

Intellectual Property Rights and Innovation in SMEs in OECD Countries

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Received 4 October 2004

The increasing importance of intangible assets as a source of competitive advantage for firms, has made the intellectual property (IP) system increasingly attractive and, in many cases, indispensable for all economic agents. As small and medium-sized enterprises (SMEs) account for approximately 95% of the business population and play a significant role in the national economy in terms of their sizeable contribution to GDP, employment generation, export performance, and achieving sustainable national economic development, most governments have placed increasing emphasis on facilitating the creation and development of the national SMEs sector. Nevertheless, empirical evidence suggests that SMEs face significant barriers in making effective use of the IP system and this may have an impact on their ability to exploit their innovative and creative capabilities. This paper explores some of these barriers and analyses some of the policies enacted, primarily in OECD countries, to try and overcome them. The paper also suggests that it is crucial that initiatives seeking to make a real impact in increasing awareness and encouraging a more effective use of the IP system by entrepreneurs and SMEs manage to incorporate IP within the broader development framework of support for SMEs.

Keywords: SMEs, intellectual property rights, IP system, new technology-based firms

The phrase ‘knowledge-based economy’ describes the new economic environment in which the generation and management of knowledge play a predominant part in wealth creation, as compared with the traditional factors of production, namely, land, labour and capital.

Aptly, the 21st century is often labeled as the ‘century of knowledge’, as the ability to create, access and use knowledge has become, even more than before, a fundamental determinant of global competitiveness of enterprises and economies. In the Organisation for Economic Cooperation and Development (OECD) countries, the rise of the knowledge economy is evidenced by the growth in the knowledge-based industrial and service sectors, which are growing faster than GDP, and thus increasing their share in the overall economy. Despite the economic slowdown in recent years, the knowledge intensity of OECD economies continues to increase and private sector investments in R&D continue to rise (OECD, 2003).

The centrality of knowledge as a source of productivity gain and competitiveness has recently placed the intellectual property system at the centre stage of the knowledge economy. Statistics on patent applications and patent grants show a significant increase in patenting over the past two decades leading to what has generally been termed a ‘pro-

patent era’ (Kortnum and Lerner, 1997). In the United States, for example, the total number of patents granted by the USPTO has been rising by 6% a year since the mid-1980s. The surge in patent applications has been particularly significant in knowledge-based industries such as biotechnology, information and communication technologies (ICT), nanotechnology or advanced chemicals. Since 1993, the growth of biotechnology-related patent applications in the European Patent Office (EPO) has been 14.3% a year, compared to 8.3% for all patent applications. In many developing countries, the increase in patent applications has also been significant over recent years, though in many cases the rise has been due to increases in applications by non-residents rather than by residents.

Part of the reason behind the surge in patenting is an increasing trend to patent in more foreign markets, which is a direct result of the ‘global’ approach taken by many firms, including SMEs in a number of high-technology sectors. In addition, the increase in patent applications also reflects the increased importance companies attach to patents, which may be due to a variety of reasons:

- (a) The shift towards knowledge-based industries has placed increasing importance on intangible assets as the source of competitive advantage for firms, thus increasing the need to have such assets protected.

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- (b) The outsourcing of manufacturing activities to subcontractors, both domestically as well as in low-cost foreign locations, has also intensified the need for outsourcing companies to retain ownership over the innovative and creative aspects of their products.
- (c) Legislative changes at the national, regional and international levels have led to increased protection for IPRs in many countries, increased inter-national harmonization of the IP system, and easier access to, and more effective enforcement of IP rights in foreign countries¹.
- (d) The expansion of patentable subject matter has also played a significant part. The landmark case of *Diamond v Chakrabarty* (1982) produced a flood of patent applications for biotech-related products and sparked the impressive growth of the biotechnology sector in the US and subsequently in the other OECD countries.
- (e) A surge in patenting among universities and public-sector R&D institutions since the enactment of the Bayh-Dole Act in the US and similar legislation in many other countries has led to the establishment of an institutional framework that is more suitable to the promotion of university-industry collaboration and the commercialization of publicly funded research results.

