日本経済経営研究所

CENTER

ON JAPANESE

ECONOMY

& BUSINESS

COLUMBIA
BUSINESS
SCHOOL

SOFTWARE AS A STRATEGIC TOOL OF COMPETITIVE ADVANTAGE: JAPANESE AND US INDUSTRY CASE STUDIES

NOVEMBER 10, 2000

Successful companies in main-line industries are integrating information technology (IT) into almost every aspect of their business. This includes using IT to develop, implement, and support business strategies. Because of the way IT is being used, these firms typically develop most of their IT in-house (or, in Japan, in cooperation with closely related providers), although (at least in the US) there is recognition of a role for "off-the-shelf" components and outsourcing. ■ *On November 10, 2000, the Center on Japanese Economy and Business, Columbia University, and the Alfred P Sloan Foundation held a one-day conference to discuss how three leading firms—Merck, Citibank, and Toyota—are using IT, and how it relates to their overall business strategies. Each panel included a representative of the company and a scholar from the Sloan center that studies the firm's industry. A panel of distinguished academics then explored the broader issues of IT's effect on competitiveness and industrial structure. Excerpts of the presentations are presented below, along with highlights of the intra-panel and audience discussions.*

OPENING REMARKS

Hugh Patrick

Under the leadership of Bill Rapp, the CJEB has been involved in a major project analyzing how IT is becoming a strategic tool for successful companies in main-line industries. This conference presents some of the results.

In earlier work, Rapp, to his surprise, concluded that the Japanese software industry as an industry was never going to become a direct international competitor. Rather, it has specialized in customized software, which frequently is tied to specific computer hardware for large Japanese companies. (See the 1996 Center on Japanese Economy and Business conference report "Software as a Tool of Competitive Advantage: A US Comparison".)

That lead to this project to compare selected successful Japanese and US firms in a number of different industries in terms of their use of software as a strategic input. Funding for the project has been provided by a grant from the Alfred P Sloan Foundation. Besides the direct support, the Sloan Foundation has supported industry-specific study centers at various universities that have provided material for the project.

SESSION ONE

PHARMACEUTICAL INDUSTRY

FRANK LICHTENBERG (CHAIR)
Courtney C Brown Professor of Business,
Columbia University

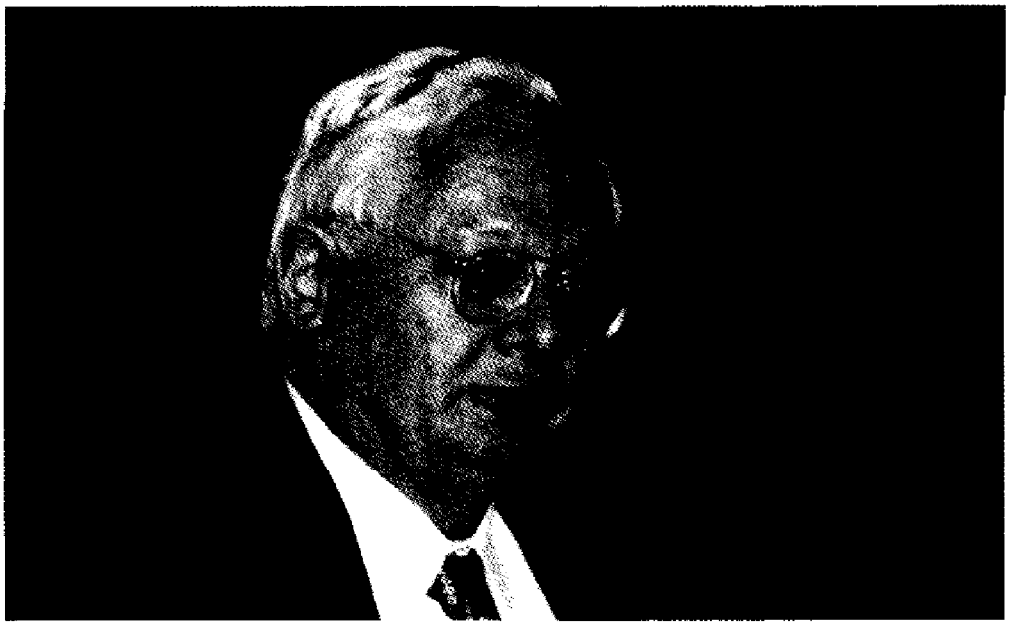
WILLIAM RAPP (INDUSTRY BACKGROUND)
Henry J Leir Professor of International Trade and Industry,
New Jersey Institute of Technology

CHARLES POPPER (PRESENTER)
Managing Director and Chief Technologist,
Orama Partners, Inc;
former Chief Information Officer, Merck & Co, Inc

STANLEY FINKELSTEIN (DISCUSSANT)
Senior Research Scientist, School of Management,
Massachusetts Institute of Technology

William Rapp

The overwhelming choice of a pharmaceutical company using IT to improve the way it competes was Merck. It was largely from the study of Merck that a hypothesis, which I call "control production", emerged. (I think others call it "end-to-



Hugh Patrick

William Rapp

end IT management".) Basically, it is the concept of using information technology to control all parts and processes associated with a business, including suppliers, customers, and those providing after-sales service.

The pharmaceutical industry is heavily regulated, including pricing in many countries. An aging population creates both demand and pressure to contain health-care costs.

The industry probably uses IT most extensively in discovery R&D. Developing a new drug is expensive—the current numbers are $350-500 million. To recapture such costs, the drug must sell on a global basis.

To get a drug approved requires extensive clinical trials which accounted for 70-80% of the $350-500 million cost of introducing a drug in the late 1990s. It also is essential to have after-sales data, in part because of the risks associated with multiple drug use by patients, especially many seniors. All this leads to a tremendous emphasis on IT.

A specific technological factor is called "rational drug design"—essentially, using computers to design drugs. This relates to combinatorial chemistry, the combining of various molecules to achieve certain results based on data on how particular molecules or similar molecules have operated on other patients.

Then there is the "drug pipeline"—simplistically, a listing of drugs at their various stages of development, approval, and sales life. Revenue from drugs already being sold finances the R&D that keeps the pipe full and flowing. It is thus important to gather and organize data on the pipeline as efficiently and usefully as possible.

