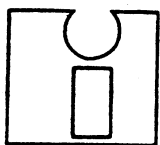


WIPO/IFIA/BUE/00/6

ORIGINAL:English

DATE:September2000



INTERNATIONAL FEDERATION OF
INVENTORS' ASSOCIATIONS
(IFIA)



WORLD INTELLECTUAL
PROPERTY ORGANIZATION

INVENTORS AT THE DAWN OF THE NEW MILLENNIUM: WIPO-IFIA INTERNATIONAL SYMPOSIUM

organized by
the World Intellectual Property Organization (WIPO)
and
the International Federation of Inventors' Associations (IFIA)
in cooperation with
the Government of Argentina
and
the Argentine Association of Inventors (AAI)

Buenos Aires, September 5 to 8, 2000

SMALL AND MEDIUM-SIZED ENTERPRISES (SMES)
INNOVATION AND INTELLECTUAL PROPERTY

Document prepared by the International Bureau of WIPO

INTRODUCTION

1. A large body of evidence shows that SMEs, especially young firms, contribute greatly and increasingly to the innovation system by introducing new products and adapting existing products to the needs of customers¹. As a consequence, governments have generally increased the priority attached to policies directed towards SMEs; these policies are particularly focussed on the promotion of innovation. These policies must take into account the challenges and opportunities that new technologies and globalization raise for small firms.

2. This paper will deal with the following questions:

A) What are the challenges and opportunities that globalization raises for SMEs as they are faced with pressure to reduce production costs, increase productivity, and become more knowledge intensive?

B) What is known about the ways in which different types of SMEs innovate, and which strategies can SMEs adopt in order to enhance their competitiveness in the global market?

C) What are the implications of this recognized innovation potential of SMEs for government policies, including in the area of intellectual property?

D) What are the new WIPO initiatives in this area?

A) SMEs AND THE CHALLENGES OF GLOBALIZATION

3. The end of the last century has witnessed a shift in comparative advantage towards more knowledge based economy².

4. It has also witnessed rapid scientific changes and speedy diffusion of new technologies³.

5. Given the above changes, many economists had predicted the demise of SMEs, in particular because both scale economies and R&D had become more important instruments for competitiveness in the global economy, and SMEs seemed to be at a disadvantage for both these factors. But in fact, the share of economic activity accounted for by SMEs has risen in

¹In the period from 1994 to 1995, SMEs were responsible for 80% of new jobs created in Europe (European SME Coordination Unit, CEC, 1999).

²USA information sector has experienced an increase in the annual growth rate from 5% in 1991 to nearly 20% in 1998, as compared to the average 35% of the rest of the economy.

-Number of applications for US patents by American inventor has fluctuated over the last century within a band between 40,000 and 80,000 per year. In 1985, there were over 120,000 applications.

-Demand for less-skilled workers has decreased dramatically throughout OECD, while demand for skilled workers has exploded.

³It took around fifty years for inventors before 1900 to penetrate 25% of households in the USA. Inventions since 1975 have achieved this level of penetration in around twenty years, and many new products have a "half-life" of less than one year.

most OECD countries by deploying strategies to maintain or even enhance their competitiveness in a global economy.

6. Available evidence and literature point to the conclusion that these strategies are largely based on the ability of SMEs to innovate.

7. The end of the last century has also been characterized by increasing globalization. Progressive liberalization of international products and capital markets means that, in an increasing number of sectors, national companies face new innovative foreign competitors.

8. This leads us to consider the following question.

B) WHAT IS KNOWN ABOUT THE WAYS IN WHICH DIFFERENT TYPES OF SMES INNOVATE, AND WHICH STRATEGIES CAN SMES ADOPT IN ORDER TO ENHANCE THEIR COMPETITIVENESS IN THE GLOBAL MARKET?

9. Despite the fact that SMEs account for a very small fraction of total business R&D in the OECD, a large body of evidence shows that SMEs contribute greatly to the innovation system by introducing new products and adapting existing products to the needs of customers. It also shows that small firms account for a disproportionately large share of new products innovation given their low R&D expenditures⁴.

10. While it is true that a number of empirical studies relating R&D to firm size show that large firms undertake considerably more R&D, and more recent evidence suggests that SMEs play an important role in R&D activity. Investment in innovative activities seem to be on the rise in SMEs. The National Science Foundation (1999), shows that total expenditures for industrial R&D by SMEs has increased by almost three times between 1985 and 1995 in the United States, while in the largest firms, the increase has been only about 20%. The National Science Foundation also found an increase in the R&D sales ratio from 3.4% in 1985 to 3.9% in 1995 for SMEs, whereas the R&D sales ratios of the largest corporations fell from 3.5% to 3.1%.

