

PATENT STATISTICS ON THE WORLD TEXTILE INDUSTRY AND A LOOK AT GERMANY'S POSITION

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Abstract:

Some studies suggest that the number of patent applications can be used as an indicator to quantify the potential for innovation of industry sectors such as the textile industry. This paper shows the distribution of worldwide economic power and patent applications between 1978 and 2004 in the textile and textile machinery industry based on the example of Germany. The number of patent applications from the textile sector is compared to that of other industries. Subsequently, the patent statistics are broken down into individual enterprises with outstanding numbers of applications, as well as to individual countries and branches within the textile industry.

Keywords:

patent statistics, textile industry, textile machinery industry, textile economy

Introduction

Based on the assumption of the Harvard Business Manager magazine [1] that patents are an indicator of the technological performance of a country or an industry, one might ask what patent statistics can tell about the innovative performance of the textile industry, which in many eyes is perceived of as an "old industry" in constant decline.

Innovations are especially useful for their creator if he or she alone can use them as long as possible. This position can be achieved by strictly safeguarding these innovations, but it is often more effective and secure to gain patent protection for them. This protection is needed – in a geographical sense – where the production takes place and in the key markets, but also where direct competitors are active. Germany was chosen as an example for this study because it is one of the most important countries for exporting textiles and textile machinery, and also because it is one of the most important markets for textiles worldwide. Therefore, it is in the interest of textile and textile machinery producing companies to protect their intellectual property in Germany. To underline these facts, economic figures for the world textile economy are related to patent statistics for Germany.

Patent statistics

This study is based on patent application figures searched at the Patentinformationszentrum (patent information centre) Dresden, in 2007. All patents and patent applications are classified by the publishing patent offices according to an international standard, the International Patent Classification (IPC). This is a comprehensive catalogue of all technical knowledge documented in patents and allows for systematic search for specific or more general technical solutions. For this study, five representative classes have been selected, covering the most important sectors of the textile industry (see Table 1). The selection of five classes out of seven which

are related to textiles was necessary in order to limit the extent of this research to the technically and economically justifiable patent classes. It has to be taken into account that patent applications can be filed parallel in several classes if they comprise technological features for which more than one class exists. That means the figures for patent applications of several classes will count some of these applications more than once.

Table 1. Selected IPC classes for this study

Classes	Content (based on IPC)	Short description
D 01	natural or artificial threads or fibres; spinning	fibres & threads
D 03	weaving	weaving
D 04 B	knitting	knitting
D 04 H	making textile fabrics, e. g. from fibres or filamentary material (nonwovens, multi-ply)	nonwoven fabrics
D 06	treatment of textiles or the like; laundering; flexible materials not otherwise provided for (only subclasses B, C, F, J, L, M, P, Q)	finishing

The statistical analysis encompasses the years from 1978 to 2004. More recent numbers of patent applications were not available at the time this study was conducted. This is due to the fact that the patent offices examined in this study – the German Patent and Trademark Office (DPMA), the European Patent Office (EPO), and the World Intellectual Property Organization (WIPO) – have established an 18 month time span between the filing and publishing of patent applications.

To file a patent application valid in Germany, each applicant has basically three different ways to go: the direct national

way to the DPMA, the European way through the EPO, or the international way according to the Patent Cooperation Treaty (PCT) through the WIPO. Applications through the EPO or according to PCT are increasingly popular with applicants (see Figure 1). Because of this, patent applications in Germany undertaken in these ways were also taken into consideration in this study.

