

Protection of inventions derived from plant research in a megadiverse country: the case of Mexico

[Protección de invenciones derivadas de la investigación en plantas en un país megadiverso: el caso de México]

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Abstract

This paper examines the current situation concerning the poor protection of industrial property in Mexico, a country rich in plant species. In addition, plant species have been employed medicinally by indigenous communities, and an important plant products research has been developed. The protection of industrial property remains an issue of recent introduction in the Mexican economy. The lack of a federal policy regarding science and technology appears to be the main point in increasing patent filing and promoting technology transfer of inventions, as well as natural resources protection. It is also discussed the possible measures and outlines that could contribute to create a better situation for involving patenting procedure, specially in the protection of inventions derived from traditional plant knowledge. All suggestions could be useful for placing Mexico as a competitive country with the capacity of confronting the present-day challenges of society.

Keywords: Mexico; Invention; Patent; Industrial property.

Resumen

Esta contribución examina la situación actual concerniente a la pobre protección de la propiedad industrial en México, país rico en especies de plantas. Diversos grupos indígenas del país han utilizado las plantas debido a sus propiedades medicinales y al mismo tiempo, se ha desarrollado una importante investigación científica en el área de los productos derivados de plantas. La ausencia de una política de estado referente a ciencia y tecnología luce como uno de los puntos cruciales para el incremento en el número de solicitudes de patente y la promoción de la transferencia tecnológica respectiva, así como para la protección de los recursos naturales. En este artículo también se discuten las posibles medidas y acciones para mejorar la situación en el proceso de patentamiento. Estas sugerencias podrían ser útiles para posicionar a México como un país competitivo con capacidad de enfrentar los retos de la sociedad actual.

Palabras Clave: México; Invención; Patente; Propiedad industrial.

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INTRODUCTION

For many decades in the field of plant products research, many investigations have been focused on developing new alternatives for advancement in providing solutions for unresolved problems, particularly in the health sector, through the generation of medical or pharmaceutical knowledge. Generation of this knowledge comprises the origin of patentable inventions.

Within this context, it can be supposed at first glance that countries with important natural resources and technological development would be able to produce numerous patents directed toward solving their own health problems. Even more so, it appears that countries with indigenous communities practicing mainly plant-based medicine could generate patentable inventions due to the crucial role that traditional medicine has demonstrated in access to biological and genetic resources, particularly during the last 15 years. However, some countries with these characteristics have no presence in the industrial property system, especially Latin American countries (Alcorta and Peres, 1998). This situation can be translated as a great loss, in those economic and social benefits to inventors and indigenous communities have not been retrieved, but even worse, the possible enormous benefits on quality of daily life and health are not exerting an impact on society.

The complex mixture of relationships among Research and Technology (R&T), natural resources, indigenous communities, and governments is currently demanding the creation of policies and a solid organization to face the challenges involved in patent protection of plant research-derived inventions. To date, some efforts have been carried out on the international scene; nevertheless, even at the interior of a country—as the case of Mexico—there are differences in the perception and definition of priority problems in patent protection, which combined with certain previous failures, offer a complicated panorama.

Definitions related with patent protection

Protection of industrial property (PIP) involves the patent as one of the legal devices that is regulated by the Industrial Property Law in Mexico (LPI) for the protection of inventions derived from technical and scientific knowledge. A patent is an exclusive right of exploitation of an invention that confers the following prerogatives upon its owner: the right to

prevent others from manufacturing, using, selling, offering for sale, or importing the patented invention without his/her consent for a period of 20 years. In order to consider it as an invention and as such, susceptible to be protected by a patent, inventions must fulfill the following patentability criteria: *novelty* (meaning anything not in existence in prior art); *inventive step* (the creative process or the results of which are not obviously deducible from prior art by a person skilled in the relevant art), and *industrial application* (the possibility of an invention being produced or used in any branch of economic activity) (WIPO, 2009). In many countries, and particularly in Mexico, the theoretical or scientific principles, the essential biological processes for obtaining, reproducing, and propagating plants and animals, the biological and genetic material as found in nature, and the plant varieties are not patentable according the LPI (LPI, 2009). The categories of patent protection contemplated by the LPI include products, processes, uses, or apparatuses. Perhaps with the exception of strict studies on systematic taxonomy and ecology, any other area of plant research is able to generate potential knowledge susceptible to be protected by patent in all of these categories. Thus, Mexican inventors are presented with the possibility for filing patent applications related to inventions that involve plant research-derived products, processes, and/or uses.