All these issues point to a more active utilization of the IP system, particularly, in the OECD countries, reflecting a higher perceived value of ownership of IP rights. Structural changes to the economy, increasing importance of intangible assets as a source of competitive advantage for firms, legal and institutional policies encouraging the use of IP as a means for the transfer of technology from research institutes and universities to industry as well as changes to the IP system in favour of the right holders have made the IP system increasingly attractive and in many cases indispensable for all economic agents.

Small and Medium-sized Enterprises (SMEs) and Intellectual Property Rights

Worldwide, SMEs account for approximately 95% of the business population. Given the significant role of SMEs in the national economy in terms of their sizeable contribution to GDP, employment generation, export performance, and achieving sustainable national economic development, most governments have placed increasing emphasis on

facilitating the creation and development of the national SMEs sector. Over the past two decades, government policies have consistently sought to encourage innovation among SMEs, on the understanding that the development of a vibrant and dynamic SMEs sector, requires constant creativity and innovation to adapt to fast-changing market conditions, short product cycles and intense market competition².

SMEs, however, are an extremely heterogeneous group. Their innovative capacity and ability to develop new and innovative products, processes and services vary significantly, depending on their sector, size, focus, resources and the business environment in which they operate. In certain high-technology sectors, such as semiconductors and biotechnology, innovative SMEs have been a key to the growth and dynamism of these sectors. In such sectors, patenting activity is comparatively much higher than in other sectors and small firms rely heavily on patents to signal expertise, either to attract research partners or investment [Mazzoleni and Nelson (1998)]. Patenting is generally considered particularly important in 'discrete product industries' (e.g. pharmaceutical or chemical industry) as compared to other manufacturing industries where it may be more difficult to appropriate R&D results through patenting³. For new technology-based firms (NTBFs) in certain sectors, reliance on IP rights for a competitive edge is increasingly important, as such enterprises generally have limited capital and tangible assets and largely depend on intangible assets to succeed in the marketplace.

In a number of other sectors, however, innovation by SMEs mainly consists of minor adaptations to existing products, innovation in designs, mode of service delivery or management and marketing practices. In many such sectors, SME innovations are mainly of an informal nature, without formal R&D investments, R&D laboratories or R&D personnel. In such cases, other intellectual property rights, such as utility models, industrial designs, trade secrets, and trademarks may play a bigger role than patents in providing a competitive edge to SMEs. IP rights such as trademarks and industrial designs may provide companies with the ability to differentiate their products, segment markets, create a brand image, find niche markets, target specific customer groups and obtain exclusivity over the commercial use of a mark or design that may be the main selling point of a company's products or services.

The rise of the information and telecommunications industries and the increasing importance of the services sector in the economy of OECD countries have also enhanced the importance of the copyright system as a tool for protecting the creative efforts of companies in, for example, the software and multi-media sectors, as well as in many other sectors which rely on creative work protectable by copyright.

Effective management of IP rights may provide new business opportunities for companies with the appropriate skills, innovative capacity and resources to benefit from the range of options offered by the IP system. Nevertheless, SMEs are often constrained in many more ways than larger enterprises in making an effective and efficient use of the IP system. The heterogeneity of SMEs in terms of their ability to innovate and to use existing technology is also reflected in the ways that such enterprises use the IP system. The crucial point to note is that SMEs of varying sizes and levels of technological sophistication may benefit from different aspects of the intellectual property system according to their specific needs and technological capacity. In the knowledge-based economy, it is their ability to use the IP system efficiently and effectively, which will largely influence their capacity to make the most of their creative and innovative capacity and recoup their investments in innovation. The important question is, therefore, the extent to which SMEs are currently aware of, have access to and are making an effective and efficient use of the IP system and, if not, what are the barriers that are preventing them from doing so?

Barriers Faced by SMEs in Using the IP System

Studies from various countries (in particular OECD countries) reveal that SMEs face a number of difficulties in using the IP system. This is often the result of their limited knowledge of the ins and outs of the IP system, lack of clarity about its relevance to their business strategy and competitiveness, and of their finding the system too complex and expensive to use. Available studies/research on the use of the IP system by SMEs are largely limited to the use of patents. This empirical evidence paints a picture in which the propensity to apply for patents is highly related to the size of the company. This is the case even when focusing exclusively on innovative companies. The evidence is somewhat similar, though to a lesser degree, for trademarks (WIPO, 2003).

