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Technology and the U.S. Economy

In the two and a half decades immediately following World War II, the United States was far and away the world leader in science and technology. Its high technology products earned respect and markets globally. It enjoyed annual increases in productivity of about 3 percent. The gross domestic product increased about 3 percent annually, and the inflation rate was less than 4 percent.

We still lead in science, but our position is eroding. Unless a turnaround occurs soon in all levels of science education, we are headed for long-term inferiority. We still enjoy a positive balance of payments in high technology goods, but our share of the world market has dropped, and the balance with respect to Japan and Germany has become negative. Innovation is difficult to gauge, but one measure—patents—indicates a relative decrease. In 1966 only 20 percent of U.S. patents were awarded to foreigners. In 1976 the figure was 36 percent. Innovation is also related to increases in productivity, and during the last several years gains in productivity have not occurred. This, in turn, has been a factor in the high inflation rate. Most economists agree that increases in productivity tend to hold down inflation, and failure to obtain such gains was a factor in the double-digit inflation we have experienced. Another symptom of economic woes is the drop in the rate of increase in real gross domestic product, which currently is around zero.

A number of studies have been made to analyze the causes of this country's poor performance. Groups have been organized by the Committee for Economic Development (1980), the National Research Council (1978, 1979, 1980), the Department of Commerce (1979), the Industrial Research Institute (1980), and others. In 1980 the National Academy of Engineering published a report highlighting areas of agreement among previous studies. These findings have now been supplemented by a special issue of *Technology in Society** in which 21 leading economists and technologists give their analyses of our economic ills and prescriptions for their amelioration.

Some part of our problems is due to a drastic change in energy prices. Another factor has been a bias among some business managers toward quick-payoff projects in decisions involving allocation of resources. But the principal targets of criticism, and rightly so, are the past policies and practices of the federal government. These have discouraged innovation through a multitude of regulations. Tax policies have compared unfavorably with those of our principal competitors. The introduction of new products or processes is particularly affected by uncertainties raised by regulatory actions. Delays increase costs and add to the substantial risks that accompany innovative ventures. Perhaps the most important factor limiting innovation is the availability of capital. In visits to industrial laboratories, I was repeatedly told this. A leader of R & D at U.S. Steel said to me sadly, "We know exactly what we need to do to compete successfully with the Japanese, but we don't have the money." In times of high inflation, a particularly troublesome factor is that replacement costs of equipment far exceed its original costs.

The recently enacted tax legislation goes far toward a long-term easing of problems of capital accumulation for investment in more efficient plants and processes. But as more funds become available, industry will be expanding its R & D and seeking more scientific and technical personnel. The pipeline from the secondary schools through the universities is not in good shape; if anything, it is deteriorating. Features of the tax legislation that encourage industrial contributions to universities will be helpful, but that addresses only part of the problems of science and engineering education. Technological innovation requires money, a favorable environment for investment, and trained people. The first two requirements are being met; the new bottleneck will probably be a shortage of prepared minds.—PHILIP H. ABELSON

*R. Landau and N. B. Hannay, Eds., "Taxation, technology and the U.S. economy," *Technology in Society*, vol. 3, Nos. 1 and 2, 1981.