Internationalization of Research and Development in Pharmaceuticals

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6.1 Introduction

In the 1970s, investment of research and development (R&D) in foreign countries was noted only by a few academics (e.g. Ronstadt, 1977; Mansfield/Teece/Romeo, 1979; Behrmann/Fischer, 1980). Today the internationalization of R&D is a major topic within the business community as well as for academic researchers and policymakers. Since then the international generation of innovation has increased. Large multinational firms play a key role in this process (see e.g. Cantwell, 1994; Nonaka/Takeuchi, 1995; Patel/Pavitt, 1994). During earlier periods of international expansion (the 1960s and 1970s), multinational corporations first built up their sales, distribution and assembly operations in foreign countries. In later phases (late 1970s/early 1980s), efforts were then directed towards supporting foreign subsidiaries with corresponding capacities in application engineering and applied R&D. Although initially the tasks of development departments abroad were limited to adapting product and process technologies from the home country to local production and market requirements, there was a recognizable trend, since the late 1980s, towards strengthening R&D in foreign countries and extending the international competence portfolio. Increasingly, research became established at a high level in foreign locations. This development is strikingly described by Nosi (1999) as a process 'from technology transfer to the learning organization'.

There are mainly three reasons why we included the topic of the internationalization of R&D activities, especially the issue of the generation of innovation in foreign countries, in our study. Firstly, pharmaceuticals (including biotechnology) is - among chemicals/materials and electrical/electronics - a sector in which companies have already highly internationalized their research and technological activities abroad (see CEC, 1998; Odagiri/Yasuda, 1996; Patel/Vega, 1999; Reger/Beise/Belitz, 1999; Serapio/Dalton, 1999).

Secondly, based on our own research on large companies and other studies (see Chiesa, 1996; Florida, 1997; Gerybadze/Meyer-Krahmer/Reger, 1997; Kuemmerle, 1997), we wanted to learn more about the qualitative changes in the internationalization process in this sector. We assumed that large
pharma companies try to tap into the worldwide leading center where leading-edge research is done and where new drugs can be introduced best and first to the market. New here is that the innovation - the new drug - is generated outside the home country and, after having learnt much from excellent research and a sophisticated market, is internationalized to other markets. Since the degree of R&D internationalization varies from country to country (see e.g. Roberts, 1995; 1995a) we expected differences between corporations with their headquarters in Germany/ Europe, Japan and the US.

Thirdly, this chapter was driven by the concern that the technological performance of pharmaceuticals in Germany has been disappointing for many years. What role does the ongoing process of the R&D internationalization play herein? For instance, if German pharma companies invest in R&D abroad this has not to be negative from the view of the national system of innovation if foreign-based companies invest more in R&D in Germany and if outflows are compensated by inflows of R&D investment. If outflows are higher than inflows, industrial R&D and the long-term technological base for innovation is decreasing in a country.

This chapter will start with an analysis of R&D input and R&D output indicators and changes in the technological specialization of selected countries since the 1980s. Further, the internationalization strategies of selected pharmaceutical companies are investigated. It will be shown how these firms establish 'centers of excellence' at different locations, what factors influence the location decisions and what role the attractiveness of regional innovation clusters plays. The understanding what a center of excellence differs from company to company. 'Centers of excellence' may focus on a distinctive technology like biotechnology or integrate the whole value chain for a specific therapeutic area. However, the corporate-wide responsibility for a certain research field, technology or therapeutic area, talented researchers, own resources, a high degree of self-guidance as well as corporate-wide coordination tasks are included in many cases. Regarding regional innovation clusters we will borrow from the of other authors and define clusters as geographically proximate groups of interconnected companies, related and supporting industries, research and education institutes, and associated institutions in a particular field (i.e. pharmaceuticals, biotechnology) which are linked by commonalities and complementarities (see Porter/Stern, 1999, p. 17). Since proximity plays an important role, the focus of innovation in clusters is often at the regional level in larger countries such as the US or Germany.

Methodologically, this chapter is based on an analysis of the R&D expenditure (input indicator) and of patents (output indicator) on country level for selected countries as well as on interviews and a patent analysis for 16 selected pharmaceuticals companies.