In a survey done by the Roland Berger Forschungs Institut for EPO on the use of the patent system by the

production industries (excluding micro-enterprises and enterprises in the handicraft sector), it was reported that one out of every three companies in the countries that are members of the European Patent Convention and engaged in R&D activities may be considered potential patent applicants, but only one in six actually do apply for patents (EPO, 1994). According to the survey, SMEs that do not apply for patents stated that the main reasons for not doing so are the costs and time needed for filing applications, while some SMEs also mentioned the ineffectiveness of the patent system. The survey also concluded that there is a major information deficit among SMEs on the patent system, which leads to a low level of filing of patent applications by potential applicants, and a lack of active government support to assist SMEs in the patenting process.

The costs of patenting are generally perceived as one of the greatest barriers for SMEs⁴. In budgeting the costs relating to the acquisition of IP rights, companies need to take into consideration not only the official fees (including application fees, publication fees and maintenance fees) but also the costs relating to application preparation and prosecution, legal advice and translation costs whenever the applicant intends to apply for protection abroad. Overall, the costs of protection may be perceived by many SMEs as exceeding the potential benefits to be obtained from protection, particularly, considering that a significant part of the costs may be incurred before the product has reached the market and that lenders, investors or government programmes rarely provide financial support for the protection of IP rights (though they sometimes require protection as a precondition for funding).

Evidence gathered by some national IP offices (e.g. the Danish Patent and Trademark Office) suggests that a reduction of official fees for SMEs would not necessarily lead to an increase in the number of patent applications from that sector. A number of IP offices in fact offer discounted rates for SMEs, but it is unclear the extent to which this acts as an incentive. It may be that the other costs related to patent protection, other than the official filing and processing fees, may be more of an obstacle. It may also be that the reasons for low use of the patent system by SMEs may be totally unrelated to costs of filing but relate, for example, to business strategy, to a limited knowledge of the IP system or to limited access to expert advice on the subject matter. More research on these issues is required.

Aside from the costs, there are a number of additional elements of the application process that may act as a disincentive for SMEs to seek IP protection, including the time required to be granted a patent or to obtain a trademark registration. The increasing number of applications at some IP offices has led to an increase in the backlog and therefore an increase in the time required from filing to grant of a patent or registration of a trademark. In some cases, a patent may take over 7 years to be granted. For SMEs, a long delay for obtaining a patent leaves a great degree of uncertainty and delays the possibility of enforcing it or finding potential licensees or partners for exploiting an invention.

In a recently published WIPO study on the use of the IP system by SMEs in Norway, attention is drawn to the fact that small companies not only apply for patents less often than large enterprises, but also that when they do apply their success rate (in terms of being granted the patent) is significantly lower. This suggests that SMEs that invest in protecting their inventions are often not effective in obtaining patents. Reasons for this may be many, ranging from insufficient information on the prior art, poorly drafted patent applications, limited access to adequate legal advice and lack of resources (human and financial) to follow the application through to the grant stage (WIPO, 2003). It is to be expected that failure to obtain a patent or, after grant of patent rights, failure to successfully exploit the granted patent, may also discourage SMEs in applying for patent protection in the future.

In terms of IP protection in foreign markets, a recent report by the General Accounting Office (GAO) of the US identified high costs, limited resources, and limited knowledge among small businesses about foreign patent laws and systems as some of the greatest obstacles faced by American small businesses in applying for patents abroad (GAO, 2003). The GAO report expressed a concern that small businesses, particularly, high technology firms, were losing potential sales in foreign markets by not applying for patent protection abroad. Empirical data suggests that small firms file for less patents abroad than do large firms (e.g. Moguee 2000). In this respect, the importance of the global protection systems administered by WIPO (i.e. the Patent Cooperation Treaty for inventions, the Madrid system for trademarks and the Hague system for industrial designs) and of the regional protection systems must be highlighted as they significantly facilitate

procedures and reduce costs for applying for IP protection in several countries.

