Technology in Commerce

Technology and Global Industry. Companies and Nations in the World Economy. BRUCE R. GUILE and HARVEY BROOKS, Eds. National Academy Press, Washington, DC, 1987. viii, 272 pp., illus. Paper, $19.95. National Academy of Engineering Series on Technology and Social Priorities. Based on a symposium, Feb. 1986.

It is by now a commonplace that the world economy is being "globalized." Firms are increasingly organized as "multinational" corporations, manufacturing their products in multiple countries and selling them throughout the world.

In *Technology and Global Industry* a group of distinguished business and policy analysts examine the important contributions of technology to this process. As the editors explain in their overview chapter, the papers address a formidable set of issues, including the effects of changing technologies on the production and distribution of goods and services in a global economy; the role technology plays in shifts of relative competitive advantage of nations, regions, and firms; and how government and enterprises respond to technological advance.

The papers do not live up to this challenging agenda. No clear theme emerges from the collection. Nevertheless, several of the papers individually make an important contribution, and for this reason the book merits attention.

One of the most interesting essays, "Does technology policy matter?," is by Henry Ergas, a trade counselor at the Organization of Economic Cooperation and Development (OECD) in Paris. Ergas compares technology policies in different countries and finds that they basically fall into three groups.

In "mission-oriented" countries (such as the United States, the United Kingdom, and France), governments generally try to boost the emergence of a specific emerging technology—the breeder reactor, the space program, or the supersonic airplane. In contrast, countries pursuing "diffusion-oriented" policies (Switzerland, West Germany, and Sweden) do not target specific technologies but rather construct environments—through strong support of education, cooperative research efforts by universities and industry, and industry standard-setting—that are designed to promote the development of mature products and processes. Only Japan has taken a third course, mixing elements of each of the first two strategies but focusing its greatest effort on assisting industries in their "consolidation phase"—well after new technologies have emerged but before final product designs have been established.

Which approach works best? Ergas gives each of the strategies its due but in the end avoids choosing. Instead, he counsels nations to avoid putting too many of their eggs in a single technology basket—as the United Kingdom and France have done with the Concorde. The United States, he notes, has greater freedom by virtue of its size to pursue large projects, but Ergas makes an excellent case that, like Japan, we should place greater emphasis on commercializing innovations than on creativity and novelty.

David Teece, a professor of business administration at the University of California at Berkeley, follows up on this theme in his chapter. Specifically, Teece points to the experiences of a number of firms that were successful innovators—EMI, which developed the CAT scanner; Royal Crown Cola, which first introduced cola in cans and diet cola; and Bowmar, which introduced the pocket calculator—and asks why each ultimately failed to withstand the competition from later imitators.

Teece provides a persuasive answer. Unless the innovator has ironclad patent or copyright protection or is able, like Coca-Cola, to guard its secrets effectively, being first will not guarantee market dominance or even success. Firms must have the ability to manufacture, market, and deliver innovations. If innovators do not have these "complementary assets," imitators will appropriate the profits from their efforts. Teece provides no specific policy recommendations but directs his advice to corporations, warning them against divorcing their R&D activities from manufacturing and marketing.

Two other chapters, by James Brian Quinn of Dartmouth and Raymond Vernon of Harvard, place the current concern about the ability of the U.S. manufacturing sector to compete in international markets in some perspective. Quinn argues that it is wrong to despair about the growing importance of services relative to manufacturing, a trend that is apparent not only in the United States but in other industrialized countries as well. In addition, he presents convincing evidence that high technology is quite important in services—communications, transportation, financial services, and health services, among others.

Vernon, meanwhile, contends that the ease of acquiring new technologies around the world is the primary reason why so many other countries have been able to compete successfully against U.S. producers. If the United States is to counter this trend, Vernon argues, it must enhance its "factors of production"—notably improve education and better target federal R&D support—while avoiding trade protection.

In short, readers of this book will find few new policy suggestions for significantly improving the technological performance of the United States. Moreover, they will find no thorough discussion of two of the most important and controversial policy instruments now used to promote technology in the United States: the R&D tax credit and the recently approved process for reducing the antitrust exposure of firms that collaborate on R&D projects. Indeed, the basic weakness of the book is that it provides little "bottom-line" advice for federal policy-makers interested in promoting technology and its contribution to the nation's economic performance. However, selective readers will find several interesting essays that help shed light on the role of technology in the new global economy and how different broad government approaches to technology policy have fared in the past.

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Global Currents

General Circulation of the Ocean. HENRY D. I. ABARBANEL and W. R. YOUNG, Eds. Springer-Verlag, New York, 1987. xiv, 291 pp., illus. $69. Topics in Atmospheric and Oceanic Sciences. From a lecture series, San Diego, CA, 1983.

This volume from a workshop on ocean dynamics begins with a set of lectures by P. P. Niiler on the observational basis for large-scale ocean circulation. Niiler's presentation of direct measurements of the flow obtained by moored current meters and profilers illustrates the new view of the ocean interior provided by modern instrumentation. The trick is to blend information obtained in this way with the temperature and salinity data painstakingly accumulated over the past 100 years of shipboard expeditions—not easy, because there is a real mismatch of scale between the eddies and the global circulation, and this affects each measurement (pressure, velocity, density, and so on) in a different way. Real discoveries were rare in