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**CONSEQUENCES OF THE PATENT AGENDA FOR DEVELOPING COUNTRIES:
STUDY BY MRS. DEBORAH LAZARD**

Document presented by the Secretariat

The study reproduced in this document is one of the four on the consequences that the international patents system could have for developing countries: they were commissioned by the Director General and are now submitted under headings A/39/13 Add. 1 to Add. 4. For more information, please consult document A/39/13.

The author of the study, Mrs. Deborah Lazard, is an independent scientific researcher and former Divisional Director of Patents at the Mexican Institute of Industrial Property.

The views expressed in the study are those of the author alone, and do not necessarily reflect the position of either the Member States or the Secretariat of WIPO.

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STUDY BY MRS. DEBORAH LAZARD

Independent Scientific Researcher
Former Divisional Director of Patents, Mexican Institute of Industrial Property

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EXECUTIVE SUMMARY

The objective :

This study has been undertaken to determine the possible effect that the Patent Agenda, and specifically the harmonizing tendencies embodied in it, might have on developing countries. The aim is to clarify some of the uncertainties regarding the costs and benefits that the strengthening of the patents system might involve for certain sectors of the population, specifically those concerned with the production and development of technology.

Methodology and results :

The research was conducted using Mexico as the reference because, as this document explains, in the course of the last 15 years, adding another wheel to the machinery that drives the policies of liberalization and globalization of its national economy, Mexico has opted to strengthen industrial property rights by means of various harmonization devices that follow a rightness similar to those set forth in the Patent Agenda.

In attempting to analyze the possible interrelatedness of the policies for the modernization of the Mexican industrial property system and technological innovation processes, it has been necessary to accept the latter as a fundamental part of a company's ability to stay ahead of its competitors and thereby create genuine competitive advantages for itself.

In this, while Mexico has indeed managed to establish itself as a producer of high-quality, high-impact science and technology, there have not been the right conditions in the country for creating the vital link between the academic and scientific sector and the business machinery that will convert technological development into corporate innovation structures. The indicators analyzed in this document suggest that the same pattern has been observed in other countries of the region.

As a result of this fragmentation of the flow of technology, in 20 years corporate competitiveness in Mexico has nothing done on business strategies incorporating R&D activities as the main driving force of the innovation process.

Nevertheless, under the innovation scheme being implemented in national industry, the strengthening of industrial property rights, combined with the decision that Mexico has taken in an attempt to achieve better integration in the world economy, has in the last decade caused national companies to increase their purchases of technology from abroad; this in turn has enhanced the ability of those companies to compete on international markets using the advanced technology that they have required.

As a result, by advocating an infrastructure capable of accommodating any innovation scheme, either present or future, based on internal research and development processes, or, as happens more and more often, the implementation of strategies for the acquisition or adoption of the knowledge from elsewhere, industrial property policies have become an essential component of the production systems in which the companies are involved.

What is more, as the PCT is now and will continue to be a fundamental part of any international system for the protection of technological development, this study has set aside a special chapter in which to investigate the impact that the system has had on science and technology production sectors in Mexico.

Accession to the PCT has given impetus to innovation and technological development from three sides: the first is its ability to raise standards of quality and efficiency in the processing work done by IMPI; the second is the provision of a safe and smooth path that users can follow while diversifying their options regarding the number of countries towards which they should direct their intention to protect and consequently market their technology, and the third is the provision of an international framework for the benefit of users interested in embarking on technological innovation with the legal certainty of not duplicating effort, coupled with knowledge of commercial trends for the year to come.

LIST OF ABBREVIATIONS

TRIPS	Agreement on Trade -Related Aspects of Intellectual Property Rights
HTG	High-Technology Goods
TB	Technology Balance
CIPR	Commission on Intellectual Property Rights
CONACYT	National Council of Science and Technology
IPRs	Intellectual Property Rights
EPO	European Patent Office
GATT	General Agreement on Tariffs and Trade
GRULAC	Group of Countries of Latin America and the Caribbean
R&D	Research and Development
IMPI	Mexican Institute of Industrial Property
IPEA	International Preliminary Examining Authority
IPER	International Preliminary Examination Report
ISI	Institute for Scientific Information
LDPIP	Law on the Development and Protection of Industrial Property
IPL	Industrial Property Law
OECD	Organization for Economic Co-operation and Development
WTO	World Trade Organization
WIPO	World Intellectual Property Organization
SSTP	Special Science and Technology Program 2001 -2006
PCT	Patent Cooperation Treaty
GDP	Gross Domestic Product
PLT	Patent Law Treaty
INSTI	Iberoamerican Network of Science and Technology Indicators

SPLT SubstantivePatentLawTreaty

NAFTA North-AmericanFreeTradeArea(Treaty)

USPTO USPatentandTrademarkOffice

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CHAPTER I: INTRODUCTION

A. Background

At the thirty-sixth series of meetings of the Assemblies of the Member States of WIPO, the Director General launched an initiative known as the "Patent Agenda,"¹ by means of which it was hoped to give cohesion, direction and coherence to the future development of the international patent system.

The efforts to achieve ratification of the PLT, the PCT reform process and the continuing discussions on the SPLT are the cornerstones of the Patent Agenda, the main objectives of which include looking for solutions to the pressing problems affecting the patent system, in particular the serious increase in the workload confronting many of the world's offices, and devising machinery with which to achieve a user-friendly system that makes it possible to obtain, maintain and sustain rights and at the same time promote the exploitation of patent and technology by means of inexpensive and efficient processes conforming to the expectations formulated by applicants.

In the search for options for improving patent grant, the Patent Agenda has concentrated a considerable amount of its effort on the definition of strategies to promote the strengthening and harmonization of the system.² Under this scheme, harmonization would take place at all levels and be used as a means of achieving, among other things, the grant of patents according to an internationally recognized procedure, the introduction of regional systems in order to reinforce the infrastructure of small offices and the harmonization of substantive examination criteria with a view to hastening the realization of the single examination concept.

This plan is however being extensively questioned in a number of sectors where serious doubt exists as to the effect that such a harmonizing trend might have on developing countries. It is argued that different socio-economic circumstances and dissimilar levels of development call for different intellectual property systems which cannot reasonably be accommodated by a single, universal standard.³

The same questioners maintain that a harmonized structure probably has far less flexibility than that advocated by the TRIPS Agreement, and it is a matter of particular concern that this situation will result in patents being granted for subject matter of little inventiveness and immense breadth, and also in areas of technology that nowadays can be denied patent protection.^{4,5} It is thought moreover that developing countries should not be deprived of the flexibility, which at their time industrialized countries had, with which to design their own industrial property systems, and also that they should not have a heavy-duty protection system forced on them without a thorough and objective assessment of the effect that such a measure would have on their development.⁶

So at the meetings of the Assemblies of the Member States of WIPO in 2002 GRULAC repeated its demand that the Secretariat compile a study on the potential impact of the Patent Agenda on developing countries, and asked for it not only to concentrate on the interests of the users of the system but also to broaden its coverage to the interests of governments, consumers and society in general, the consideration of which was crucial to the evaluation of the possible adverse effects of a toughening-up of patent protection.⁷

In response to this request, the WIPO Secretariat undertook to compile a document that would consider the implications of the Patent Agenda for developing countries. It proposed to fulfil that undertaking by conducting four independent studies in various regions of the world, its expectation being to achieve a more global view of the questions involved. This document is part of the implementation of that undertaking.

B. Objectives

This study proposes to investigate the possible effect that the Patent Agenda, and more specifically the harmonizing trend embodied in it, might have on developing countries. It will endeavor to clarify some of the areas of uncertainty regarding the possible costs and benefits that the strengthening of the patent system might involve for certain areas of the population, most specifically those concerned with the production and development of technology.

The specific objectives of this study are the following:

- To explore the interrelatedness of the harmonizing trends in the patent system and the promotion of innovation and technological development;
- To assess the impact of the strengthening of industrial property rights in science and technology production; and
- To examine the impact of the PCT on the sectors involved in science and technology production.

C. Strategy and methodology

We have chosen to analyze the impact of the harmonizing tendencies noted in the Patent Agenda on sectors concerned with the production and development of technology, as the leading role played by technological innovation has been an essential dimension of the competitiveness of nations within the context of the phenomenon of the globalization of economies.⁸

Mexico has been used as the reference for the research, because, as Chapter III of this document explains at some length, in the course of the last 15 years, adding another wheel to the machinery that drives the policies of liberalization and globalization of its national economy, Mexico has opted to strengthen industrial property rights by means of various harmonization devices which follow a sightliness similar to those set forth in the Patent Agenda.

Chapter III gives an account of the impact that the policies of modernization of industrial property rights have had on the country's innovation and technological development. The study is essentially based on patent system indicators, but it does include information from other areas, in particular the academic and corporate fields, the latter being after all intimately connected with the acquisition, development and exploitation of technology.

The beginning of the chapter describes the courses of action that have been adopted in national legislation to make the patent system work as a true catalyst of technological progress in the country's industry and commerce. An attempt is also made to put this work in its place in the context of national realities with the aid of a brief analysis of the impact that industrial property policies have had on the country's economic development.

Chapter III is subdivided into three sections; the first sets about analyzing the interaction of industrial property rights and technological development trends in the country. It also tries to define the part that harmonization machinery could play in technological innovation, and makes comparisons with other countries of the region. The study focuses mainly on exploring the scope of competitiveness in the corporate sphere.

The second section is used to examine the science and technology strategies that have been implemented in the country, and how they help develop and improve on technology in order to convert it into intangible assets. The costs and benefits of strengthening industrial property rights are analyzed to determine their potential for hampering or stimulating the development of science and technology in the country, and once again comparisons are made with other countries of the region.

The third and last section of the chapter considers the effect that accession to the PCT has had on science and technology production sectors in Mexico. A quantitative estimation is made of that effect, but qualitative aspects are also investigated.

Finally, Chapter IV documents a final summary of the findings, and certain conclusions are drawn and suggestions for the future made regarding them.

CHAPTER II: MEXICO AS A REFERENCE: REASONS FOR THE CHOICE

Since the 1980s economic policy in Mexico, traditionally known for its protectionist, interventionist approach, adopted an open, competitive economy. This involved the Mexican economy in large-scale structural reforms; the country acceded to GATT in 1986, and since then has made efforts to open up its trade by various means including tariff reductions, the privatization of a number of State companies, liberalization of the important technology transfer control regime and the enactment of a new law on foreign investment.⁹

Faced with the increase in commercial and industrial competition within the country and throughout the world that resulted from the opening of the country to foreign trade and the growing globalization of the international economy that occurred in the course of the 1980s Mexico had to set in place a more reliable, more transparent legal framework for investment and technology transfer, with industrial property policies becoming factors of certainty and trust.