Given some of the barriers faced in using the patent system, SMEs often use alternative means of appropriating their innovations. Some of the alternatives to patenting include secrecy, exploitation of lead-time advantages, moving rapidly down the learning curve, use of complementary sales and service capabilities, technical complexity, on-going innovation, relationships based on trust and use of trademarks to differentiate their products from those of imitators⁵. It is often noted that secrecy and lead-time advantages may be the most common way of appropriating innovations among firms, particularly (though not exclusively) among SMEs. One of the main reasons for this is that a large variety of innovations may lack the inventive step to be protectable under the patent system (in such cases utility models, where such protection is available, or industrial designs may be suitable alternatives) or because process innovations or innovations in certain low-technology sectors are considered less useful and are less likely to be patented. In addition, the costs related to patent protection will act as a disincentive to patenting whenever firms do not expect to obtain sufficient benefits to cover the expenditure related to patent protection (e.g. when the commercial potential is limited).

With respect to the use of secrecy as a means to appropriate innovation, companies may rely on legislation on trade secrets and/or unfair competition for the protection of their confidential business information. Trade secrets are intellectual property rights recognized as such by international agreements such as the WTO/ TRIPS Agreement. However, very little is known on how SMEs protect their trade secrets and to what extent they are aware of the protection offered by specific national laws on trade secrets and/or laws on unfair competition that also deal with protection of trade secrets. There is a general perception that SMEs often use trade secret protection by default, i.e., as a way of avoiding the expenditure and administrative procedures involved in patent protection, without taking adequate measures that need to be in place in order to ensure that confidential information is considered a legally protectable trade secret.

An additional element that must be taken into account when analysing barriers to the use of the IP system by SMEs is the enforcement of IP rights. The difficulties that companies may face in monitoring the

use of their IP rights in the marketplace and in enforcing them may act as additional disincentives to applying for protection in the first place (*see* Cordes 1999 and Koen 1992). In a recent survey of patenting companies in the European Union, it was argued that in 49% of sampled firms, fear of the costs of patent-defence litigation had an impact on investments in R&D (European Commission, 2000 a). In the US, the enforcement of IP rights is more of a problem for small enterprises than for large firms; while patents owned by small firms are infringed more often than those owned by large firms, the small firms are much less likely to litigate (Koen, 1992). In addition, a cause of concern for many user groups is the possibility of their patents being invalidated during patent litigation, thus increasing the uncertainty relating to the ownership of a patent.

An area that has not been fully explored, is the extent to which SMEs use titles of protection other than patents. Raw statistics on applications for utility models and industrial designs have shown that, with some exceptions, SMEs have generally made limited use of these two forms of protection, despite them being considered titles of protection that would appear to be most suited to SMEs. In most developing countries, it is to be noted that utility models are largely used by nationals whereas statistics on patent applications show that an overwhelming majority of patent applicants are foreign companies. Utility models are often perceived as low-cost entry points into the patent system for domestic SMEs, but their use remains limited.

Not only is the propensity to apply for the protection of IP rights among SMEs low, but so is the use of the information contained in patent databases. Various studies have shown that the use of patent information as a source of technological information rises with firm size (Arundel and Steinmuller, 1998). The Community Innovation Survey shows that 34% of large R&D performing firms find patent information important, while only 18% of R&D performing SMEs and 5.9% of non-R&D performing SMEs do so. For most enterprises, trade fairs, information from suppliers and specialized magazines remain preferred sources of information. This may be so because of their lack of awareness of the wealth of information available in patent documents, limited skills to conduct patent searches, lack of familiarity with patent jargon and inability to interpret the 'claims' in patent documents. Basic training in this area would enable entrepreneurs, researchers and

engineers in SMEs to benefit from the public disclosure function of patents.