11. Evidence also shows that the propensity to patent, which is a measure of the production of new technological knowledge, tends to increase as firm size decreases. For instance, a USA study in 1994 examined 2,852 US companies and 4,553 patenting entities: small firms (less than \$10 million in sales) accounted for 4.3% of the sales from the entire sample, but 5.7% of the patents. Similarly, a German study in 1991 found that the propensity to patent is more for SMEs than for the largest companies in Germany.

12. The realization that SMEs play an active role in innovation has led to a number of insights on the reasons why small firms may have an innovative advantage compared to larger ones.

13. Possible reasons for this relative innovative advantage of small firms have been given as follows:

- Innovative activity flourishes in environments free of bureaucratic constraints;

⁴ Acs and Audrestsch, 1990.

- Larger firms tend to promote successful researchers to management positions, while SMEs can place innovative activity at the center of their competitive strategy;
- Bureaucracy in large firms is not conducive to undertaking risky R&D, as decisions must survive several organizational layers of resistance, while in an SME the decision to innovate is made by a small number of people.

14. A study by Sherer (1988), has summarized the advantages SMEs may have in innovative activity: "Smaller enterprises make their impressive contribution to innovation because of several advantages they possess compared to large -sized corporations. One important strength is that they are less bureaucratic than more highly -structured organizations. Second, and something that is often overlooked, many advances in technology accumulate on a myriad of detailed inventions involving individual components, materials, and fabrication techniques. The sales possibilities for making such narrow, detailed advances are often too modest to interest giant corporations. An individual entrepreneur's juices will flow over a new product or process with sales prospects in the millions of dollars per year, whereas few large corporations can work up much excitement over such small fish, nor can they accommodate small ventures easily into their organizational structures. Third, it is easier to sustain a fever pitch of excitement in small organizations, where the links between challenges, staff, and potential rewards are tight. "All -nighters" through which tough technical problems are solved expeditiously are common."

15. The ability of SMEs to create, access and commercialize new knowledge on global markets is fundamental to their sustained competitiveness. Innovation strategies that have enhanced the competitiveness of SMEs in global markets can be summarized as follows:

- ◆ The innovation strategy, in which SMEs try to appropriate returns from their knowledge base (which may or may not involve own investments in R&D);
- ◆ The information technology strategy, which makes innovative uses of information technology in order to reduce SME costs and increase productivity;
- ◆ The niche strategy, in which SMEs choose to become sophisticated global players in a narrow product line;
- ◆ The network strategy, in which SMEs work and cooperate with other firms, be they SMEs or large enterprises in order to improve their ability to access and absorb innovations;
- ◆ The cluster strategy, in which SMEs locate in close proximity with competitors in order to take advantage of knowledge spillovers, especially in the early stages of the industrial life cycle;
- ◆ The foreign direct investment strategy, in which SMEs exploit firm -specific ownership advantages abroad.

16. Let me give you a few examples:

The information technology strategy: A strategy SMEs can use to improve their competitiveness in global markets involves the application and adoption of new technologies that effectively serve to reduce costs. A number of significant new

technologies, which include the Internet and the microprocessor, help mitigate economies of scale and the gain traditionally associated with large-scale production. New web-based information technologies are enabling SMEs to attain global marketing capabilities at very low costs. SMEs are also using electronic commerce and internet-based access to products like financial and accounting management software systems that enhance organizational and management capabilities, while at the same time reduce the high costs associated with managing SMEs;

The niche strategy: Some enterprises, especially small and medium-sized firms, choose to pursue increasingly specialized markets or innovative niches, which exist both in the home country and in foreign markets. To some extent this strategy is employed by Germany's small and mid-size companies, commonly referred to as the "Mittelstand." Many of these small and medium-sized companies are not well known by the public. Yet the global market share of these companies typically far exceeds that of the giant companies of Germany. One of the major strategic instruments deployed by the "Mittelstand" companies is the combination of product specialization with geographic diversification. Typically these firms focus on a particular market niche, usually one that requires technical expertise, and company resources are devoted to maintaining market leadership in that niche;

The cluster strategy: SMEs can opt to enhance their competitiveness in global markets by participating in localized geographic clusters. In a clustering strategy, firms take advantage of linkages with other enterprises afforded by geographic proximity, in order to better access new ideas and knowledge. This strategy may be especially important in young industries or industries where strategic knowledge is tacit. The importance of local clusters is evident from the Italian experience. According to several surveys of the Italian clusters, they facilitated the diffusion of new technologies through:

- ◆ Imitation of innovators by followers, which is facilitated by the observing technology adoption and by access to facilities;
- ◆ Positive word-of-mouth, which occurs more rapidly in a social community of entrepreneurs;
- ◆ Spillover effects, which are made easier by the mobility of workers and technicians, the activity of technical consultants, and commercial activity of capital equipment suppliers;
- ◆ Interaction with equipment manufacturers, which is intense, repeated and socially embedded, allowing for the development of technical reputation, trust, and the willingness to experiment new technologies.