At the same time an attempt was made to bring the patents system to a level of protection comparable to that of industrialized countries, so that improving the competitive position might be improved and the Mexican economy integrated in the international one by the promotion of foreign investment and technology transfer, with industrial and commercial development being encouraged at the same time.

Towards the end of the 1980s an intensive process of harmonization and restructuring of the Mexican industrial property system began, and indeed is still taking place today, the aim being to offer users an efficient and transparent system with which to obtain and maintain their rights as a balanced medium of protection for the defense of the legitimate rights and expectations of third parties.

The strategies that were to bring about the harmonization of the Mexican industrial property system were implemented in four areas: the international area, the area of national legislation, the area of everyday practice in the examination of patent applications and the area of accession to the Patent Cooperation Treaty (PCT). Many of them followed sightlines similar to those set forth in the Patent Agenda; they are discussed below.

A. Harmonization strategies at international level

In the course of the last two decades the Mexican economy has undergone a dramatic economic and institutional transformation as the phenomenon of globalization has intensified worldwide. This transformation is the consequence of Mexico's recent integration in the world economy. In a study on the country, three central events affecting it during that period have been highlighted: accession to GATT (1986), the negotiation and entry into force of the NAFTA Treaty in 1984 and the inclusion of Mexico in the OECD, also in 1984.¹⁰

With regard to industrial property rights, internationalization efforts formed part of the world trend towards commercial integration, with the aim of creating better opportunities for export, making imports more competitive and providing a safer, more transparent legal framework for investment and technology transfer.

Accession to the TRIPS Agreement was one of the key factors of this reform. The TRIPS proposals, as far as the regulatory framework for goods and services is concerned, aim at the lowering or elimination of trade barriers and, as far as IPRs are concerned, at harmonization through the raising of protection levels. The TRIPS provisions reflect the search for minimum common levels of protection in this area, and they have been the fundamental instrument by which harmonization has been achieved in legislation and generally in the institutions and offices devoted to the management and administration of the intellectual property rights of both industrialized and developing countries members of the WTO.

A mention should be made to the parallels between the time and content aspects of the TRIPS negotiations and Chapter XVII of the NAFTA Treaty. A number of writers have claimed that this chapter of the Treaty is of greater moment than the TRIPS Agreement, and that its obligations reflect a will to harmonize that has served as a model for the development of chapters of comparable scope in the trade agreements signed by Mexico.¹¹ Today Mexico is party to ten multilateral treaties on the subject and to ten free-trade treaties that contain chapters on intellectual property.

Almost eight years after the entry into force of the NAFTA Treaty, the commercial vigor and integrity of the market is reflected in the fact that the three-way trade is growing at an average rate of 13 percent a year, and that Mexico has become the second trading partner of the United States.¹²

Apart from that, accession to the PCT in 1995 was intended to contribute to the process of internationalization of Mexican companies through the promotion of commercial exchanges with other countries and the protection of national technology on foreign markets, but also to enhance the attractiveness of investment by increasing the international reliability of patents granted in Mexico.

B. Harmonization strategies at national -legislation level

The intense effort to harmonize intellectual property rights (IPRs) made by Mexico at the international level has had a direct effect on the restructuring of the industrial property system at the national level; this culminated in 1991 with the entry into force of the FLPIP which was reformed in 1995 to give birth to the IPL, and in the creation of IMPI in 1993.

The patent system has been structured with IMPI as the central component and with a vision that encompasses on the one hand the legal and technical tools for examination and the grant of industrial property rights, and on the other the necessary infrastructure and services with which to carry on the work of administration, monitoring, exploitation and enforcement of those rights. It was understood in addition that the natural counterweight to the patent system was easy and inexpensive access for the public at large to the information contained in patent documents, as a result of which a specialized area was created within IMPI where services were provided with a view to increasing access to and the use of technological information as a means of supporting the research work of national inventors.

As far as the main provisions that have been brought into force by the new legislation, the following are noteworthy:

1. With the basic aim of stimulating equally, in all areas of innovation, investment in the development of new goods and manufacturing processes, there has been a significant reduction in the number of technological sectors still excluded from patent protection, notably the following:

- (a) essentially biological processes for the production, reproduction and propagation of plants and animals;
- (b) biological and genetic material as encountered in nature;
- (c) animal breeds;
- (d) the human body and live body parts; and
- (e) new varieties of plants.

2. Discoveries that consist in publicizing or revealing something that has always existed in nature, even though previously unknown to man, and methods of surgical, therapeutic or diagnostic treatment applicable to the body, and those concerning animals, are likewise still excluded from patent protection, as they are not considered inventions for the purposes of the law.

3. With effect from 1991 the term of patents has been reset at 20 years from the filing date of the application.

4. The grant of compulsory licenses for patents has been restricted to exceptional circumstances involving a critical shortage of a product or serious abuse on the part of an owner.

Other provisions that are considered for their catalytic relevance to the impact that the policies of the industrial property system might have on innovation and the development of technology in the country are discussed in a later section of this document.

C. Harmonization strategies in the everyday practice of examination of patent applications

From the beginning of the 1990s the Patent Office in Mexico has been facing an operational crisis, in which it has become clear that the steady increase in the number of patent applications, combined with the diversity and complexity of the new technology eligible for protection, will substantially increase its workload, forcing the operators of the system to look for alternatives whereby the Office can carry out its work efficiently, in terms of quality as well as quantity, with a view to meeting the needs and expectations of users.

The increase in the volume and also the complexity of applications has made it necessary to reorganize the procedure for the examination and grant of patents, with the introduction of machinery that will increase productivity and at the same time ensure quality control.

As a result of the harmonization strategies that Mexico opted for, it was considered that there were sufficient common elements in national legislation that would allow advantage to be taken of the search and examination work conducted by the offices of other States, so from 1991 a chapter was included in national legislation in which it was expressly stated that, in the course of the substantive examination of patent applications, the substantive findings, or their equivalent, of searches done by foreign offices could be accepted or requested.

As a result, in the course of the last 12 years Mexico has been taking advantage of work done by other offices as reference material in the substantive examination of patent applications. Use has been made in particular of patents granted by the EPO and by the USPTO, search reports received from the EPO or, more recently, search and examination reports drawn up under the PCT.

The use of this material has been partial in character, as on one hand it is necessary to conduct complementary anticipation searches restricted to a national database, and on the other hand legislation and practice are not fully harmonized, which has made it necessary, by means of collaboration agreements, to determine whether and to what extent practices observed by other offices are valid in the context of national law.

It is worth mentioning that the measures adopted in Mexico with a view to avoiding overlap have been accompanied by other strategies, including the creation in the course of the last decade of specialized areas, among them the Department of Biotechnology, the development of the Examiner's Manual as a means of quality control and internal standardization, in addition to the implementation by IMPI of a large-scale project in 1999 which culminated in an 80 percent increase in the total staff working at the Institute, the creation of four regional offices to deal with applications from national users, and the 100 per cent increase in the number of examiners conducting substantive examinations at the Patent Directorate.

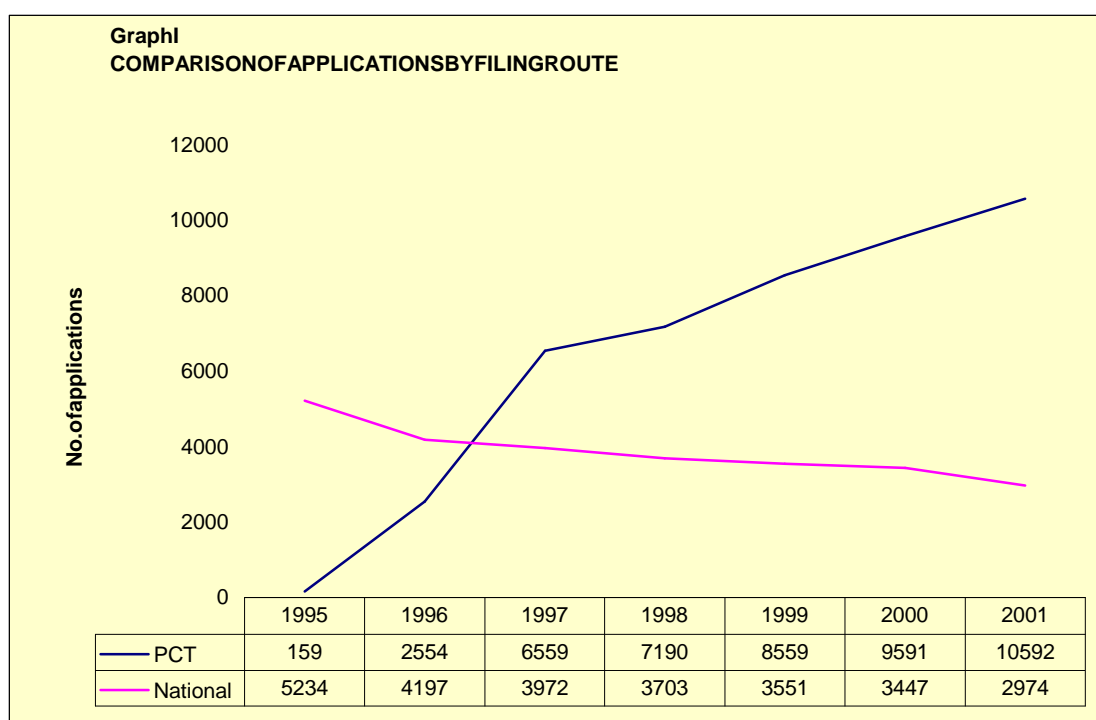
The combined effect of the measures adopted by Mexico has been a significant increase in the capacity for examination and settlement of patent applications, with a number of patents granted increasing by up to 241 percent between 1990 and 2000.

Nevertheless, the continuous growth in the number of applications which is persisting at the national level is an enormous challenge, calling for urgent action including for example the recruitment of a large number of substantive examiners and the creation of a department with specific responsibility of harmonization and quality control, while the IPL needs to be amended to increase the means whereby the applicant can secure and enforce his legitimate rights himself, third-party use of disclosed technology may be promoted and national legislation harmonized with the latest international trends.

