

Chapter 1

Is telecommunications truly revolutionary?

Lester C. Thurow

More than a decade ago I heard Ithiel Pool say there was going to be a computer telecommunications revolution. I was skeptical. Now I am much less of a skeptic. Historically only two inventions have revolutionized our industrial world.

The train speeded up transportation from one point to another. I much remember a history book pointing out that Napoleon's army did not move any faster than Julius Caesar's army. Two thousand years, and armies moved exactly the same way with horses and carts moving as fast as human beings could walk. The internal combustion engine and the automobile are not that important. If they had not been invented, we would have had a lot more street railways, and perhaps not quite as much suburbanization, but the world would look approximately the same without the automobile as it looks with it.

The other major invention is electricity. It clearly revolutionized the world in all kinds of ways. It made night usable. I periodically climb mountains in the Himalayas and get to villages where there is still no electricity. To live in a world with absolutely no electricity, no batteries, no lights, is a very different experience from the life most of us are used to. Electricity essentially changed night into day and altered human habits in profound ways.

Is the computer telecommunications revolution equivalent to trains and electricity? We will not be sure until we look back on it, but I am more persuaded today that Ithiel Pool was on to something, and that this could be a third major revolution.

In business schools we talk about MIS (management information systems) and refer to telecommunications systems as if they were ways to bring information to managers for them to do a better job. I am convinced that what is going on is more fundamental in the sense that

the telecommunications industry is becoming the production technology of many industries. Finance is a good example. Finance has become a technological enterprise. The financial institution that can bring information from Hong Kong to New York five seconds faster than some other group does not make part of the arbitrage profits – it makes all of the arbitrage profits.

Look at who the banks have been hiring recently. Salomon Brothers last year hired as many computer programmers and telecommunications experts as they did financial experts. A gentleman came into my office the other day and was absolutely convinced that the Japanese banks were going to drive every other bank in the world out of business because they were willing to put up satellites and build better telecommunications networks than the banks in Europe and the United States. They were going to be able to move information around the world faster and a few pennies cheaper per document than anybody else. They were going to turn finance into manufacturing. The one who can produce a product the cheapest and the fastest wins; and they were going to win because of their superior technology. He may be wrong about the Japanese advantage. At Citibank the person in charge of computer telecommunications has a budget of one billion dollars. One company one billion dollars to invest in telecommunications in one year.

Technology certainly changes the world capital markets. In one sense, Alan Greenspan, the Chairman of the Federal Reserve Board, and every other central banker in the world, has become technologically obsolete. Alan Greenspan is in charge of *the* American money supply. But in today's world, because of technology, there is no '*the* American money supply.' There is a world money supply. We can instantly borrow dollars or Euro dollars or Euro yen or Euro marks in London without ever being there. Those transactions do not have anything to do with any central banker in the world. I could buy and sell a house in Boston by using German marks. You could do a deal in the Bahamas without ever being in the Bahamas. We have major institutions like national central banks that are becoming obsolete.

Central banks can collectively control *the* world money supply – and there is a world money supply – but they cannot control it individually. The way we regulate, operate, and do our economics will have to be quite different because of the telecommunications revolution that has occurred.

After the Second World War, we had capital controls. They were difficult to enforce in the good old days, but today we could not make

them work at all. How would you monitor financial transactions across national boundaries if they are done with personal computers (PCs)?

If you look at the Brady Commission's report on why the stock market fell in October 1987, it perfectly illustrates a group of human beings who are presumably intelligent, writing a report that is technologically obsolete. The Brady Commission wrote about the fall of the American stock market as if it was the only stock market in the world that fell. Almost no word about any other markets falling. They blamed the fall on telecommunications computer trading. Portfolio insurance and program trading supposedly brought the system down. The interesting point is that London was crashing for five hours before New York crashed and London does very little portfolio insurance or computer trading compared to New York. Stock markets have also managed to crash hundreds of times, hundreds of years before anybody invented this technology. The Mississippi Bubble, Tulip Mania, the South Sea Bubble, the Great Crash of 1929, all managed to occur without computers and telecommunications.

If one reflects on the Brady recommendations, how would you stop program trading? Suppose you wanted to stop it. How would you do that, in a technical sense? This is a little like stopping sex between consenting adults. Can one really stop people in the privacy of their own office from looking at their computers and using their telephone to trade stocks, bonds, and commodities around the world?

Computer telecommunications has effectively become the modern devil that is blamed for everything wrong. If a package does not get delivered to my house, what went wrong? Well, the computer did it. Exactly the same thing happening on the stock market. We needed a convenient scapegoat to blame for what went wrong, and computer telecommunications took the blame.

The telecommunications revolution has two important economic puzzles. It was widely predicted when the revolution began that computer telecommunications would decentralize economic activity because it would make it much cheaper to move information from one place to another. And you can find examples of decentralization, like Citibank processing all its credit cards in Sioux Falls, South Dakota rather than in New York City. But the aggregate data show precisely the opposite. We *are* piling up, in record amounts, in narrower geographic areas. Big central cities around the world are growing. If a city is a financial capital plus a government capital, probably 40 per cent of all the people in the entire country live there. This is true in South America,

in Japan, in Britain. Where you would predict decentralization, the technology somehow seems to be contributing to centralization. It is clear that, in the aggregate – despite dramatic examples like Citibank out in Sioux Falls – something very different is happening.

The second puzzle concerns productivity. Computer telecommunications is a wonderful new technology, with wondrous capabilities. It should make productivity grow faster, which makes the standard of living grow faster. Thus this technology is going to pay off in a higher standard of living than we would otherwise have.

Again, the data belie these expectations. Precisely those industries that are most intensively using this technology have the worst productivity performance. In fact, the industries using it the most generally have negative productivity growth, like financial services. Financial services are certainly using telecommunications to move information around the world, to do new things such as computer accounting, to service customers with ATM machines, the robots of the financial world. But no matter how you measure productivity in financial services in the United States, it is falling. For every employee exiled from a little branch bank that no longer has any employees in it, banks are adding two employees in the telecommunications office to replace the one from the old-fashioned office.

Financial services in the United States have had negative productivity growth for the last ten years. Every year productivity is falling about 1 percent. Part of the explanation is reasonably clear. We find that maintenance expenses are soaring. The conventional computer system that a company might buy requires annual maintenance expenses that are half the original purchase price. It takes an enormous amount of labor and supplies to keep these systems running. The enormous labor force necessary to maintain the systems has more than offset the productivity gains.

This problem is not limited to finance. The worse the productivity performance the more that industry is using computer telecommunications systems. Is this just a temporary phenomenon – that it takes a while to get used to new technology so people can use it efficiently? Or is this something where the payoff ultimately comes much later when ways of doing business actually change? One could argue the issue both ways. One answer may be that Ithiel Pool was right: It is a real revolution, which means we have to do things differently as opposed to just automate the old.

Consider office automation. If you think about the model office, it is remarkably similar to the office that was invented in Florence during the

Renaissance. The way we shuffle paper around the system has not changed much in 500 years. And then we bring in office automation and we simply automate exactly the same paper shuffling that we were doing before we automated. That may very well be a way you cannot make the system pay off. When I walk into business firms in the United States, every desk has a computer terminal and a telecommunications system attached to it, and I would bet that 95 percent of them are seldom turned on.

Recently we have been putting about half of the total investment in the United States into computers and telecommunications. Putting half of the investment for an entire country into an area that does not pay off in productivity creates a major problem. At some point we will either have to do it differently or quit doing it at all. From an industrial point of view, that is going to be the key question over the next five or ten years.