C) WHAT ARE THE MAIN IMPLICATIONS OF THIS RECOGNIZED INNOVATION POTENTIAL OF SME FOR GOVERNMENT POLICIES, INCLUDING THE AREA OF INTELLECTUAL PROPERTY?

17. With the advent of an increasingly knowledge-based economy, governments are increasingly concerned with the creation and commercialization of knowledge. Typical measures under this new policy approach are measures to encourage R&D investments, venture capital creation, and the rapid establishment of startups firms.

18. As specifically regards SMEs, great emphasis is placed on promoting investments in innovation. This leads to two questions, as follows:

What are the policy obstacles to innovation by SMEs ?

19. The OECD recently conducted a survey of SMEs and other representative business organizations to evaluate what they perceive to be the most important impediments to innovation in their respective countries. While there were certainly variations among respondents depending upon national circumstances, a number of common obstacles emerged from the study.

20. Given the importance of research and development to innovation, and the limited resources within many SMEs for carrying out R&D, access to finance was understandably a primary concern. Most respondents cited the lack of well-functioning venture capital or seed finance markets to support their research and development efforts, or their investments in innovations. Another key issue for SMEs is their ability to keep abreast of the latest developments affecting their sector. Timely information can be crucial to the success of businesses. Inadequate knowledge about or access to new technologies and know-how were a central concern for many survey respondents.

21. One of the best ways of promoting innovation is to ensure that individuals and firms benefit from the results of their research efforts. In this context, effective rules and procedures for the protection of intellectual property are essential. Although most OECD countries have laws and regulations governing patents and property rights, arcane administrative procedures and inconsistent enforcement can seriously undermine the objectives of such rules. According to the OECD survey, many SMEs consider themselves particularly vulnerable to overly complicated patent procedures and property right laws. In this context, several respondents noted the generally high level of regulatory and administrative burdens in their countries, and the dampening effect this has had on innovation as well as on broader entrepreneurial activities.

22. A number of the issues raised related to the broader economic and social climate for innovation. For example, many respondents noted that effective education and training programmes are fundamental to a country's innovative capacity, but added that their systems unfortunately fell short in delivering the technical and managerial skills required to develop or take advantage of new developments.

What can Governments do to promote innovation by SMEs ?

23. For each of the concerns mentioned by business associations, a number of interesting solutions were proposed under the said OECD survey. For example, on the issue of access to financing for R&D, many respondents recommended public programmes and support for venture capital and other types of risk financing through, for example, tax incentives. Others maintained that governments should be prepared to work directly with SMEs, offering special financing arrangements, including state guarantees and/or tax incentives for research activities, particularly in the early stages of development. Better cooperation and access to government-supported research centres including, for example, universities, was also mentioned as a useful step that could be taken to promote innovation by SMEs. A number of

respondents called for a central clearinghouse, a “one-stopshop”, for information related to national, regional, and international, programmes and support for SMEs⁵.

24. Recommendations to address the problem of access to new technologies and know-how focused on cooperative information-sharing arrangements at the local, national, regional or international levels. Such initiatives would not only give SMEs the opportunity to benefit from a broader pool of information resources, but would also provide a ready network of potential business partners. It was further suggested that such cooperative resource centres would best be owned and controlled by SMEs themselves. In some countries, SME organizations were more concerned about obtaining new technologies and urged governments in those countries to reduce barriers to certain imports.

25. On the important role of effective patent protection in sustaining innovation, the operative word is simplicity. SMEs need user-friendly patent offices with lower cost, streamlined procedures. Some even suggested a special patent regime for SMEs with simplified registration processes. The OECD survey respondents who were concerned about protection of property rights were consistent in calling for new or reformed legislation in their countries, harmonized with regional or international standards.

26. The issue of education and training is crucial, not only for promoting innovation, but also more generally for providing a competitive foundation for national economies. Because they often lack the resources to engage in in-house training, SMEs have a particular stake in the effectiveness of local and national education and training programmes. There was thus broad agreement in the survey for public support for basic education, for financial assistance with SME training, and for promoting greater cooperation and exchanges between business and universities.

