國立政治大學九十六 學年度研究所博碩士班入學考試

第 | 頁，共 | 頁

考試科目	產業經濟學	所別	科管所	考試時間	5月26日 星期六 第 | 節

答題請儘量輔以圖表或方程式來說明

一、 （20%）需求函數與供給函數是如何由生產函數及效用函數推導出來的？

二、 (20%)

已知便當的邊際成本爲 60 元，市場需求爲 P = 100 - 4Q：

(1) 若便當市場爲完全競爭市場，試求社會福利的最大「產量」、「價格」、「生產者剩餘」與「社會福利」。

(2) 若便當爲某廠商獨占生產，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」。獨占下的「社會福利淨損失」爲何？

三、 (30%)

（1） 請解釋以下名詞：（20%）

公共財，外部性，囚犯困局，「寇斯」定理 (Coase Theorem)

（2） 請用以上名詞解釋政府需要介入科技發展的原因及方法。（10%）

四、 （30%）假設某產業中有 2 家廠商生產完全相同的產品，消費者對該產品的市場需求線爲 Q=A− P，其中 Q 爲市場需求量、P 爲市場價格，假設每家廠商之平均成本均爲一常數 C。

1、若市場競爭是 Cournot 型式，且兩家廠商同質，試求市場價格、總產量與兩個廠商的個別利潤。

2、若市場競爭是 Stackelberg 型式，假設兩家廠商一個是 leader 一個是 follower。試求市場價格、總產量與兩個廠商的個別利潤。

3、請比較兩種狀況下的市場價格、總產量與利潤；請注意到在 Stackelberg 情況下，兩家的總利潤比 Cournot 競爭時的兩家總利潤小，請綜合說明其意義。

備考	試題隨卷繳交

命題委員 162 （簽章） 2007年 5 月 9 日

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考試科目	物流與運籌管理	科別	物管所	考試時間	5月26日 星期六 第2節

1. 本文主要想表達的概念爲何？
2. 「組織/組織設計」與科技管理的關連性可能爲何？

(25%)

一、

When organization isn't enough

Restructuring doesn't always lead to improved performance.

Cathy H. Fraser and Warren L. Strickland

2006 Number 1

Struggling CEOs often seize on top-level corporate restructuring as a way to appease anxious boards and shareholders or to galvanize employees around the importance of change. But our research suggests that executives are unwise to assume that restructuring is a quick fix.

We studied 45 underperforming global companies, representing a wide range of industries and all major geographical regions, that had undergone a top-level restructuring from 1998 to 2002.[1] On average, these companies improved their total returns to shareholders (TRS) by 17 percent relative to their industries in the two years after a restructuring announcement. Yet a control group of 13 underperformers that resisted changing their organizational structure actually achieved a similar jump in TRS a full year earlier than those that did restructure.

Our findings reinforce the view that companies undergoing structural change can improve their performance, but not necessarily as a result of these changes. Indeed, the struggling companies that restructured may actually have been distracted by the shake-up of high-level functions, product groups, or geographies at a time when more pressing business imperatives needed attention.

A broader look at the proprietary database[2] underlying our sample reveals another significant pattern. In all but 1 of the 12 sectors studied, we identified default structures, or common approaches to organizational design, that were adopted by a majority of companies in the sector. These default structures include not only "pure" archetypes (organized exclusively around products, functions, or geographies) but also hybrids derived from that archetype—for example, a dominant, archetypal model, such as product-related business units, combined in parallel with a few key geographic business units.

Outliers are companies with structural models that resemble neither an industry's dominant archetype nor hybrid models derived from it. Our analysis shows that these outliers are more likely to underperform: over the five years ending in June

備考	試題隨卷繳交

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2005, 58 percent of them posted lower TRS than did the average company in their industries.

Companies that exclusively followed their industry's dominant archetype outperformed competitors on TRS by an average of some 7 percent. But the hybrid configuration appears to produce an even greater margin of success; companies with a hybrid model enjoyed an average advantage of 11 percent over their industry peers. When pursued as part of a broader, more coherent strategy, such hybrid models can help CEOs to manage complexity better and to focus on the highest-value opportunities.

