Supplementary Reading for

Chapter 2　New Economy

Technology and Worker Efficiency

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HOW much does information technology really contribute to economic productivity and corporate competitiveness? It has been a matter of debate for years. Efforts to measure technology's contribution tend to follow Sherlock Holmes's maxim on deductive sleuthing: When you have excluded the impossible, whatever remains, however improbable, must be the truth.

That kind of reasoning has given technology a large share of the credit for the American economy's strong — and sometimes puzzling — productivity gains for the last several years. The gains cannot be explained any other way, it is said, so they must be the result of companies getting an increase in productivity from all that computer hardware and software they bought.

Yet this technology-by-default explanation is not very intellectually satisfying. Nor does it provide much of a guide to government officials or corporate executives as they make decisions on economic policy or business investments. There is something to the business adage that you can't manage what you can't measure.

Economists, business school professors and Federal Reserve researchers have been puzzling over the technology conundrum for some time. And today, the Information Work Productivity Council, an industry group, is sponsoring a gathering in New York of business executives, consultants and academics to discuss current research, case studies and future trends. The council says it is independent, but it is hardly disinterested since its supporters are major technology companies including Accenture, Cisco Systems, Hewlett-Packard, Intel, Microsoft, SAP and Xerox.

What is intriguing about much of the research marked for citation and discussion at the forum is how modest a role technology itself plays in the productivity gains studied. The wise use of technology, researchers say, is one ingredient in the recipe for improving the productivity of information workers, who now represent up to 70 percent of the American labor force, or 100 million workers, from customer service people in call centers to scientists in research labs.

The main focus of recent study has been on what researchers call "organization capital." This asset includes a company's work practices and routines, its storehouse of corporate knowledge in computer databases and in people's heads, and even culture and values as they guide how a company operates.

In a National Bureau of Economic Research working paper, Baruch Lev, a professor at New York University, and Suresh Radhakrishnan, a professor at the University of Texas at Dallas, studied 250 companies and assessed the contribution from organization capital. In the paper, "The Measurement of Firm-Specific Organization Capital," published last year, the professors found that investments in organizational capital accounted, on average, for 71 percent of sales growth.

"How information gets communicated and coordinated in a company can drive organization capital," Mr. Radhakrishnan said, "so it is enhanced by information technology."

Much of organization capital is expressed in terms of work practices - how things are done in a company. When blended with technology investments, certain work practices yield the biggest gains, said Erik Brynjolfsson, a professor at the Massachusetts Institute of Technology. The companies that perform best, he said, use teams more often than their rivals. They decentralize work that requires local knowledge and interpersonal skills like product design, sales and on-the-fly adjustments on the factory floor, and they centralize and computerize work that is easily quantified, like accounts payable systems and obtaining the lowest airline fares for routine travel.

Investments in technology alone, Mr. Brynjolfsson said, bring little or no benefit. But he says that technology and organization capital are complements, reinforcing each other when used wisely together. "When you put organization capital into the model, it goes a long way to explaining the productivity surge we've seen," Mr. Brynjolfsson said. "It's not so much of a mystery."

The observation that it is learning how to use a technology - more than the technology itself - that brings economic gains is not surprising. That is the historical pattern, economists note. The electric motor, for example, was introduced in the 1880's but did not generate discernible productivity gains until the 1920's, when businesses reorganized work around the industrial production line, the efficiency breakthrough of its day.

What is striking, however, is how large the investments in organization capital - "computer-enabled assets" to Mr. Brynjolfsson - are compared with technology investments. For example, one popular kind of technology-related investment in recent years at major companies has been installing an enterprise resource planning system to streamline and automate operations. Mr. Brynjolfsson estimates that in a $20 million enterprise resource planning project, the new computer hardware required costs $1 million and the software $3 million. The remaining $16 million is in organization capital - redesigning work practices, retraining workers and other such investments.

John Seely Brown, former director of the Xerox Palo Alto Research Center, says he believes that recent changes in software technology could allow big gains in productivity and innovation. The opportunity, he says, is to move beyond the limitations of centralized systems for automating business operations, like enterprise resource systems. "Those systems are prisons," said Mr. Brown.

The software plumbing of computing, Mr. Brown explains, is evolving, and so is Internet-based software for individual workers. Software systems built on Web standards, he said, can be used as pick-and-place building blocks, instead of the more formal hierarchical systems of the past.

Mr. Brown also points to the rapid development of what he calls "social software" like instant messaging, Weblogs, wikis (multi-user Weblogs) and peer-to-peer tools - all of which make it easier for workers to communicate and collaborate online, almost instantaneously.

The combined result, Mr. Brown said, is information technology that can amplify social interaction and enhance workers' understanding of what is happening around them. The benefit, he added, could be to increase their ability to "collectively improvise and innovate."

That is a key to productivity and peak performance, according to Mr. Brown. Business, he said, is a lot like soccer. In soccer, there are some set plays, but the best teams also display a wealth of effective improvisation based on the players' deep knowledge of one another. "It's the same in the best corporations or start-ups," he said.

Mr. Brown insists that the relentless pressure of global competition and the migration of skilled jobs abroad adds urgency to the pursuit of technology-enhanced productivity gains. "We can get a lot more out of people here if we really tap into them as new sources of innovation and productivity," he said. "And we're getting the right kinds of technology tools to move this along. It's the only way we can compete."

Questions for discussion:

1. What is technology-by-default explanation?
2. Why is it important to find an explanation for recent American productivity gain?
3. What is organization capital?
4. What is the role technology plays in productivity gain according to New Economy advocates?
5. Many companies invested heavily in IT. How can one explain the fact that some succeeded while others failed?
6. What is a social software?
7. What is needed for a team to win beside set plays?
8. Is the writer a believer of New Economy? Give your reason.