PATENTS IN INTERNATIONAL COMPETITION C 5

Overview

A patent is a right of exclusion. For a specified period it gives the holder the right to prevent others from using the patented invention. Patents are national rights – they apply within a limited jurisdiction.

In order to obtain a patent, the invention must be described in a patent application. The invention must meet three conditions. It must be novel, it must have a certain quality (inventive step), and it must have a commercial use. As a rule, an examination is carried out by the relevant patent office to ensure that the application meets these criteria. The German Patent and Trade Mark Office (DPMA) and the European Patent Office (EPO) can award patents for Germany.

In addition to details of the invention, patents also include additional information about the inventor and applicant, a classification of the patent in terms of time and place, and also a technical classification. With such data, patents can become an important source of information for the evaluation of the technological performance of a country, a region or a company.

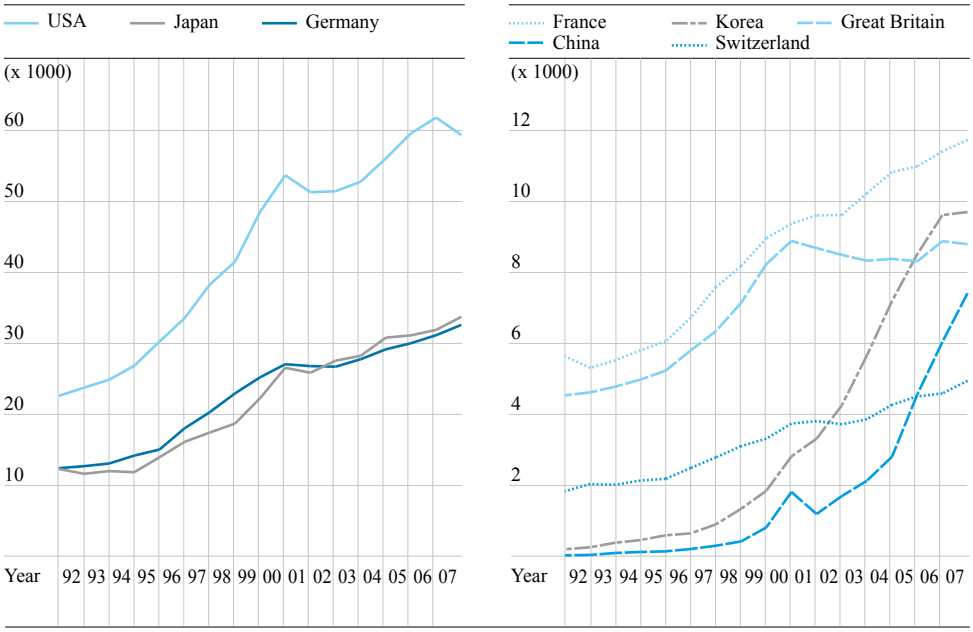
There are a series of factors, which can limit the use of patent data for R&I analyses. Firstly, not all inventions are protected by patents. Patenting involves making an invention public. But in many cases the inventor or company will decide to keep the invention secret rather than applying for a patent. Also, patent law excludes certain areas from patenting, e.g. scientific theories or mathematical methods.

The Commission of Experts for Research and Innovation mainly considers “transnational patent applications” in its analyses. These are patent applications made to the European Patent Office for European countries or which are made under the Patent Cooperation Treaty for non-European countries. A transnational patent application is made when the invention is to be implemented in various national markets. For patent statistics and the associated indicators, the use of this data offers two advantages. Firstly, the transnational patent applications are very relevant. Secondly, it is possible to make better comparison between economies on the basis of the data of the international offices (EPO and WIPO) than using national patent data.

Investigated indicators:

– Transnational patent applications in selected countries
– Number, intensity and growth of transnational patent applications
– Patent specialisation in the field of high technology
– Patent specialisation in cutting-edge technology

C 5 – 1 VARIATION OVER TIME OF NUMBERS OF TRANSNATIONAL PATENT APPLICATIONS IN SELECTED COUNTRIES



Source: Questel (EPPATENT, WOPATENT). Calculations by Fraunhofer ISI, October 2009.

The transnational patent applications cover patent families with at least one application with the WIPO[183] through the PCT[184] procedure or an application with the European Patent Office.

Increasing internationalisation of technological activities

The United States, Japan and Germany are worldwide leaders for transnational patent applications. In 1991, German and Japanese inventors applied for about the same numbers of patents. The Asia crisis in the 1990s led to a slight German advantage, but this has been lost again in the new century.

There was a noticeable decline in patent applications from the USA in 2007. The tense economic situation in 2008 had a negative effect on the decision of American inventors to also submit their patent applications with the priority year 2007 internationally. In retrospect this is a sign of the current economic crisis.