Interestingly, an industry's default structure seems to prevail across different corporate strategies. In the United States, for example, American Airlines and Southwest Airlines have very different strategies and modes of operation but share organizational structures aligned by functions such as marketing, operations, and revenue management. Wal-Mart Stores and Tesco, meanwhile, are both functional organizations, but their strategies in global retailing are dissimilar: Wal-Mart drives standardization and centralization across its store network and has historically grown via expansion and scale, whereas Tesco takes a tailored approach to customer segments and looks for growth within its existing customer base as well as identifies new segments to serve. Again, these examples support the view that structure is just one of several organizational levers that can be pulled to support strategy.

For many companies, structure alone is rarely responsible for problems such as sluggish decision making, a lack of accountability on the part of employees and management, or stagnant innovation processes. More often, the root causes of such difficulties are poorly defined responsibilities, misaligned incentives, or substandard management processes.

Executives should think twice about departing from a sector's default organizational architecture. Unusual or innovative structures—often the goal of highly publicized corporate makeovers—do not appear, by themselves, to be the answer for troubled businesses.

考試科目	科技管理之研究	所別	科管所	考試時間	5月26日 星期六 第2節

Companies should launch an organizational redesign focused primarily on restructuring only if they have compelling evidence that the current structure is suboptimal and only if they can't address this shortcoming less invasively—for instance, with increased accountability and better planning and performance-management processes. Meanwhile, businesses that deviate from the norm should take a hard look at whether an outlier organizational structure is truly beneficial. Only proven industry front-runners should seek structural ways to maintain—or even increase—their advantage.

About the Authors

Cathy Fraser is a consultant and **Warren Strickland** is a director in McKinsey's Dallas office.

Notes

[1]This period covers the announcement of the 45 restructuring initiatives represented in our sample. Each company's total returns to shareholders were measured relative to its industry peers over the two years following its announcement.

[2]The database includes information on the organizational structure and senior-level positions at 362 global companies in 12 broad industry sectors.

備考	試題隨卷繳交

命題委員： 165 （簽章） 96 年 5 月 10 日

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考試科目	科技管理之理論	所別	科管所	考試時間	5月26日 星期六 第2節

二、（1） 本書所提出的核心架構爲何？作者打破哪三個有關創新的迷思？以及創新的三個目標？

（2） 請說明你對「創新擴散」（Diffusion of innovation）一書的瞭解，並說明書評者將 Moore 及其作品和 Everett Rogers 做了哪些比較？ (25%)

Dealing with Darwin: How Great Companies Innovate at Every Phase of Their Evolution

By Geoffrey A. Moore. New York: Portfolio, 2005. 281 pages, hardcover, $25.95

Reviewed by Joel West (www.JoelWest.org), Associate Professor of Innovation and Entrepreneurship, San José State University College of Business

Dealing with Darwin is the latest book on innovation by Silicon Valley strategy consultant Geoff Moore. It has the potential to displace his *Crossing the Chasm* on MBA reading lists, and may also earn him some long-delayed respect among researchers.

Certainly his most ambitious book yet, *Dealing with Darwin* uses his consulting practice—with a special emphasis on Cisco—to offer nothing less than a grand unified theory of product and service innovation. While academics may be skeptical absent peer reviewed statistical tests, Moore appears to offer a complete framework for innovation that is both mutually exclusive and exhaustive. The hubris is stunning, even by business best-seller standards: still, the integration is novel, as are many of the concepts.

Moore builds the book upon three key points. First, Darwinian selection decides which innovations are valued by the marketplace, and that ongoing innovation "is not a strategy, it is a requirement." Next, he attacks three "myths:" (1) that innovation is valuable in itself; (2) that innovation is less necessary in mature segments; and (3) that innovation is the same across all companies. Further, Moore identifies three goals for innovation—to create differentiation, to neutralize a competitor's advantage, or to improve efficiency; he flatly states everything else is wasted resources, typically on innovation that fails to produce a customer-noticeable improvement relative to rivals.