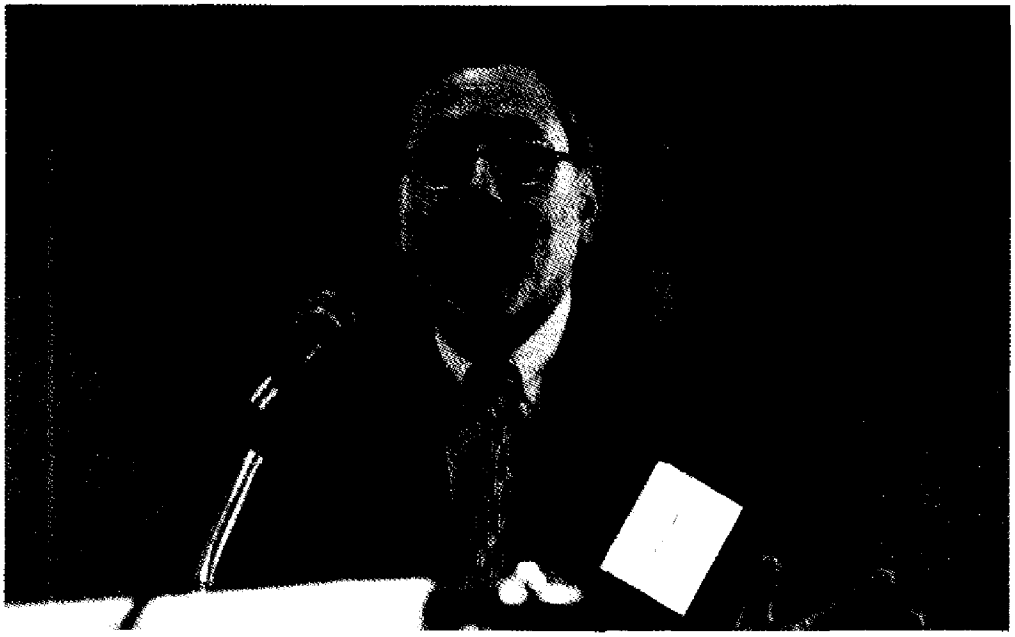
TO GET A DRUG APPROVED REQUIRES EXTENSIVE CLINICAL TRIALS WHICH ACCOUNTED FOR 70-80% OF THE $350-500 MILLION COST OF INTRODUCING A DRUG IN THE LATE 1990S.
—RAPP

Charles Popper

My remarks focus on the techniques aligning IT with business strategy. Because of my work experience, I bring something of a technical bias to what I say.

Case studies suggest that the business strategy comes first, then IT is used to support the strategy and amplify it and build on opportunities. Every business strategy today that I can think of requires processing a lot of information to support the strategy. That said, there are situations where IT can drive strategy. An example is in basic research in pharmaceuticals.

A transformation is underway of what has been a "wet science" into a "dry science". Wet science is "real" chemistry: chemists and biologists sitting at a bench with molecules and assays doing traditional science experiments. Dry science relates to the



Charles Popper

computational analog of this.

I see the fundamentals of the pharmaceutical industry shifting from mass production of a medicine that services millions of patients to being more fine-tuned and thus more customer focused and specific. As an example, there are very subtle differences in individual tolerance to particular drugs. Currently, general dosage levels are set based on trials. Fine tuning means predicting what types of people will benefit from variations of the molecule, thereby avoiding adverse reactions. The result will be a family of medicines that can be targeted based on genetic markers. How quickly this will happen is unclear. But clearly this is an area where IT is driving strategy.

In pharmaceutical benefit management (PBM), the original strategy was to get the lowest cost for the pharmaceutical components of health care, primarily through volume buying. After Merck acquired MedCo, a leading PBM company, in November 1993, MedCo started looking at the total cost of health care. Often, by using the right medicines — even if they cost more than alternatives — hospitalization and other serious effects can be avoided, thereby reducing total cost.

Getting the company involved with IT is important, and if you do not understand how to measure qualitatively what IT is doing for you, you will never be able to improve quality in a systematic way. The first level is IT literacy, simply an understanding by the executives of what IT means, and what their choices are. The next level is when executives are willing to discuss IT in terms of what to do to be on the leading edge. This is IT fluency.

The strategic plan we did for Merck Basic Research in the late 1990s involved asking the leadership of the laboratories if they wanted the IT to be bleeding edge, leading edge, or trailing edge, and we explained the differences. They all said that for research they would have to be bleeding edge because of the transformation of wet science to dry science. That required every possible advance in IT that we could apply. For clinical trials, they needed really good technology, but not something that might fail, which means being just behind the leading edge. For the administrative and other systems, they wanted the oldest and most reliable stuff.

How applications are imple-

I SEE THE FUNDAMENTALS OF THE PHARMACEUTICAL INDUSTRY SHIFTING FROM MASS PRODUCTION OF A MEDICINE THAT SERVICES MILLIONS OF PATIENTS TO BEING MORE FINE-TUNED AND THUS MORE CUSTOMER FOCUSED AND SPECIFIC.
—POPPER

BECAUSE THE JAPANESE GOVERNMENT ALLOWS HIGHER PRICES FOR "NEW" DRUGS, MANY ARE INTRODUCED EACH YEAR, BUT ALMOST ALL OF THEM ARE VARIATIONS OF EXISTING DRUGS RATHER THAN REAL INNOVATIONS.
—FINKELSTEIN

mented, deployed, and operated so as to have maximum beneficial impact on the company is a key issue. Delivering what you have promised on time, on budget, and working reliably is very difficult. There is a lot of variation here, and some companies are correct in trying to outsource. However, I believe that, especially at the scale of pharmaceutical companies, you can afford to do it inhouse. And if you do, you will do it better.

In essence, Merck is a knowledge company, focused on breaking new ground. This requires smart people with access to all the possible information that has been developed. IT systems can create knowledge and help to make it available. The general question is how to leverage knowledge effectively, and this is a way of thinking about IT that is an alternative to the concept of controlled production, although it may turn out not to be so different in practice.

