

8 Computers and Work

8.1 The Changing Nature of Work

Does increased productivity from computerization lead to reduced working hours and more leisure, or to fewer jobs and more unemployment, or to little change in working hours, but more wealth (or less wealth)?

“Telework” and “telecommuting” have become part of our vocabulary, describing the growing phenomenon of working at a distance from the traditional company office, connected by computers.

Communications networks make it possible for companies to locate in small towns and work with dispersed consultants instead of having hundreds or thousands of employees in large population centers.

At the same time that information technology is giving some workers more autonomy, computers are giving employers increased power to monitor the work, communications, movements, and Web activity of employees. These changes affect productivity, privacy, and morale. Should monitoring be limited? How?

8.2 The Impact on Employment

Does computerization destroy jobs? Does it cause mass unemployment?

The number of bank tellers dropped by about 37% between 1983 and 1993.

The number of telephone switchboard operators dropped from 421,000 in 1970 to 164,000 in 1996.

A bank holding company receives 1.5 million customer inquiries by telephone each month; 80% are handled by computer. The company reduced the number of customer service employees by 40%.

“What was once done by our people is now done by technology.”

As the prices of digital cameras decline, more film processors will go out of business.

There is no doubt that technology in general and computers in particular eliminate some jobs.

While the number of telephone operators was dropping by more than 60% between 1970 and 1996, the number of long-distance calls increased from 9.8 billion to 94.9 billion.

In 1998, U.S. factories produced 3.5 times as much as in 1960 but had only 10% more workers; productivity per worker more than tripled.

If a technology is successful, it eliminates some jobs, but it is likely to create others.

The Web created new jobs in software, Web page design, and security.

In 1998, the Semiconductor Industry Association reported that chip makers employed 242,000 workers directly in the U.S. and 1.3 million workers indirectly. The chip industry,

which did not exist before the microprocessor was invented in the 1970s, ranked fourth among U.S. industries by annual revenue. According to the Department of Commerce, in 1996, there were 506,000 computer scientists and engineers, 427,000 computer systems analysts, and 568,000 computer programmers. The Department expected these figures to grow to 1,026,000, 912,000, and 697,000, respectively, by 2006. In 1998, 7.4 million people worked in information technology jobs in the United States.

There are countless new products that use computer technology: VCRs and DVD players, computer games, fax machines, cell phones, medical devices, and so on. New products create new jobs in design, marketing, manufacture, sales, customer service, repair, and maintenance.

Do computers destroy more jobs than they create?

In the long term, if technology brings the cost of a product or service down far enough to expand the market, more people will work in that field. Other new jobs created by technology are ones not imagined or possible before.

Unemployment rates fluctuate. They might be high or low when you read this, but it seems clear that computer technology did not cause significant unemployment in the last decades of the 20th century.

TECHNOLOGY, ECONOMIC FACTORS, AND EMPLOYMENT

In 25 countries from 1950 to 1995, OECD concluded that unemployment stems from “policies...[that] have made economies rigid, and stalled the ability... to adapt.” The study suggested that “unemployment should be addressed not by seeking to slow the pace of change, but rather by restoring economies’ and societies’ capacity to adapt to it.”

If technology destroyed jobs, there should be fewer people working now than in 1900. But, with four times as many people, the national unemployment rate was less than 4% in May 2000, lower than throughout most of the 20th century. (One segment of the population is working less: children. In 1870, the average age for starting work was less than 13; in 1990 it was 19.1.)

BUT ARE WE EARNING LESS?

Living Standards and Leisure in the Computer Age

	1970	1997
Average new home size (sq. ft.)	1500	2150
New homes with central heat and air conditioning	34%	81%
Households with 2 or more vehicles	29.3%	61.9%
Households with color TV	39.9%	97.9%
Households with VCRs	0	89%
Households with microwave oven	Less than 1%	89.5%

Housing units lacking complete plumbing	6.9%	2.3%
Median household net worth	\$27,938	59,398
Shipments of recreational vehicles	30,300	281,000
Average household ownership of sporting equipment	\$769	\$1895
Americans taking cruises	0.5 mill.	4.7 mill.

A few figures are for 1995 or 1996. All dollar figures in both columns are in 1997 dollars.

Between 1970 and the late 1990s

Also in this time period, attendance at operas and symphonies doubled (per person), recreation spending more than triples (per person), and spending on toys quadrupled (per child).