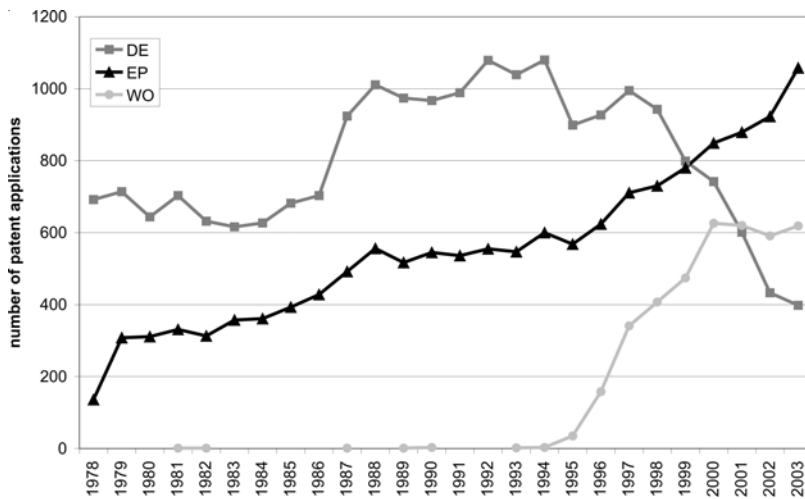


Figure 1. Patent applications in Germany in the finishing sector (IPC-class D 06) by way of application (DE = DPMA directly, EP = through EPO, WO = through WIPO)

The priority year was selected as indicator for the date of the invention. According to the Paris Convention, which is valid in most countries, every applicant has the right to file his application in all countries of the Convention within twelve months after the original invention was filed. It will then be treated as if it had been filed the same day as the original application. This is very important for the examination of the invention with regard to novelty and inventive step compared to other applications, filed after the first (the priority) document but before the following second application of the original inventor. That means the priority year of the application indicates the year in which the invention was first filed.

3. Economic background

Recent years have witnessed a constant decline of companies and employees in the German textile and apparel

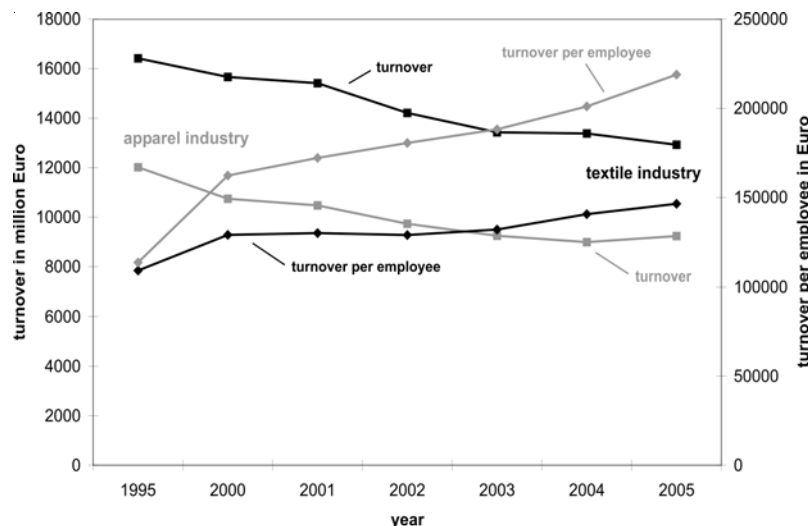


Figure 2. Turnover in the German textile and apparel industry [2]

sector. While more than 256,000 people were employed in 2,372 companies in 1995, these numbers dropped to 139,000 employees and only 1,288 companies in 2004 [2]. This trend is continuing. But on the other hand there are still more than 2.8 million people employed in the textile industry of the European Union, which underlines the importance of this sector for the European economy [2]. Amid this decline, the

performance of the remaining companies is increasing, signified by the turnover of these companies. Although the absolute turnover of the textile sector declined between 1995 and 2005 from 28.4 billion to 22.2 billion Euros [2], the turnover per employee increased, as shown in Figure 2. Compared to these numbers the German textile machinery industry is small, employing 25,500 people and exporting goods worth 3.4 billion in 2005 [3].

Hampered by the obvious disadvantage of high labour costs, German textile manufacturers are increasingly producing high value technical textiles to differentiate themselves from their more cost-effective competitors. The share of technical textiles produced in Germany has risen from 8 % in 1988 to 35 % in 2006 [4]. Taking into account this concentration on knowledge-intensive products, one may assume as a corollary that there is a strong need to protect

this knowledge. Whether this trend is reflected in patent application figures is investigated in this study.

Taking into account its labour cost advantage, sheer size, and other factors it is not surprising that China is by far the world's leading textile exporting country. By adding Hong Kong the gap between China and its closest competitors, Italy and Germany, widens even more [2]. Next on the list of the largest exporters of textiles in the world are Turkey, the United States, France, South Korea, India, and Belgium. The countries with the largest import volume of textiles are the United States, followed by Germany, China (with Hong Kong), and Japan as well as several European countries (United Kingdom, France, Italy, Spain, Belgium) [2].