The heart of the book is a new framework that identifies the value of innovation across the entire product life cycle—from the high growth initial period, across the long period of maturity until its eventual decline. For these three phases, he suggests 11 different approaches to innovation, four of which are applicable during the high growth period, eight for maturity (half for differentiation, half for improved efficiency), and three for decline.

His framework offers another key contribution to theories of innovation strategy, one that is especially useful for teaching principles of strategy. In particular, the framework addresses a pedagogical (if not theoretical) problem with Porter's ideas of competitive advantage. When an undergraduate textbook tells students that firms (other than Toyota) generally can't be both a differentiation and cost leader, this suggests that managers need only worry about one or the other strategy. Instead, Moore argues that in mature markets, a firm needs to "major" (achieving differentiation) in an approach to creating value and "minor" (achieving strategic parity) in improving efficiency—or vice versa, gaining differentiation from efficiency and achieving parity on value creation.

This notion touches on a puzzle I confronted in the late 1990s during a research project on the evolution of the PC industry. At the time, pundits assumed that the commoditized industry meant that the only path to success was trying to "out-Dell" Dell. At the time, Dell's closest challenger appeared to be Gateway, while Apple and its high-R&D strategy seemed doomed. Today, Apple is four times as big as Gateway, with a market cap larger than Dell's. Moore might explain this finding that Apple's innovation strategies worked once it achieved parity in supply chain efficiency by stating that Apple succeeded by majoring in

備考	試題隨卷繳交

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marketing innovation while minoring in process innovation.

The book has several other key ideas that seem less complete. Moore offers a distinction between "core" and "context" (differentiating vs. non-differentiating) innovation that changes over time, but they seem difficult to operationalize *a priori* either in practice (or research). His distinctions about a difference between assembled (systems) and component (volume) businesses are intriguing, but seem more anecdotal and arbitrary than the rest of the framework and don't draw on the considerable previous research on systems businesses.

While Moore is one of the best-selling innovation authors of the past 20 years, academics rarely cite him. Google Scholar (admittedly a crude measure) lists about 200 cites for Moore's *Crossing the Chasm* vs. 7,400 citations for Everett Rogers' *Diffusion of Innovations*. One reason may be Moore's lack of empirical evidence common in academic journals. Further, while he cites business books, he ignores decades of management research behind much of such managerial advice. For example, *Chasm* extended the Rogers framework without acknowledging the earlier work (an omission rectified in *Inside the Tornado*). Finally, Moore uses his own terminology, such that many refer to the "bowling alley" or "tornado" instead of the more extensively researched "early majority" of the Rogers typology.

Still, over the past six years, I've found that Moore's work is extremely effective in helping students understand innovation adoption and changes over time. I have assigned both *Crossing the Chasm* and now *Dealing with Darwin* in my MBA technology strategy class. Judging from students' subsequent ability to apply the ideas, the latest book's ideas seem equally approachable although perhaps a little more complex, and provide a big picture on innovation strategies often missing from other innovation articles and books.

In that regard, the hubris of offering a grand unified theory of innovation (however incomplete or opinionated) is a pedagogical advantage. I try to use business books rather than textbooks for MBA electives, yet practicality limits what and how much my part-time MBA students will read. The typical business book focuses on one idea, great for a postgraduate self-improvement audience; but not for a semester survey on innovation strategies. *Dealing with Darwin* is sufficiently broad, meaty and complete in its treatment of innovation adoption and promotion to justify the two to three weeks it requires to cover in a typical night class.

I will certainly be using the book again with my MBA students, and would feel comfortable using chapters with undergraduates. And I'd strongly recommend its evaluation by any instructor who's assigned *Crossing the Chasm* or other innovation books.

考試科目	科技管理與創新	所別	科管所	考試時間	5月26日 星期六 第2節

INNOVATION

The Five Stages of Successful Innovation

Defining an innovation process increases companies' future value.

