

Use of Patent Information: Empirical Evidence from Innovative SMEs

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Abstract

This paper discusses the use of patent information by innovative SMEs. The standard literature tends to focus on obtaining patents; studies of using patent information for different purposes are underrepresented in the innovation literature. Studying the case of SMEs is especially interesting, because they often do not have in-house specialists dealing with patent issues. Our research reveals that the most important reasons why SMEs do not use patent information are: (i) costs; (ii) unclear procedures. These constraints may be tackled by improving the communication on the usefulness of patent information, improving access to patent information, and integrating more lessons on using patent and patent information in education. Given that using patent information is useful for SMEs, its use should be promoted. The key players in this respect are NIPO (the Dutch organization responsible for patents and patent information), trade associations, and educational institutions.

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Introduction

Using patent information may be very important in the competitive process. It can yield inspiration for innovations, and it may inform the user about the state of the art concerning specific products and processes. Furthermore, it can reveal the progress of competitors and other market players.

This paper presents the opinion of a well-selected group of innovative small and medium-sized enterprises (SMEs; especially medium-sized ones) on the use of patent information. It starts in Section 1 with a theoretical discussion of innovation. Section 2 then considers the role of patents in the innovation process, and Section 3 the use of patent information. Section 4 discusses the influence of firm scale on the use of patents and patent information. The two main research questions are identified in Section 5, and the process of data collection in Section 6. The results of our field work are presented in Sections 7, 8 and 9: the division of the sample into users and non-users in Section 7; the characteristics of users and non-users in Section 8; and the reasons for the use and non-use in Section 9. The paper ends in Section 10 with conclusions and recommendations on the use of patent information by SMEs.

1. Innovation

Patenting and the use of patent information become relevant issues where innovations are involved, i.e. an innovation with unique product or process aspects. Much has been written on innovation. Readers interested in the general subject of innovation are referred to, among others, Garcia and Calantone (2002), DeCanio et al (2000), Song and Parry (1997), Atuahene-Gima (1996), Montoya-Weiss and Calantone (1994), Edgett et al (1992), Zirger and Maidique (1990), Wissema and Euser (1991), Cooper (1990), and Drucker (1985). Needless to say, modern innovation theory began with Schumpeter (1934) and his process of creative destruction.

Pavitt (1982) sketches the process of innovation as follows: novelty/invention -> development -> testing and engineering -> full-scale innovation. Nooteboom (1993) sketches the stages of innovation in a comparative way: invention -> development -> tooling / production -> introduction to practice / market -> diffusion. Both models go back to Schumpeter (1934). The latter stage, diffusion, can be defined as a process of dissemination in a social system, part of which is adoption

by new users. Rogers (1983) identified the following stages of adoption: knowledge -> conviction -> decision -> implementation -> confirmation.

Patents can, therefore, be viewed as one of the means by which entrepreneurs protect their innovations, trying to augment the monopoly profits from innovation by making it more difficult for potential competitors to copy or imitate. Patenting starts with innovation, but defining innovation is often a complex task (see also Drew (1995), and Morgan et al, 1995). In general, it can be stated that innovation leads to improved productivity of the organization involved.

The human aspect in the innovation process is extremely important. Therefore, 2 specific aspects are stressed here: (i) creativity; (ii) enterprise culture. According to Florida (2002), creativity plays an important role in social-economic development. Creative people (scientists, technicians, teachers, artists) develop new ideas and new technologies, and solve complex problems. Therefore, they need an independent judgment, on the basis of knowledge and experience. In this approach, the three most important factors of economic progress are: (i) technology; (ii) talent; (iii) tolerance. The latter concerns how to deal with creative people (soft control).

Furthermore, culture within the firm has its influence on innovation performance (Gudmundson et al, 2003). Employees should be granted some degree of freedom, in order to develop innovative ideas. Support from the top and empowering employees to make decisions are both important factors in this context. More practical examples are: shifting underutilized resources to individuals and teams for use in exploring ideas; having weekly sessions to discuss ideas; giving time and encouragement to employees to read appropriate periodicals and surf the Internet; training individuals and teams in creativity and in brainstorming techniques and activities; and developing reward and recognition systems for generating ideas that are ultimately put into practice.