There are considerably fewer patent applications from other countries. However, since 2002 there has been an upward trend in France, Korea and China. In particular, the Chinese and Korean patent applications have shown very dynamic development. In the case of China, for example, patent applications more than tripled over a five year period. In Korea there was an increase of about 70 percent, but in France only of some 15 percent.

ABSOLUTE NUMBERS, INTENSITIES AND GROWTH RATES OF TRANSNATIONAL PATENT APPLICATIONS IN HIGH TECHNOLOGY[185] FOR 2007

C 5 – 2

	Absolute	Growth %	Intensity	Total growth[186] in %
Total	**141 500**	**191**	–	**186**
EU-27	50 086	167	280	161
USA	41 401	151	328	155
Japan	25 786	202	531	193
Germany	21 168	167	673	160
France	7 957	170	392	154
Korea	6 598	1 028	305	1 057
Great Britain	5 680	137	254	138
China	5 679	2 502	9	2 341
Italy	3 431	174	174	178
Switzerland	3 261	203	934	177
Canada	3 223	220	264	212
Netherlands	3 174	170	459	172
Sweden	3 000	158	832	147
Finland	1 502	152	712	152

Index: 1997 = 100.
Source: Questel (EPPATENT, WOPATENT). Calculations by Fraunhofer ISI, October 2009.

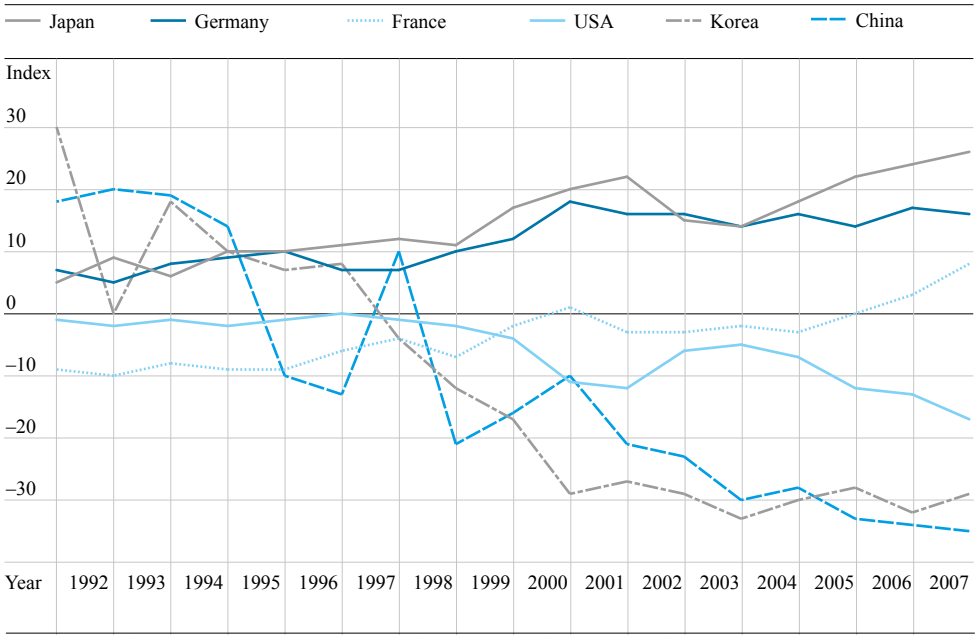
The high technology sector includes manufacturing branches which invest between 2.5 and 7 percent of revenue in research and development.

Increased involvement of the investigated countries in high technology

The USA dominates with regard to the absolute numbers of transnational patent applications in high technology, followed by Japan and Germany, with France, Great Britain, Korea and China some way behind. The number of patent applications per million employees (intensity) is an indicator of the relative innovation potential of an economy. Switzerland is in first place with an intensity value of 934, followed by Sweden and Finland. Germany lags some way behind them, but is ahead of Japan, the United States, France and the Netherlands.

The rapid development of China and South Korea is highlighted by the growth rates in high technology patents in the period 1997–2007. Of course, both countries started from a relatively low level. Chinese inventors applied for 262 high technology patents in 1997, and the South Koreans for 756 patents. These only represent a fraction of the 12 661 transnational patent applications from Germany. Nevertheless the figures do signal an expansion of the activities of Asian companies on international high technology markets. A comparison shows that the growth rates for high technology transnational patent applications are somewhat higher than the overall growth rates. Many companies register high technology patents in order to secure strategically important fields of innovation.

C 5 – 3 HIGH-VALUE TECHNOLOGY[187] SPECIALISATION INDICES FOR SELECTED COUNTRIES



Source: Questel (EPPATENT, WOPATENT). Calculations by Fraunhofer ISI, October 2009.