Serendipity is not a strategy, yet that's the extent of most companies' innovation planning. The importance of innovation to a company's future is unquestionable. Then why do so few companies have a process for it? The authors of a September 2006 working paper, *Crafting Organizational Innovation Processes*, address that question. Their underlying research comprised semi-structured interviews conducted with senior research and development, marketing and product management executives from more than 30 U.S. and European companies in several distinct industries, supplemented with data from annual reports.

The paper identifies five discrete and essential stages of successful innovation.

Stage 1: Idea Generation and Mobilization

The generation stage is the starting line for new ideas. Successful idea generation should be fueled both by the pressure to compete and by the freedom to explore. IDEO, the product development and branding company based in Palo Alto, California, is a good example of an organization that encourages successful idea generation by finding a balance between playfulness and need.

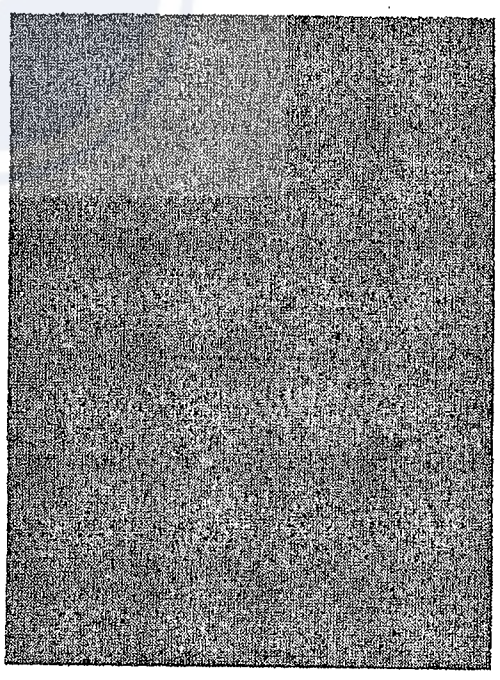
Once a new idea is generated, it passes on to the mobilization stage, wherein the idea travels to a different physical or logical location. Since most inventors aren't also marketers, a new idea often needs someone other than its originator to move it along. This stage is vitally important to the progression of a new idea, and skipping it can delay or even sabotage the innovation process.

Stage 2: Advocacy and Screening

This stage is the time for weighing an idea's pros and cons. Advocacy and screening have to take place at the same time to weed out ideas that lack potential without allowing stakeholders to reject ideas impulsively solely on the basis of their novelty. The authors found that companies had more success when the evaluation process was transparent and standardized, because employees felt more comfortable contributing when they could anticipate how their ideas would be judged. For example, one software engineer from an information technology organization said, "One of the things I have struggled with is evaluations of my ideas. Some of my ideas light up fires around here, while others are squashed. … Needless to say, I grow skeptical when [the executives] ask for ideas and then do not provide feedback as to why an idea was not pursued."

Stage 3: Experimentation

The experimentation stage tests the sustainability of ideas for a particular organization at a particular time — and in a particular environment. At this stage, it's important to determine who the customer will be and what he or she will use the in-



三、

(一) 請說明實驗階段在創新流程中的重要性？並舉一個你所熟悉的創新案例最能凸顯實驗階段。

(二) 請說明 IBM 的 Innovation Jam，爲何這是擴散與執行階段的好例子。

備考	試題隨卷繳交

命題委員：168 （簽章） 96年5月10日

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novation for. With that in mind, the company might discover that although someone has a great idea, it is ahead of its time or just not right for a particular market. However, it's important not to interpret these kinds of discoveries as failures — they could actually be the catalysts of new and better ideas.

Washington Mutual Inc.'s recent interior redesign provides a good example of how successful experimentation works. Instead of applying a new design to all its branches, the banking and insurance company, headquartered in Seattle, Washington, implemented the design in just a couple of locations to see how it would be received. Subsequently, when customers responded favorably, the bank took its innovation to the next level, applying the new design to several other branches. This way, the company didn't lose money and time by applying a new idea all at once without knowing if it would succeed.

