試科目	產業經濟學	所別	科管所 491	考試時間	5月22日(上)下午第 星期六

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、 (30%)

（1） 請解釋以下名詞：（18%）
進入障礙，套牢，轉換成本，網路外部性，規模經濟，搭售

（2） 微軟一再投入重金以更新並擴充 WINDOW 系統軟體的功能，甚至要把 IE 瀏覽器也納入系統軟體的一部份。請用以上名詞解釋微軟採取這種策略行爲的原因。（12%）

三、(30%)假設產業中的每一個廠商有相同的邊際成本曲線 MC ＝ c， 產業的需求曲線是 P ＝ a－bQ。請問在以下各種市場結構下，均衡的價格 P、產業產量 Q、各個廠商的產量及利潤 分別是多少？

（8）完全競爭 （9）獨佔 （10）Cournot 雙占 （11）合作雙占
(12) Bertrand 雙占 (13) Stackelberg 雙占

四、(20%)請自行設定賽局報酬矩陣，以

(1) 說明「囚犯困局」的現象。
(2) 說明「爲何人人都不喜歡污染，但是自利的人卻還是會丟垃圾？」
(3) 說明「爲何科技創新對整個社會有好處，但是自利的人有時卻不願意進行創新？」
(4) 討論「外部性」的意義與類型。

考試科目	科技管理文獻選讀	所別	科管所	考試時間	五月二十二日 上午 星期六 下午

(491)

1、

a. 請用一兩個你所熟悉的管理理論來討論 Fuji Photo Film Co 在個案中的情境（10%）

b. 請用另一個產業另一家公司的例子來說明『類似』的故事（5%）

2、

a. 請用你所熟悉的一、二個管理理論來討論 Toyota 的問題（10%）

b. 請舉另外一家視覺形象較爲清晰的汽車公司，並說明爲什麼？（5%）

3、

a. 請問此一理論是否能解釋新竹科學園區的群聚創新效果？（10%）

b. 請問該研究的限制是什麼？（5%）

4、

a. 文內的研究在兩年前做的，最近這兩年「電子商務」及「顧客關係管理」有什麼變化？較顯著的績效？（10%）

b. 就你所知台灣的廠商有無超越個案中的 e-business 或 CRM 經驗，請說明（5%）

5、

請用以上四篇文章（可以不必全用）所引發的想法，自行設計一個研究題目，列舉你的研究問題（5%），其中主要的構念（5%），研究架構（10%），研究變數的操作性定義（5%），如何選取適當的研究對象（5%），研究限制（5%），及可能的研究貢獻（5%）

JAPAN

FUJI'S DIGITAL PICTURE IS DEVELOPING FAST

With a slew of hit products and services, it's making a smooth shift away from film

KAZUKO IYANAGA HASN'T bought a roll of film in two years. When she needs prints, she heads for an electronics store in downtown Tokyo. There she downloads snapshots from her digital camera into a bright green terminal that looks like an automated teller machine. She can choose the snaps she wants, crop them, and print them out on standard photo paper or as sheets of postage-stamp-size stickers. Within a minute, the machine churns out the prints at 48¢ a pop. "It's very convenient," says the 33-year-old photography buff. "I don't have to pay for pictures I don't want."

The self-service terminal is one of thousands of such kiosks sold by Fuji Photo Film Co. in Japan and the U.S. It's also a symbol of Fuji's effort to withstand the digital tsunami that's turning the once-staid photography market on its head. This is not the company's only digital maneuver. Fuji pioneered consumer digital photography in the late 1980s, and today it's the fourth-biggest digital camera maker. It has also become the world's biggest supplier of specialized film for liquid-crystal-display screens and a leading producer of the image-sensing chips used in digital cameras and camera phones.

What was once Fuji's lifeblood—analog film—is rapidly being drained by the digital age. Traditional products such as silver-halide film, photo paper, developing chemicals, and nondigital printers still account for 42% of Fuji's sales. That's expected to shrink to just 31% in three years, which is far ahead of rival Eastman Kodak Co. For the U.S. film maker, film, paper, and processing make up 61% of annual revenue and will still account for 43% by 2007, according to Citigroup Smith Barney. Meanwhile, Fuji expects its digital-camera sales to double, to 12% of revenue, by 2006. "Rapidly changing technology requires us to act more dynamically," says Chief Executive Shigetaka Komori.

NEW YORK There are thousands of Fuji printing kiosks in Japan and the U.S.