Stanley Finkelstein

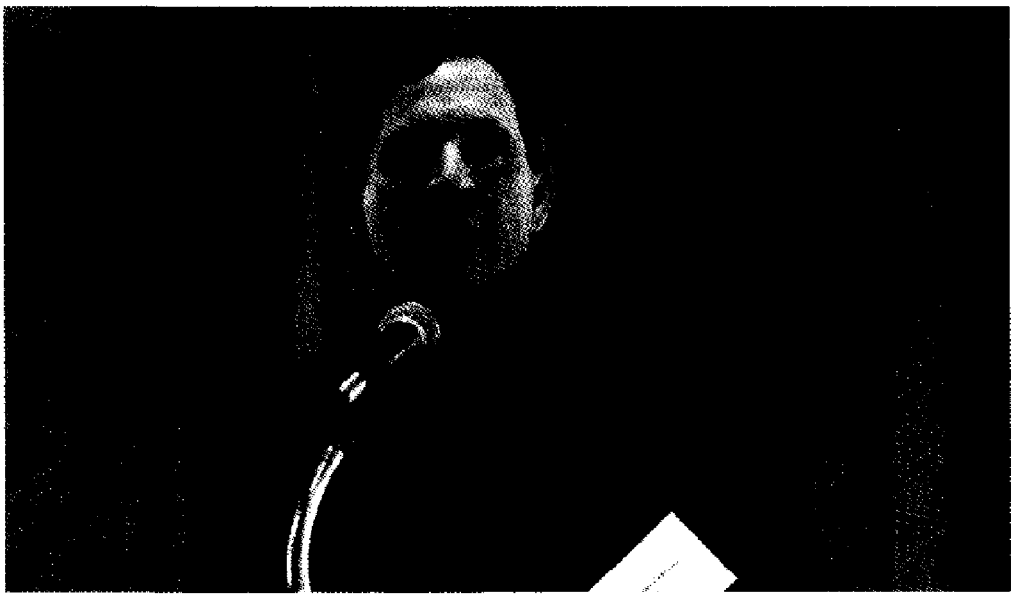
Crossnational comparisons in any industry need to keep in mind the differences in context. For pharmaceuticals, these are the health care delivery and financing environment. Thus, because the Japanese government allows higher prices for "new" drugs, many are introduced each year, but almost all of them are variations of existing drugs rather than real innovations. Japanese doctors financially benefit from writing prescriptions, and that helps explain why per-capita spending on drugs is higher in Japan than in the US.

One sees opportunities to out-source clinical development, clinical trials, regulatory applications, and manufacturing. An interesting question is the extent to which companies will specialize in just some of these functions. Many small biotech companies have become very excellent research boutiques, and there is talk they might be able to develop a drug with substantially fewer resources than integrated companies do, but I have not seen compelling evidence of this.

Discussion

Q: How do you integrate purchased or newly developed in-house IT into the existing system?

Popper: I'm not sure there is any magic, just very rigorous testing. The key is making sure you understand how the new system works and the theory behind it—in Merck's case, this includes the scientific aspects of what it is supposed to do.



Stanley Finkelstein

SESSION TWO

RETAIL BANKING

Eli Noam (Chair)
Professor of Finance and Economics, and Director, Columbia Institute for Telecommunications, Columbia University

Nobuhiko Hibara (Industry background)
PhD candidate Columbia University

Alan Young (Presenter)
VP, Citibank, responsible for remote access devices

Peter Burns (Discussant)
Wharton Financial Institutions Center

William Rapp (on behalf of Citibank's Alan Young, who was unable to attend)

Citigroup has been using IT to improve how it does business. Let me give you some examples.

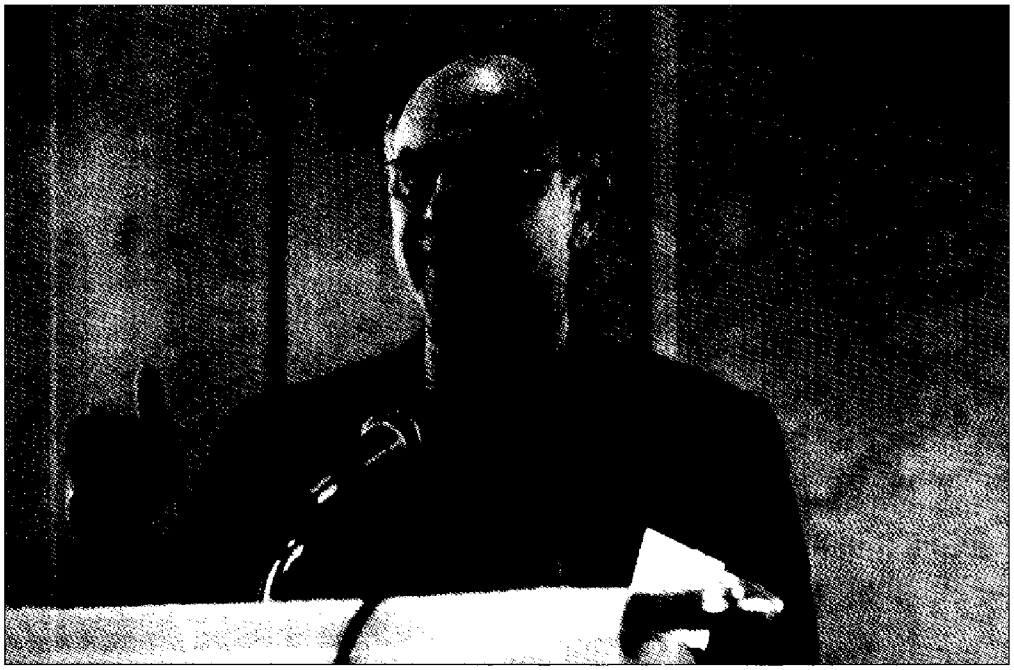
Citibank recognizes that there will always be a need for a human interface. But call centers are expensive, as much as $300 million. So ways are found to save that interface for when it is really needed. Thus, an analysis of calls in Europe found concentrations around times when people wanted to know if their paychecks had been deposited. There could be five or six calls in a day from the same person. A system was developed to send a message to a customer's mobile phone confirming deposit, and some 70% of potential customers signed on. As a result, Citibank was able to avoid putting in a new call center. This illustrates why Citi sees a major role for mobile phones, greater even than for ATMs, although Citi is involved with them as well.