COMPANIES HAD MORE SUCCESS WHEN THE EVALUATION PROCESS WAS TRANSPARENT AND STANDARDIZED, BECAUSE EMPLOYEES FELT MORE COMFORTABLE CONTRIBUTING WHEN THEY COULD ANTICIPATE HOW THEIR IDEAS WOULD BE JUDGED.

Stage 4: Commercialization

In the commercialization stage, the organization should look to its customers to verify that the innovation actually solves their problems and then should analyze the costs and benefits of rolling out the innovation. The authors make sure to note that "an invention is only considered an innovation [once] it has been commercialized." Therefore, the commercialization stage is an important one, similar to advocacy in that it takes the right people to progress the idea to the next developmental stage. For example, one chief executive officer said, "We learned a simple thing: Researchers and idea creators do not appreciate the nuances of marketing and commercialization. ... In the past, we tried to get the researchers involved in the commercialization aspects of the business. ... The end result was pain and more pain."

Stage 5: Diffusion and Implementation

The diffusion and implementation stages are, according to the authors, "two sides of the same coin." Diffusion is the process of gaining final, companywide acceptance of an innovation, and implementation is the process of setting up the structures, maintenance and resources needed to produce it. A good example of a successful approach to diffusion comes from International Business Machines Corp., which involves its employees early in the idea-generation stage and conducts so-called innovation jams, to which they invite not only employees but also clients, business partners and even employees' families. IBM aids later diffusion by giving everyone a stake in the idea from the beginning.

The authors of *Crafting Organizational Innovation Processes* are Kevin C. Desouza, assistant professor, Caroline Dombrowski, Ph.D. student, and Jeffrey Y. Kim, assistant professor at the Information School at the University of Washington; Sridhar Papagari and Sanjeev Jha, Ph.D. students at the Department of Information and Decision Sciences, College of Business Administration at the University of Illinois at Chicago; Yukika Awazu, the Henry E. Rauch Doctoral Fellow at the McCallum Graduate School of Business at Bentley College; and Peter Baloh, Ph.D. student, Faculty of Economics, at the University of Ljubljana. For more information, contact the authors through kdesouza@u.washington.edu.

— Alissa Mariello

考試科目	科技管理與政策	所別	科管	考試時間	5月26日 星期六 第 3 節

(25%)

1. Leighton 認爲網際網路面對的安全威脅有哪些?
2. 這些威脅是緣自哪裡?這個現象可讓你聯想到哪些科技管理或一般管理的概念?

HOW Secure IS THE Internet

Given its increasingly integral role in business and society, the Internet's security flaws are troubling, to say the least.

For businesses, the Internet continues to represent a tool of great potential in areas as diverse as cost-cutting, collaboration and retailing. But there's a big, potential problem with the increasing reliance by business on the Internet. A 2005 report submitted to President Bush by the President's Information Technology Advisory Committee described the problem bluntly: "The information technology [IT] infrastructure of the United States, which is now vital for communication, commerce and control of our physical infrastructure, is highly vulnerable to terrorist and criminal attacks." ■ According to Tom Leighton, a professor of applied mathematics at MIT as well as co-founder and chief scientist of Akamai Technologies Inc. — a developer of techniques to handle Web interactions based in Cambridge, Massachusetts — the difficulty lies in the very design of the Internet. Leighton, who served on PITAC and chaired its subcommittee on cyber security, explained that the Internet protocols used today were in many cases built on top of the original Internet protocols developed almost 40 years ago. And the

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		170 (簽章) 96年5月10日

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security needs of the Internet in those early days — when it was used by only a small number of trusted researchers at places like government labs and a few universities — were very different from those of today's massive global network. "The [Internet] protocols that were developed then were developed in an environment of trust," Leighton explained. "There were only a few people using the Internet back then, and they were very knowledgeable and very trustworthy." Times have changed. "Now we have a situation where we have tremendous adoption and use of the Internet and the Web — with very little security," states Leighton. This vulnerability, according to him, has implications not only for businesses but also for national security.