⁵ US Small Business Innovation Research (SBIR) Program:

In the 1980s, US Congress mandated that each major research agency allocate 45% of its research budget to funding innovative small firms. By the end of the 1990s, the SBIR programs accounted for about 60% of all public SME financing programs, and taken together the public SME financing is about two-thirds as large as private venture capital. Thus the government has a strong impact on innovative SMEs.

The benefits of the SBIR program include:

- launch of new companies;
- better survival and growth rates for recipient firms compared to other start-ups;
- a shift in many recipient research careers from academia to entrepreneurship;
- demonstration effects encouraging entrepreneurship.

European Union (EU) Special SME Measures:

The EU considers SMEs the cornerstone of Europe's competitive position and job creation. They form a dynamic and heterogeneous community which is confronted by many challenges. These include increased competition resulting from the completion of the European internal market and the growing demand of larger companies for which they often work as subcontractors. EU considers that to meet these challenges SMEs need to constantly innovate, e.g. developing new technologies in-house or gaining access to them. The EU Framework Programme for Research and Technological Development (RTD) assists SMEs in these areas through a specific package of measures. These consist of:

- getting information;
- preparing a project proposal;
- finding partners;
- setting up a Cooperative Research (CRAFT) project.

Detailed information is available on the site www.cordis.lu

27. Finally, in a refrain that continued throughout the policy recommendations, many SME organizations suggested that the climate for research and development would be improved if regulatory and administrative burdens were reduced. A summary of the results of the survey is given in Annex I.

28. As specifically regards intellectual property, I shall develop two main points, the essence of intellectual property rights (IPRs) and the benefits deriving therefrom, as follows:

Meaning of intellectual property rights

29. Intellectual property rights are rights accorded to persons over the creations of their minds. They usually accord the creator an exclusive use of her/his creation for a certain period of service time. They include: i) industrial property (i.e. patents, trade and service marks, industrial designs, utility certificates, trade secrets); ii) copyrights (for literary works, artistic works, folklore); iii) neighboring rights or related rights (e.g. as is common in the music industry performances in drama, etc.).

Essence of industrial property rights

30. The drive towards strengthening and harmonizing the standards for the protection of intellectual properties derives from the ongoing process of global liberalization and the role of strategic knowledge embodied in technological innovations in new competition. In this regard, while new technologies have become a necessary condition for enterprise and therefore macro-economic competitiveness, the possibilities for their imitation has also increased and become cheap. Therefore, there is an explicit need to regulate the diffusion and assimilation of new technologies through internationally mandated protection of IPRs.

31. One of the strongest arguments for IP protection is that, unless inventions or creations are appropriately compensated, there will be sub-optimal incentives to undertake research and development.

32. For the global economy as a whole, several benefits are posited for effective protection of IPRs. Generally, domestic industry all over the world will be promoted through the exportation/importation of technology, within the framework of strongly harmonized regimes for the protection of IPRs. Arguably, well-founded IPR systems at national and international levels can promote enterprise competitiveness in developing and developed economies alike through:

- (a) Protecting the right of individuals/enterprises, with relation to their intellectual property, in much the same way as laws protect other forms of property;
- (b) Encouraging/protecting incentives for innovation (e.g. by enabling the private sector to patent inventions and innovations, etc.);
- (c) Inducing investments to develop and commercialize inventions;
- (d) Providing incentives to disclose information;
- (e) Protecting the disclosure of partially developed inventions, particularly during licensor talks;

- (f) Assisting technology transfer;
- (g) Enabling the private sector to patent discovery;
- (h) Regulating the institutions' use of employees' inventions and innovations;
- (i) Augmenting the marketing efforts of enterprises.

IPR Issues of Significance to SMEs

33. IPRs are important for SMEs and, if properly enforced, they can contribute significantly to their competitiveness. The potential benefits of IPRs draw from the functions they can fulfil, which include:

- (a) Protecting the right of individuals/institutions with relation to their IP in much the same way as laws protect other forms of property;
- (b) Encouraging/protecting incentives for innovation, inducing investment to develop and commercial inventions, providing incentives to disclose information (which would be necessary for the so-called horizontal cooperation);
- (c) Protecting the disclosure of partially developed inventions (particularly during license talks), assisting technology transfer;
- (d) Enabling the private sector to patent discovery, regulating institutions' use of employees' inventions/discoveries;
- (e) Attraction of foreign direct investments (FDI);
- (f) Encouraging competition in technological development, etc.