As another example, the customer sales rep (CSR) at a call center can almost instantaneously bring up the entire relationship with Citigroup, including banking, insurance, and brokerage. So, to make a change, such as address, one call does it for all Citi accounts.

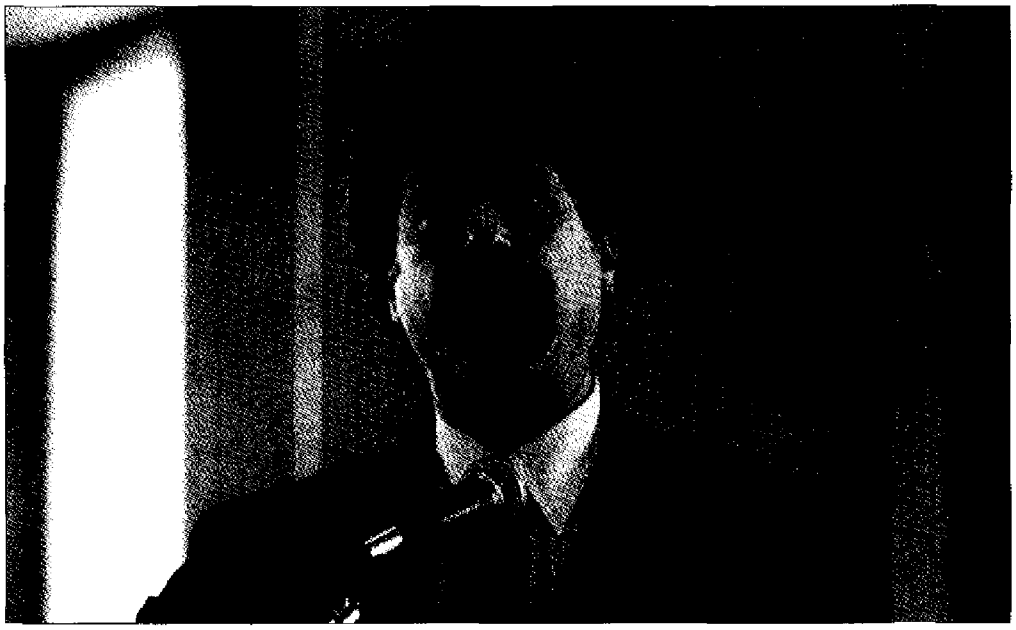
Not only does it irritate a caller to be passed to someone else, it is very expensive because, if the hand-off does not work, the customer calls back. Better to solve the problem at the beginning.

Customer needs change with age and circumstances. This is

CITIBANK RECOGNIZES THAT THERE WILL ALWAYS BE A NEED FOR A HUMAN INTERFACE. BUT CALL CENTERS ARE EXPENSIVE, AS MUCH AS $300 MILLION. SO WAYS ARE FOUND TO SAVE THAT INTERFACE FOR WHEN IT IS REALLY NEEDED. —RAPP



Peter Burns



Eli Noam

captured in Citi's life-cycle model that leads to what is called a tailored facility, unique to an individual but entirely generic as to components. This is very IT-intensive.

Citibank generally does not outsource IT, and this has been true historically.

In fact, it got into trouble in the 1970s and '80s trying to develop products that other banks were unwilling to go along with. But since then it has achieved an effective balance between innovation and the industry's technological path, especially within the Citicorp Group.

THE NATURE OF STRATEGY IS CHANGING. I THINK THIS IS IN LARGE PART DRIVEN BY TECHNOLOGY.
—BURNS

Peter Burns

There has been a lot of consolidation in banking. At first this was explained as being about economies of scale, but research has found little supporting evidence. I feel only some capital-intensive functions, such as clearing, possess them.

The next explanation was economies of scope. As a first pass, this means having many different activities and products, then cross-selling. Again, research and analysis leads to skepticism. Cross-selling is not easy. It requires collecting information about customers, then doing something with it. Citibank reports that 3-5% of global revenue comes from cross-selling. For a large bank, that is a large amount, but it is a long way from being meaningful.

The nature of strategy is changing. I think this is in large part driven by technology. When I was running a strategic planning function at a bank, it was about creating sustainable competitive advantage. You looked at your strength and weaknesses, and examined markets looking for places you fit. That worked in a static environment, which for many years fairly characterized banking. Of course their was episodic change, such as the debt crisis in the late '80s. Things were smooth, a bump was hit, a lot of things changed, then plateaued again. Now, there is much evidence that what we are dealing with is an environment of continual change. This means there is "strategic risk".

One response relates to option theory. That is, thinking about investments or actions that allow participation in some future state. You think about the possibilities in such a way that you can measure the opportunity cost of taking that option. This also involves thinking about residual values and how the option is closed, that is, an

Nobuhiko Hibara

BANKS HAVE BEEN VERY EFFECTIVE IMPLEMENTING IT IN ENVIRONMENTS WHERE THINGS ARE REASONABLY PREDICTABLE. THEY ARE LESS SUCCESSFUL IN AREAS WHERE THERE IS MORE UNCERTAINLY.
—BURNS

exit strategy. This is very different from what banks have done. Banks are notorious for investing in all kinds of things, which then continue for generations. Now, you want to do things that maximize the opportunities, and be smart enough to know when to quit.

Citibank has invested in two quite independent Internet ventures in the United States. One is Direct Access, which is tied to their banking product. The other was a more stand-alone operation. Citi ran on these parallel paths for some time, and now have announced an integration of the two, along with a brokerage piece. In effect, Citi made bets on—optioned—different states of the world, spent some time observing, took what was learned, and moved on the next solution, which is a mix of its two options.