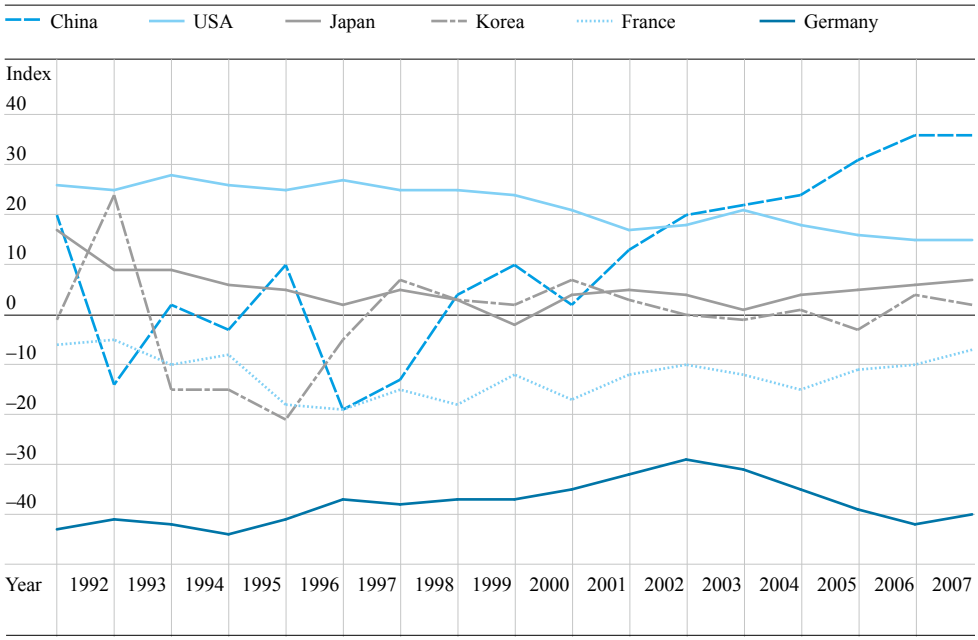
The specialisation index[188] is calculated with reference to all worldwide transnational patent applications. Positive values indicate activity in a field, which is above the global average, and negative values indicate activity which is below average.

The focus in Germany is still on high-value technologies

Japan und Germany enjoy a relative advantage in high-value technologies. Traditional German strengths such as motor vehicle construction, mechanical engineering and chemistry are reflected in above-average specialisation in this technology sector. However, the German specialisation values have remained more or less unchanged since the year 2000, whereas Japan has steadily increased its specialisation. This indicates that Japan will be focusing even more on high-value technologies in the near future. In contrast, the USA shows a definite under-specialisation in this sector. This means that Germany and the USA have complementary patent profiles. In technology sectors such as rail vehicles, motor vehicles, engines and components, or machine tools, which form an important part of the German technology portfolio, the USA is unable to establish such a clear profile. There is a clear downward trend in the specialisation profile for high-value technology in China und Korea, and both countries are definitely under-specialised here. In China there are indications of a clear shift in the patent structure towards cutting-edge technology and a decreasing focus on the field of high-value technology. However, despite the decline in specialisation in high-value technologies in Korea, the following section shows that there is only an average specialisation in cutting-edge technology.

CUTTING-EDGE TECHNOLOGY[189] SPECIALISATION INDICES FOR SELECTED COUNTRIES

C 5 – 4



Source: Questel (EPPATENT, WOPATENT). Calculations by Fraunhofer ISI, October 2009.

The specialisation index[190] is calculated with reference to all worldwide transnational patent applications. Positive values indicate activity in a field which is above the global average, and negative values indicate activity which is below average.

Under-specialisation in cutting-edge technologies remains a characteristic of the German technology profile

In comparison, patent applications for both the USA and China show above-average orientation towards cutting-edge technologies. The development is particularly dynamic for China. Since the year 2000, cutting-edge technology has become increasingly important. Japan and Korea show only average activity in this technology field, although the Japanese technology profile shows a slight upward trend in specialisation since 2003.

German companies continue to compete successfully above all in high-value technology, and in comparison with the other countries selected for this comparison, Germany shows the least focus on cutting-edge technology. The IT crisis in 2000–2001 affected in particular young German companies which were active in this market segment – they were faced with considerable financial problems as a result of the lack of venture capital. This had a negative effect on the number of patent applications.[191] However, the effect of the crisis on the German economy as a whole was less noticeable given the low level of specialisation in cutting-edge technology. The lack of a structural change towards more cutting-edge technology has contributed to the failure to achieve the three-percent target of the Lisbon Strategy.[192]