

Chapter 5

Internationalization of Research and Technology

Internationalization and globalization are two relatively new words in the vocabulary of scholars and scientific analysts in research and development. While the actual meaning and acceptance of these terms have developed slowly in science and technology policy, the activities they describe have stimulated scientific advance and technological transformation for centuries, but particularly in recent decades with the increasing speed of change. Especially since the 1950s, the relaxation of strict national boundaries in favor of a more integrated global economic system has changed the nature of the world economy. Increasing internationalization of production and trade has generated new demands on domestic R&D, while facilitating diffusion of ideas and technologies. The weakening of geographical and political protection of markets has forced more and more industries and firms to measure their competitive success not only on local, regional, and national scales, but also on the international scale.

National innovation systems tend to concentrate more and more on topics where there is a competitive advantage to be had. New materials and information technologies, telecommunications, electronics, health and the environment, and biotechnology have become generally recurring priority topics in the plans of Western governments. Yet each nation has developed special emphasis in selected fields: the USA has covered almost all aspects of materials research; Japan has been more selective and has given priority to fine ceramics, carbon fibers, technical plastics, amorphous alloys, and superconductors; Germany has focused on high-temperature metallic materials, new polymers, ceramics, and new conductors; Switzerland has specialized in

alloys and materials for electronics; Norway has stressed the study of materials for offshore techniques; Denmark has developed materials for instrumentation and catalysis; and so on (OECD, 1992, p. 31). Countries in the West have highlighted particular topics within a large array of R&D endeavors, which have been carried out in the international community. Therefore, the combination of specialization and international cooperation has secured advancement in existing scientific fields and induced headway in expanding new areas.

Specialization in a few areas should not lead to the complete disregard of other topics of interest in science and technology. The growth of global R&D activities provides more incentive for developing solid overall national innovation systems based on strong research and development activities than for solely relying on the successes of specialization. A certain amount of domestic research is essential in order to be receptive to scientific progress and technological advances made in foreign countries.

Indeed, one may question why it is important for a nation to be active in the internationalization of R&D, on both the producing end and the receiving end. The scientific and technological levels of the United States and the Soviet Union provide the answer by displaying two contrary scenarios. Even if one is a major R&D producer, such as the USA or the USSR, the rest of the world may still be inventing something of interest for them with respect to production, policy, or improvement in the standard of living. The USSR essentially cut itself off from this world stock of knowledge, leaving many potentially advantageous innovations beyond their reach. Now scientists in the former USSR find themselves far behind the technological levels of nations that are substantially inferior to them in domestic R&D output. In addition, the absence of internationalization has eliminated the possibilities for the republics of the former USSR to accrue economic returns on a given invention domestically and abroad, reducing the general ability to secure economic benefits.

Different nations possess different capabilities to innovate and imitate, which determine their domestic flows of product and process innovations. The descriptive evidence would appear to indicate the presence of a strong correlation between active participation in the international market place and internal technological and economic development. Isolation and inbreeding have not exhibited the ability to generate the same successes as open market policies with respect to achieving technological advance, particularly not at similar levels of efficiency.

After 1945, postwar rebuilding began and a new world economic system emerged that reflected the sharp division between political, economic, and consequently social policies of different groups. The primary division in the