Banks have been very effective implementing IT in environments where things are reasonably predictable. They are less successful in areas where there is more uncertainly. This includes uncertainty regarding future states and uncertainly because of organizational complications. The latter involves things that cross business lines, so its hard to determine what the objectives of the technology are, and who will benefit. However, these decisions are the most important to the future competitiveness of the institutions.

This is an argument for new metrics—new analytic methods—for evaluating decisions, before and after they are made. Many opportunities had been missed because of reliance on a net present value type of analysis. The bigger question for the firm is "What is this project really going to do?" Some of that is intangible. Dealing with the intangibles has led to winks and nods and saying "we know these numbers really don't mean anything".

Discussion

Popper: What is the potential role of the startups offering technology in niche areas?
Burns: Citibank views itself as being way ahead of the smaller companies, particularly since the bank is integrating everything it does. There have been prominent examples where Citibank was unwilling to take on certain new technologies. It wants to be assured of essentially 100% security before it moves into a new technological area. That is a problem for many startups, because they do not understand the importance of security and account access.

Kay Magilavy

AT A TOYOTA DEALER IN JAPAN, A BUYER CHOOSES A SPECIFIC MODEL WITH SPECIFIC FEATURES FROM A DISPLAY TERMINAL, THE DEALER PUSHES A BUTTON, AND TWO WEEKS LATER THE CAR IS DELIVERED.
—MAGILAVY

Rapp: A major challenge for Citi is resolving credit card problems for its 100 million card accounts. This is one reason Citibank is interested in tying-in with convenience stores. If everything is done at the store, including delivery, the consumer can refuse the merchandise or the service at that point and there will never be a charge to the credit card. So a future dispute is avoided. The money that can be saved in this way is very significant.

Magilavy: Toyota North America spends $3.6 billion dollars a year in very small transactions—under $100,000 each. There does not seem to be a bank that can support that volume of transactions as efficiently as Toyota would like. There is a big opportunity here, and Citi is starting to look it.

SESSION THREE

AUTOMOBILE INDUSTRY

HUGH PATRICK (CHAIR)

WILLIAM RAPP (INDUSTRY BACKGROUND)

KAY MAGILAVY (PRESENTER)
Manager, Information Resources, Corporate Planning Group, Toyota Motor Corp—North America

CHELSEA WHITE III (DISCUSSANT)
Professor, Industrial Operations and Engineering, and Director of Intelligent Transportation Systems Laboratory, University of Michigan

William Rapp

The impact of IT on the auto industry has truly been dramatic, not only in the way cars are produced, but also in the way we drive them.

Large global groupings are emerging, and they will be using IT extensively both in managing operations and in the car. Japan 10 years ago had 11 independent automobile companies, now it has 2. At the same time, worldwide, there is more competition.

Still, one company remains the benchmark, Toyota. Toyota's approach to IT is multidimensional, covering design, quality, and manufacturability, as well as ecommerce and conventional administrative uses.

Kay Magilavy

Toyota Motor North America is the holding company for the two largest affiliates within North America, Toyota Motor Sales and Toyota Motor Manufacturing. There are 20 separate corporations doing business in North America on

behalf of Toyota. Although they report financially to Japan, they are operationally autonomous to the extent that they are responsible for coordinating their activities with the parent company in Japan. That means we have 20 separate IT groups working within North America. We have 20 different management processes in place, and therein lies both the opportunity and the challenge to synchronize things while trying to work with the benefits of what these separate and talented organizations can do within their functional area. We produced 1.2 million vehicles in our North American plants last year, and over 60% of the vehicles sold in the region are manufactured here.

Toyota's global automotive operations can be classified in five areas. One is design. With respect to IT, design groups in Japan, North America, and Europe are charged with incorporating advanced IT technologies, including building in GPS (Global Positioning Systems), broader intelligent-highway functions, and communication. Those are immediate demands from our customer base.

Order-to-delivery lead time reduction is a joint initiative of manufacturing and marketing. Within Japan that means built to the customer's order, the way Dell builds for a specific end user; within North American, it is to a dealer's order that may or may not be linked to a specific customer order. At a Toyota dealer in Japan, a buyer chooses a specific model with specific features from a display terminal, the dealer pushes a button, and two weeks later the car is delivered.

The company collects extensive information on warranties and warranty claims that are used to make changes in production and design to ensure that problems are resolved. Other after-sales activities include service support, manuals and documentation, parts ordering, and customer service. These show high immediate returns from being made on-line processes.

The process of unifying Toyota's independently developed administrative processes is currently underway. This is a major challenge. Once infrastructure commonization is complete, uniform administrative processes, including accounting and ERP (Enterprise Reporting Programs) systems can rest on them.

The last piece of the IT picture is the addition of a management decision-making

TOYOTA IS COMMITTED TO MAINTAINING ITS RELATIONSHIPS WITH ITS DEALERS, SO WHILE THE WEB SITE PROVIDES PRICING AND OTHER INFORMATION, A PURCHASE IS DONE THROUGH A DEALER.
—MAGILAVY

Nelson Fraiman

KNOWING PRECISE VEHICLE REQUIREMENTS HAS PERMITTED PLANTS USING THE [EKANBAN] SYSTEM TO REDUCE ON-SITE MATERIALS AND COMPONENT INVENTORY BY MORE THAN 30%.
—MAGILAVY

support system. Access Toyota is our customer-facing web site; it was developed by Toyota Canada. Toyota is committed to maintaining its relationships with its dealers, so while the web site provides pricing and other information, a purchase is done through a dealer.

Breakthrough strategies are those that significantly reform business processes and represent new ways of operating. They often are possible only with enabling technology. Although not a function of IT, new strategies may become apparent through the improved visibility offered by IT tools.

Developed at Toyota Manufacturing in Canada and now being implemented at Toyota's plants worldwide, the ekanban process assigns a vehicle ID number several days before actual production starts. This enables bills of materials to be generated specifically for that vehicle rather than from projections of orders. Knowing precise vehicle requirements has permitted plants using the system to reduce on-site materials and component inventory by more than 30%. Extending the virtual-vehicle's life two days past line-off captures any additional parts and components that were pulled for the manufacturing process for that vehicle but not used. Any defects that caused the parts to be discarded are addressed by production engineering immediately and at that point. Defect-free components previously lost to the production cycle are returned for reuse.