2. The role of patents in the innovation process

For a patent to be granted, the invention must be non-trivial (i.e. not obvious to relevant professionals), and useful (i.e. having commercial value). See Jaffe et al (1998). If a patent is granted, a public document is created, containing information about the invention, the inventor, the organization to which the patent property right is assigned, and the technological antecedents of the invention. The references or

citations that appear in the patent identify earlier inventions whose claims are so close to those of the citing patent that the patent examiner deems it necessary to identify them (technological antecedents). Also, subsequent patents can be identified that later make citations to a given patent (technological descendants).

On the one hand, the issue of monopoly is important, because a patent gives the inventor exclusive rights for a limited period within the geographical boundaries specified. These rights are issued by the state or by the patent-issuing authority that is authorized by the state to do so. The purpose of issuing these rights is to generate innovative activity and ensure that inventors can enjoy the commercial benefits of their inventions. See Schmoch (1990), Jaffe et al (1998) Deakins (1999) Hisrich and Peeters (1998) and Hall et al (1999). Drucker (1985) does not see patents themselves as being anti-competitive. For this reason, he is against raising patent fees, as innovations should be appreciated and rewarded.

On the other hand, patents make it possible to inform the public about the contents of an invention in order to encourage other companies to undertake further development. In the early days of patent history, there was no obligation to publish the specification. It was only much later that this requirement became normal practice. Today, patents are an important source of scientific, technical and business information for people other than the actual inventor. See Schmoch (1999), Hisrich and Peeters (1998) and Hall et al (1999). So, using (studying) patent information may be an important source for future competition, and for short-term inspiration.

The period attached to the protection is crucial. According to Pavitt (1982), patenting activity may extend over the whole of the product lifecycle: from the protection of the basic invention to the activities related to product and process engineering, and then on to a myriad of improvement and blocking patents. Today, however, one could make a strong case for reducing the time period of patents, since technological progress is so much more rapid and product life cycles are much shorter (Deakins, 1999).

There are, moreover, institutional and more abstract alternatives for patents. Examples include intellectual property rights, such as copyrights (whereby the author of a work is the person who creates it), and trademarks (whereby a firm which attaches its trademark to its products or services gains goodwill or reputation). See Deakins (1999). Other methods of discouraging imitation involve: secrecy; further

technological advance based on firm-specific R&D and skills; influence over suppliers or marketing outlets; and manipulation of standards (Pavitt, 1982).

3. Use of patent information

Intellectual property has become increasingly important in competition. A company's book value is determined not just by its management of physical and financial assets (Grindley and Teece, 1997), but also by its intellectual property rights (IPR), including patents (Rabino and Enayati, 1995).

IPR can be used in different ways:

- Defensively (done in attempts to stymie both domestic and foreign competitors by creating barriers to entry), or offensively (when encountering barriers to entry in world markets). See Rabino and Enayati (1995).
- In cross-licensing, where two or more firms license their IPR to each other. There are two main models for cross-licensing agreements. One is the *capture model*, in which the licensee has the rights to use all patents within a certain field during the license period and retains survivorship rights to use the patents until they expire. The other is the *fixed model*, which accords licensees similar rights to use patents during the license period, but does not grant them survivorship rights once the license period has expired. Thus, obtaining the cross-license for subsequent periods would require full renegotiation. See Grindley and Teece (1997).
- For analysis and planning. Moge (2000) concludes that the statistical analysis of international patent records is a valuable tool for technology analysis and planning. Applications are rival analysis, technology tracking and forecasting.

But, according to Nonaka et al (2000), there is still little understanding of how organizations create and manage knowledge. Teece (2000) mentions the crucial role of patents in protecting IPR (among other important issues).

4. Scale issues

In the same way that patent statistics underestimate innovative activities in large firms, so do R&D statistics in small firms and service sector firms. This is attributable to the different degree of specialization and formalization of innovative activities involving R&D departments and sector effects. See Pavitt (1982) and Jacobsson et al (1996).

