晚上，近百個頻道幾乎二十四小時放送的節目，看在批評者眼中，都是只想賺錢、不在乎觀眾心理發展的媒體集團所炮製出來「一連串鈍化我們大腦的麻醉劑」，讓我們變得「頭腦簡單又墮落」。

當然，還有電玩。批評者引述多項研究的結果，告訴我們打電玩非僅會減少孩子從事戶外健康活動的時間，也會從不良的遊戲中，接觸到暴力與色情，不利於孩子的發育與成長，家長們都應該密切注意孩子所選擇的電玩，還要嚴格管制孩子們玩電玩的時間。總之，照這些批評者的說法，無論大人或小孩，都應該設法減少開機的時間，把時間用來讀書、從事戶外活動，或是陪伴家人。

真的嗎？開機，真的這麼糟糕？我們真的得這樣管自己、教孩子？

備考	試題隨卷繳交
命題委員：	203 (簽章) 96年3月5日

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考試科目	社會學	所別	社會學碩士班	考試時間	3月18日 星期日 第3節
<p>三、</p> <p>1. 全球化對瑞典的時裝設計師有什麼影響? 20%</p> <p>2. 外國人和瑞典人自己對什麼才是「瑞典人」的觀感有何異同? 從國家的角度, 瑞典在「管理及行銷」國家形象算成功嗎? 20%</p>	<p>Is there such a thing as Swedish fashion? How do you decide what is 'Swedish'? We Swedes have one image of ourselves while people abroad may have another. We consider ourselves trailblazers in many respects, but abroad we are probably better known for our long-established welfare society. What modern Sweden actually looks like is seldom discussed.</p> <p>A couple of years ago, a study by the Royal Academy of Engineering Sciences in Stockholm described Sweden's rapid progress in the IT field and the profound impact this was having on the country's infrastructure. The focus on information and new communications systems, the study noted, was affecting all areas of education and training.</p> <p>One result is that new forms of expression in fashion are now technology-based and design students are consequently able to experiment freely. In retrospect, we can see that progress may have been a little too rapid. For a while, Sweden was an IT leader, and Swedes were quick to adopt new trends in mobile phone communication. This was made possible by our high standard of living. 'Hi-tech fashion' - which in the world of fashion and industrial design stands for both futuristic design and the content of fabrics - soon became a reality for IT-based creators, and design became a key concept. It affected the look of most technical gadgets and influenced fashions in clothing, accessories, interior design, etc. In short, it became a fashion for technology enthusiasts. And it lives on today as a new avenue of expression ready for further exploration.</p> <p>Now that fashion is more or less global, and styles are exported and imported from all corners of the world, attempting to pin down Swedish fashion is a more exacting task than ever. I believe that, at heart, designers everywhere would like to arrive at a clear-cut national identity, a recognisable look, reflecting what is essentially French, Italian or Spanish, etc. This would make it easy to identify fashion as the export article it essentially is. Fortunately, however, this is impossible, due to the manner in which we who live in the information society communicate with one another, gather information, and meet and work across all manner of boundaries, as a result of which we have become fascinated by one another's traditions. The only distinctive feature available to us as a nation is our own history. In one way or another, though, history provides the basis for all modern fashion, affecting things like design, choice of colour and choice of materials.</p> <p>Creative designers active in Sweden today whose work reflects contemporary fashions and culture in clothing are primarily influenced by their own origins and their love of what is distinctively theirs. These influences are augmented by whatever impulses from other cultures the designers bring home from their real or virtual travels.</p> <p>The history books teach us that the nobles and aristocrats, kings and queens, influenced popular fashions in clothing. But I would prefer to describe Swedish fashion as a product of the Swedish people and their history.</p> <p>"One person's as good as the next" is an expression that strikes a chord with Swedes and which we have adopted as a kind of fundamental principle of Swedish society. We view ourselves as uncomplicated, hard-working, democratic people who have achieved a considerable degree of equality. Excessive luxury and ostentation are not for us. Extravagance did not show its face in this country until the carefree 1980s.</p> <p>Brand crazes in the spirit of globalisation originally divided the Swedish fashion world to a certain extent: design became more conservative or 'correct' on the one hand and more unstructured and rootless on the other. Today, once again, design schools are turning out a growing number of talented students keen to experiment.</p>				
備考	試題隨卷繳交				
命題委員:	<p>20 (發章) 96年3月5日</p>				