While it is not the main objective of this document to analyze the possible impact that the Patent Agenda might have on the role of IMPI, it is worth making the point that measures such as the introduction of regional systems as a means of strengthening the infrastructure of small offices, the harmonization of criteria in substantive examination with a view to progressing towards a single examination and the use of information technology by offices and applicants to speed up the process in going for a patent, would be enormously useful in dealing with the challenges facing the Institute.

D. Harmonization strategies involving accession to the Patent Cooperation Treaty (PCT)

Accession to the PCT has been one of the instruments of harmonization that have contributed most to altering the vision and operation of the Mexican Institute of Industrial Property. While by its very nature the PCT renders services to applicants and to patent offices, the system provides many other advantages, including, in the specific case of Mexico, bringing about a substantial increase in the inward flow of patent applications by providing a simple, convenient route for users from other countries who have technology that they wish to protect. The filing of applications under the PCT has become the preferred instrument for the majority of users of the system, to such an extent indeed that, in 2001, of the total number of applications coming into IMPI 80 percent had taken the international route (see Graph I).



Source: IMPI.

In practice it is in the patent examination and grant procedure that the use of the PCT as a harmonization tool has had a decisive effect. The constantly increasing volume and complexity of applications cannot be absorbed solely by hiring, training and maintaining a sufficiently qualified body of staff; what is more many offices, including IMPI, would not have the means of doing so, as a result of which, within this frame of reference, the PCT offers very specific alternatives for reducing the duplication of work and raising the standards of processing work in terms of quality and efficiency.

The PCT is an example of total harmonization of formalities, and it lays down common provisions for all applications filed by that route, which promises a considerable reduction in the workload on national offices. As a result, IMPI has been making use of this international control, by means of which it has been possible to maintain the established workforce and without to absorb the substantial increase in the total number of patent applications filed in the country since 1995 (see Graph IV) without needing to hire more staff for the examination as to form.

What is more, both the search and the examination reports compiled under the PCT are used as support material for the streamlining of substantive examination because, as mentioned, the harmonization strategies that Mexico has adopted provides sufficient scope for taking advantage of work done by the offices of other States.

In this connection, based on the Mexican experience, those initiatives which in the wake of the PCT reform process seek to raise quality standards in preliminary search and examination will have the effect of building up the confidence of developing country offices in working efficiently and making the most of work done by the offices of other States.

One of the reforms, specifically the PCT Assembly decision to amend the time limits for entry into the national phase from 20 to 30 months from the priority date under Article 22(1), combined with the production in all cases of an international search finding, corresponding to a written opinion under Chapter II, represents a two-fold advantage for the offices of developing countries, as on the one hand it will supply a well-grounded opinion even in the case of applications that have not opted for entry into Chapter II, and on the other hand the IPEAs will have more time in which to concentrate on applications where users are genuinely interested in knowing the IPEA results, which in turn will very probably make for higher-quality examinations.

It would also be enormously valuable for the role of IMPI to have machinery adopted that would permit the grant of patents according to an international, widely-recognized procedure, in other words if the international phase were to be extended in order to produce a high-quality non-binding international report attesting fulfilment of the requirements of novelty, inventive step and industrial applicability,¹³ both office and users would benefit noticeably, as the lessening of the workload that measures of this kind would bring would obviously bring also an increase in the quality and efficiency of examination and the grant of rights, but above all would introduce the possibility of catering better for less experienced applicants, who generally make up the bulk of national innovators.

CHAPTER III:
IMPACT OF THE POLICY OF MODERNIZATION OF INDUSTRIAL PROPERTY
RIGHTS ON INNOVATION AND TECHNOLOGICAL
DEVELOPMENT IN MEXICO

In the Patent Agenda it is provided that "a robust and dynamic industrial property system, and particularly the patents system, (...) brings more and better products onto the market for the benefit of people, and promotes investment and technology transfer. The patents system provides conditions whereby creative potential can be released and channeled into tangible, sustainable development."

With a view to succeeding in Mexico in making the policies for the modernization of the industrial property system into genuine engines of innovation promotion and technological development for the country's industry and trade, the following courses of action have been chosen:

(a) Harmonize the protection of industrial property rights at a level comparable to that afforded to industry and trade in industrialized countries, in such a way that Mexican inventors, researchers, industrialists and traders can rely on protection that will enable them to compete on equal terms.

(b) Create machinery in national legislation that will act as a catalyst for activities related to production and technological development in the country. That machinery is described below:

(i) protection is given to scientific and technological research activities that are purely experimental or for testing or teaching, by limiting patent rights in such situations;

(ii) attempts are being made to streamline the rate of technological progress and at the same time to create a well-balanced industrial property system by requiring the inventor to describe in the patent application all the technical information necessary for a person skilled in the art to reproduce the invention, this being the best known method of achieving that aim;

(iii) "technology watch" machinery has been introduced by the publication of the patent application 18 months after the filing date, in such a way that all interested parties may inform themselves sufficiently in advance about new goods or processes which after one or two years would best start to be introduced, with patent protection, in trade or industry;

(iv) the legislation expressly allows the prior disclosure of an invention with a view to protecting national innovations that have been displayed, either inadvertently or for the researcher's own purposes, at fairs or exhibitions or in scientific articles or other media;

(v) utility model protection has been introduced to encourage the development of simple innovations;

(vi) it has been made an everyday practice to limit the breadth of the invention to the contribution described in the patent application in order to avoid inhibiting research and technology.

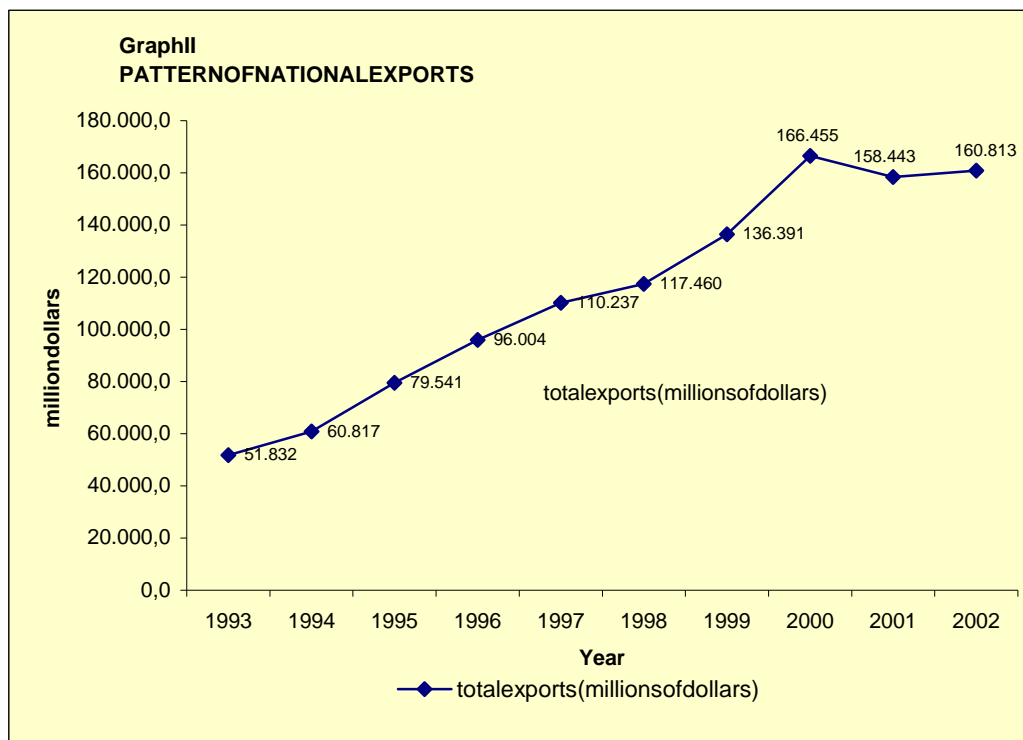
(c) Create the infrastructure and services necessary for increasing access to and use of the technological information contained in patent documents. Technological information is an essential tool in the innovation process, being both a means of avoiding duplication of effort and understanding technological development trends.

(d) Promote the development of a national culture on industrial property-related subjects by means of hard-hitting promotional campaigns and technical assistance focused on the management and development of intangible assets.

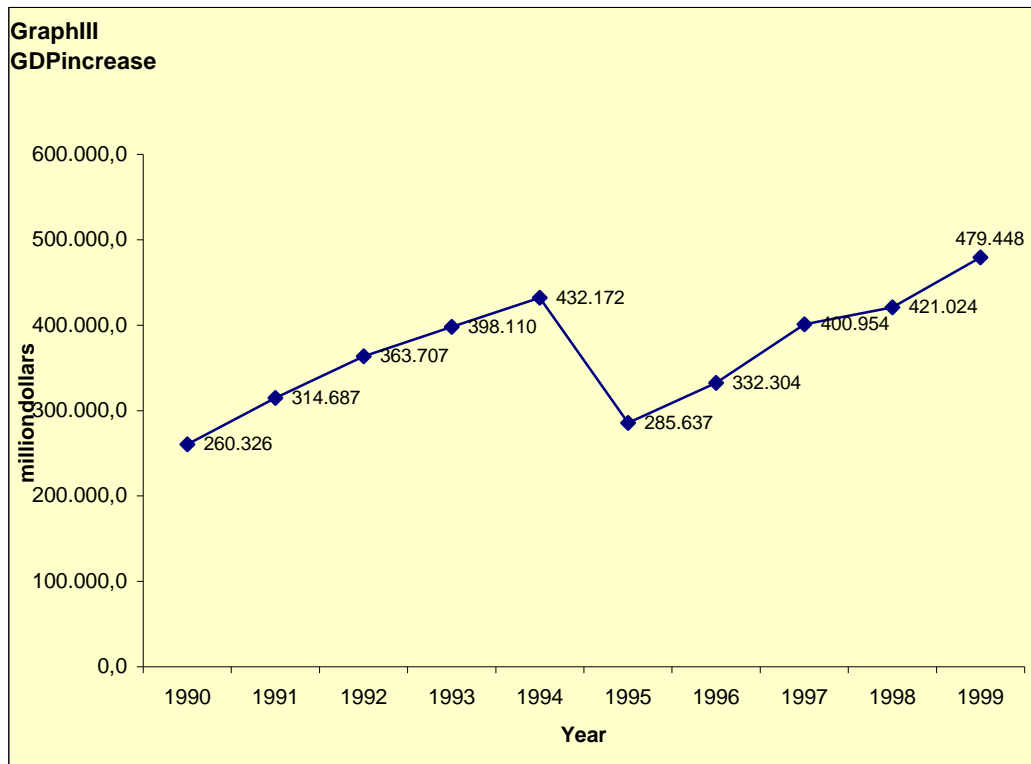
The following sections will look for reference parameters which could make for objective conclusions on the impact of such courses of action on the activity and development of these sectors dealing with the production and development of technology in the country.