Since the inventions protected by patents comprise textile products as well as textile machinery, those countries that are focused on producing textile machinery also have to be taken into account. The largest number of textile machines is exported from Germany, followed by Japan, Italy, and Switzerland. China ranks sixth, behind the United States and in front of France and South Korea [3]. All the countries leading either in exporting and importing textile products, or in exporting textile machines, are examined in the following sections with regard to the number of patent applications originating therefrom.

4. Patent statistics for the textile industry

Context

To better evaluate the number of patent applications in the textile sector it is necessary to

take a glance at the wider context. In 2005, a total of 60,222 patent applications were filed with the DPMA (either directly or through the PCT way), as well as 20,418 utility patents [5]. A utility patent in Germany is an intellectual property right comparable to a patent. The main differences result from the shorter term of possible protection - ten years instead of twenty – and from the fact that methods cannot be protected, and that no examination is conducted by the patent office. The advantages arise from lower costs and faster procedures, so that protection may be gained within a few months.

For comparison, the European Patent Office received 193,623 patent applications in the same year [6]. Table 2 shows the numbers of patent applications from countries examined in this study. Not all figures were available for the German Patent and Trademark Office.

Naturally, by far the most patent applications in Germany were filed by German applicants, followed by applicants from Japan

Table 2. Patent applications with EPO and DPMA in 2005 by country of origin

Country	Number of applications (EPO)	Number of applications (DPMA)
Belgium	1,658	
China	538	
France	8,034	312
Germany	23,789	48,367
Hong Kong	40	
India	392	
Italy	4,199	85
Japan	21,461	3,449
South Korea	3,853	
Spain	972	
Switzerland	5,027	943
Turkey	68	
United Kingdom	4,649	120
United States	32,738	3,245

and the United States. American, German and Japanese applicants also file the most applications with the European Patent Office. The numbers suggest that international applicants prefer the European way to the national way through the German Patent and Trademark Office, whereas the number of application by German residents in Germany is still larger than their number of European applications. Among the textile related countries the applicants next following in terms of numbers come from Europe and South Korea. China, India and Turkey lag behind.

Although the worldwide number of applications, especially from China and India, has been soaring in recent years, the total numbers are still on a very low level [7]. The picture in China itself on the other hand is totally different. The activities of Chinese inventors are enormous. In 2006, more than 371,000 patents and utility patents were filed with the Chinese patent office (SIPO), from which 76 % came from Chinese applicants. This is the largest number for any country worldwide [8]. It can be concluded that besides the off-heard

complaints about infringements of European or US patents, there is also a growing demand for patent protection by Chinese companies. The discrepancy between the number of domestic and foreign applications may then be attributed to the fact that those inventions either do not need protection or are not eligible for protection in Europe. In either case it can be assumed that most imported goods lack innovative potential.

The case is a different one for India and Turkey. In 2005, a total of 17,446 patent applications were filed in India, among which only 3,630 were from Indians [9]. In Turkey, which has roughly the same population as Germany, only 5,165 applications were filed and only 1,090 were from Turkish residents [10]. Those numbers, which are comparatively small for the size and economic power of these countries, indicate the small importance, at least for now, place on the patent system in both India and Turkey. It is worth noting that changes may be on the way in India, where the number of patent applications has grown by 64 % since 2001.

Among all European patent applications, those which are related to textiles amount only to a very small proportion (Table 3). Medical science, electric communication and computing are the domains of by far the most patent applications. This can be further emphasized by the fact that the 2,701 applications in 2005 filed by the most active company alone at the EPO, the Koninklijke Philips Electronics N.V., exceeded the total amount of textile related filings. Of the 1,368 textile related applications in 2005 were 796 from Europe, 173 from Japan and 223 from the United States [6].