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考試科目	管理個案	所別	公共行政學系	考試時間	二月廿四日上午十時至十二時
<p>請以中文說明以下四篇文章(共6頁)的主要涵意。並說明你對該篇文章內容的讀後心得與感想[每段各計分25%]</p> <p>一、 WHERE CAPABILITIES RESIDE</p> <p>Our research suggests that three factors affect what an organization can and cannot do: its resources, its processes, and its values. When thinking about what sorts of innovations their organization will be able to embrace, managers need to assess how each of these factors might affect their organization's capacity to change.</p> <p>Resources</p> <p>When they ask the question "What can this company do?" the place most managers look for the answer is in its resources—both the tangible ones like people, equipment, technologies, and cash, and the less tangible ones like product designs, information, brands, and relationships with suppliers, distributors, and customers. Without doubt, access to abundant, high-quality resources increases an organization's chances of coping with change. But resource analysis doesn't come close to telling the whole story.</p> <p>Processes</p> <p>The second factor that affects what a company can and cannot do is its processes. By processes, we mean the patterns of interaction, coordination, communication, and decision making employees use to transform resources into products and services of greater worth. Such examples as the processes that govern product development, manufacturing, and budgeting come immediately to mind. Some processes are formal, in the sense that they are explicitly defined and documented. Others are informal: they are routines or ways of working that evolve over time. The former tend to be more visible, the latter less visible.</p> <p>One of the dilemmas of management is that processes, by their very nature, are set up so that employees perform tasks in a consistent way, time after time. They are meant not to change or, if they must change, to change through tightly controlled procedures. When people use a process to do the task it was designed for, it is likely to perform efficiently. But when the same process is used to tackle a very different task, it is likely to perform sluggishly. Companies focused on developing and winning FDA approval for new drug compounds, for example, often prove inept at developing and winning approval for medical devices because the second task entails very different ways of working. In fact, a process that creates the</p> <p>capability to execute one task concurrently defines disabilities in executing other tasks.¹</p> <p>The most important capabilities and concurrent disabilities aren't necessarily embodied in the most visible processes, like logistics, development, manufacturing, or customer service. In fact, they are more likely to be in the less visible, background processes that support decisions about where to invest resources—those that define how market research is habitually done, how such analysis is translated into financial projections, how plans and budgets are negotiated internally, and so on. It is in those processes that many organizations' most serious disabilities in coping with change reside.</p> <p>Values</p> <p>The third factor that affects what an organization can and cannot do is its values. Sometimes the phrase "corporate values" carries an ethical connotation: one thinks of the principles that ensure patient well-being for Johnson & Johnson or that guide decisions about employee safety at Alcoa. But within our framework, "values" has a broader meaning. We define an organization's values as the standards by which employees set priorities that enable them to judge whether an order is attractive or unattractive, whether a customer is more important or less important, whether an idea for a new product is attractive or marginal, and so on. Prioritization decisions are made by employees at every level. Among salespeople, they consist of on-the-spot, day-to-day decisions about which products to push with customers and which to de-emphasize. At the executive tiers, they often take the form of decisions to invest, or not, in new products, services, and processes.</p> <p>The larger and more complex a company becomes, the more important it is for senior managers to train employees throughout the organization to make independent decisions about priorities that are consistent with the strategic direction and the business model of the company. A key metric of good management, in fact, is whether such clear, consistent values have permeated the organization.</p> <p>But consistent, broadly understood values also define what an organization cannot do. A company's values reflect its cost structure or its business model because those define the rules its employees must follow for the company to prosper. If, for example, a company's overhead costs require it to achieve gross profit margins of</p> <p><small>¹ See Dorothy Leonard-Barton, "Core Capabilities and Core Rigidities: A Paradox in Managing New Product Development," <i>Strategic Management Journal</i> (summer, 1992).</small></p>					
備考	試題隨卷繳交				
命題委員：	196 (發單) 年 月 日				