However, with a view to giving this research work a context compatible with an overall picture in which technological innovation processes are set against a background of national realities, the effect that industrial property policies have had on the country's economic development is briefly analyzed below.

The decisions that Mexico has taken with a view to achieving greater integration in the world economy have had a decisive impact both on the country's economic performance and on the nature and operation of its institutions. Mexico has become the eighth world exporter, increasing its exports by up to 210 percent (see Graph II) and among the emerging economies it is the second greatest captor of direct foreign investment. In 2001 direct foreign investment rose to 24,730.4 million dollars, 87.9 percent above the figure for 2000. This indicator is itself a sign of investor confidence in the country.¹⁴ As a result of all this economic activity, gross domestic product has doubled in the course of the last decade (see Graph III).



Source: Ban kof Mexico.



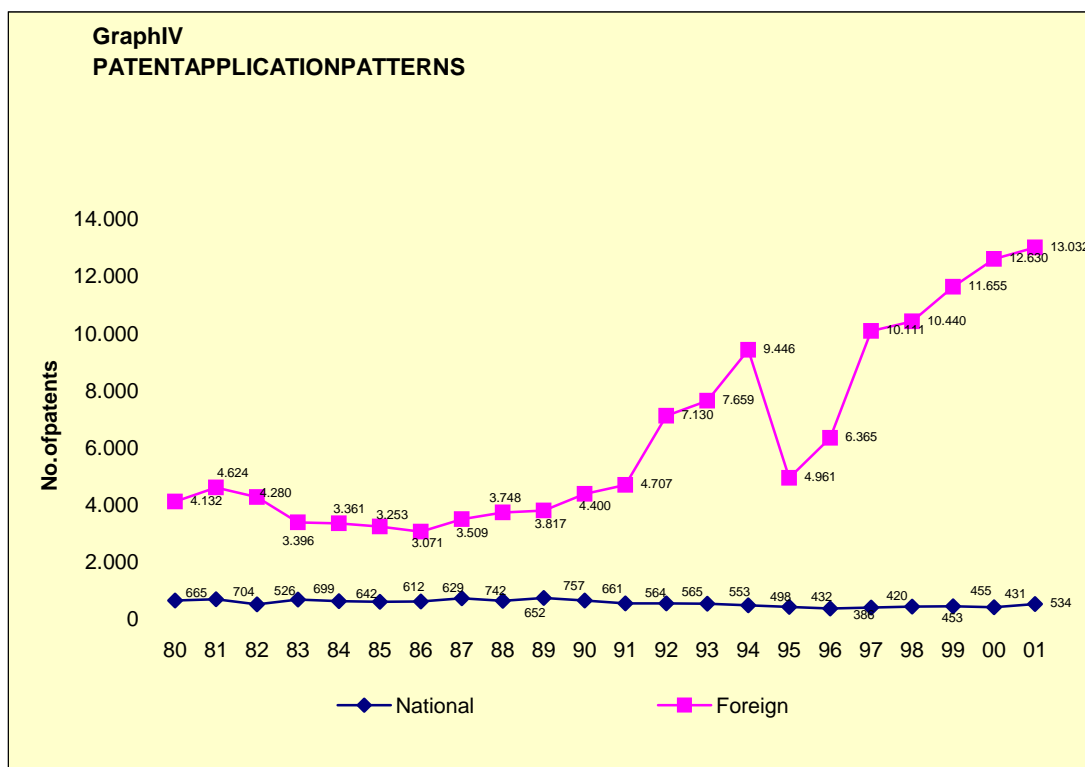
Source: Bank of Mexico.

A. Innovation and technological development trends in Mexico and their relation to industrial property rights

When one speaks of innovation one should situate it in the context of its contribution to corporate competitiveness. Competitiveness is in fact an advantage due to a company's control of a characteristic, skill, resource or item of knowledge that improves its efficiency and enables it to distance itself from its rivals.¹⁵ As a result innovation is a factor that is necessary but not sufficient to achieve competitiveness, and one that can be located either inside or outside the actual business.¹⁶

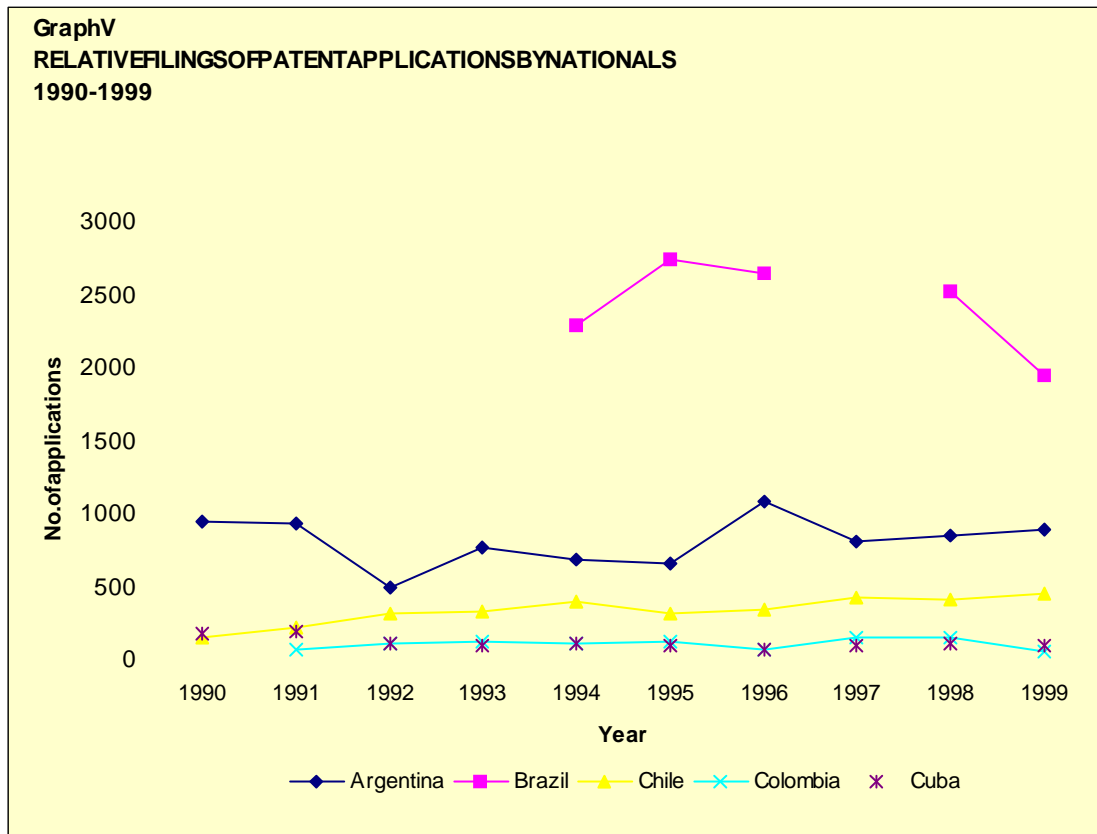
Recent studies have shown that Mexican businesses innovate by acquiring technology and adapting it, establishing various forms of collaboration with other businesses for the purpose, but without necessarily going through the stage of conducting R&D projects, and by joining complex production chains in response to market stimuli.^{17,18}

The trends revealed by patent indicators bear out these findings, as they suggest that corporate competitiveness in Mexico has not centered on strategies for incorporating R&D activities as the central axis of innovation processes. That being so, the number of patent applications filed in Mexico by national users has oscillated the last two years between 400 and 700 a year. In the course of the same period, as a result of the economic policies pursued by the country, the percentage of foreign applications coming into IMPI increased by 215 per cent (see Graph IV).



Source: IMPI.

The processes that support technological innovation are complex and multi-faceted, and it would be difficult to define them solely according to just one element, in this instance industrial property policies; nevertheless, it is interesting to highlight the similarity of patent indicators in various countries of the region, including Argentina, Brazil, Chile, Colombia and Cuba, where independent patterns have been noted in this era of opening-up of trade and modernization of industrial property rights, and where patent applications filed by nationals have in fact varied very little in the course of the last decade (see Graph V).