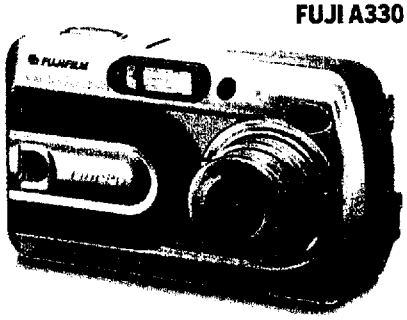
The move seems to be paying off. True, Fuji posted lackluster third-quarter results in January, which Komori blamed on a glitch that delayed shipments of a key digital camera component. Yet for 2003, Fuji expects profits of $762 million on sales of $25 billion, up from earnings of $463 million and revenues of $23.9 billion in 2002. That's not bad compared with Kodak's 70% profit slide, to $265 million.

BILLION-DOLLAR PUSH

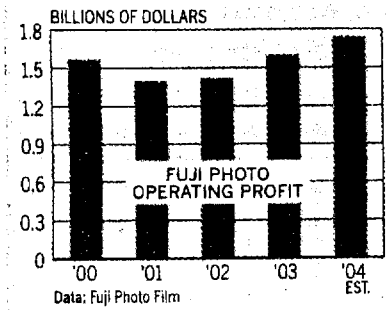
SO WHY HAVEN'T Fuji's shares spiked along with the Nikkei stock index? For starters, investors are worried about a brutal war with the likes of Canon, Olympus, and Sony for supremacy in digital photography. And whatever Fuji manages to achieve may not be as profitable as film was. "I'm somewhat skeptical digital can be as good a market as analog," says Joel Scheiman, an analyst at ING Financial Markets in Tokyo.

Komori is out to prove the naysayers wrong. Kicking off Fuji's 70th anniversary on Feb. 5, he outlined a plan to invest more in imaging products such as high-grade printers, lenses, and sensors for digital cameras and mobile phones. Komori, who has been president of Fuji for five years but only became chief executive in June, is eager to put his stamp on the company. To meet his ambitious plans to double profits by 2007, he vows to cut costs by $1.9 billion over the next three years.

FUJI A330



DIGITIZING EARNINGS



Despite all the turmoil, Komori is keeping a hand in traditional film, since business is still good in developing markets such as China and India. But as prices for digital cameras fall, it won't be long before green terminals start popping up from Bombay to Shanghai. One way or another, Fuji intends to stay in the picture. ■

–By Chester Dawson in Tokyo

SPECIAL REPORT

MATSUMOTO Lexus' design chief says that Toyota's luxury brand is about to get sexier

STRATEGIES

WANTED: TOYOTAS THAT SAY 'TOYOTA'

VISIT TOYOTA MOTOR Corp.'s sleek new design center in Toyota City, Japan, and the first thing you'll see will be dozens of meter-long, jelly bean-shaped sculptures strewn about the main foyer. The brightly colored plastic baubles were commissioned to inspire the 650 stylists, technicians, and modelers on site. While they represent an artist's interpretation of Toyota's design philosophy, they also unintentionally showcase the company's chief problem: a schizophrenic identity. "Our lineup is like a series of vibrant colors that stand out up close but look gray when viewed together from a distance," says Hideichi Misono, a veteran designer who heads Toyota's new global design management division.

With 99 vehicles in its lineup, no wonder car buyers are confused by Toyota. While it has come up with pathbreaking vehicles such as the RAV4 compact sport utility, Lexus RX 300 SUV-sedan crossover, and the Yaris subcompact, it is best known for blander fare such as its homey—but homely—Camry sedan.

Of course, the Camry's middle-of-the-road styling helps explain why its appeal is broad enough to make it America's best-selling car. Still, for years, Japan's top auto maker did little to discourage the notion that it was content to churn out boring cars. "I've never thought Toyota had bad design," says Shiro Nakamura, design chief at arch-rival Nissan Motor Co. "Their problem is just that they make so many vehicles, it's hard to distinguish between them." Eventually, Toyota fears that this profitable blandness will turn into something far more pernicious: Nissan's snazzily upgraded cars and vans, for example, could one day upstage Toyota.

»With a 99-vehicle lineup, Toyota lacks a recognizable visual style

To help carve an identity out of its vast array of nameplates, the company last year completed the new, $40 million design center. Inside, the facility features a virtual reality workshop known as "the cave," where prototypes are rendered in life-size 3-D images inside and out, an auditorium with a retractable roof for viewing models bathed in natural light—but far from the prying eyes of outsiders—and a conference room outfitted with tatami mats, shoji paper screens, and local pottery. There, Misono and his team brainstorm while sitting on the floor around a rough-hewn wood table, a setting reminiscent of a Japanese inn. One of the new team's first decisions was to boost the "J-Factor"—a Japanese look and feel that had been missing. "We're looking back to our roots as a Japanese auto maker," says Simon Humphries, a British designer and a key member of the global design management team.