國立政治大學圖書館

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考試科目	管理個案	所別	科管碩士後組	考試時間	3月19日(土) 星期六 下午第一節
<p>40%, then a value or decision rule will have evolved that encourages middle managers to kill ideas that promise gross margins below 40%. Such an organization would be incapable of commercializing projects targeting low-margin markets—such as those in e-commerce—even though another organization's values, driven by a very different cost structure, might facilitate the success of the same project.</p> <p>Different companies, of course, embody different values. But we want to focus on two sets of values in particular that tend to evolve in most companies in very predictable ways. The inexorable evolution of these two values is what makes companies progressively less capable of addressing disruptive change successfully.</p> <p>As in the previous example, the first value dictates the way the company judges acceptable gross margins. As companies add features and functions to their products and services, trying to capture more attractive customers in premium tiers of their markets, they often add overhead cost. As a result, gross margins that were once attractive become unattractive. For instance, Toyota entered the North American market with the Corona model, which targeted the lower end of the market. As that segment became crowded with look-alike models from Honda, Mazda, and Nissan, competition drove down profit margins. To improve its margins, Toyota then developed more sophisticated cars targeted at higher tiers. The process of developing cars like the Camry and the Lexus added costs to Toyota's operation. It subsequently decided to exit the lower end of the market; the margins had become unacceptable because the company's cost structure, and consequently its values, had changed.</p> <p>In a departure from that pattern, Toyota recently introduced the Echo model, hoping to rejoin the entry-level tier with a \$10,000 car. It is one thing for Toyota's senior management to decide to launch this new model. It's another for the many people in the Toyota system—including its dealers—to agree that selling more cars at lower margins is a better way to boost profits and equity values than selling more Camrys, Avalons, and Lexuses. Only time will tell whether Toyota can manage this down-market move. To be successful with the Echo, Toyota's management will have to swim against a very strong current—the current of its own corporate values.</p> <p>The second value relates to how big a business opportunity has to be before it can be interesting. Because a company's stock price represents the discounted present value of its projected earnings stream, most managers feel compelled not just to maintain growth but to maintain a constant rate of growth. For a \$40 million company to grow 25%, for instance, it needs to find \$10 million in new business the next year. But a \$40 billion company needs to find \$10 billion in new business the next year to grow at that same rate. It follows that an opportunity that excites a small company isn't big enough to be interesting to a large company. One of the bittersweet results of success, in fact, is that as companies become large, they lose the ability to enter small, emerging markets. This disability is not caused by a change in the resources within the companies—their resources typically are vast. Rather, it's caused by an evolution in values.</p> <p>The problem is magnified when companies suddenly become much bigger through mergers or acquisitions. Executives and Wall Street financiers who engineer megamergers between already-huge pharmaceutical companies, for example, need to take this effect into account. Although their merged research organizations might have more resources to throw at new product development, their commercial organizations will probably have lost their appetites for all but the biggest blockbuster drugs. This constitutes a very real disability in managing innovation. The same problem crops up in high-tech industries as well. In many ways, Hewlett-Packard's recent decision to split itself into two companies is rooted in its recognition of this problem.</p> <p style="text-align: center;">II. THE MIGRATION OF CAPABILITIES</p> <p>In the start-up stages of an organization, much of what gets done is attributable to resources—people, in particular. The addition or departure of a few key people can profoundly influence its success. Over time, however, the locus of the organization's capabilities shifts toward its processes and values. As people address recurrent tasks, processes become defined. And as the business model takes shape and it becomes clear which types of business need to be accorded highest priority, values coalesce. In fact, one reason that many soaring young companies flame out after an IPO based on a single hot product is that their initial success is grounded in resources—often the founding engineers—and they fail to develop processes that can create a sequence of hot products.</p> <p>Avid Technology, a producer of digital-editing systems for television, is an apt case in point. Avid's well-received technology removed tedium from the video-editing process. On the back of its star product, Avid's stock rose from \$16 a share at its 1993 IPO to \$49 in mid-1995. However, the strains of being a one-trick pony soon emerged as Avid faced a saturated market, rising inventories and receivables, increased competition, and</p>					
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shareholder lawsuits. Customers loved the product, but Avid's lack of effective processes for consistently developing new products and for controlling quality, delivery, and service ultimately tripped the company and sent its stock back down.