Toyota constantly benchmarks against Cisco, Dell, and a number of other nonautomotive companies doing similar processes.

Chelsea White

Intelligent transportation systems (ITS) which include highway systems as well as systems embedded in the vehicle combine information, communications, and computer technologies to solve transportation problems. This includes IT that allows a vehicle to communicate with the cars around it and with the highway infrastructure. Globally, three major organizations are involved: ITS America, which is a publicprivate partnership in the form of an advisory committee to the US Department of Transportation, Vertis, in Japan, and Vertigo, in Europe.

Based on these organizations' activities, the relationship between the vehicle and the driver is changing. In the first stage of IT usage, the car provides information to the driver, monitoring such things as whether the driver is awake, as well as electronically paying tolls. The second stage is where the car supports the driving function, taking a more active role in how the car is managed. This includes collision-warning signals. Ultimately, there is collision avoidance, where the car actually brakes for the driver or even turns off the road to avoid an accident. The third step is where the automobile can drive itself. In Japan, the goal is to have, by 2012, a truly automated highway system where we will no longer be drivers, but supervisors.

To ease traffic congestion, traffic and travel management systems are being deployed. These change traffic and ramp-access lights and electronically collect payments. Singapore is a leader in such systems. Related to this are dynamic route guidance systems that determine, on the basis of real-time traffic congestion, the best way to get somewhere. These are more than the computerized maps found in basic route navigation systems. Here Japan is ahead with 2 million dynamic-system vehicles compared to the US with about 100,000, or Germany with perhaps 50,000.

Discussion

Magilavy: The Toyota design group jokes that in five years you will pay $5 for the automobile and the rest will be to download the software to run it.

White: Most automotive design is very integrated, because if you simply put modules together, the result may not run smoothly or have customer appeal. Rather, build-toorder requires modularity. It also needs a coordinated supply chain, which means less vertical integration, which means stronger tier-one suppliers, and that is a concern to auto makers.

Bernd Schmitt

My concern for Toyota is that because of its successful integration, it may be less able to transition to a modular approach than some others. But if Toyota already can deliver customized cars in a few days, this may not be a problem.

Magilavy: In Japan part of Toyota's website invites people to submit ideas for automobiles. The goal is to generate future models that appeal to younger Japanese, who are the most likely respondents to the site. This has led to a very strange looking car, called the Willy, which looks like the Citron Deucheveaux. In cooperation with other companies, the Willy brand has been expanded to a range of consumer goods.

SESSION FOUR

IMPLICATIONS FOR COMPETITIVENESS AND INDUSTRIAL STRUCTURE IN JAPAN

Bernd Schmitt (Chair)
Professor; Director, Center on Global Brand Leadership, Columbia University

Peter Drysdale
Professor, Asia Pacific School of Management and Research School of Pacific and Asian Studies; Executive Director, Australia Japan Research Center, Australian National University

Nelson Fraiman
Professor of Management Science and Operations and Codirector, W Edwards Deming Center for Quality, Productivity, and Competitiveness, Columbia University

Bruce Greenwald
Robert Heilbrunn Professor of Finance and Asset Management, Columbia Business School, Columbia University

Bruce Greenwald

In economics, a competitive advantage for an incumbent firm is synonymous with a barrier to entry. There are a limited number of such barriers: proprietary technologies, captive customers, scale economies of some sort, and government protection. As a result, the effect of software, and webbased software in particular, is to eliminate barriers. The new economy and webbased efficiencies do not particularly create value for investors. To the extent they do, it is because competitors are less able to earn returns on the necessary investment, or there is a franchise, or protected market. Put differently, customers are the ultimate beneficiary of IT-induced productivity growth as costs drop and are passed on to customers via competition.

Something like this has happened before. In the late

IN JAPAN, THE GOAL IS TO HAVE, BY 2012, A TRULY AUTOMATED HIGHWAY SYSTEM WHERE WE WILL NO LONGER BE DRIVERS, BUT SUPERVISORS.
—WHITE

THE BIGGEST IMPACT OF SOFTWARE ON JAPANESE INDUSTRIAL STRUCTURE IS THAT IT IS THE SUPPORTER OF COMPETITION, IT IS THE ENEMY OF PROFITABILITY. PEOPLE HAVE TO THINK ABOUT THAT EXTREMELY SERIOUSLY.
—GREENWALD

Bruce Greenwald

19th and early 20th century, retailing was largely a local monopoly. Then, in the 1920s the automobile gave alternatives to formerly captive customers. Even more than the auto, the internet allows easy price comparisons.

The biggest impact of software on Japanese industrial structure is that it is the supporter of competition, it is the enemy of profitability. People have to think about that extremely seriously.

There are three things that seem to me important about adapting and using information technology in the quest for competitive advantage, and these apply to countries, sectors, and firms. First, it is a dynamic process: every day is, in a sense, a new paradigm, a new opportunity. Second, IT must be pursued in an overall context. If pursued in isolation—buying PC's for everybody and the like—research suggests it is likely to be unsuccessful. Where a project is rooted in a fundamental reorganization oriented toward efficiency of the underlying processes, the returns can be enormous. Third, copying is good. Firms need to be willing to adapt innovations from companies used as benchmarks.

The Sloan School looked at people's capacity to absorb information, and found it has been constant. But there is an increasing level of information production. The result is a traffic jam that, IT having helped create, IT must now help address.