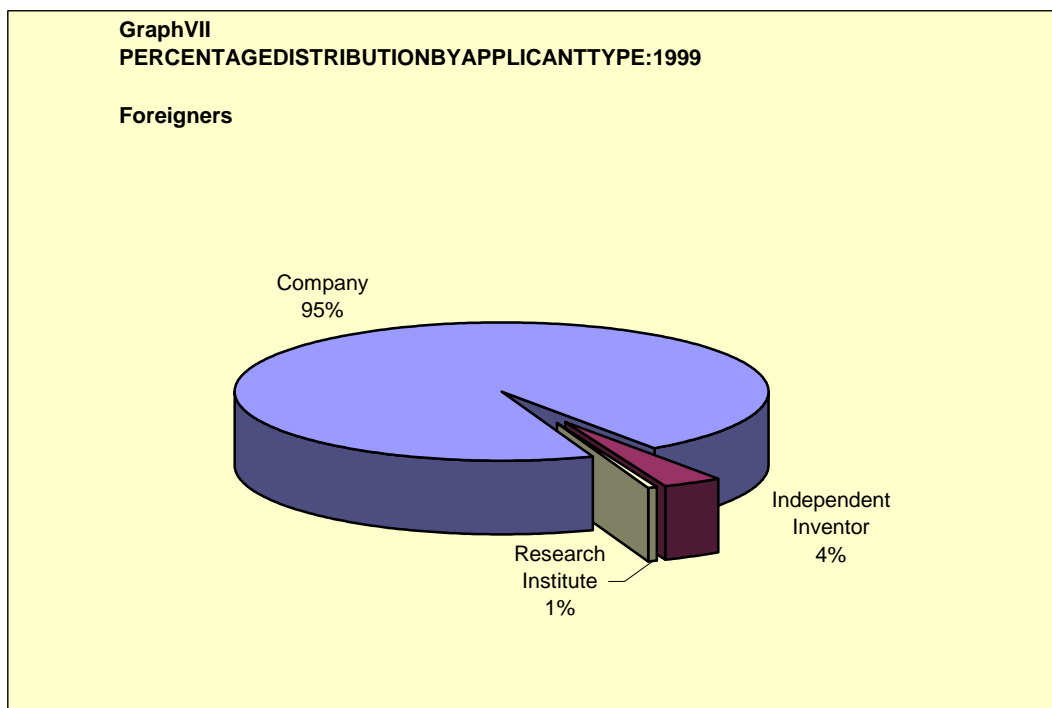
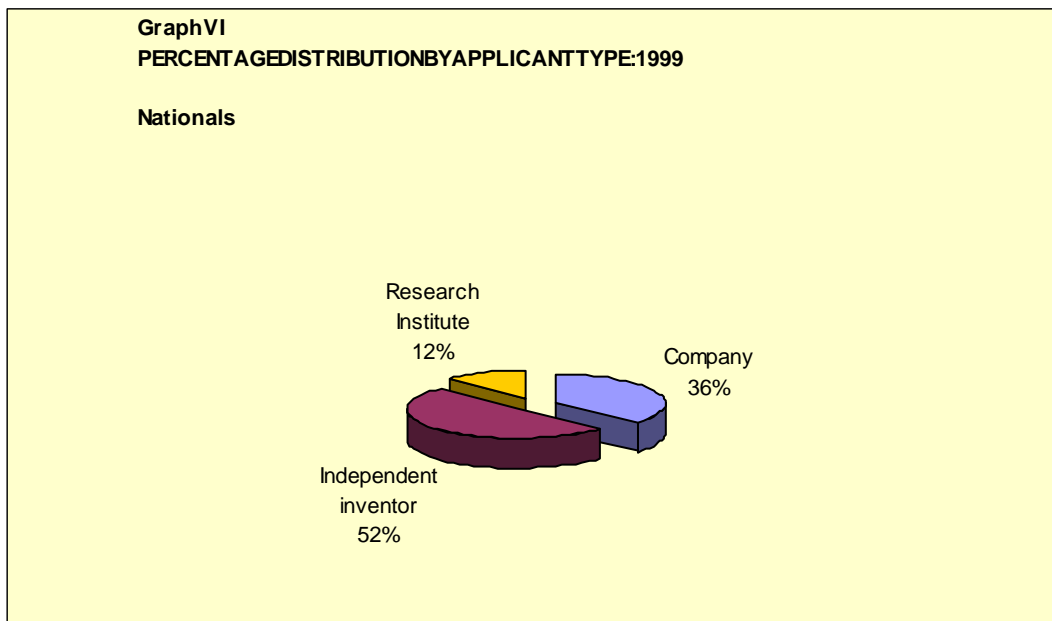


Source: WIPO and RICYT.

It should come as no surprise that the innovation and technological development trends of a country are not determined solely by industrial property policies, as, according to a contemporaneous view, innovation calls for vast networks of technological cooperation in which businesses function as the central axis and engage in both two-way and multidirectional relations with a view to sharing knowledge and collaborating in research and development, training, manufacture and marketing.¹⁹

Clearly, within this scheme, the policies for the promotion of innovation and technological development chosen by Mexico have not been sufficient to set an innovation system in motion that has the company as its axis and the competitive application of knowledge as its objective.²⁰ In the course of the last decade, of the total applications filed by national users, the share of the corporate sector has not been greater than 40 percent (compare

Graph VI with Graph VII), which contrast with the trend observed in industrialized countries or countries with strong policies of research and technological development promotion, for instance, Republic of Korea, where just ten leading companies are the owners of 62.4 percent of all patents granted in Republic of Korea in 1991. ²¹



Source: IMPI.

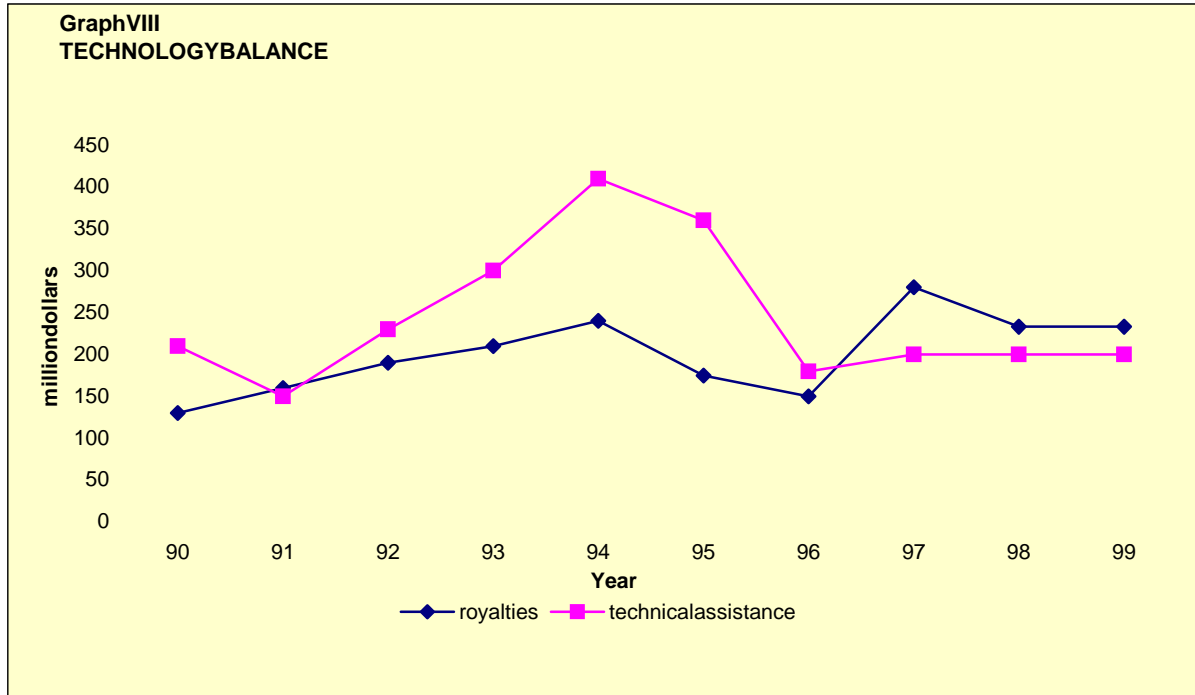
However, in the innovations scheme implemented in national industry, the Mexican industrial property system, as designed, could be considered an efficient instrument supporting the formation of technological alliances between differing institutions, which would define knowledge links that would afford the Mexican companies access to the skills and expertise of other organizations with a view to acquiring and adapting technology, whether by making judicious use of the technological information in the definition of market trends or by paying royalties or again by contracting for technical assistance.

Making an analysis of the latter aspect, the technology balance (TB) is a record of commercial transactions involving the transfer of technological information between a country and the rest of the world. This "sub-account" of the balance of payments, devised by the OECD, is exclusively for incoming and outgoing currency for transactions involving rights in the use of technology registered as industrial property and the rendering of services that have some technical content. This indicator is significant, not only for the monetary amounts, which are small in comparison with other transactions in the balance of payments, but because it reflects the potential for transfer of technological information to companies.

In relation to the international framework, of the 18 OECD countries systematically reporting TB data, those with the highest rate of participation in the overall technology trade (representing 14,597 million dollars) in 1997 were the United States of America, with an average share of 37.7 percent, Germany with 19.8 percent, the United Kingdom with 7.1 percent and Japan with 7.3 percent, while the four countries contributed 68 percent of the total. Mexico accounted for about 0.7 percent of the technology trade of OECD members during the period between 1990 and 1997, its impact being comparable to that of Austria, Finland, Norway, Portugal and Spain.²²

During the 1990s payments by Mexico for the acquisition of technology and for technological services totalled 46,86 million dollars. The magnitude of outgoings from the TB indicate just how much the technological innovation of companies established in the country depends on the purchase of technology developed abroad. This shows that TB outgoings constitute one of the indicators of a country's technological development.

Looking at a breakdown of the outgoings into royalties and technical assistance services, the two followed an uneven pattern as a result of the economic recession experienced by Mexico in 1995, albeit to a lesser extent in the case of royalties, where the average annual rate grew by 6.6 percent, accounting for a 79.2 percent increase in the space of the last decade (see Graph VIII).



Source: Bank of Mexico.

The strategies for effecting the modernization of the Mexican industrial property system have favored access to and the use of foreign technology by national entrepreneurs. As shown by the TB figures, companies increased their purchases of technology in the last decade, preferring acquisition through the use of patents and the industrial property rights rather than the import of technical assistance services, thereby keeping themselves more independent of outside agencies.

Reverse engineering and other methods of innovation by imitation are limited in a scenario where policies for the harmonization of industrial property protection have been brought to a level comparable to what is available to industry and commerce in industrialized countries,²³ but the transfer of patented technology gives the recipient access to all the accumulated knowledge and experience possessed by the owner of the title, which speeds him along the road to modernization, apart from which the transfer of technological information developed elsewhere promotes an increase in the potential of domestic companies for using advanced technology to compete on international markets.

The relation between the purchase of the right to use technology and receive technical assistance services on the one hand, and the progress of the companies' international competitiveness on the other seem to be confirmed if one considers the performance and composition of the exports of some of the leading branches in the acquisition of technology from abroad (see Table I).

Table I	
PAYMENTS ABROAD FOR ROYALTIES AND TECHNICAL ASSISTANCE	
Percentage Structure	
Economic Activity	Cumulative 1990 -1995
Total manufacture*	100.0
Foodstuffs, beverages and tobacco	22.0
Textiles, clothing and leather goods	1.7
Wood industry	0.1
Paper, printing and press	7.5
Chemicals and rubber and plastic goods	24.2
Goods in non-metal minerals	1.9
Basic metals	0.3
Metal goods, machinery and equipment	41.8
Machinery and assorted equipment	3.7
Office, accounting and computer equipment	1.9
Electrical machinery and equipment	3.2
Radio, TV and communication equipment	7.5
Medical Instruments	0.8
Motor Vehicles	21.1
Other manufacture	0.7
*The manufacturing sector represents 85 percent of the total of all cumulative transactions in 90	-95.
Source: Bank of Mexico.	