By contrast, at highly successful firms such as McKinsey & Company, the processes and values have become so powerful that it almost doesn't matter which people get assigned to which project teams. Hundreds of MBAs join the firm every year, and almost as many leave. But the company is able to crank out high-quality work year after year because its core capabilities are rooted in its processes and values rather than in its resources.

When a company's processes and values are being formed in its early and middle years, the founder typically has a profound impact. The founder usually has strong opinions about how employees should do their work and what the organization's priorities need to be. If the founder's judgments are flawed, of course, the company will likely fail. But if they're sound, employees will experience for themselves the validity of the founder's problem-solving and decision-making methods. Thus processes become defined. Likewise, if the company becomes financially successful by allocating resources according to criteria that reflect the founder's priorities, the company's values coalesce around those criteria.

As successful companies mature, employees gradually come to assume that the processes and priorities they've used so successfully so often are the right way to do their work. Once that happens and employees begin to follow processes and decide priorities by assumption rather than by conscious choice, those processes and values come to constitute the organization's culture.² As companies grow from a few employees to hundreds and thousands of them, the challenge of getting all employees to agree on what needs to be done and how can be daunting for even the best managers. Culture is a powerful management tool in those situations. It enables employees to act autonomously but causes them to act consistently.

Hence, the factors that define an organization's capabilities and disabilities evolve over time—they start in resources; then move to visible, articulated processes and values; and migrate finally to culture. As long as the or-

ganization continues to face the same sorts of problems that its processes and values were designed to address, managing the organization can be straightforward. But because those factors also define what an organization cannot do, they constitute disabilities when the problems facing the company change fundamentally. When the organization's capabilities reside primarily in its people, changing capabilities to address the new problems is relatively simple. But when the capabilities have come to reside in processes and values, and especially when they have become embedded in culture, change can be extraordinarily difficult. (See the sidebar "Digital's Dilemma.")

三、SUSTAINING VERSUS DISRUPTIVE INNOVATION

Successful companies, no matter what the source of their capabilities, are pretty good at responding to evolutionary changes in their markets—what in *The Innovator's Dilemma* (Harvard Business School, 1997), Clayton Christensen referred to as *sustaining innovation*. Where they run into trouble is in handling or initiating revolutionary changes in their markets, or dealing with *disruptive innovation*.

Sustaining technologies are innovations that make a product or service perform better in ways that customers in the mainstream market already value. Compaq's early adoption of Intel's 32-bit 386 microprocessor instead of the 16-bit 286 chip was a sustaining innovation. So was Merrill Lynch's introduction of its Cash Management Account, which allowed customers to write checks against their equity accounts. Those were breakthrough innovations that sustained the best customers of these companies by providing something better than had previously been available.