SMEs that use patent information tend to focus more on protecting patents than on searching for information. Their use of patent databases is often for legal purposes. As compared with larger companies, SMEs clearly have problems with the use patent information. This applies especially to their searches for technical information. See Hall et al (1999), and Arundel and Steinmuller (1998).

There appears to be a tendency to see this non-use as being inherent to SMEs, and not as resulting from a failure in the patent system to function as an effective source of information. Nonetheless, the evidence indicates that the current patent system is of little help to SMEs. There are several reasons for this non-use, including such obstacles as scarcity of resources, irrelevance, poor access, and a lack of awareness. Non-use presents potential dangers, such as wasted investments and litigation arising from the infringement of competitor patents. See Hall et al (1999 and 2000).

Andrick (1998) stated that, unlike big companies, SMEs generally have no information offices of their own, but in principle have the same need for information. Patent information centers, information distribution offices, technology transfer offices, etc. offer a wide range of scientific and technical information primarily for SMEs. Patent information centers - with extensive specialist libraries as well as up-to-date facilities for accessing not only these but also external archives and international database services - play an important role in providing SMEs with practical regional support for innovation and economic development.

Normally, however, patent documents are fairly detailed and application-oriented, often covering specialized products and processes, and in this respect, they are adapted to the needs of SMEs. Nevertheless, patent information should also be made available through other channels: namely, those more suited to the needs of SMEs. This can be done by using other means of communication, offering training support and offering simpler and more efficient methods of searching patent databases. See Hall et al (2000), Arundel and Steinmuller (1998), Schmoch (1990), Koch (1991), and Andrick (1998).

5. Research questions

Using patent information may be very important in the competitive process. It can yield inspiration for innovations, and it may inform the user on the state of the art

concerning specific products and processes. Furthermore, it can reveal the progress of competitors and other market players. Studying the case of SMEs is especially interesting because they often do not have in-house specialists dealing with patent issues. Therefore, we identified two research questions:

- (1) To what extent do SMEs make use of patent information?
- (2) What are the main reasons why SMEs do *not* use patent information?

For information on the Dutch context of patents and patent information, we refer to www.bie.nl, the website of the Netherlands Industrial Property Office (NIPO). This organization is responsible for granting patents in the Netherlands and for disseminating the technical knowledge stored in the literature on patents. See also Masurel (2002).

The important role of the patent attorney should be stressed here: this agent is an independent, legally-qualified specialist in the fields of patents, trademarks and designs. He/she gives advise on the effective protection of knowledge, products and ideas, acts as a representative for a principal, and takes care of all procedures for obtaining and maintaining the desired protection. In the Netherlands, they are members of the trade-association NOvO (see www.octrooigemachtigde.nl).

6. Data Collection

In 2002 we interviewed 15 directors of what were considered to be innovative firms. These directors were randomly selected from a database of Syntens, the main Dutch organization in the field of innovation support for SMEs. This database contained a large number of innovative SMEs in Amsterdam and its environs. Other respondents were selected in collaboration with KVGGO, the Dutch trade association in the printing industry.

After making a first selection of 188 firms, 98 firms were then asked to participate in the project. Of these, 15 eventually took part. These firms covered a heterogeneous area of industrial activity: machinery (3); printing (3); fibers (2); chemicals (2); construction (1); ICT (1); electronics (1); other (2). Although the selection process was done carefully, and although we are convinced that these firms provide a pretty good picture of the attitude of SMEs towards using patent information, the representativeness of the project is questionable, especially given the small number of cases in our sample. Reasons for not collaborating in the project were (among others):

(i) lack of time; (ii) lack of interest because the would-be respondents had nothing to do with patents or patent information.

First, we asked our respondents to fill in a questionnaire, after which an in-depth interview took place. So the research contains both a quantitative and qualitative approach. Given the small number of respondents, the emphasis here is on the qualitative part (it is more a series of case studies). Five subjects were covered: personal characteristics of the interviewee; firm characteristics; R&D; patents; and patent information.