For new technology-based firms (NTBFs), as for most SMEs, funds remain the most scarce and valued resource. NTBFs reliance on intangible assets complicates the process of obtaining loans from financial institutions including commercial banks and venture capitalists. Protection of intangible assets as IP rights slightly improves the situation, particularly, when dealing with venture capitalists and business angels, though less so with commercial banks. According to a study commissioned by the European Commission, the difficulty involved in valuation of intellectual property assets is an important reason as to why such assets cannot be used effectively as collateral (European Commission, 2001). The survey pointed out that none of the surveyed European commercial banks accept intangible assets such as intellectual property, as security for a loan. In some countries, however, patents are crucial and often indispensable to have access to any funding for NTBFs in certain sectors. Developing reliable mechanisms to put a value on intellectual property rights and the further development of markets for IP assets would help in creating a more NTBF-friendly environment with easier access to funding on the basis of the IP rights.

The barriers to a wider and more effective use of the IP system by SMEs are, therefore, many. In the first place, low awareness of the system limits the exposure SMEs have to the IP system and their ability to use all the elements offered by the IP system effectively, including not just patents, but also utility models, trademarks, industrial designs, trade secrets, patent databases, copyright and other IP rights. Poor IP management skills within SMEs reduce their ability to fully benefit from the system and, therefore, discourage its future use. Secondly, limited access to the necessary human resources and/or accessible legal advice make use of the IP system complicated and decrease the chances of success in the application process for registration/grant of IP rights. Efficient IP management requires an array of skills ranging from legal to the scientific/technical and the commercial that not all SMEs have in-house. In fact, such expertise is generally lacking in many if not most SMEs support institutions; this is equally true of SME consultants and business advisors in the private sector. Thirdly, high costs, not just for acquiring and maintaining, but also for monitoring and enforcing IP rights are an additional barrier, particularly, for firms

that are operating in a number of geographically dispersed markets.

Measures for Encouraging a More Effective Use of the IP System by SMEs

In most countries, the national Intellectual Property Offices (IPOs) have been historically perceived as being responsible for the IP system at the national level. The IP system was traditionally detached from innovation policy, SME policy, entrepreneurship policy, or science and technology policy. It was generally seen as a separate legal sphere of little direct relevance to the broader innovation promotion or competitiveness strategy of a country. As such, IP offices dealt almost exclusively with the registration and grant of IP rights and were generally not involved in debates on how to stimulate innovation, notably among entrepreneurs and SMEs.

In recent years, the increasing importance of IP rights in a knowledge-based economy has begun to change the way national, regional and local governments view intellectual property rights and the IP system as a whole. In many countries, there has been a shift in the focus of national IPOs. While the traditional functions of IPOs in the area of examination, registration and grant of IP rights (mostly limited to patents, trademarks and industrial designs) still remain the central element of their day-to-day work, IPOs are increasingly devoting resources to a range of additional services aimed at facilitating the access to, and reaping the benefit from, the IP system by various users of the IP system, including researchers, entrepreneurs and SMEs.

The information gathered by the SMEs Division of WIPO on the basis of a survey of IP offices and SME support institutions shows that activities for facilitating a wider and more effective use of the IP system by SMEs generally fall into five main categories⁶:

- (a) Awareness-raising and training on IP
- (b) Technological information services
- (c) Financial assistance
- (d) Customized advisory services on IP
- (e) Assistance for IP exploitation and technology transfer

The bulk of activities specifically targeted at the SME sector have focused on awareness-raising and advice on procedural matters concerning the application for IP rights. These activities take into account that low

awareness and limited knowledge of the IP system by SMEs is perceived in many countries to be one of the main challenges that needs to be addressed.

It is increasingly clear, however, that institutions, in order to be successful in their activities for promoting a wider and more effective use of the IP system by SMEs, must seek to target not just the entrepreneurs themselves, but also their business advisers, whether they be private sector consultants, or employees of chambers of commerce and industry or investors and employees of financial institutions who are more likely to be listened to by the entrepreneur and managers/owners of SMEs. In addition, promotion activities on IP have generally proved to be more effective when included in other activities seeking to meet some of the most immediate needs of SMEs, such as marketing, new product development, exporting, financing, etc. In other words, for IP to be included in the business strategy of enterprises it must also be integrated into the overall framework of business support services of those seeking to promote it.