The current panorama of protection of plant research-derived inventions in Mexico

Mexico is considered a megadiverse country in which between 26 000 and 30 000 plant species thrive, ranking as fourth worldwide, and in first place regarding cactus varieties (SEMARNAT, 2009). The use of Mexican medicinal plants is extensive from pre-Hispanic times and has been widely documented elsewhere (Bye and Linares, 1999). Some studies reveal that traditional Mexican knowledge utilizes approximately 5000 medicinal plants, of which 25% are native from Mexico. Only 16 of these native species were studied by means of a pharmacological approach during the 20th century (Lozoya and Rivera, 1999). Nevertheless, natural products research focused on plants maintains a strong tradition in Mexico; for example, the National Autonomous University of Mexico (UNAM), the most important research public institution in the country, has had specialized research units on natural products for 65 years. Another example is the case of

Mexican Institute of Social Security (IMSS), which has incorporated a full-time research center dedicated exclusively to Mexican medicinal plants 20 years ago. At present, the IMSS personnel conducts multidisciplinary plant research ranging from traditional knowledge to clinical studies for validating the therapeutic effects of Mexican medicinal plants. Consequently, numerous manuscripts have been published on the plant products research area, especially on native plants. But, had this knowledge been protected by patent?

Between 2000 and 2008, according to the Mexican Institute of Industrial Property (IMPI), a total of 117 319 patent applications were filed, of which 61 982 were granted in Mexico. It is calculated that approximately <3% of these patent applications are filed by Mexican inventors each year. In contrast, only in 2006 certain countries such as the U.S., obtained 173 770 nationally granted patents, Japan 141 399, and Germany, 21 034 (IMPI, 2008). Mexican applications have been especially focused on areas related with chemistry and metallurgy, diverse industrial techniques, and the food industry (Urquidi, 2005), but no data are available about the number of patent applications involving plant research-derived products, processes, and/or uses that are filed or granted. Nevertheless, it could be assumed that there are few patent applications related with this technical area, because other reports have shown that 85% of Mexican applications are utility models. According to these data, Mexican inventors are, in practice, not protecting their inventions.

Inventors, IMPI and research funding

Researchers who become inventors

One of the most important problems regarding to the PIP in Mexico is that researchers and potential inventors simply are not acquainted with the patenting procedure. There is a total absence of any link to the Industrial Property System during the researchers' academic training. Consequently, they carry out their research activities from undergraduate- to post-doctoral-degree levels is closing total knowledge generated, which affects possibilities for protecting patentable inventions because, in the first instance, these do not fulfill the novelty criteria. Even worse, sometimes these disclosures also affect inventive-step criteria, because some predictions and suggestions for future research are settled in the discussion sections of their own papers. In other cases, in which inventors receive specialized

assistance on the patenting procedure from the IMPI, these find that the majority of their investigations do not fulfill requirements for consideration as inventions according to the LPI. After these primary aspects, researchers who possess patentable matter in their investigations begin to deal with the patenting procedure itself; the latter is a legal procedure with very strict deadlines and legal terminology that researchers find difficult to understand and manage. Researchers also consider that the patenting procedure is very risky, because the majority of public research institutions do not recognize and accept patents as an instrument of productivity. Several research institutions employ the publication and citation impact factor count in the Science and Social Sciences Citation Indexes produced by the Institute of Scientific Information (ISI) to monitor and score the performance of their researchers as the base for awarding raises, promotions, and grants. However, these measurements also result in notable limitations, because patents, books, or publications in certain journals do not form part of ISI (González-Brambila and Veloso, 2007). Compared with papers in internal productivity evaluations, patents are devaluated; consequently, Mexican researchers prefer to publish in ISI-indexed journals rather than filing patents. Otherwise, researchers who have been interested in filing patents in Mexico have had to suffer from learning the patenting procedure to obtain any type of recognition for their effort, because in many cases, the patent application can be refused in the end. Inventors experience with unpleasant results disappointed with the procedure and results. Moreover, in the case of researchers who were successful in obtaining a patent, these are unaware of how to transfer their technology to industry. In this respect, as patent applicants and technologists, Mexican researchers perceive themselves as completely lost in the Industrial Property System; therefore, patents can represent, from this point of view, a great waste of time.