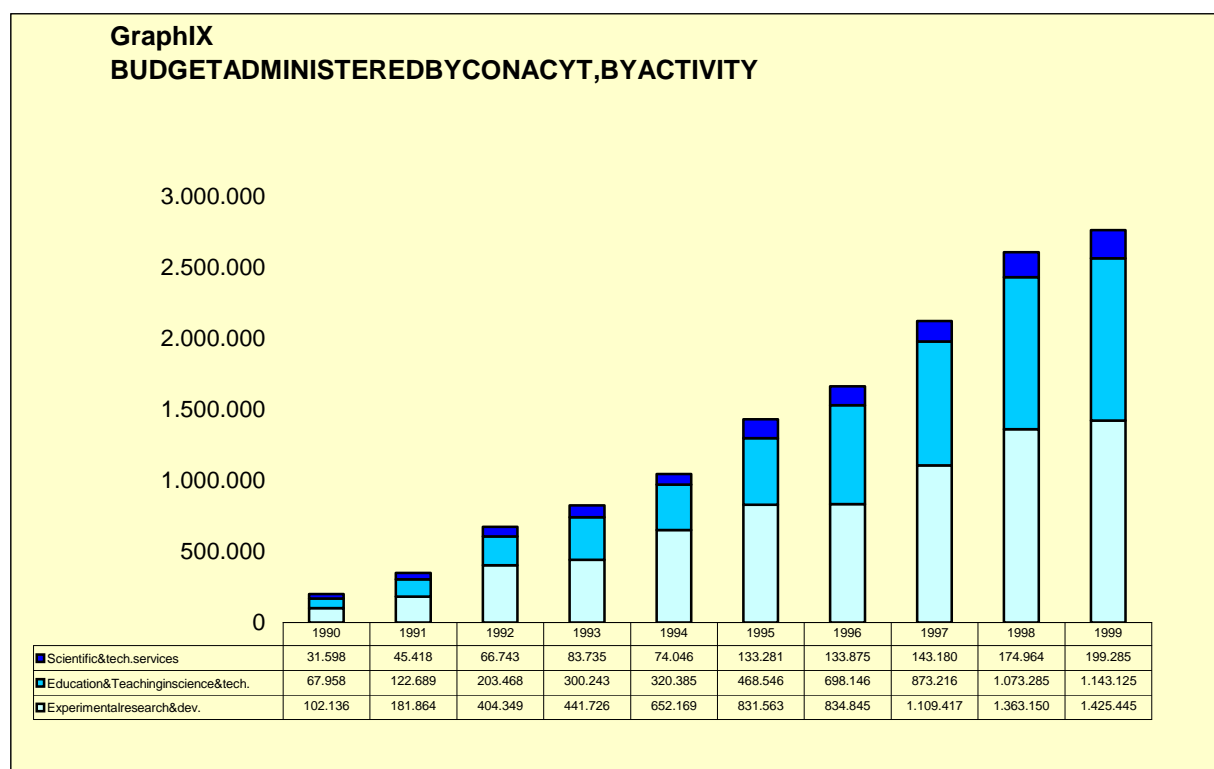
So, of all the industries in the manufacturing sector, the branches with the most dynamic exports in the 1990s were: the manufacture of radio, television and communication equipment, with an annual average growth rate of 39.1 percent; it was followed by the rubber and plastic goods industry, with an export growth rate of 24.6 percent, and the manufacture of office machinery and equipment with 23.8 percent; exports of the engineering industry in general increased by 21.7 percent, and those of the electrical machinery and equipment sector by 22.6 percent; the exports of the motor vehicle industry were the most noteworthy for their place in the total exports of manufactured goods, rising from 30 percent to 37 percent between 1990 and 1999.²⁴

In essence, innovation is the ability to administer knowledge creatively in order to respond to demand signalled by the market.²⁵ Within this context, by providing an infrastructure capable of supporting any innovation scheme, whether present or future, based on internal research and development processes or - as happens more and more frequently - through strategies for the acquisition or adoption of the knowledge from elsewhere, industrial property policies are becoming an essential component of the production systems in which companies are involved.

B. Impact of science and technology strategies and their relationship with industrial property rights

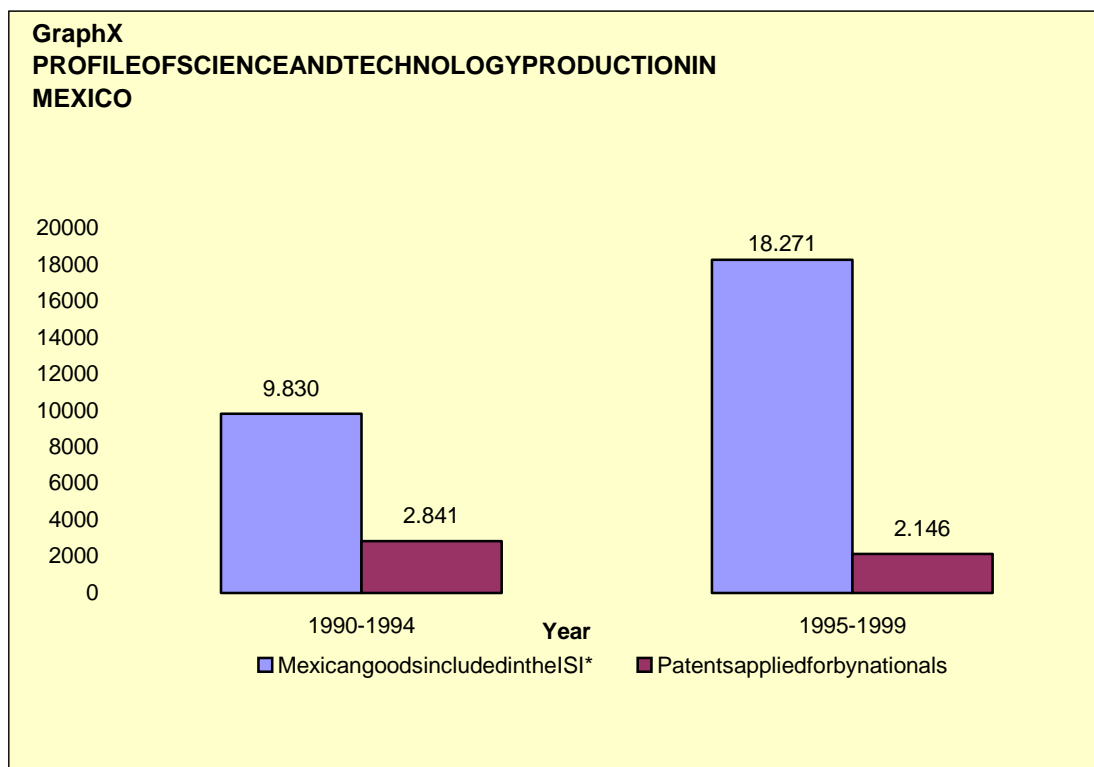
Scientific research in Mexico is not worthy for being an activity concentrated in universities and public research centers, financed mainly from Federal public funds, focused on basic and applied research and making a limited contribution to the process of industrial production.²⁶

That being so, of the budget administered in the 1990s by CONACYT, the agency determining the country's science and technology policy, about 90 percent of expenditures were earmarked for experimental research and development activities and educational and teaching activities in science and technology, while actual scientific and technological services were awarded about only ten percent of the total (see Graph IX).



Source: CONACYT.

As a result of this strategic vision, political decisions on the direction that should be taken by science and technology in Mexico has resulted in a consolidation of national scientific production in various sectors. For instance, while no substantial change has been noted in the number of patent applications filed by national inventors in the last decade, the number of scientific articles published by Mexicans and indexed by the ISI increased by 85 percent from the 1990-1994 to the 1995-1999 quinquennium (see Graph X).



In the course of the last decade, there has been not only a quantitative increase in national scientific development, but also a marked substantive increase in the quality and impact of the literary output, the latter being measured according to the number of times the published work was cited (see Table II). The counting of citations is one of the methods of recording the use of the knowledge embodied in research projects for the purpose of subsequent works, and is used by the international scientific community.

Table II				
FIVE-YEAR IMPACT OF MEXICAN LITERARY OUTPUT				
	Citations recorded		Impact*	
	1990-1994	1995-1999	1990-1994	1995-1999
Mexico	16,601	39,232	1.69	2.15
*Impact=citations recorded/articles published				
Source: ISI, 1999				

When one compares the increase, both in science output and in its quality, with certain countries in the regions such as Brazil, Argentina, Chile and Colombia, we once again encounter a trend very similar to that observed in Mexico, where both the science output and its quality grew substantially in the course of the last decade (see Table III). This study includes the United States of America as a reference, as the country is one of the world's main science producers.

Table III						
RELATIVE IMPACT IN SELECTED COUNTRIES						
	Articles published		Increase	Impact by country		Increase
	1990-1994	1995-1999	%	1990-1994	1995-1999	%
Argentina	10,408	16,603	60	1.78	2.31	30
Brazil	21,421	35,174	64	1.59	2.13	34
Chile	5,931	7,665	29	1.89	2.63	39
Colombia	1,057	2,068	96	2.08	2.99	44
Mexico	9,830	18,271	86	1.69	2.15	27
USA	1,141,692	1,226,785	7	4.78	5.63	18
Source: ISI, 1999.						

These results highlight the innovation potential and the capacity present in the countries concerned. To quote just one case, in Brazil 6,000 doctoral students graduated in 2000, exceeding the number of graduating students in Spain, Republic of Korea, or Canada in the same year.

What is particularly striking is the fact that in Mexico the number of patent applications originating in the academic sector (32 in 1999) continues to be very low in relation to national science production potential. While one reason for innovation in the academic environment not being reflected in patents may indeed be complexity and cost of acquiring a patent and maintaining rights, particularly abroad, it is equally true that there is no evidence, in the country's academic vision, of the development of the necessary infrastructure to support technology management processes in universities and research centers having been perceived as a priority.

The results analyzed to date show that in Mexico, and probably in other countries of the region, the conditions have not been right for the necessary bond to be created between the academic and scientific sector and the production apparatus capable of transforming technological development into corporate innovation machinery. It is not the purpose of this document to analyze the causes of this fragmentation of the flow of technology or the remedies for it; however, in such circumstances the existence of industrial property rights will contribute, albeit to a limited extent, to the provision of the conditions whereby creative potential can be released and channeled into tangible, sustainable development.

Indeed the improvement of patent protection levels will have a beneficial effect on innovation and technological development only where industrial property rights form part of an integral, articulated policy whose central objective is to increase national competitiveness through the creation of machinery with which to encourage the planning of corporate strategies in matters of technology, both for the acquisition and for the development and exploitation of that technology.