Some IP offices have sought to go beyond the awareness-raising and training phase by providing a wide range of technological information services to their clients. The technological information provided in patent documents provides a point of departure for understanding the technological trends in specific fields or in monitoring the activities of competitors. However, the raw information contained in patent databases may be of limited use. This is why a number of IP offices provide value-added technological information services, turning the raw information provided by patent databases into more workable knowledge that can be of practical use to firms in developing new and improved products and services for improving the chances of success of their business strategy.

To partly overcome the barrier of limited access to relevant legal information on IP rights, some IP offices have ventured into providing customized legal and technical support in the field of IP to their clients. In a number of cases, this has been done through the establishment of decentralized sub-offices of the IP office (e.g. Mexico) in order to reach out to entrepreneurs and enterprises located far from the national capital, which is usually the headquarters of the national IP office. This has generally had a strong impact in terms of bringing such IP offices closer to their users. In other cases, IP offices have contributed to the establishment of patent libraries or other new

types of institutional structures, often in partnership with universities, chambers of commerce and industry, science parks or other new types of institutional structures for improving access of entrepreneurs and SMEs to basic legal and procedural advice on how to go about applying for IP protection.

From the point of view of the application process, a number of recent trends may contribute to making the system more accessible to inventors, researchers, entrepreneurs and SMEs. In the first place, the introduction of electronic filing by many IP offices is likely to make a contribution in reducing the transaction costs faced by enterprises in filing their applications. Secondly, the availability of procedures for pre-and post-grant opposition at the IP offices as well as for a quasi-judicial review of the granted patent, makes it easier to contest titles of protection without having to enter into potentially expensive litigation in courts. Thirdly, a number of countries have introduced procedures for the accelerated grant of patents upon request by the applicant in certain specific circumstances, thus reducing the time required for patents to be granted. This may be particularly important, for example, for companies that have already identified a potential licensee for their innovative technology.

At the legislative level, the introduction of utility model protection (known in some countries as 'petty patents' or innovation patents) in a number of countries, where such protection was previously not available, is also perceived as an important development for inventors, entrepreneurs and SMEs. The recent introduction of the unregistered community design in the countries of the European Union may also have an important impact in providing an easily accessible means of protection for SMEs operating in the fashion industry or in products with designs that are linked to short-term or passing trends. It would also provide SMEs with the possibility to test market their products before going through the effort and expense of registering all designs.

Despite all the above initiatives, mainly at the level of the IP offices, it is crucial that initiatives seeking to make a real impact in increasing awareness and encouraging a more effective use of the IP system by entrepreneurs and SMEs manage to incorporate IP within the broader development framework of support for new and existing SMEs. Increasing cooperation between institutions providing support to entrepreneurs and SMEs and institutions involved in

the national innovation system, such as universities, R&D centres, IP offices, incubators, chambers of commerce and industry, SME associations, inventors associations and venture capitalists is crucial to address the issue of IP promotion for SMEs in a holistic manner with greater coordination and collaboration amongst institutions.

The ambitious goal of assisting new and existing SMEs to become and remain competitive, through a more effective use of the IP system, can only be really attained if all the relevant actors in the public, private and civil society sectors in the OECD countries make sustained efforts to bridge the gap in awareness of, access to, and use of the IP system by inventors, researchers, entrepreneurs and SMEs. This has begun to happen in some countries, but efforts are generally still scattered. For example, in the Republic of Korea, close cooperation between the Korean Intellectual Property Office (KIPO), the chambers of commerce, the government SME support agency, the Korean Patent Attorneys Association and other public and private partners, including financial institutions, business training centres and multinationals have established a network of support for SMEs in IP matters that has had an enormous impact in increasing the use of the system by SMEs.

Research at WIPO on IP support services to SMEs has led to the conclusion that in some countries, government and non-government institutions responsible for supporting the growth of entrepreneurship and development of SMEs have begun to include intellectual property related services within their programmes of support for SMEs. This has particularly been the case in the following areas:

- (a) Innovation promotion programmes;
- (b) programmes aimed at promoting the development of specific priority sectors (e.g. biotechnology, software, nanotechnology, and advanced or new materials);
- (c) export-promotion programmes; and
- (d) R&D funds to promote the commercialization of R&D results and the acquisition of new technology by SMEs.