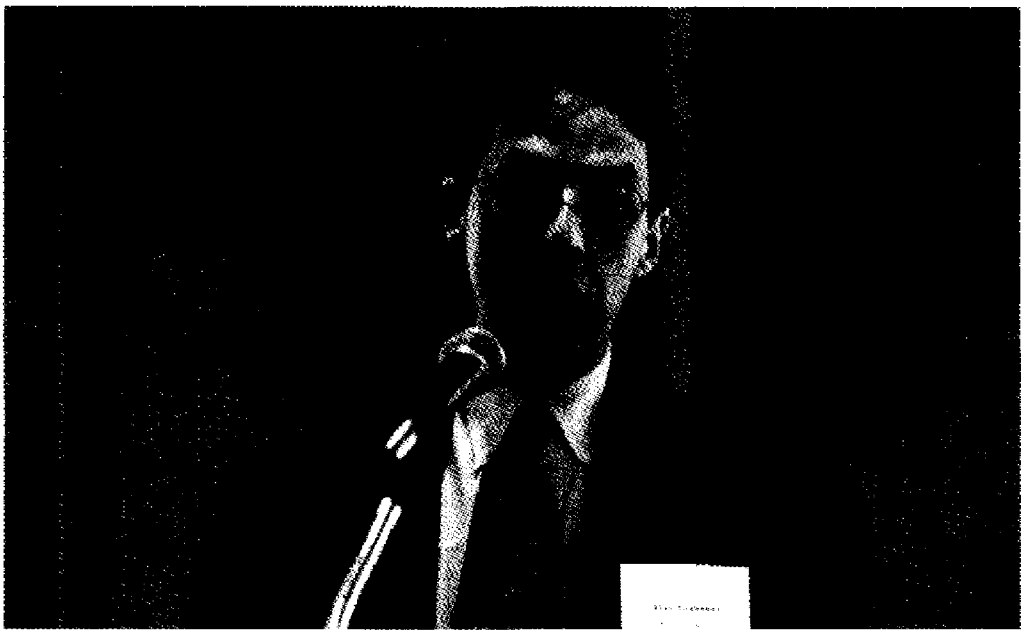
Nelson Fraiman

Everything we have been talking about depends on the availability of data. But it takes a long time to have databases that are properly maintained and reliable. An example is that organizations often have multiple databases that do not talk to each other. If you make a travel reservation on a web site, the data probably are different than if you telephoned the airline.

Then there is the matter of what data to collect and how to use it. The RitzCarlton hotel chain tracks guests so, for example, if it knows you are allergic to feather pillows, it will put some other pillow on your bed regardless of which Ritz Carlton you stay in.

The world is not really a single market because of local customs. In the US, Walmart restocks at night. In Brazil, labor laws do not allow that, and Walmart first tried to change the laws before adapting.

Project execution is critical, and many firms are not very good at it. The head of operations of a major New York



Frank Lichtenberg

retailer told me about the store's system that predicts when a customer is going to run out of a cosmetic and alerts a sales associate to call the customer. On the way out, I stopped at the cosmetic counter and asked how the clerk was using the system. She was unaware of it.

BCG and shop.org found that only 1.8 % of visits to online retail sites result in a purchase. For specialty stores, the number is 40%. One reason is that customers are confused by complicated web sites, especially at checkout if you want to adjust an order in some way. Instead of looking at what wins orders in the marketplace, many sites are bringing in even more complex technology. I think that will simply lead to further alienation.

When concern with quality became important, firms created VPs of quality. Successful firms eventually eliminated them because quality became an everyday activity. Now firms are creating VPs of ecommerce. Successful firms will be the ones who know how to link everything together. I do not see many that are.

When I taught a technology management course last year, I made it paperless. Not this year, because we found paperless was less efficient and more effort. A managed and strategic mix of systems and organization thus seems to work best.

Peter Drysdale

The researchers deliberately chose successful companies and examined their response to the IT revolution. But if you examine a larger sample, you might come to different conclusions about how firms have adapted, especially small and medium enterprises in the same industries as these large multinationals. The experiences of unsuccessful firms also is relevant.

I think useful interpretation of the role of IT means broader issues need to be taken into account. This includes specific conditions in the industry and in the national economy.

As to Japan, in many ways I am rather pessimistic about overall performance. There is a real need for structural adjustment. That said, in the next 5 to 10 years, I can see Japan as a strong and vibrant economy with a high rate of productivity growth. Part of this will be because Japan has a good record of absorbing outside technologies, and that will extend to IT.

THE WORLD IS NOT REALLY A SINGLE MARKET BECAUSE OF LOCAL CUSTOMS. IN THE US, WALMART RESTOCKS AT NIGHT. IN BRAZIL, LABOR LAWS DO NOT ALLOW.
—FRAIMAN

I THINK USEFUL INTERPRETATION OF THE ROLE OF IT MEANS BROADER ISSUES NEED TO BE TAKEN INTO ACCOUNT. THIS INCLUDES SPECIFIC CONDITIONS IN THE INDUSTRY AND IN THE NATIONAL ECONOMY.
—DRYSDALE

Discussion

Greenwald: In 1980 Toyota was going to destroy everybody and rule the world. Well, it turns out the US auto companies coped with that. Going forward, some firms are going to be firstrate companies, and no firm will enjoy a particular competitive advantage.

Those who think brand names are a competitive advantage have to explain why the premier global brand for quality, probably Mercedes, earns 810% on capital at best, and that's pretax. Ford has earned over 20% for the last ten years.

Q: Is the biggest problem dealing with problems?

Greenwald: There are companies that do that extremely well, and they do not do it with IT. The key is to see where IT is useful and where it is not useful. This means making the systems work together so that routine things are handled by IT, semiroutine things are handled by more sophisticated IT that never works the first time, and you have a default function which is an oldfashioned function that shrinks with time.

Patrick: The ultimate back up is a human being. My wife finds catalogs the most efficient way to shop, but she hangs up if put on hold or the like, and goes someplace that says, "Yes ma'am, we're delighted to have you."

Fraiman: She will find the cost of providing human service will force her to change her approach and learn to use the new technologies.