Table 3. Technical fields with the most filings and textile related filings with the EPO

IPC-Classes	Number of applications	In percent of total
A 61 medical or veterinary science; hygiene	14,688	11.4
H 04 electric communication technique	12,843	10.0
G 06 computing	8,664	6.7
D 01 – D 07 textiles	1,368	1.06

Textile related patent statistics

The number of patent applications in the sectors of textile technology chosen for this study has been growing since 1978, reaching its peak in 2000. Since then a decline has set in, more or less visible in all sectors (Figure 3). Since most of these applications originate from Germany, this reflects the declining strength of the textile industry as well as the economic stagnation in the Germany textile machinery industry [2,3]. Furthermore, especially small and medium companies are increasingly following different paths to protect their intellectual property. By far the most patent applications are related to textile finishing, followed by fibres and threads. The knitting, weaving and nonwoven fabrics sectors see fewer applications.

The distribution of the applicants' origins reflects the general trend of all industry sectors. Most of the filings between 1978 and 2004 came from Germany, the United States and Japan

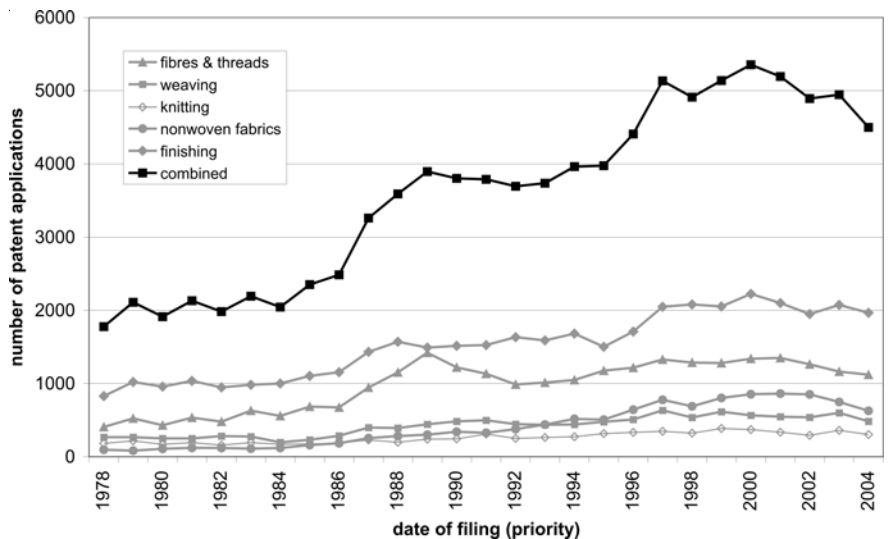


Figure 3. Number of patent applications in Germany (domestic, EPO, PCT) for the textile sector

(Figure 4a). Switzerland also ranks in this group. Figures 4b and 4c show the other countries relevant for the textile industry

of the technical fields within the textile sector in the examined countries. In almost all countries the most activities are related to finishing as well as fibres and threads, but there are regional differences. The inventions related to weaving are especially numerous in Belgium, while in Italy knitting and weaving are well represented. Germany is leading in all fields except nonwoven fabrics, where most applications are from the United States. These findings are, of course, directly related to the distribution of companies from the respective fields in these countries.

Figures 5a to 5e show the ten most active applicants in each of the different textile fields between 1978 and 2004. For better legibility the y-axis has been resized in every Figure. Two major aspects can be derived from these figures. Firstly, the ten most

active applicants in every field concentrate upon themselves a large proportion of all applications in their field. Between 34

