Chapter 26

PATENT DATA FOR MONITORING S&T PORTFOLIOS

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Abstract: This chapter deals with the use of patent data to monitor science and technology (S&T) portfolios. S&T portfolios have become central tools for examining and for monitoring the vitality of institutions, innovative clusters, and regions in the innovation game that underpins their respective economic growth and development. Those portfolios have to be monitored not only at the intra-organisational level, but also at the inter-organizational level, as well as at other appropriate levels of analysis for designated systems of innovation (e.g., specific technology clusters). To this end, the development of appropriate, easy to use and transparent, benchmark indicators to assess the relative strengths and weaknesses of S&T portfolios is important. In this chapter the construction of a particular type of benchmark indicator, based on relative specialization indices, is reported and its usefulness is assessed by its application to the European Patent Database.

1. MONITORING S&T PORTFOLIOS

Portfolio management in science and technology is not new. Ever since the development of the concept of technological S-curves many years ago (see for example: Martino, 1983; Girifalco, 1991; Porter et al., 1991; Roussel et al., 1991; or Floyd, 1997), companies have developed methods to monitor and to assess the potential and the relative quality of their science and technology investments. The concept of S-curves pointed to the explicit risks and uncertainties involved in developing new technological capabilities and applying them towards the fulfilment of product–market needs. They also provided an attempt to extrapolate the speed at which new technological trajectories would diffuse and become common technological practice.

(Sahal, 1981). As most companies manage a myriad of projects attempting at major as well as minor improvements of their current Science and Technology (further abbreviated as S&T) base, it became obvious that S-curves were just one criterion relevant to assessing the vitality of a corporate S&T portfolio. Risk–reward criteria, as well as indicators of competitive dynamics such as a company’s S&T position versus those of competitors, became standard concepts. Those analyses showed that not all S&T endeavours could be considered equal. Some were indeed more fundamental than others. Abernathy and Clark (1985) were amongst the first to discern different types of S&T efforts within a company. Some of those efforts would indeed disrupt the technological competences of the company, whilst others would just enhance those competences in a somewhat incremental way. Along a second dimension they stated that a company’s S&T efforts might either destroy or enhance existing market and distribution relationships.

Combining the market and technology dimensions, they constructed a two by two-dimensional model assessing the transilience, or impact, of various types of S&T efforts. They coined them: regular (enhancing both the existing technology and market competence of the company); niche (enhancing the existing technology competence but destroying the market competence); revolutionary (destroying the technology competence, but enhancing the market competence) and finally, architectural (destroying both the existing technology and market competence of the company). The resulting ‘transilience map’ proved to be an interesting tool to map and to assess a company’s S&T portfolio. The central units of analysis in this assessment became the types of product–related S&T projects a company was undertaking in its R&D departments.

The ‘transilience map’, which was first published by Abernathy and Clark in 1985, was characteristic of the onset of a wide array of research efforts aimed at understanding and developing methods and tools for assessing and managing the multiple S&T projects going on within a company. As project management techniques no longer sufficed, multi-project management techniques were developed. The S&T portfolio became both the method and the tool to handle the complexity of this multi-project environment (e.g., Roussel et al., 1991; Wheelwright and Clark, 1992; Floyd, 1997; Meyer and Lehnerd, 1997; and Cooper et al., 1997a&b). Typical S&T portfolio management at the company level includes assessing and mapping the following dimensions of the portfolio:

- The degree of technological maturity of the various S&T projects in the portfolio (typically according to such notions as ‘embryonic’, ‘growing’, and ‘mature’, as described in Foster (1986) or Roussel et al. (1991)).