C. Impact of the adoption of the Patent Cooperation Treaty (PCT) on National Innovation and Technological Development

Mexico's accession to the PCT in 1995 opened a window of opportunity to national users, which in turn resulted in better use of the industrial property system and consequently enhanced promotion and internationalization of Mexican technology.

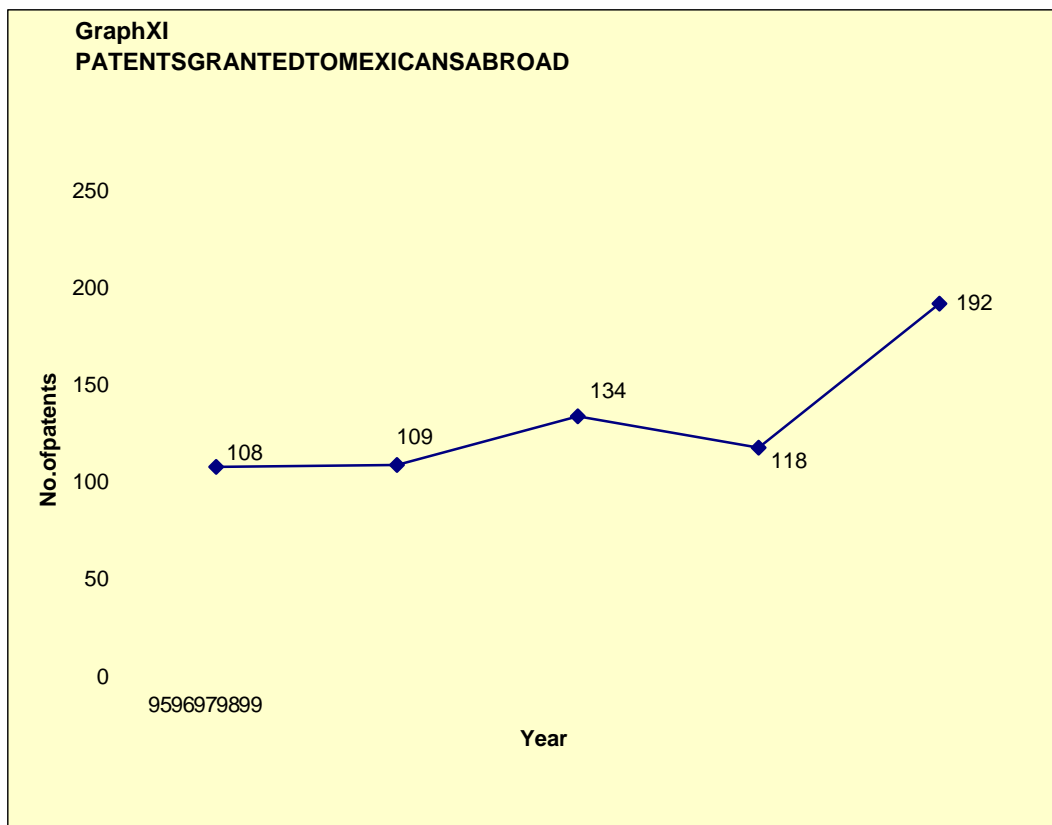
At the international level, the majority of patent applications originating in developing countries and making use of the PCT route come from seven countries: Republic of Korea (2,552), China (1,124), India (480), South Africa (407), Singapore (322), Brazil (204) and Mexico (128).

For this group in 2002, India recorded the highest rate of growth (51.9%) followed by Mexico (19.6%), Singapore (18.8%) and Republic of Korea (10.2%). Forty-eight percent of the PCT applications originating in developing countries came from Republic of Korea (see Table IV).

Table IV							
PCT APPLICATIONS FROM DEVELOPING COUNTRIES							
Year	2002			2001		2000	
Country	Applications received	% growth	World rank	Applications received	% growth	Applications received	% growth
Rep. of Korea	2552	10.1	8	2318	53.1	1514	91.6
China	1124	-32.7	15	1670	188.4	579	141.3
India	480	51.9	22	316	102.6	156	155.7
South Africa	407	-2.6	23	418	8.3	386	37.4
Singapore	322	18.8	24	271	20.4	225	56.3
Brazil	204	5.7	27	193	19.9	161	27.8
Mexico	128	19.6	29	107	50.7	71	39.2
Colombia	33	135.7	39	14			
Philippines	26	420	43	5			
Cuba	13	30	47	10	100	5	-40
Source: WIPO.							

At the national level, there has been a steady increase since 1995 in the number of national applicants who have opted for the PCT route (see Table V) with a consequent increase in the number of patents granted to Mexicans abroad (see Graph XI).

Table V								
MEXICAN PCT -ROUTE PATENT APPLICATIONS								
	1995	1996	1997	1998	1999	2000	2001	2002
Mexico	10	24	44	67	51	71	107	122
Source: IMPI.								

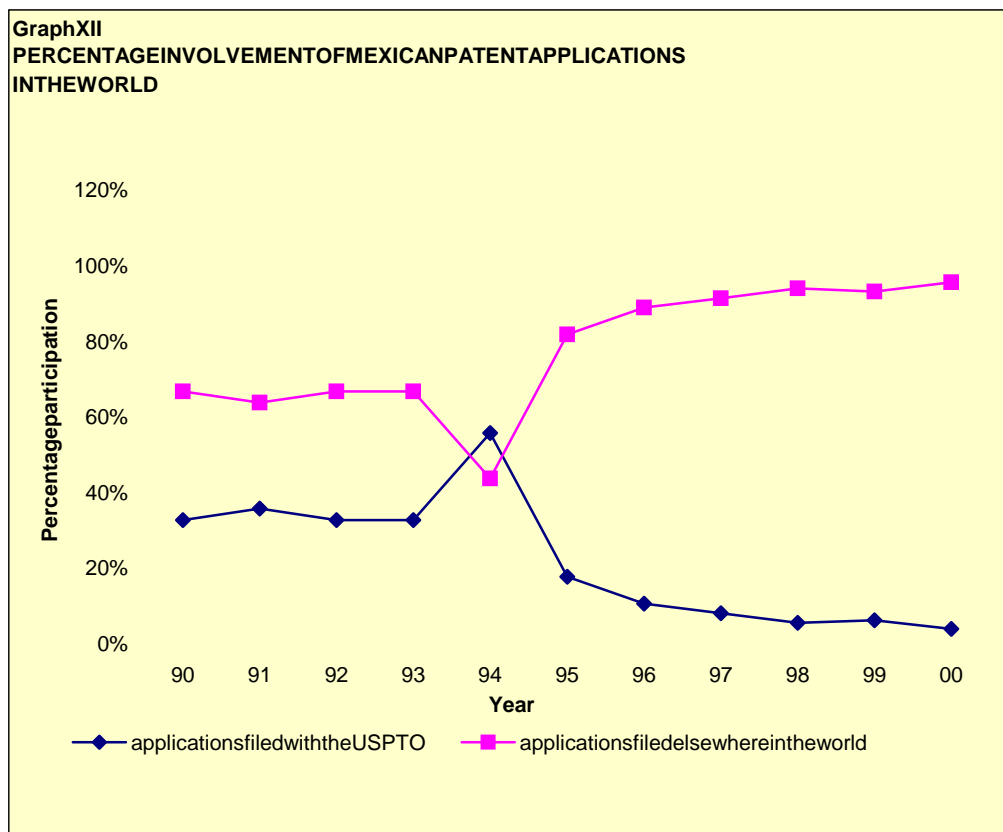


Source: WIPO .

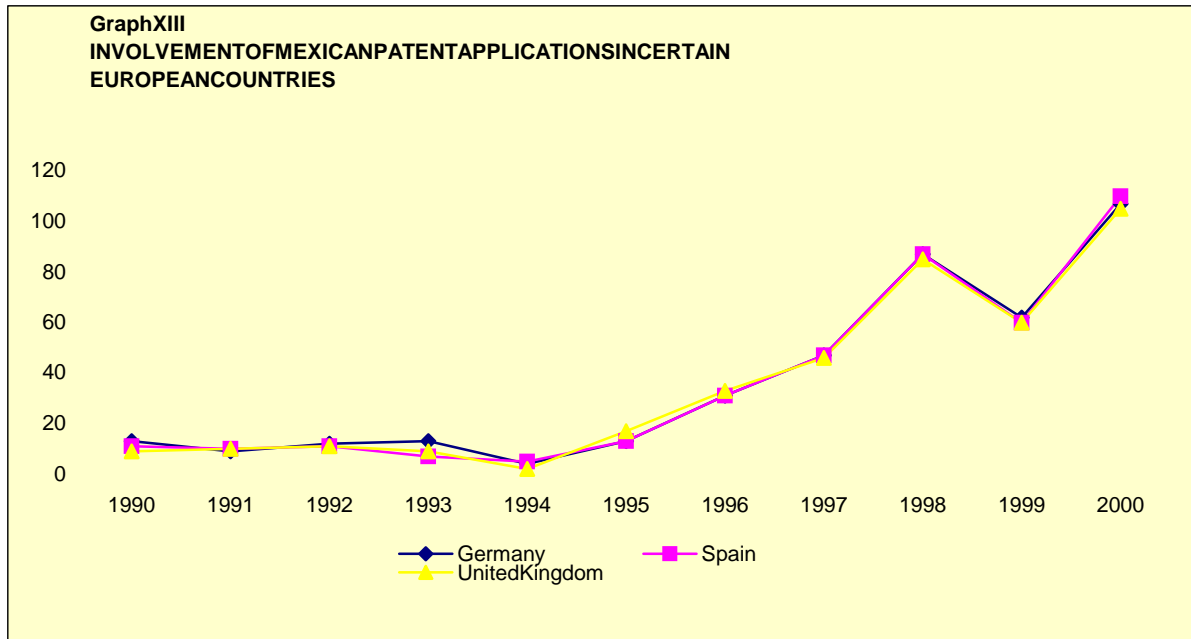
Of the national inventors who used the PCT route in the 1990s, 62 percent were independent inventors, 28 percent companies and the remainder academic institutions. This breakdown reflects the percentage participation noted within the country, and for decades in the applications filed by Mexican residents with the USPTO.

From a qualitative standpoint, the PCT has provided the Mexican user with the possibility of using a simpler and more reliable method of diversifying his options with respect to the number of countries on which to focus his intention to protect and consequently market his technology.