It must be noted that in most countries, the range, scope and performance of these services continues to be very limited; as a result, these services have made limited difference to the performance, productivity, competitiveness and success of entrepreneurs and SMEs.

The problems faced by SMEs, particularly, NTBFs, in raising funds for the development of new technologies, have led some countries to begin to explore ways in which IP rights may be of use for obtaining funds. A few public sector institutions providing venture funding to SMEs have begun to consider IP as collateral/security for loans. However, in the aftermath of the 'dot.com crisis', questions have been raised to the extent to which such an approach may be viable in the long run, and whether it could ever become a widespread practice. For public funds to be invested in supporting the R&D activities of inventors, researchers and SMEs, it is important, however, to ensure that R&D results obtained with the support of public funds are properly protected in order to enhance their commercial exploitation. It is also important that prior to investing in specific innovation projects, a proper patent search is conducted to ensure that funds are not being devoted to duplicative research. More IP-conscious policies on public sector venture loans or grants would generally be desirable.

In addition, many countries have established mechanisms for supporting the protection of patents, trademarks and designs in foreign markets as an essential part of their export promotion programs. This also includes assistance in gaining access to international application filing systems for patents, trademarks, and industrial designs (i.e., the PCT system for inventions, the Madrid system for trademarks and the Hague system for industrial designs). An important aspect of such programs is that they treat IP as a component of a broader service package aimed at helping SMEs with a number of aspects of the innovation process.

New technology-based firms (or technology start-ups) are perhaps best placed as potential customers for programmes seeking to assist the development of a dynamic and innovative SMEs sector, which is capable of making effective use of the IP system. The fast development of business and technology incubators in many countries over the last decade provides evidence of conscious government and non-government efforts to reduce some of the barriers faced by entrepreneurs during the start-up phase. Given the reasons for lack of use of the IP system and its importance as a tool for innovation management, it seems that there is a strong case for providing IP services within or through business incubators, particularly, technology incubators. Facilitating access to legal, technical and financial support for

access to and use of the IP system by tenants of incubators may be important for assisting start-up firms to adequately manage their innovations, by identifying, protecting, exploiting and enforcing their IP rights.

A recent pilot survey done by WIPO on the intellectual property services provided by European high-tech incubators illustrated the extent to which incubators are including IP within the support services to SMEs. The results of the pilot survey indicate that most IP rights are considered either very important or quite important by the majority of the responding incubators. In addition, IP ownership, or having a licence to use the IP rights of others, is considered (by 57% of responding incubators) an important or very important factor in selecting tenants for incubators. Sixty percent of responding incubators have personnel responsible for IP advice while a few that do not, have links with external partners who offer support on IP matters. It is important to point out that very few of the responding incubators provide any support in areas such as IP enforcement and the valuation of IP assets; that is, in areas which are considered to be important for NTBFs, but in which most incubators lack expertise (WIPO 2003b).

Promoting interaction between universities, public R&D centres and SMEs in the field of innovation and technology transfer has also been the target of many government and university programmes. It is generally felt that a closer interaction between universities and industry would enable enterprises (and society as a whole) to benefit from the innovative capacity of universities. In that context, transparent and clear rules on ownership of intellectual property and equitable sharing of income generated by commercialization of IP rights has often been perceived as a key mechanism for creating the appropriate incentives to enhance such interaction. Different countries and institutions have adopted different policies in terms of defining the ownership of IP rights, royalty-sharing mechanisms, how to resolve conflicts of interest and other similar issues that arise when public sector institutions and universities become involved in patenting their R&D results. While analysis of the most appropriate mechanisms for fostering public-private partnerships for technology transfer is beyond the scope of this paper, it is worth noting the enormous impact of the Bayh-Dole Act and similar legislation in other countries has had in favoring the commercialization of university research results, often by means of

licensing to, or establishment of, technology-based SMEs⁷⁸.