All respondents were male (although we also tried to involve females). 13 of the respondents were aged 40 years or older. Two-thirds had completed university or polytechnic, so we are dealing with a relatively highly-educated group of people.

7. Segmentation

The focal question on the use of patent information concerned how many times the respondents had used this source of information in the last 12 months: 7 of them had not used such information at all, 1 did so on a weekly basis, 5 once per quarter, and 2 of them once a year. So the 'yes group' (users of patent information) consists of 8 firms whereas the 'no group' (non-users) consists of 7 firms.

Note that the percentages of users and non-users are not necessarily representative for firms in general, as quite a number of would-be respondents refused to collaborate because they had nothing to do with patents or patent information. So in fact, considerably, more than half of the innovative Dutch SMEs can be seen as non-users of patent information. This is confirmed by the size effect (see below), as there are more smaller than larger SMEs (due to the pyramid-like sector structure of SMEs)

8. Characteristics of users versus non-users

The average age in our sample was 46.4, with hardly any difference between the users and the non-users (46.8 versus 46.0). As mentioned above, all were males. The users are more highly-educated than the non-users: 7 of them had finished university (4) or polytechnic (3), while only 3 non-users had finished polytechnic and none had finished university. So, apparently using patent information has something to do with educational level or background.

Concerning the firm characteristics, we may state that, although each group is not found in every sector, both groups are divided among the various sectors: machinery (3 users/0 non-users), printing (0/3), fibers (1/1), chemicals (2/0), construction (0/1), ICT (1), electronics (0/1), and other (1/1). So, no clear sector pattern appears. The average number of employees (full time equivalents) of the users is 196.2, versus only 49.3 for the non-users. So there is a clear size effect.

Almost half of the firms are independent (4/8 versus 4/7), and the rest are affiliated to larger firms. Almost all are members of a trade association (but 1 respondent of each group is not), and almost all collaborate with other firms in innovation projects (7/8 and 5/7).

However, it is striking that the majority of the users do not use an external network to exchange information (5/8), whereas the majority of the non-users do (5/7). This may have to do with the size difference between the 2 groups: in other words, smaller firms have more need to collaborate than larger firms, which is a recognizable pattern for SMEs. Furthermore, it struck us that 6 of the 8 users had undertaken market research in the last three years, while only 3 of the 7 non-users had done such research. This also may have to do with size: in other words, with the ability to do so.

All say that they improved or renewed their internal production processes recently, and all have employees who are involved in their daily work in innovation endeavors. Only 1 user had not introduced new products or services to the market in the last three years, while 14 participants had done so. 12 (6 users and 6 non-users) respondents introduced innovations new to the sector, as did the same number concerning innovations new for the Netherlands.

10 firms (6/8 users and 4/7 non-users) had their own R&D department, which also reflects the size effect. 12 had their own specialists for R&D activities (7/8 users and 5/7 non-users), with an average of 8.4 and 1.6, for users and non-users respectively (this difference in averages of course also coincides with the size effect).

The average number of years the respondent had experience with patents was 15.3 years: 21.1 years for the users, and 8.7 for the non-users. So the users of patent information obviously have more experience with patents than have the non-users.

5 firms (all users) had applied for one or more patents in the last 12 months. All did so because of protection of the technological advantage, though 3 of them mentioned that they also did this for the sake of diminishing investment risks. Informing the public

about technological development, raising the interest of other firms, and using patent information as a marketing tool were not mentioned at all. 1 respondent mentioned that he deliberately did not apply for a patent, because he did not want to dominate the market and frighten his clients with a possible monopoly position. Another respondent said he did not apply for patents because of secrecy: applying would require publication of his research. Furthermore, a number of firms produced only on client specifications, which implied the impossibility of applying for a patent. Finally, 1 respondent mentioned that the life cycles of his products were too short to apply for a patent.

The average number of patents applied for was 6.9 (only users here). Only 3.1 applications (i.e. less than 50%) were successful.

