SCIENCE

27 APRIL 1990
VOLUME 248
NUMBER 4954

Science and Technology Policy

Suddenly we are aware of living in a changed and changing world. The United States remains the top military power, but it is now the world's greatest debtor nation—more than $600 billion in debt—and debt grows each year by at least $100 billion. U.S. companies have lost market share in both mature and high-tech industries. U.S. higher education is preeminent, but half of the doctorates in crucial fields are going to foreign-born students. Uncertainties occasioned by the federal research grant system have affected morale of scientists. These were some of the matters discussed in the Fifteenth Annual AAAS Colloquium on Science and Technology Policy held in Washington, D.C., on 12 and 13 April. The theme for the meeting was "science and technology and the changing world order."

The concluding major presentation was made by Robert M. White, president of the National Academy of Engineering. He reminded the audience of a major global evolution in technology and production and pointed to policy matters that need to be addressed. A crucial development has been a powerful trend toward globally operated engineering and production. Very large volumes of capital, goods, services, components, people, data, and technological know-how flow across national boundaries every day. U.S. businesses participate in a substantial part of the action. They have more than $1.2 trillion in assets abroad, and in 1988 a third of U.S. multinational companies' earnings came from overseas operations. U.S.–owned operations abroad employ 6.2 million people and depend heavily on local production and technical and management capabilities. The movement of companies is not one-sided. Today more than 3 million Americans work for foreign multinational corporations with affiliates in the United States.

In the past, U.S. companies created overseas subsidiaries for access to markets or low-cost labor. With the growing excellence of engineering research and development overseas, more and more U.S.–based multinationals are buying high-technology goods and services in place. Globalization of technology has blurred corporate nationalities and dissolved the once strong bond between corporate and national interests.

Much of high technology has been fostered by knowledge created at U.S. universities. After World War II, these became global intellectual centers. They are regarded as keys to economic growth. Pressure has increased on scientific and technical and research universities to contribute to local, regional, and national economic development. Federal agencies increasingly expect research grants to contribute to national competitiveness. Congressional concerns are evident about foreign firms' active use of U.S. university research as a means to gain access to new technologies. In the future, U.S. universities are likely to be questioned about who pays for and who benefits from university research. If scientific and technological knowledge developed in the United States is available so that its benefits can be acquired by others, then our policies must make it possible to exploit more quickly the immense output of our universities. This is urgent, for they are a principal source of a possible competitive advantage.

In the light of the integration of the world economy, we need to consider what we must do to maintain a U.S. technological base for both military and economic security. At minimum we must have a full range of key technical competencies in the United States, especially in the high-tech areas. We should maintain capabilities in production of goods whether the facilities are owned by domestic or foreign competitors. If corporations locate where the economic climate is favorable and talent is plentiful, our policies must provide the economic incentives and talent that will induce them to locate in the United States. A key challenge is to determine how the United States can capture the benefits of technological advance no matter where it originates.

Restoring this country's competitiveness will not be done easily or quickly. We have many matters that need to be more effectively addressed. These include pre-college education, better retention of majors in science and engineering, support of graduate education, adequate support for small science, better interaction of universities and industry, and a level playing field in international high-tech trade. The problem is difficult and complex, but the matters require thoughtful action.—PHILIP H. ABELSON