Declining Cost, Measured in Working Time

Product	1900	1920*	1970	1990-2000
Milk (half-gallon)	56 min.	37 min.	10 min.	7 min.
Hershey chocolate bar	20 min.	6 min.	1.8 min.	2.1 min.
Chicken (3 pounds)	2 & 2/3 hrs.	2 & 1/2	22 min.	14 min.
Electricity (100 KWH)	107 & 1/4	13 & 1/2	39 min.	38 min.
Bread (one pound)		13 min.	4 min.	3.5 min.
Oranges (one dozen)		69 min.	15 min.	9 min.
Gasoline (one gallon)		32 min.	6.4 min.	5.7 min.
Phone call (3 min., coast-to-coast)		30 hrs.	24 min.	2 min.
Air travel (100 miles)		12 & 3/4 hrs.	102 min.	62 min.
Computing power (1 MIPS)			1.2 lifetimes	9 min.

***The air-travel datum is for 1930.**

**** Figures in this column are from various years in the late 1990s and 2000.**

***** “MIPS” means *million instructions per second*.**

A GLOBAL WORKFORCE

The Internet and the Web have reduced “transportation” costs for many kinds of information work to almost zero, Digitized voice files are sent to India by satellite, transcribed, and returned by e-mail.

8.2.1 Job Destruction and Creation

Computers differ from earlier technologies in several key ways.

Computers eliminate a much wider variety of jobs than any single new technological advance in the past.

The new jobs created by computers are different from the jobs eliminated.
Will jobs diverge into two distinct groups: high-paying jobs for the highly skilled and highly trained intellectual elite, and fewer low-paying jobs for people without computer skills and advanced education?

8.2.2 Changing Skills and Jobs

REASONS FOR OPTIMISM

A bookkeeper in 1980 had to be highly skilled, whereas a bookkeeper in 1920 was a high-school graduate using an early form of an adding machine.

Complex interactive computer systems guide workers through steps of jobs that required extensive training before.

Companies more willing to hire people without specific skills when they can be trained quickly and use automated support systems.

COMPUTERS REPLACING SKILLED WORKERS

Computers eliminate more high-skilled jobs than older technologies. Software makes decisions that used to require trained, thinking human beings.

Software to design the electrical layout for new housing developments can do in half an hour a job that would take a high-paid employee 100 hours.

In the 17th and 18th centuries, people were shocked and disturbed by machines that did simple arithmetic, a task thought to require uniquely human intelligence.

Human imagination and desires continued to find new fields of work to replace those no longer needed or made more efficient.

TRANSITIONS

In societies that change very slowly, a person might hold the same job for all of his or her working years. This does not happen in a dynamic society where technology is developing at a fast pace.

Computer technology, especially the Web, can help people find better jobs and can make transitions easier.

8.3 The Work Environment

8.3.1 Teleworking

“telecommuting” is working for an employer at a computer-equipped office in the employer’s home.

By 2000, 24 million Americans telecommuted regularly or occasionally, up from about four million in 1990. Europe had approximately 10 million telecommuters in 2000.

BENEFITS

The main advantages for employers are reduced overhead and, in some cases, increased productivity.

At home, one can more easily work a few hours at night that are compatible with foreign time zones.

Telecommuting reduces rush-hour traffic congestion and the associated pollution and energy use. A one-percent decrease in urban commuting could reduce gasoline usage by a few million barrels per year.

Telework gives people increased flexibility of work location.

PROBLEMS

Lacking immediate supervision, some people are less productive, while others work too hard and too long.

Some employees complain that the costs of office space and overhead that have been reduced for the employer have simply been shifted to the employee.

Some telecommuters fear that lack of “visibility” in the office will be a disadvantage when promotions and bonuses are awarded.

Telework may be very desirable for some employees and employers and of no use to others.

SIDE EFFECTS

Working at home in the late 20th century seemed new and unusual, but, before the Industrial Revolution, most people worked at, or close to, home.

Now that we can communicate with people all over the world on the Internet, will home workers stay inside, communicating with unseen business and social acquaintances, and be just as unlikely to know their neighbors as many commuters are now?

RESTRICTIONS ON TELEWORK

Local zoning laws often prohibit a home business from receiving deliveries or customers at the home.

In 1999, OSHA declared that employers must ensure that workplaces in employees' homes meet legal regulations for workplaces at work.