"VIBRANT CLARITY"

THAT J-FACTOR REFERS TO a Mod Japan that's more about *anime* cartoons than samurai and sumo wrestlers. The company is aiming at something it dubs "vibrant clarity," which means spirited vehicles easily recognized as Toyotas. Some cars Toyota originally made only for the Japanese market sport that cool Nipponica styling—like the boxy, out-there bB, now sold as the Scion xB in the U.S.

The idea is to add some of that edge to the rest of the lineup and help make Toyotas stand out in the crowd. To get there, Toyota has split its product lineup into seven distinct groups, each of which will now share more styling characteristics. For instance, the front grille of vehicles in its light truck group (which includes the Tundra pickup and Sequoia SUV) and the Lexus group will evolve to showcase clearer identities as Toyotas.

The first peek at the new look for Lexus came at the Tokyo Motor Show last fall. There, a pair of sleek concept vehicles featured horizontal bars on a grille positioned well below the headlamps—a big departure from classic luxury car design. "Lexus has been so successful because there's nothing harsh about the design," says Lexus design chief Kengo Matsumoto. "But the flip side is that there isn't much to grab you visually."

Achieving a more common look across the carmaker's entire fleet will require more cooperation among Toyota's network of studios. Already, stylists in Toyota City are rubbing shoulders with personnel sent in from Toyota's other design hubs in Tokyo, Newport Beach, Calif., and Nice, France. The exchanges allow headquarters to keep tabs on developments overseas and spread the new design gospel. Don't expect Toyota to shock the world. But this giant may be capable of some wonderful surprises. ■

–By Chester Dawson in Toyota City

MAKOTO ISHIDA

INNOVATION

How Location Clusters Affect Innovation

The tacit knowledge shared among geographically agglomerated companies may have more to do with marketing than technology.

Innovation is thought to come easily for companies in a high-tech cluster such as Silicon Valley, where firms in related businesses colocate. In a cluster, reasoned economist Alfred Marshall some 80 years ago, "the mysteries of the trade become no mysteries; but are, as it were, in the air, and children learn many of them unconsciously." So, as theorists who continue Marshall's line of inquiry like to propound, technology is so pervasive in a cluster that surely clustered companies must have an easier time innovating than their competitors in the hinterlands, right?

Maybe not, say the authors of a February 2002 working paper, who measured the relationship between clustering and innovation on U.S. software firms and found unexpected results. "I thought that firms would try to free-ride," says co-author Brent Beal, assistant professor at Louisiana State University's E.J. Ourso College of Business Administration. It's thought that within clusters, there is a collective pool of knowledge that companies can tap by hiring from local firms or simply socializing with their brethren's employees. So Beal and his co-author Javier Gimeno, associate professor at INSEAD, expected clustered firms to spend less per employee on R&D, because they would garner some tacit knowledge simply by breathing the air. The clustered firm's employees and suppliers would bring knowledge to the table that nonclustered firms would need R&D investment to realize.

That pattern of R&D expenditure didn't exist. Instead, the authors found that clustered firms launched fewer products for their R&D bucks. "[Clustering] didn't have much effect on the amount spent on R&D, but there is a negative impact on innovative output, which is counterintuitive," says Beal.

Beal and Gimeno's research tracked 56 firms that primarily sold prepackaged software from 1982 to 1998 and determined the degree to which they were "agglomerated" (as the authors called clustering), by counting software firms at the county level. Beal and Gimeno are revising the paper, "Geographic Agglomeration, Knowledge Spillovers and Competitive Evolution," which emerged from Beal's Ph.D. dissertation at Texas A&M University, for submission to the Academy of Management Journal after having presented it at the Academy of Management's 2001 annual conference.

There is another surprise in the data. Although the study finds that innovative output declined for clustered firms, revenue per employee was higher. That is, the few products that clustered firms introduced did better in the marketplace. Isolated firms, in fact, brought in $68,000 less per employee in sales each year than clustered firms, according to the study. That's a big drop-off considering the sample's average of $280,000 in sales per employee.

How could this be? One explanation the authors offer is that the clustered firms do get a free-ride on knowledge spillovers — the pervasive pool of knowledge in the cluster. But the spillovers are not of a technical nature; they're of a marketing nature. So clustered firms don't gain an advantage in new technological innovations; rather they get an edge in finding markets and customers and in tailoring products for them.

In part, this could be a function of the nature of the software industry. "The tacitness of the [technical] knowledge is not as relevant. You can access the newest software technologies wherever you are," says Gimeno. Thus, the technologies are not geographically bound. The information that is more tacit, or harder to codify, is market information — knowledge of industry trends, market niches and customer needs might be signifigantly easier to acquire when a firm is focused in a cluster.