34. WIPO's work in this area is related to provide reliable input to serve as a basis for policy actions and other measures, on which ground economies, including in the developing countries, could be assisted to:

- (a) Raise and cement awareness on IPRs and their economic significance;
- (b) Build capacity to design effective IPRs at national/regional level and implement them;
- (c) Identify knowledge gaps on the possibilities of the application of IPRs to protect products of unique significance for the economies of the region (e.g. handicrafts products, natural resources, traditional medicine and developments thereof, etc.);
- (d) Identify knowledge gaps on the possibilities of the application of IPRs to facilitate the transfer of strategic technologies (e.g. agricultural technology) to their economies;
- (e) Design national/regional IPRs regimes that conform with international standards;

- (f) Create a platform for informed individuals, representing major institutions with a stake in IPR.

35. Important opportunities exist for SME in transition and developing country economies to cooperate with SME in industrialized countries. Main policies for encouraging and support cross-border cooperation between SME can be mentioned as follows:

- (a) To raise awareness among SME of the potential benefits offered by such partnerships;
- (b) To foster business to business contacts by supporting SME participation in appropriate international fairs and the creation of appropriated databases;
- (c) To review existing legal frameworks from the point of view of encouraging foreign cooperation with domestic SMEs;
- (d) To take steps to support to help firms exploit the Internet for searching for partners; to develop cross-border partnerships support programmes;
- (e) To facilitate linkages between support organizations and diaspora communities, that often represents significant social capital in relation to the development of cross-border partnerships.

D) WHAT ARE NEW WIPO INITIATIVES IN THIS AREA?

36. Under this chapter, I shall develop the following four points:

- The Implications of Firm Size in the Utilization of Intellectual Property Rights: The WIPO -Norway Project;
- WIPO Assembly 2000: The Nordic Proposal on Intellectual Property and SMEs;
- Follow up to the Bologna OECD Conference on SME: the Italian Project (see also Annex II);
- The WIPO study on the profile of SMEs in the Economies of the Southern African Development Community (SADC) and a follow-up study on IPRs.

[Annexes follow]

ANNEXI

Suggestions for Policy Action Based on the OECD Survey
of Business Representatives

Impediments*	Suggested policy actions
Difficulty in accessing finance for R&D or other innovative efforts	<ul style="list-style-type: none"> ◆ Reduced -tape in access to public R&D programmes. ◆ Provide more public funding at the national level to facilitate SME access to R&D. ◆ Introduce tax incentives such as pro -innovative investment tax credits and allowances. ◆ Encourage cooperative agreements with government-paid and R&D infrastructure (universities, research institute).
Lack of qualified personnel	<ul style="list-style-type: none"> ◆ Foster links between universities and SMEs ◆ Liberalize the hiring of qualified foreign workers. ◆ Enhance cooperation between schools, entrepreneurs and branch organizations. ◆ Improve education, orienting it more towards entrepreneurship. ◆ Harmonize vocational training system with innovations and technological change.
Inadequate access to technological know-how	<ul style="list-style-type: none"> ◆ Foster links between enterprises and research centres and laboratories. ◆ Improve information networks on technological know-how. ◆ Introduce tax incentives or tax relief for SMEs. ◆ Promote the creation of joint ventures between SMEs to stimulate technology transfer.
High costs or complex procedures to register or defend patents	<ul style="list-style-type: none"> ◆ Reduced -tape! ◆ Lower rate for patents and utility models for SMEs. ◆ Increase public funding for the protection and registration of patents. ◆ Use all of the EU languages in patent registration.

*In the order the impediments most frequently rated by the respondents.

[Annex II follows]

ANNEXII

RECOMMENDATIONS OF THE “BOLOGNA CHARTER” OF JUNE 2000

(...) Recognizing the vital contribution of innovation to SME competitiveness, the central role played by SMEs in national innovation systems, and the importance of improved access to information, financing and networking in facilitating the innovation process, recommended that in developing SME policies, the following be considered:

- ◆ SMEs' ability to manage innovation be improved by: facilitating the hiring and training of qualified personnel; diffusing and innovation culture; disseminating technological and market information and providing related assistance (e.g. through improvements in relevant labor market mechanisms, and linkages between enterprises and education systems, and between industry and public and university research);
- ◆ Financial barriers to innovation in SMEs be reduced by:
 - (i) Facilitating the development of market mechanisms for equity financing, and related services, especially for innovative start-ups;
 - (ii) Promoting risk-sharing programmes and measures, including financial support and tax incentives to R&D and innovation;
 - (iii) Supporting initiatives which facilitate “partnerships for innovation” between entrepreneurs, public agencies and financiers.
- ◆ SME access to national and global innovation networks be facilitated and their participation in public R&D programmes and procurement contracts encouraged (...).

[End of Annexes and of document]