8.3.2 Changing Business Structures

A tremendous amount of business reorganization is taking place, and it is still unclear what the eventual main trend will be.

Between 1991 and 1995, companies with more than 5000 employees eliminated 3,377,000 jobs, but companies with fewer than 500 employees added almost 11 million employees.

The availability of information technology is leading many businesses to give workers more information and more decision-making authority.

8.4 Employee Monitoring

8.4.1 Background

Electronic monitoring capabilities are the modern version of the time clock, telephone expansion, and camera.

Monitoring can be constant, more detailed, and unseen by the worker.

New monitoring capabilities, such as reading an employee's e-mail, affect "white collar" (professional) workers too.

8.4.2 Data Entry, Phone Work, and Retail

The management style that includes constant watching, very demanding work quotas, and threats of being fired is older than computers. The modern, computerized version of such workplaces is described as an "electronic sweatshop."

Workers complain that such constant, detailed surveillance diminishes their sense of dignity and independence and destroys confidence.

In retail environments, another purpose of employee monitoring is to reduce theft. Theft by retail-store employees amounts to more than losses from shoplifting (\$12.85 billion versus \$10.15 billion in 2000).

Counting keystrokes is counterproductive because it increases stress, reduces worker productivity, and causes health problems and costs.

Which monitoring guidelines involve issues of rights that should have legal protection, and which should be matters of policy to be determined within the company?

In the late 1980s, shippers began installing tracking systems in their long-haul trucks.

Do the benefits of monitoring outweigh the privacy intrusion, or is this an example of computer technology inappropriately infringing on privacy and personal autonomy?

8.4.3 Location Monitoring

Electronic identification badges that serve as door keys raise similar issues.

8.4.4 Employee E-mail, Web surfing, and Voice Mail

The Electronic Communications Privacy Act (ECPA) prohibits interception of e-mail and reading of stored e-mail without a court order, but the ECPA makes an exception for business systems; it does not prohibit employers from reading employee e-mail on company systems.

There is no law restricting monitoring by employers of Web activity by employees at work on the company system. Should there be?

E-MAIL AND VOICE MAIL AT WORK

Roughly half of major companies in the U.S. sometimes monitor or search the e-mail, voice mail, or computer files of their employees.

Most companies that read employee e-mail do it infrequently, primarily when there is a complaint or some other reason to suspect a problem.

LAW AND CASES

Courts put heavy weight on the fact that the computers, mail, and phone systems used at work are the property of the employer and are provided for business purposes.

At a minimum, an employer should set clear policies and inform employees about whether personal use of employer-provided communications and computer systems is permitted and about whether, and under what circumstances, the employer will access employee messages and files.

The problem, for both ethics and law, consists of defining a reasonable boundary between, on the one hand, the employer's property rights, protection of company assets, the need for access to business information, and the need to monitor for possible legal and liability problems, and, on the other hand, actions that invade personal privacy.

SURFING THE WEB AT WORK

In the late 1990s, Employees found the Web so attractive that they quickly began to use it for nonwork purposes.

Some companies found that employees spent more than two hours a week on nonwork Web activity. One company found that 3% of its Web traffic was to an online investment sight and another 4% was used by employees downloading music.

Is employer monitoring of Web activity by employees and unreasonable invasion of privacy?

Web sites can determine where a visitor is coming from. Some companies want to avoid the embarrassment of having their employees reported to be visiting pornographic sites, perhaps racist sites, or even job-hunting sites.

8.5 Health Issues

8.5.1 Repetitive Strain Injury

Repetitive strain injury (RSI) causes pain in the wrist, hand, and arm. It is associated with frequent, repetitive, forceful and/or awkward motion and unusual hand positions, or stress on the hands and wrists. Carpal tunnel syndrome involves damage to a nerve in the wrist and can result in numbness in the fingers and eventually permanent disability.

LEGAL ISSUES

OSHA spent more than 10 years working on federal workplace rules for RSI. In 1994, it said that specific rules could not be developed because scientists did not understand the causes of the injuries or how to prevent them.

In 2000, OSHA issued ergonomic workplace standards that included 1600 pages of rules. Congress repealed the new rules in 2001.

EDUCATION AND CHOICES

User of any tool should learn the proper techniques for its use. Employers have a responsibility to provide training in proper and safe use of tools, including keyboards.