Prior to accession to the PCT, the international efforts of Mexican users were concentrated mainly on the United States of America, and that country accounted for about 35 percent of all applications filed abroad. Nevertheless, from 1995 onwards national applicants directed their interest more widely towards other regions of the globe in such a way that, of the Mexican applications filed internationally, only 4.6 percent were filed in the United States of America (see Graph XII), while the remainder went to other regions, mainly the European continent (see Graph XIII).



Source: WIPO.



Source: WIPO.

Finally, in an earlier chapter of this document we discussed the enormous benefit that would be derived from the adoption of machinery with which to effect the grant of patents according to an internationally recognized procedure and thereby improve the efficiency and quality of the services rendered by IMPI, but it would be worth analyzing the possible impact of such a measure on national users.

In science and technology production sectors there are two kinds of users of the system; first there are the applicants who want to protect their technological achievements by means of patents; the adoption of this method would enable them, by virtue of the entry into the national phase being further delayed, to establish and strengthen the necessary links with other production sectors so as to place their innovations in a good competitive position, this being combined with taking the maximum possible advantage of international ratification of their compliance with patentability requirements before entry into the national phase.

Then there are the users who use the system as interested third parties, and in the particular case of Mexico and many developing countries they are a majority. For them the alternative would provide the possibility of acquiring, as quickly as possible, an international framework within which to become involved in technological innovation with the legal certainty of not duplicating effort and combined with knowledge of commercial trends for years to come.

CHAPTER IV: CONCLUSIONS

At the thirty-sixth series of meetings of the Assemblies of the Member States of WIPO, the Director General launched an initiative known as the Patent Agenda by means of which it was hoped to give cohesion, direction and coherence to the future development of the international patents system.

This study set out to investigate the possible effect that the Patent Agenda, and more specifically the harmonization trend embodied in it, might have on developing countries. In doing so we have attempted to clarify some of the areas of uncertainty regarding the possible costs and benefits that the strengthening of the patents system might involve for certain areas of the population, especially those concerned with the production and development of technology.

This research was conducted using Mexico as the reference because in the course of the last 15 years, adding another wheel to the machinery that drives the policies of liberalization and globalization of its national economy, Mexico has opted to strengthen the industrial property rights by means of various harmonization devices that follow a sightline similar to those set forth in the Patent Agenda.

In attempting to analyze the possible interrelatedness of the policies for the modernization of the Mexican industrial property system and technological innovation processes, it has been necessary to access the latter as a fundamental part of a company's ability to stay ahead of its competitors and thereby create genuine competitive advantages for itself.

In this connection, the innovation strategies that have been implemented in Mexico have traditionally concentrated on the public-sector bodies and on the legal machinery that governs experimental research and development work, looking for innovation in the supply coming from the sciences sector and not in the needs of the production sector.³⁰

The result of this vision has been that, in the course of the last decade, Mexico has managed to establish itself internationally as a producer of high-quality and high-impact science and technology. However, as the indicators analyzed in this document show, there have not been, either in Mexico or indeed probably in other countries of the region, the right conditions for creating the necessary link between the academic and scientific sector and the corporate apparatus capable of converting technological development in entrepreneurial innovation machinery.

As a result of this fragmentation of the flow of technology, in the course of the last 20 years corporate competitiveness in Mexico has nothing to do with business strategies incorporating R&D work as the central axis of innovation processes. Indeed recent studies have shown that Mexican businesses innovate by acquiring technology and adapting it, establishing various forms of collaboration with other businesses for the purpose, but without necessarily engaging in R&D projects themselves, and by joining complex production chains in response to market stimuli.³¹

Under these circumstances, the strengthening of standards of patent protection will have a beneficial effect on innovation and technological development only where industrial property rights form part of an integral, articulated policy whose central objective is to increase national competitiveness by the creation of machinery with which to promote the planning of corporate strategies in matters of technology, including both the acquisition and the development and exploitation of that technology.

However, in the innovation scheme pursued in national industry, the process of modernization of the Mexican industrial property system, as designed, could be looked upon as an effective means of supporting the formation of technological alliances between various institutions, which would afford the Mexican entrepreneur access to the skills and expertise of other organizations with a view to acquiring and adapting technology.

As indicated by the results described in this document, the strengthening of industrial property rights has indeed caused national companies to increase their technology purchases in the last decade, and preference has been given to acquisition through the use of patents and other industrial property rights, as against the import of technical assistance services, which makes for less dependence on outside agencies.

On the other hand, the transfer of patent technology affords the recipient access to the whole wealth of knowledge and experience held by the owner of the title, while the transfer of technical knowledge developed elsewhere has effectively increased the ability of resident companies to compete on international markets through the use of advanced technology, as evidenced by the performance and composition of the exports of some of the leading acquirers of outside technology.

With regard to promoting an infrastructure capable of supporting any innovation scheme, either present or future, based on internal research and development processes or, as happens more and more often, relying on strategies of acquisition or adoption of the knowledge of others, industrial property policies become an essential element of the production systems within which the companies are involved. In this connection, the strengthening of the Mexican industrial property system, within the limits set by the commitments that Mexico made with a view to achieving better integration in the world economy, has had a decisive impact both on the country's economic progress and on the nature and operation of its institutions, making Mexico into the eighth world exporter and the second greatest recipient of direct foreign investment of all emerging economies.

What is more, with the PCT being both today and in the days to come a fundamental component of any international system for the protection of technological development, this study has devoted a special chapter to the exploration of the impact that the system has had on science and technology production sectors in Mexico.

Accession to the PCT has given impetus to innovation and technological development from three sides: the first is its ability to raise standards of quality and efficiency in the processing work done by IMPI; the second is the provision of a safe and smooth path that users can follow while diversifying their options regarding the number of countries towards which they should direct their intention to protect and consequently market their technology, and the third is the provision of an international framework for the benefit of users interested in embarking on technological innovation with the legal certainty of not duplicating effort, coupled with knowledge of commercial trends for the years to come.

Finally, one cannot overemphasize the importance of the proposal embodied in the PCT reform process regarding the adoption of machinery with which to grant patents according to an internationally -recognized procedure, and the possible impact that the measure might have not only on the work of industrial property offices of developing countries but on all users of the system.

The alternative of extending the international phase with a view to producing a high-quality, non-binding report confirming that the requirements of novelty, inventive step and industrial applicability have been met, so that the need for a substantive examination by national offices might be limited or even ruled out, would for them clearly mean a lessening of their workload and in turn would bring about an improvement in the quality and efficiency of examination and the grant of rights, but above all it would afford the possibility of devoting more attention to less experienced applicants, a group generally consisting of national users.

For those users of the system who wish to protect their technology by patenting it, the adoption of this measure would allow them, by delaying still more their entry into the national phase, to forge and strengthen the necessary links with other production sectors so as to place their innovations in a good competitive position, combined with the maximum advantage that they could take of international ratification of their compliance with patentability requirements before entry into the national phase.

For users who resort to the system as interested third parties, and in the particular case of Mexico and many developing countries they are a majority, the adoption of this measure would represent the discovery of the natural counterbalance to the patents system, namely simple and timely access to technological information which in turn would give that group the possibility of defining an international framework within which to become involved, in all legal security, in technological innovation through the imitation, acquisition or modification of technology protected in other regions of the world.

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CURRICULUMVITAE:
DeborahLazardSaltiel

ACADEMICTRAINING

SheobtainedherBiologyDegreefromtheUniversidadNacionalAutónomadeMéxico (UNAM)andreceivedan“HonoraryMention”forherthesisworkonthepoliomyelitisvirus. SheobtainedherMastersandDoctorate(PhD)DegreesfromtheCentrodeInvestigacióny EstudiosAvanzadosdelInstitutoPolitécnicoNacional(CINVESTAV)inthefieldsof MolecularBiologyandExperimentalPathologyrespectively.HerMastersandDoctorate Thesisgaverisetointernationalpublicationsandtothepresentationofherworkinnational andinternationalconferences.HerDoctorateThesis,onthemolecularbiologyofthemoeba, wasdistinguishedwiththe“AnnualPrizefortheScientificInvestigation: Dr. Jorge Rozenkranz”.

PROFESSIONALDEVELOPMENT

1994 - 2002: IntheMexicanInstituteofIndustrialProperty(IMPI)shewasinchargeofthe followingduties:

Advisor to the Director General on the Subject of Biotechnology (1994 - 1998)

- (a) Underthispositionsheparticipatedinthedraftingprocessofthe1994reforms of theMexicanIndustrialPropertyLaw.
- (b) Shewasincludedinthedesignandimplementationofthestrategiesthatleadto thecreationoftheBiotechnologicalDepartmentonthePatentDirection.
- (c) Shedevotedlinkingprogramswiththeacademicandmanagementsectorsin ordertocreateawareness,validateandsubsequentlypromotetheuseoftheintellectual propertysysteminordertostimulatethetechnologicaldevelopmentofthecountry.
- (d) Shehasbeenaspeakerandaprofessorofindustrialpropertyonthesubjectof patentsinalmostallmajorUniversitiesorTechnologicalCentersinMéxicothathavea BiotechnologicalDepartment.Shehasalsoparticipatedasaspeakerinseveralnational and internationalforumsandhaswrittensomepublicationsrelatedtotheprotectionof biotechnologicalinventions.
- (e) Sheestablishedcooperationagreementswiththeenvironmentalsectorinorderto findcommongroundforthediscussiononthe geneticresourcesandtraditionalknowledge protection.

Divisional Director of Patents (1999 -2002)

(a) Under this position she was responsible for the implementation of the “IMPI 2000 Project”, which aimed to consolidate significant growth in the Patent Direction in order to increase the production and reduce the backlog while maintaining the quality of the patent granting procedure.

(b) She adopted several policies to improve the quality and the quantity of the services that this Direction provides, such as the implementation of the Formalities Examination in the Regional Offices throughout the country; the adoption of the International Preliminary Examination Report (IPER) as an auxiliary tool in the Patents Substantive Examination and the creation of a special unit dedicated to develop quality control projects.

(c) She was also responsible for the implementation of the new Patent Software System (created through a cooperation agreement with WIPO), which permitted an integral administration of the patent procedure.

(d) She was involved in the design of the Patent Direction strategic planning for the 2001-2006 period.

(e) She participated as a member of the Mexican Delegation in the sessions of the Committee of Experts, the Diplomatic Conference of the PLT as well as in the Traditional Knowledge Conferences at WIPO.

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