9. Use and non-use

The reasons for using patent information are presented in Table 1. Bearing in mind, that we are working only with small numbers, the main reasons are the mapping of competitors' activities and researching the patent possibility for an invention. Then follow inspiration & problem solving, and keeping informed about the technical progress. Finally, in the rear comes checking of possible violation of patent rights. None of the respondents mentioned finding new licensing possibilities as a reason to use patent information. No other reasons were given.

Table 1. Reasons for Using Patent Information

Mapping competitors' activities	75.0%
Researching patent possibility	75.0%
Inspiration / problem solving	62.5%
Keeping informed about technological progress	50.0%
Checking possible violation of patent rights	37.5%
Finding new licensing possibilities	0.0%
Total	100%
N = 8	

Table 2 shows the methods used when searching for patent information. Searching on the Internet was mentioned most frequently, followed by the assistance of a patent attorney. Other information services, assistance of the mother company and assistance

of the trade association were also mentioned. Again recall that we are talking only of small numbers.

Table 2. Methods used for searching patent information

Searching on the internet	50.0%
Assistance of patent attorney	37.5%
Assistance of external information services	25.0%
Assistance of mother company	12.5%
Assistance of trade association	12.5%
Total	100%
N = 8	

Only 2 out of the 7 non-users wanted to make more use of patent information. As Table 3 shows, high costs is the most important reason for not making use of patent information (these respondents ticked rather or sure, and did not tick modest or not). Then follows the reason of unclear procedures. In the rear follow the reasons lack of time and not being familiar with patent information. Once again, note that we are dealing only with small numbers here.

Table 3. Reasons for not using patent information

High costs	71.4%
Unclear procedures	57.2%
Lack of time	42.9%
Not familiar with patent information	42.9%
Total	100%
N=7	

The most frequently mentioned ways to overcome the bottleneck were the use of the Internet and CD-ROMs, and the development of user-friendly interfaces (see Table 4). The respondents hardly mentioned the promotion of the use of patent information and paying extra attention to patent literature during technical education.

Only 2 of the 7 non-users agreed fully with the statement that they were aware of the possibilities of patent information. All of the respondents agreed to a certain extent with the statement that patent information is useful for their firm. All non-users said they acquired information from other sources than patents, such as client feedback (6/7), specialized literature (6/7), trade fairs (6/7), and discussions with suppliers (5/7).

Table 4. Ways to promote the use of patent information

Use of Internet and CD-ROMs	85.7%
Development of user-friendly interfaces	71.4%
Promotion of the use of patent information	28.6%
Extra attention to patent information during technical education	14.3%
Total	100%
N = 7	

10. Conclusions and recommendations

Using patent information may give a big boost to the competitive position of firms, as it may yield inspiration and information. SMEs have a special place in this context, as opposed to larger firms: their size disadvantage can often be overcome.

From our research it becomes clear that considerably more than half of the SMEs do not use patent information at all, inter alia because of lack of awareness. The entrepreneurs who represent firms that use patent information are more highly educated than the entrepreneurs who represent firms that do not use patent information. Firms that use patent information are much larger than firms that do not use patent information. From this, it may be derived that the non-use of patent information is (amongst other things) a scale issue. One of the proven remedies against scale issues is collaboration with other firms, an approach that may also work in this context.

The main reasons for using patent information are: mapping of competitors' activities; investigating the possibility of patenting an invention; inspiration & problem solving; and keeping informed about technical progress. Searching on the Internet was mentioned most frequently as a methodology when trying to find patent information, followed by the assistance of a patent attorney.

However, the non-users seem to be hardly disadvantaged by not making use of patent information: good substitutes are client feedback, specialized literature, trade fairs, and discussions with suppliers. On the other hand, they admit that patent information might be useful for them. Apart from the above-mentioned lack of awareness, the most important reason for non-use are that costs are too high and procedures unclear. The

most frequently mentioned way to overcome the bottleneck was the use of the Internet and CD-ROMs, and the development of user-friendly interfaces.

Given that using patent information is useful for SMEs, their use should be promoted. The key player here is NIPO, the Dutch organization which is responsible for patents and patent information. Furthermore, there is an important role for trade associations and educational institutions.

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