The Situation of the IMPI

The IMPI was formally created in 1993 as an autonomous concern (Amigo, 1996). Enormous efforts have been made by the IMPI to promote itself and the patenting procedure. Over the past 2 years, the IMPI has been imparting free training courses and workshops to train and inform the public on all topics related to the industrial property system and all of the services offered by the IMPI (IMPI, 2008).

Additionally, the IMPI has been active in providing consultancy in scientific symposia and to individual research groups, universities, and industry. Thus, many potential inventors have begun to know the IMPI and to show interest in the PIP. However, the IMPI remains an institution with the need for consolidation. For instance, since its creation the IMPI has employed an important number of scientific staff as examiners. These in turn left these positions after a brief time because these positions are not recognized efforts. There is a total absence of salary, recruitment, promotion, and training policies, as well as an excess of pending work that creates professional frustration and low morale (Alcorta and Peres, 1998). Several permanent and qualified examiners remain a basic necessity of the IMPI to support and offer efficient service. In the field of plants, the IMPI requires examiners trained in industrial property and in ethnobotanical and ethnomedical topics and who are able to evaluate patent applications under an integral perspective (Cordell, 2000; Kartal, 2007). In addition, the reorganization of the IMPI based on models from other countries appears to be a contribution to create successful institutional policies.

Research funding

One crucial aspect that influences low interest in filing patents in Mexico is related with that the majority of public research institutions are not linked with industry, which implicates an absence of financial support for developing new products and filing patent applications. The few research institutions that indeed are linked with industry have dealt mainly with foreign industry; one of the conditions for obtaining financial support is to return their results to the mentioned industry (Estrada and Heijs, 2006). Furthermore, industry does not consider research and development in Mexico a top priority nor an attractive long-term investment. Rather, industry tends to acquire a substantial amount of technology based on products or processes from other industrialized countries, therefore limiting the possibilities to create, develop, and innovate high technology and relegating Mexican scientists to the improvement of already existing technology (Wagner, 1998).

Precarious Mexican-government investment from R&T over the past 20 years is directly reflected in the low number of Mexican patents, an indicator that not only takes into account creativity, inventiveness, and

innovation, but also the capability for cognitive production in industrial applicability, which allows discerning a clear difference between developed economies and advanced countries (Sandoval and Valladares, 2008). Government has not identified areas that are particularly useful to development according to its own needs and resources (Estrada and Heijs, 2006).

Taking together all of this previous data, it is clear that in Mexico, there is no state policy with regard to science and technology sectors. Consequently, Mexico has not been a competitive country, and it possesses an inability to face the challenges of society. Additionally, the protection of industrial property remains a recent introduction in the Mexican economy (Amigo, 1996); therefore, there is no culture related with patent protection. However, Mexico possesses one of the most difficult things to replace: natural resources (especially in plants), and human resources. Some successful isolated cases show that Mexicans have the capacity to increase the protection of their inventions by filing patent applications and contributing to forge better conditions for the population of this country. Other cases in Mexican industry, such as tequila-producing companies, demonstrate that a global technological strategy that involves researchers, industry, and academics results in successful inventions that produce and share benefits at all these levels (Casas, 2006). Therefore, the missing link existing in Mexico between research institutions and industry is one of the central points to solve for improving the current conditions under which patents and technology transfer represents an enormous and unproductive effort.

Possible measures to increase the industrial property culture? Future considerations

There is a vast number of aspects to consider for improving protection of knowledge by patent in Mexico. Mainly, it would appear that informing and about promoting the industrial property interest in terms of potential inventors comprises an indispensable and primary task. For this purpose, the incorporation of basic industrial property-associated concepts into scientific-technological careers requires implementation, from the undergraduate university degree itself to topics related with international treaties and national laws. The writing of a patent application based on experimental thesis work could be validated as thesis work for obtaining a degree,

even at postgraduate levels. With these aspects, new researchers could begin to be trained in industrial property, and would be able to direct their own research lines to obtain patentable matter. In this manner, they would be skilled in industrial property issues and could be employed in, for example, patent offices, firms, industry, or universities. These actions can be incentives for scientist to pursue more generalized projects by cooperating not only with other researches from different disciplines, but also with industrials to obtain diverse funding sources. In this regard, “pure science”, directly related with the most frequently encountered mentality of Mexican researchers, where there prevails a negative and pejorative attitude toward patentability due to the supposed mixing of “pure science” with “business”, may result in a positive patenting attitude, one that permits the emergence of scientist-entrepreneurs (Wagner, 1998). As a positive aspect in this regard, researchers can consider that projects of great importance to Mexico will attract increased interest and promote collaboration with foreign colleagues and industry.