Leighton should know about Internet security issues. Akamai operates what is known as a "content delivery network" — in essence a worldwide, decentralized network of servers that hosts Web sites for other organizations and delivers their Web content and applications. For example, if a site using Akamai's services receives a large spike in traffic, that traffic can be distributed throughout the network of servers so that the site's operation is not disrupted.

What does Leighton see as some of the big security threats facing the Internet? In addition to the more well-known threats such as viruses and "phishing" (the practice of sending bogus e-mails purportedly representing a business in an attempt to get access to a person's password and account), Leighton described the following problems:

■ Denial of service attacks. In a "denial of service attack," a Web site's IP address is bombarded with traffic in an attempt to overwhelm the infrastructure managing the site. "Bad guys," Leighton explained, can use armies of "bots"— computers controlled, often unbeknownst to their owners, after having been infected with a virus or worm — to launch denial of service attacks. Such an attack can be targeted at a company or more broadly. For example, InformationWeek reported on February 6, 2007, that on that day a denial of service attack "nearly took down" three of the Internet's 13 so-called root servers, temporarily slowing the three servers. Though the attack did not have a significant effect on Internet endusers, what would happen if a denial of service attack ever actually succeeded in bringing down all 13 of the Internet's root servers? Were that ever to occur, it wouldn't take long before "your browser wouldn't be able to go anywhere; you wouldn't be able to send e-mail. Nothing on the Internet would work," Leighton said.

■ "Pharming." "Pharming," Leighton explained, often exploits a weakness in the DNS, an Internet protocol that allows a "bad guy" to tell a device known as a name server, of which there are millions, that it owns the IP address of an organization such as a financial institution. The hacker will then receive the traffic from that name server meant to go to the financial institution, and the hacker can then send that traffic to a bogus Web page that looks like the financial institution's own sign-in page. In the process, Leighton explained, criminals can gain password and account information. What's more, the user may not realize what has happened. Leighton added that another type of "pharming" can use a different Internet protocol, known as the BGP protocol, to siphon off some of the traffic intended for a given site to a bogus site, again in an attempt to gain password and account information.

More troubling still are the larger implications of these techniques if applied against a nation rather than for commercial gain. For example, Leighton noted that one worry is if terrorists could gain account and password information to access critical infrastructure, such as the nation's utilities system.

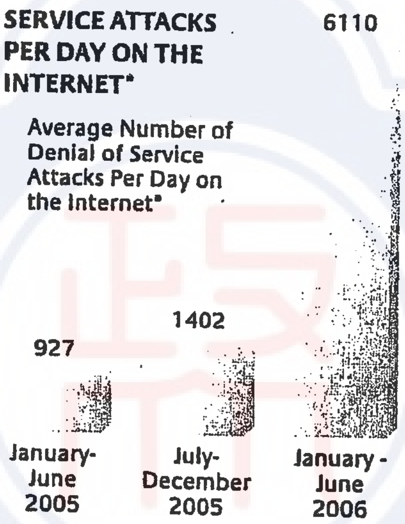
What can be done? The PITAC report made a number of recommendations, including increasing federal funding for long-term, fundamental research on cyber security issues. Leighton noted that, if the U.S. government were to fund research to develop more secure protocols to replace those currently used on the Internet, the government could then lead the way by adopting the improved protocols for its own use. That, in turn, would hopefully lead to wider adoption of improved Internet protocols and to a more secure, reliable Internet infrastructure.

"It seems to me that we're not taking the steps needed to fix the problem," says Leighton. "But I think it could be done."

— *Martha E. Mangelsdorf*

FURTHER READING **For a sobering assessment of the vulnerabilities of the Internet and related infrastructure, read the 2005 report Cyber Security: A Crisis of Prioritization by the President's Information Technology Advisory Committee: www.nitrd.gov/pitac/reports/20050301_cybersecurity/cybersecurity.pdf**

AVERAGE NUMBER OF DENIAL OF SERVICE ATTACKS PER DAY ON THE INTERNET*



*As observed by Symantec Corporation
Source: Symantec Corporation

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