Disruptive innovations create an entirely new market through the introduction of a new kind of product or service, one that's actually worse, initially, as judged by the performance metrics that mainstream customers value. Charles Schwab's initial entry as a bare-bones discount broker was a disruptive innovation relative to the offerings of full-service brokers like Merrill Lynch. Merrill Lynch's best customers wanted more than Schwab-like services. Early personal computers were a disruptive innovation relative to mainframes and minicomputers. PCs were not powerful enough to run the computing applications that existed at the time they were introduced. These innovations were disruptive in that they didn't address the next-generation needs of leading customers in existing markets. They had other attributes, of course, that en-

²Our description of the development of an organization's culture draws heavily from Edgar Schein's research, as first laid out in his book *Organizational Culture and Leadership* (Jossey-Bass Publishers, 1985).

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Digital's Dilemma

A lot of business thinkers have analyzed Digital Equipment Corporation's abrupt fall from grace. Most have concluded that Digital simply read the market very badly. But if we look at the company's fate through the lens of our framework, a different picture emerges.

Digital was a spectacularly successful maker of mini-computers from the 1960s through the 1980s. One might have been tempted to assert, when personal computers first appeared in the market around 1980, that Digital's core capability was in building computers. But if that were the case, why did the company stumble?

Clearly, Digital had the resources to succeed in personal computers. Its engineers routinely designed computers that were far more sophisticated than PCs. The company had plenty of cash, a great brand, good technology, and so on. But it did not have the processes to succeed in the personal computer business. Minicomputer companies designed most of the key components of their computers internally and then integrated those components into proprietary configurations. Designing a new product platform took two to three years. Digital manufactured most of its own components and assembled them in a batch mode. It sold directly to corporate engineering organizations. Those processes worked extremely well in the minicomputer business.

PC makers, by contrast, outsourced most components from the best suppliers around the globe. New computer designs,

made up of modular components, had to be completed in six to 12 months. The computers were manufactured in high-volume assembly lines and sold through retailers to consumers and businesses. None of these processes existed within Digital. In other words, although the people working at the company had the ability to design, build, and sell personal computers profitably, they were working in an organization that was incapable of doing so because its processes had been designed and had evolved to do other tasks well.

Similarly, because of its overhead costs, Digital had to adopt a set of values that dictated, "If it generates 50% gross margins or more, it's good business. If it generates less than 40% margins, it's not worth doing." Management had to ensure that all employees gave priority to projects according to these criteria or the company couldn't make money. Because PCs generated lower margins, they did not fit with Digital's values. The company's criteria for setting priorities always placed higher-performance minicomputers ahead of personal computers in the resource-allocation process.

Digital could have created a different organization that would have honed the different processes and values required to succeed in PCs—as IBM did. But Digital's mainstream organization simply was incapable of succeeding at the job.

abled new market applications to emerge—and the disruptive innovations improved so rapidly that they ultimately could address the needs of customers in the mainstream of the market as well.

Sustaining innovations are nearly always developed and introduced by established industry leaders. But those same companies never introduce—or cope well with—disruptive innovations. Why? Our resources-processes-values framework holds the answer. Industry leaders are organized to develop and introduce sustaining technologies. Month after month, year after year, they launch new and improved products to gain an edge over the competition. They do so by developing processes for evaluating the technological potential of sustaining innovations and for assessing their customers' needs for alternatives. Investment in sustaining technology also fits in with the values of leading companies in that they promise higher margins from better products sold to leading-edge customers.

Disruptive innovations occur so intermittently that no company has a routine process for handling them. Furthermore, because disruptive products nearly always

promise lower profit margins per unit sold and are not attractive to the company's best customers, they're inconsistent with the established company's values. Merrill Lynch had the resources—the people, money, and technology—required to succeed at the sustaining innovations (Cash Management Account) and the disruptive innovations (bare-bones discount brokering) that it has confronted in recent history. But its processes and values supported only the sustaining innovation: they became disabilities when the company needed to understand and confront the discount and on-line brokerage businesses.