So how can nonclustered firms compensate for their lack of proximity to tacit information and remain competitive? "They need to be particularly careful about developing innovation that is based on their own assessment of the market," says Gimeno. "Nonagglomerated firms may be able to provide more breakthrough innovations. But the dark side is that they are more likely to mistime entry into markets or be unaware of the attractive markets that are emerging."

— *Larry Yu*

Reprint 4411

We welcome your comments at smrfeedback@mit.edu.

E-BUSINESS

New Views on Digital CRM

Managers' opinions vary about the goals and value of Internet marketing.

As the Internet becomes ubiquitous in business life, early fears that it would disrupt the business models of many companies (for example, by enabling customers to switch suppliers easily) have subsided. According to a February 2002 study, many now see the Internet as a significant opportunity — specifically, a chance to reduce customer-service costs, tighten customer relationships, personalize marketing messages and enable "mass customization." The paper is "Customer Relationships Go Digital," by George S. Day, the Geoffrey T. Boisi Professor and a professor of marketing at the University of Pennsylvania's Wharton School, and Katrina J. Hubbard, a doctoral candidate in the marketing department at Pennsylvania State University.

The study is a survey of 352 senior marketing and sales (and several management-information system) managers on the Internet's impact on their ability to manage customer relationships. Respondents came from a wide range of industries, including manufacturing, transportation, public utilities, wholesale and retail trade, finance, insurance and real estate. Businesses were located in all 50 states, and all had more than 500 employees. Just over half were business-to-business, roughly a quarter were business-to-consumer and a quarter sold to both markets.

Using multiple regression analyses, the researchers examined the correlations between 15 specific opportunities and threats of the Internet (for instance, "reduces customer service costs," "encourages customer feedback and dialogue," "expands set of competitors" and "facilitates customer switching") and the managers' overall judgment about the Internet's impact on customer relationships. Perhaps not surprisingly, the perceived opportunities of the Internet exerted far more influence on respondents' judgment than the perceived threats did. In particular, the perceived opportunity to reduce customer-service costs revealed a noticeable shift in the goals of customer relationship management (CRM) initiatives from revenue enhancement to cost containment. Apparently, in the survey respondents' minds, the Internet's benefits far outweighed its threats.

INTERNET-BASED CRM EFFORTS ARE SHIFTING FROM REVENUE ENHANCEMENT TO COST CONTAINMENT.

However, the responses revealed varying *levels* of enthusiasm for the Internet. Additional analysis suggested that companies experiencing the Internet as a major opportunity differed from other businesses in several respects, including their market environment and numerous internal attributes. For example, Internet-as-opportunity companies tended to operate in fast-growing markets with highly loyal customers. Moreover, many of them focused their strategy on delivering superior value through close customer relationships — then devoted enough resources to that strategy to develop *and* sustain relationships. These same companies also used CRM software to coordinate customer communications, interactions and service-support activities. Finally, such companies tended to integrate the Internet into numerous other distribution and service channels.

The survey responses documented managers' opinions rather than the actual results of their CRM initiatives. Nevertheless, on the basis of those remarks, the authors propose three principles for managers to consider:

Companies that already excel at managing customer relationships seem the best equipped to take advantage of the Internet's opportunities. Early on, "relationship leaders" anticipated using the new technology to connect more strongly with customers, exploited the technology faster than competitors did and implemented their CRM initiatives better. Thus the Internet appears to offer the best opportunities for companies that have the necessary conditions in place for leveraging the technology.

New Internet market models are less disruptive than early observers believed. Models such as "infomediaries" and "name-your-own pricing" have had little impact on customer-supplier relationships. Indeed, many infomediaries "have been disabled by unexpected barriers that incumbents had long learned to live with," notes the paper. Therefore, it appears that certain companies can continue using established business models confidently and successfully.

Savvy companies use the Internet to complement existing channels rather than "bolting it on." While most companies use a variety of distribution and service channels, those that most creatively employ the Internet for CRM ensure that the technology enhances all their other channels. For example, they equip call-center employees with net-based CRM systems, augment their bricks-and-mortar stores with location-based services that enable more customers to find them and arm salespeople with mobile devices that provide additional information and tools during sales calls. These companies also skillfully manage potential channel conflict in ways that allow channels to complement one another.

The authors suggest that companies seeking to benefit more from the Internet ask customers how the company's Internet capability stacks up against rivals'; determine whether customers are truly committed to the company or are buying only out of habit or inertia; and use collective incentives and cross-functional structures to align marketing, sales and customer-service functions behind CRM initiatives.

— Lauren Keller Johnson