The latter idea is accompanied by the need for research institutions to create a full-time dedicated office in industrial property and transfer technology. One of the most relevant attempts in Mexico has been the creation of the Center for Technological Innovation (CIT) within the UNAM in 1983. At the time, CIT provided several services, which entertained the priority that researchers be involved in all patent and technology-transfer issues in order to sensitize them concerning the field of innovations (Waissbluth et al., 1988). However, the CIT was unable to consolidate its presence. At present, very few Mexican research institutions have an office dedicated to industrial property: only nine patentability centers exist in universities, and two additional centers are in the process of being created (IMPI, 2007). With these numbers, it is noteworthy that interest in industrial property and transfer technology is on the rise among Mexican researchers.

Traditional knowledge and access to biological and genetic resources comprise another decisive aspect. Certain international efforts have been made with the Trade-related aspects of Intellectual Property Rights (TRIPS) agreement, where standards for the protection of intellectual property rights are pretended to be incorporated into the national legislation of each member country. However, the TRIPS agreement deals with well-specified private

rights that do not contemplate an integral form of intellectual property, creating an important gap (Timmermans, 2003). On the other hand, the Biological Diversity Convention (BDC) considers principles regarding the conservation and use of biological and genetic resources and defining conditions for their access. BDC contemplates sharing benefits among countries, indigenous or local communities, and users in the modern sector, including innovations and practices (Bertha, 1996; Boyd, 1996; Cordell, 2000; Timmermans, 2003). Nevertheless, concepts of protection and matter susceptible to be protected continue to be discussed in an international scenario due to the lack of clarity of the objectives and the intrinsic complications of these topics. Thus, actions have been limited, especially in some mega diverse countries (Boyd, 1996; Mays and Mazan, 1996; Turner, 1996). In this respect, Mexico has no clear position. Perhaps, a first step of inventors in all scientific research disciplines involving plants could become involved in the complex, expensive, and time-consuming task of protecting our natural plant resource by means of offering the integral approaches and patentable results of their investigations, not only as an option, but also as a responsibility (Sandoval and Valladares, 2008).

Another critical consideration is the role of the Mexican Government, which through the National Council of Science and Technology (CONACyT) must create a state policy in science and technology that involves not only 1% of the Gross domestic product (GDP) (CONACyT 2007), but also an integral strategy that permits to utilize natural resources as a priority for research focused on public health, developmental technology, and conservation. The understanding of the patents impact on the national economy (Sandoval and Valladares, 2008) and attention directed toward the needs of industry linked with research will be the key in the formulation of a commitment to invest in and to finance the projects that could generate knowledge and patentable products (Alcorta and Peres, 1998).

Finally, the quality and availability of local resources, government policies, research and technology institutions, industrial investment, and commercial regulations comprise the main aspects to be taken into account in establishing a solid competitive organizational structure that could be of benefit to all the persons involved in the protection of plant research-derived inventions by patent in a mega

diverse country such as Mexico. Notwithstanding this, a change of attitude by Mexicans appears basically to be the priority.

CONCLUSION

As we have presented here, Mexico is a rich country in natural sources, especially in plants. No patent-associated culture has limited economic, social, political, and natural conservation benefits. Enormous efforts have been exerted by inventors and research institutions; however, these efforts have been diluted because these are individual efforts, and the majority of them receive no remuneration.

The absence of a policy in science and technology is a great challenge, not only in the plant products research area, but also in Mexican science in general. Government, industry, research institutions, inventors, and society must actively participate in the creation of a patent culture that allows for protection of the patentable knowledge generated and to provide an impulse for technology, the creation of employment, the protection of natural resources, and social and economic rewards, the very basis of a patent: an agreement between inventors and the government to benefit and improve the everyday life of the society.

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