The reason, therefore, that large companies often surrender emerging growth markets is that smaller, disruptive companies are actually more capable of pursuing them. Start-ups lack resources, but that doesn't matter. Their values can embrace small markets, and their cost structures can accommodate low margins. Their market research and resource allocation processes allow managers to proceed intuitively; every decision need not be backed by careful research and analysis. All these advantages add up to the ability to embrace and even initi-

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ate disruptive change. But how can a large company develop those capabilities?

四. **CREATING CAPABILITIES TO COPE WITH CHANGE**

Despite beliefs spawned by popular change-management and reengineering programs, processes are not nearly as flexible or adaptable as resources are—and values are even less so. So whether addressing sustaining or disruptive innovations, when an organization needs new processes and values—because it needs new capabilities—managers must create a new organizational space where those capabilities can be developed. There are three possible ways to do that. Managers can

- create new organizational structures within corporate boundaries in which new processes can be developed,
- spin out an independent organization from the existing organization and develop within it the new processes and values required to solve the new problem,
- acquire a different organization whose processes and values closely match the requirements of the new task.

Creating New Capabilities Internally

When a company's capabilities reside in its processes, and when new challenges require new processes—that is, when they require different people or groups in a company to interact differently and at a different pace than they habitually have done—managers need to pull the relevant people out of the existing organization and draw a new boundary around a new group. Often, organizational boundaries were first drawn to facilitate the operation of existing processes, and they impede the creation of new processes. New team boundaries facilitate new patterns of working together that ultimately can coalesce as new processes. In *Revolutionizing Product Development* (The Free Press, 1992), Steven Wheelwright and Kim Clark referred to these structures as “heavy-weight teams.”

These teams are entirely dedicated to the new challenge, team members are physically located together, and each member is charged with assuming personal responsibility for the success of the entire project. At Chrysler, for example, the boundaries of the groups within its product development organization historically had been defined by components—power train, electrical systems, and so on. But to accelerate auto development, Chrysler needed to focus not on components but on automobile platforms—the minivan, small car, Jeep, and

truck, for example—so it created heavyweight teams. Although these organizational units aren't as good at focusing on component design, they facilitated the definition of new processes that were much faster and more efficient in integrating various subsystems into new car designs. Companies as diverse as Medtronic for its cardiac pacemakers, IBM for its disk drives, and Eli Lilly for its new blockbuster drug Zyprexa have used heavyweight teams as vehicles for creating new processes so they could develop better products faster.

Creating Capabilities Through a Spinout Organization

When the mainstream organization's values would render it incapable of allocating resources to an innovation project, the company should spin it out as a new venture. Large organizations cannot be expected to allocate the critical financial and human resources needed to build a strong position in small, emerging markets. And it is very difficult for a company whose cost structure is tailored to compete in high-end markets to be profitable in low-end markets as well. Spinouts are very much in vogue among managers in old-line companies struggling with the question of how to address the Internet. But that's not always appropriate. When a disruptive innovation requires a different cost structure in order to be profitable and competitive, or when the current size of the opportunity is insignificant relative to the growth needs of the mainstream organization, then—and only then—is a spinout organization required.

Hewlett-Packard's laser-printer division in Boise, Idaho, was hugely successful, enjoying high margins and a reputation for superior product quality. Unfortunately, its ink-jet project, which represented a disruptive innovation, languished inside the mainstream HP printer business. Although the processes for developing the two types of printers were basically the same, there was a difference in values. To thrive in the ink-jet market, HP needed to be comfortable with lower gross margins and a smaller market than its laser printers commanded, and it needed to be willing to embrace relatively lower performance standards. It was not until HP's managers decided to transfer the unit to a separate division in Vancouver, British Columbia, with the goal of competing head-to-head with its own laser business, that the ink-jet business finally became successful.

How separate does such an effort need to be? A new physical location isn't always necessary. The primary requirement is that the project not be forced to compete for resources with projects in the mainstream organization.