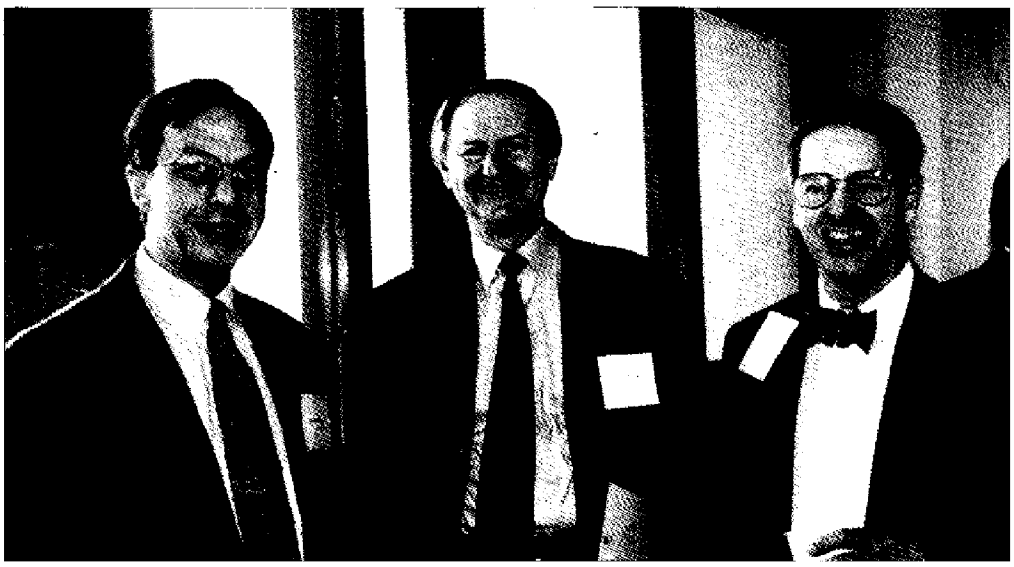
Patrick: To that she may say, "I prefer to pay the price of dealing with human beings where I get responses, because my time is valuable."

Greenwald: On the opposite side, my 11-year old daughter hangs up when she gets a human.

Drysdale: One of the striking and encouraging things about the global economic environment as it has emerged in the last 20 years is that the great global companies are no longer primarily US-based. And US firms are hiring more foreigners. There are great global corporations based in Japan and even Finland.

Fraiman: And the greatest ones, in fact, don't see themselves as Japanese or as British or whatever.

Greenwald: There is a global business culture with a common language, English, and a common set of mathematical presentational forms. It seems there are not many fundamentally different cultural things. However, there clearly are different structures of competition within different countries, and that has an important bearing on what is going on.



Frank Lichtenberg, Peter Drysdale and William Rapp

比較優位のための戦略的武器としてのソフト・ウェアー：日本、アメリカにおける産業別ケ-ス・スタディー

2000年11月10日、コロンビア・ビジネス・スクール日本経済経営研究所では、アルフレッド・P.スローン財団の助成をへて、経済、経営及び企業の専門家を招き、製薬、銀行、自動車業界について、個別企業のケースを用いて、情報技術(ＩＴ)が与えるインパクトをテーマに会議を開催した。以下は、会議での議論の要旨である。

１．製薬産業：　製薬産業では、ITのインパクトは、研究開発の分野で顕著であり、それは、企業活動の戦略にも多大に影響を及ぼしている。これまで、製薬企業は、誰にでも効く一般的な薬の大量生産が主であった。しかし、マーク(Merck)製薬の例が示すように、ITのサポートにより、より個別的なニーズにあった薬品の生産が注目されるようになった。薬品の個別化、品質の上昇により、消費者の経済的負担は上がるものの、病院などでの診察、入院費が下がり、全体の医療費は低下すると考えられる。マークは、優良製薬会社であり、今後さらに知識・技術を統合し、アフター・ケアーも含めた消費者側のニーズに効率的応える「管理生産」が行われることが期待される。

２．銀行業：　シティ・バンクは、ミクロのレベルでは、IT導入により、多様な商品を効率的に消費者に提供し、また、消費者のニーズに合わせたサービスを行なってきている。経済全体のマクロのレベルでいえば、IT導入に伴ない、企業戦略の性質そのものが変化してきている。金融業界は、長年の間、どちらかと言えば静動的で、1980年代後半に債務危機に見舞われることはあっても、また、正常に戻るというサイクルであった。しかし、現在では、経済環境が常に変化すると言うことが日常化し、戦略的リスクという概念が、企業活動に組み込まれることになった。銀行業界は、予測可能な分野については、ITの導入には、十分な効果を発揮している。しかしながら、シティ・バンクの例をとっても、新技術導入による企業活動の安全性が、100％確かな分野でなければ、IT促進には消極的である。

３．自動車産業：　ITの自動車産業に与えるインパクトは、多大であり、それは、自動車がどのように生産されるかと言う面だけでなく、私たちが、今後どのように自動車を運転するかという分野にまで、影響を及ぼしている。トヨタ自動車の場合、ITにより、自動車のデザインやコミニュケーション機能などについて、消費者の個別注文に応じて、自動車が生産・販売されるようになった。アフター・ケアー、部品の取り替えや自動車保険についても、消費者情報の管理を徹底させることで、企業側が、敏速な対応ができるようになった。更には、ITにより、交通システムそのものにも変化が見られ、事故未然防止のため安全機能の高度化、さらには、2012年頃までには、自動化された高速道路システムの上で、ドライバーは、自動車を自分で運転すると言うよりも、自動車を監視することになるという予測もある。

最後に、それぞれの産業や経済全体に関して言えば、消費者は、ＩＴの全体に与えるインパクトの利益受容者である。ＩＴは、ダイナミックなプロセスであり、効率性が追求され、さらに、企業は、新しい環境に適応することが求められる。日本では、ＩＴ革命に伴なう更なる産業構造の調整が必要である。幸い、日本は、外からの技術を吸収することに長けているので、今後、日本の産業・経済成長の見通しは明るいのではないだろうか。

EDITOR:

Larry Meisner

ASSOCIATE EDITORS:

Joshua Safier
Associate Director

Tomoko Sugiyama
Program Assistant

Center on Japanese Economy and Business, Columbia Business School

PHOTOGRAPHY

Joseph Pineiro

DESIGN/ PRODUCTION

Miwako Nishizawa Glick

CENTER ON JAPANESE ECONOMY AND BUSINESS

Columbia Business School
321 Uris Hall,
Mail Code 9155
3022 Broadway
New York, NY 10027
Phone: (212) 854-3976
Fax: (212) 678-6958
Email: hrp1@columbia.edu
Web: http://gsb.columbia.edu/japan