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# Innovation and Technological Specialisation

## An introduction

By Florian Straßberger, Brigitte Preißl and Christian von Hirschhausen

The performance of national economies relies on the innovativeness of companies. Technical change is one of the driving forces behind innovation. In an increasingly international environment countries and companies develop a specific pattern of specialisation with respect to technological expertise and potential for generating technological knowledge. Technological specialisation follows strategic decisions of internationally operating companies, as well as national innovation policies; it reflects demand for specialised knowledge and the availability of relevant inputs.

Various trends characterise the creation and adoption of technologies and their link with innovation. Internationally operating companies decide about the allocation of research facilities and innovation activities according to company strategies within a world-wide company network, thus by-passing national innovation systems.

The generation of knowledge and its transformation into innovations do not necessarily happen in the same country. However, technological competence seems to attract innovative companies. Technological specialisation is still an important factor for economic performance. The closeness between knowledge creation and the use of knowledge in innovation seems to be an advantage in terms of spillover effects and availability of expertise.

In national innovation systems the division of labour between public and private R&D capacities and between manufacturing and service companies go through profound changes. The focus of attention in economic policy expands from the creation of technologies to their diffusion and successful exploitation for innovation purposes.

The use of technological specialisation to increase a country's innovation potential and thus its economic performance is determined by these trends. This special edition of the *Vierteljahrshäfte* presents papers that deal with the dynamics of technological specialisation and innovation from various perspectives of a changing national and international division of labour.

As *Beise* and *Belitz* show, companies have become more international over the course of the past one-and-a-half decades. The main motivation behind this internationalisa-

tion is to gain access to international markets. In the course of the internationalisation of production activities, however, research and development activities are also becoming much more globalised. Germany seems to be in a rather strong position concerning the outflow of foreign direct investment and therefore the possibility to source technical knowledge internationally. Concerning the inflow of foreign direct investment in R&D intensive sectors, Germany does not seem to be far behind other nations in terms of the stock of direct investment — even though the flows have been showing a below average dynamic in latest years. The attraction of international R&D activities to locations in Germany, will, however, not so much depend on favourable conditions for domestic investment in general, but will rather be a function of the ability to spur the rise of attractive domestic markets for sophisticated products.

In international comparison, technological development in Germany shows two remarkable characteristics. The first is the strong specialisation in high-level technologies such as machinery, automobiles and electrical engineering. The second is the decentralisation of technical activities in Germany. *Jungmittag*, *Grupp* and *Hullmann* show on the basis of patent data that the technological specialisation patterns of rich nations have become more similar in the first half of the 1990s. Structural change towards the dynamic fields of technology does, however, seem to be rather sluggish. From the point of view of nations, what seems to matter most is to be specialised, not to be specialised in particular fields of technology. Not to follow the crowds might actually be an advantage, as it helps to avoid malicious competition and patent races. To build on ones' present technological strengths seems to be a rather good strategy in terms of economic success.

In Germany, centres of technological strength are less concentrated in one area than in other European economies. *Gehrke* and *Legler* consider this to be a major advantage: Technical expertise, which is an important factor for the locational decision of companies, is not only found in one central region around the capital, but is spread rather evenly throughout Germany. Therefore, Germany offers a rather attractive portfolio of regions with a fair supply of

highly skilled employees as well as potential cooperation partners — companies as well as publicly financed research centres. In other European countries — mainly France and Great Britain — such activities are located in the immediate neighbourhood of the capital whereas other regions are loosing out in the competition for employment creating activities.

Technical change has traditionally been driven by manufacturing. This, however, has been changing rapidly over the course of the past decades as services became an integral part of national innovation systems. Up to now, a full understanding of the contribution of services to the technological position of a nation is impeded by several factors: Most concepts of innovation and technical change have been developed from the point of view of manufacturing and can not easily be adapted to services, the dearth of statistical information on services makes it impossible to properly describe their importance. Traditionally, services have been considered adverse to technology and thus to productivity growth and innovation in general. Information technology now provides instruments for the automation of service processes and thus introduces technology as a driving force in service industries. *Preissl's* paper analyses the contribution of information technology to service innovation and the role of services in facilitating the diffusion and implementation of information technology in the economy.

The role of services in national innovation systems goes beyond their own innovation activities. Services are increasingly important as carriers, facilitators and enablers of innovation in other industries. *denHertog* and *Bilderbeek* study knowledge-intensive business services and their interaction with customer firms in innovation processes. In order to take into account the impact of national innovation systems they adopt a comparative perspective and reflect their findings for the Netherlands against empirical evidence in Germany.

In Eastern European countries, both the production structure and the national innovation systems were radically changed with the end of socialism, leading also to a shift of specialisation. *Bitzer* and *von Hirschhausen* propose that under these specific post-socialist conditions, there can be no innovation policy based on inherited, sectorally-oriented science&technology „potential“. Instead of supplying capacities any longer, they propose that Eastern European governments should develop a demand-oriented S&T policy. This approach is applied to three industries of different technological nature: software, shipbuilding, and computers.

We hope that this special issue contribute to the scientific discussion on issues of innovation and technology and thus be useful for policymaking as well.