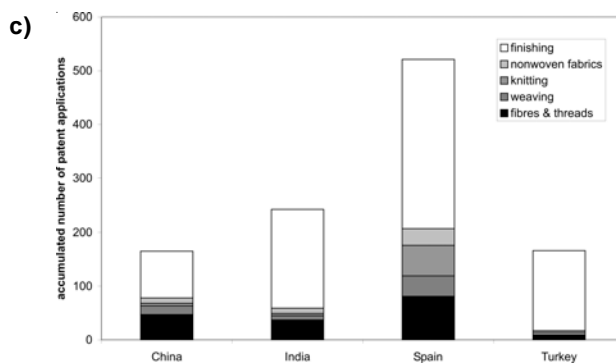
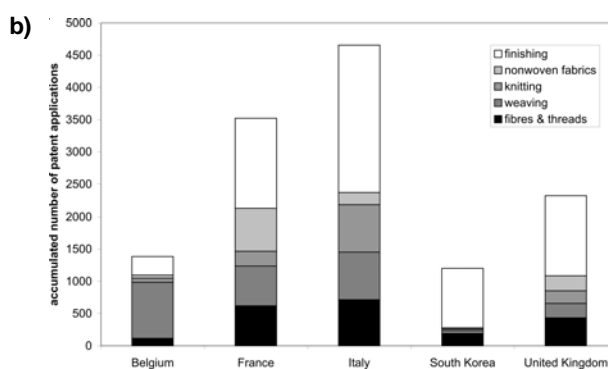
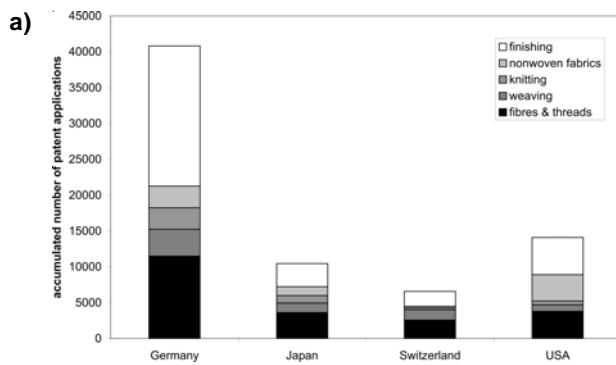


Figure 4. Number of patent applications (domestic, EPO, PCT) in Germany by country of applicant, total for 1978 to 2004

(please note that the y-axis has been adjusted in Figures 4a, 4b and 4c for better legibility). The other European countries (with Spain lagging behind) and South Korea are located in the middle, while China, India and Turkey are far behind. The combined market volume of these countries does not so far lead to a measurable output of intellectual property protected in Europe.

% and 41 % of all applications belong to this group. Secondly, besides large companies producing consumer goods and chemicals, especially textile machinery producers are represented in this set.

The United States, Japan and Germany on the other hand sustain their general leading position in technical innovations in the textile sector as well. Further information can be derived from Figures 4a, 4b and 4c concerning the different distribution

In the field of fibres and textiles (IPC-class D 01, Figure 5a) the ten most active players combine for more than 41 % of all applications. Besides international chemicals related companies such as DuPont and BASF, this sector is dominated by Swiss and German machinery producers. This dominance is even more pronounced in the weaving (IPC-class D 03, Figure 5b) and knitting (IPC-class D 04 B, Figure