In the field of enforcement, the debate on possible solutions to the problems faced by SMEs has been on the agenda for some years and a number of proposals⁸ have been made to address the issue, ranging from the enhancement of arbitration and mediation as a means for settling IP disputes⁹, the establishment of compulsory IP insurance or the creation of a Patent Defence Union (European Commission, 2000a). A 1999 report by the EU recommended the introduction of compulsory expert arbitration as a solution to the excessive costs of patent litigation (ETAN, 1999). A working group of the European Patent Organization recommended the introduction of legislation that makes it easier for the arbitration of patent disputes. At this stage, it seems far from clear as to the direction in which things will move; while many questions have been raised, solutions are as yet hard to find. However, it is clear that expedited procedures for settling IP disputes out of court such as expedited arbitration and the introduction of post-grant opposition and/or review procedures at IP offices are mechanisms for settling disputes that seem particularly appealing to inventors, researchers, entrepreneurs and SMEs with limited financial resources. In addition, fast and efficient procedures for disputes in courts are also necessary to ensure that SMEs may rely on the courts whenever necessary.

Conclusions

The 'knowledge economy' has brought about structural changes to the economies of OECD countries making it indispensable for companies and policy-makers to address new challenges. One of the most crucial challenges faced by firms is how to manage their existing and new knowledge effectively in order to benefit fully from the innovative and creative capacity of the firm. Intellectual property rights have emerged as useful tools for managing innovation and resolving some of the 'market failures' affecting innovating firms. It is, therefore, increasingly important for entrepreneurs, inventors, researchers, SMEs and business consultants to have a good understanding of the IP system in order to manage effectively a firm's intellectual assets.

In the current context, NTBFs are not only more numerous than in the past (especially in high-tech areas such as nanotechnology, biotechnology, software, and new materials), but also play an increasingly important role as innovation agents.

Evidence from a number of OECD countries shows that SMEs, including NTBFs, are not always able to use the IP system effectively and often face a number of obstacles including limited knowledge of the system, high costs and lack of adequate legal, business and technical support for developing a successful IP strategy as part of their business strategy.

Efforts to redress the situation have sought to address some of the specific challenges currently faced by entrepreneurs and SMEs. A number of experiences have brought about interesting results and should be studied in greater detail to understand the extent to which they may be replicated elsewhere. However, it is argued here that a more concerted effort is required from all institutions operating in the national innovation system to ensure that IP is adequately incorporated into the broader framework of support for entrepreneurs and SMEs. In doing so, institutions should take into consideration the main obstacles faced by entrepreneurs and SMEs not just in seeking grant/registration of IP rights, but throughout the IP management cycle, including the commercial exploitation of IP rights, the use of patent databases, the valuation of IP assets and the enforcement of IP rights.

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- 1 TRIPS Agreement, Articles 41 to 61
- 2 See Istanbul Ministerial Declaration, Fostering the Growth of Innovative and Internationally Competitive SMEs, adopted at the Second OECD Ministerial Conference on SMEs, 2-5 June 2004
- 3 Levin *et al.* (1987) and Cohen *et al.* (2000) provide evidence of the greater value attached to patents by companies operating in so-called 'discrete product' industries. Arundel and Kabla (1998) estimate that industry average patent rates range from 15% in base metals and steel to 74% in pharmaceuticals
- 4 See Derwent (2001), Cordes (1999), European Patent Office (1994)
- 5 A number of studies have focused on ways in which firms appropriate innovation, including, Levin *et al.* (1987), Cohen *et al.* (2000), Kitching *et al.* (1999)
- 6 See 'Best practices' section of WIPO's website, www.wipo.int/sme/en/best_practices
- 7 For more information on patenting at universities and public sector R&D institutions, see OECD, Turning science into business: Patenting and licensing at public research organizations (2003)
- 8 An illustration of a possible approach in a national context, <http://www.patent.gov.uk/about/ippd/issues/adr.htm>
- 9 On this issue, see activities of WIPO's Arbitration and Mediation Center, including arbitration and mediation case examples, <http://arbiter.wipo.int> and http://www.wipo.int/sme/en/ip_business/ip_dispute/dispute_resolution.htm