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As we have seen, projects that are inconsistent with a company's mainstream values will naturally be accorded lowest priority. Whether the independent organization is physically separate is less important than its independence from the normal decision-making criteria in the resource allocation process. The sidebar "Fitting the Tool to the Task" goes into more detail about what kind of innovation challenge is best met by which organizational structure.

Manager think that developing a new operation necessarily means abandoning the old one, and they're loathe to do that since it works perfectly well for what it was designed to do. But when disruptive change appears on the horizon, managers need to assemble the capabilities to confront that change before it affects the mainstream business. They actually need to run two businesses in tandem—one whose processes are tuned to the existing business model and another that is geared toward the new model. Merrill Lynch, for example, has accomplished an impressive global expansion of its institutional financial services through careful execution of its existing planning, acquisition, and partnership processes. Now, however, faced with the on-line world, the company is required to plan, acquire, and form partnerships more rapidly. Does that mean Merrill Lynch should change the processes that have worked so well in its traditional investment-banking business? Doing so would be disastrous, if we consider the question through the lens of our framework. Instead, Merrill should retain the old processes when working with the existing business (there are probably a few billion dollars still to be made under the old business model!) and create additional processes to deal with the new class of problems.

One word of warning: in our studies of this challenge, we have never seen a company succeed in addressing a change that disrupts its mainstream values without the personal, attentive oversight of the CEO—precisely because of the power of values in shaping the normal resource allocation process. Only the CEO can ensure that the new organization gets the required resources and is free to create processes and values that are appropriate to the new challenge. CEOs who view spinouts as a tool to get disruptive threats off their personal agendas are almost certain to meet with failure. We have seen no exceptions to this rule.

Creating Capabilities Through Acquisitions

Just as innovating managers need to make separate assessments of the capabilities and disabilities that reside in their company's resources, processes, and values, so

must they do the same with acquisitions when seeking to buy capabilities. Companies that successfully gain new capabilities through acquisitions are those that know where those capabilities reside in the acquisition and assimilate them accordingly. Acquiring managers begin by asking, "What created the value that I just paid so dearly for? Did I justify the price because of the acquisition's resources? Or was a substantial portion of its worth created by processes and values?"

If the capabilities being purchased are embedded in an acquired company's processes and values, then the last thing the acquiring manager should do is integrate the acquisition into the parent organization. Integration will vaporize the processes and values of the acquired firm. Once the acquisition's managers are forced to adopt the buyer's way of doing business, its capabilities will disappear. A better strategy is to let the business stand alone and to infuse the parent's resources into the acquired company's processes and values. This approach truly constitutes the acquisition of new capabilities.

If, however, the acquired company's resources were the reason for its success and the primary rationale for the acquisition, then integrating it into the parent can make a lot of sense. Essentially, that means plugging the acquired people, products, technology, and customers into the parent's processes as a way of leveraging the parent's existing capabilities.

The perils of the ongoing DaimlerChrysler merger can be better understood in this light. Chrysler had few resources that could be considered unique. Its recent success in the market was rooted in its processes—particularly in its processes for designing products and integrating the efforts of its subsystem suppliers. What is the best way for Daimler to leverage Chrysler's capabilities? Wall Street is pressuring management to consolidate the two organizations to cut costs. But if the two companies are integrated, the very processes that made Chrysler such an attractive acquisition will likely be compromised.

The situation is reminiscent of IBM's 1984 acquisition of the telecommunications company Rolm. There wasn't anything in Rolm's pool of resources that IBM didn't already have. Rather, it was Rolm's processes for developing and finding new markets for PBX products that mattered. Initially, IBM recognized the value in preserving the informal and unconventional culture of the Rolm organization, which stood in stark contrast to IBM's methodical style. However, in 1987 IBM terminated Rolm's subsidiary status and decided to fully integrate the company into its own corporate structure. IBM's managers soon learned the folly of that decision.

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