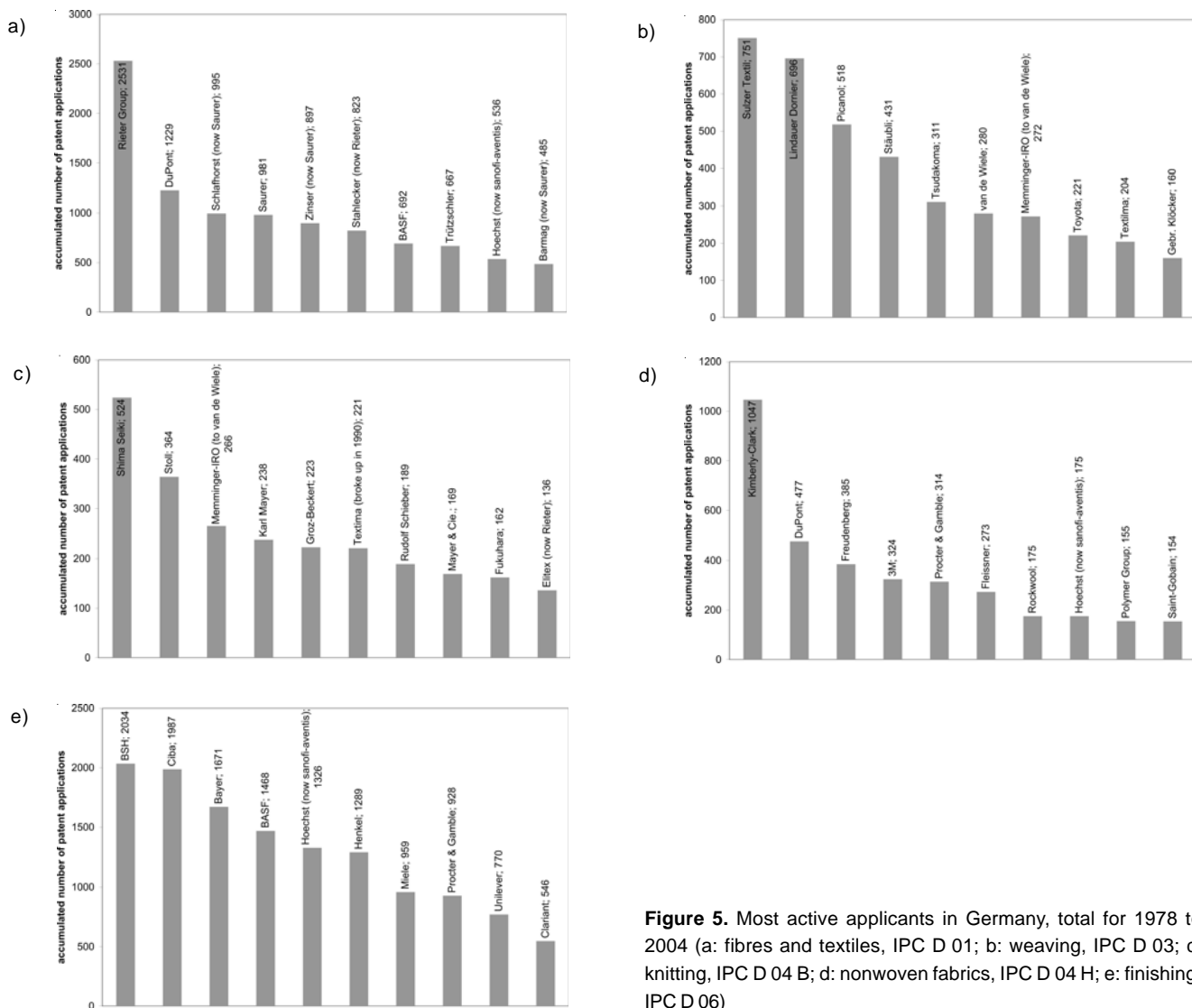


Figure 5. Most active applicants in Germany, total for 1978 to 2004 (a: fibres and textiles, IPC D 01; b: weaving, IPC D 03; c: knitting, IPC D 04 B; d: nonwoven fabrics, IPC D 04 H; e: finishing, IPC D 06)

5c) sectors. All leading applicants are machinery producers from Europe and Japan, which filed more than one third of all applications in these fields. An interesting detail in the knitting sector (Figure 5c) can be found in the fact that two companies which are still ranked among the most active went out of business more than 17 years ago. East-German Textima Group was a conglomerate of textile machinery producers and was broken up in 1990. Czech Elitex was a similar enterprise, which has been partly bought by Rieter Group.

Producers of consumer goods are leading in the fields of nonwoven fabrics (IPC-class D 04 H, Figure 5d) and finishing (IPC-class D 06, Figure 5e). As could be expected, chemical companies and producers of household appliances are also strong in the finishing sector.

Conclusions

Although the overall number of patent applications in the textile sector is small compared to other technical fields, lively activities are registered in this area too. They are, however, concentrated on a small group of very active players and a small number of countries, among them Germany, the United States, Japan, Switzerland, and Italy. Most of the inventions in the textile industry that are protected by patents come from large companies producing chemicals or consumer goods,

or from larger textile machinery manufacturers. The patent activities of the mostly small to medium sized textile companies are comparatively marginal. This is in compliance with perceptions from other industry sectors, according to which larger companies with more than 500 employees especially contribute a higher-than-average proportion of patent applications [11]. However, most textile companies in Germany (exactly 91.7 %) have less than 200 employees [2]. The growing focus on sophisticated technical textiles is not accompanied by an corollary growth in patent applications. It can be concluded then that the know-how related to these innovative textiles is either not eligible for patent protection or companies are following different paths to protect their intellectual property. Therefore, the number of patent applications alone cannot be used as a particularly reliable indicator of the innovative strength of the textile industry. The comparison with economic statistics shows that the market strength of companies from China, India and Turkey is not yet reflected in their patent applications in Europe.

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