3rd Annual Conference of the EPIP Association
Bern, Switzerland

October 3rd-4th , 2008.

Session A-1
IPR and development

Research:

The production of patented technology by Mexican public and private R&D Institutions, 1980-2007

presented by Jaime Aboites Aguilar (UAM-Mexico)
and Manuel Soria López (UAM-Mexico)

INDEX

Introduction.

Throughout the globalization process, the production of knowledge (diffusion, accumulation and productive use) has emerged as a central topic in the discussion on economic growth. The economics of knowledge has emphasized the rising importance of public and private R&D institutions and their link with the industrial sector (development of new or improved products for the market). Besides, the patterns in the production of knowledge have been transformed significantly (Gibbons, 1996), in such a way, that there are public R&D institutions that participate jointly with private firms in generating new knowledge.

In the USA, the Bayh-Dole Act of 1980 boosted the link between research institutes and firms. In fact this Act "… allows the transfer of exclusive control over many government funded inventions to universities and businesses operating with federal contracts for the purpose of further development and commercialization."[1] This institutional change constitutes an important element of a market oriented incentive system, under which public universities and research institutes can commercialize certain findings, and also collaborate with private enterprises in selected developments. Mowery and Sampat (2007) have assessed the impact of this Bayh-Dole Act in the US industrial sector, whereas Cohen *et al.* (1999) analyzed the changing perceptions of research scientists in the UK towards the market orientation of public research institutes.

In developing countries, and particularly in Mexico, the effect of this institutional change has olnly been partially evaluated (Morabitto, etc.). The aim of this paper is to analyze the patterns of production of new technological knowledge by Mexican public and private research institutions[2] using the registered patents within Mexico (BANAPA of Mexican Institute of Industrial Property) and the US Patent and Trade Mark Office (USPTO) during the period 1980-2007. This text could contribute to undertanding the changing role of the differente agents, particularly the role of this kind of institutions in the Mexican industrial sector.

This period is significant because Mexico was included in this agreement in 1994, upon signing the NAFTA. This fact meant a deep change in its economic model as it went from an *import substitution industrialization* period to an open economy.

Besides, Mexico had to change its law on intellectual property rights in order to sign the agreemnet of free trade in 1991 during the NAFTA negotiations. This change of law was made according to the TRIPs proposals, which were discussed in the World Trade Organization (WTO) before the TRIPs agreement in Marrakesh (1994). This institutional and economic changes have been considered as a transition to the modernization of the economy.

The text is divided into seven parts. In the first part we present the methodology and database used in this study. In the second, the patterns of Mexican patenting in private and public universities and R&D Institutions in BANAPA-MIIP and USPTO are analyzed. In the third part, we analyze the patenting in private and public universities and R&D Institutions. In the fourth, we explore the technological fields where the patents are granted

[1] http://www.cptech.org/ip/health/bd/
[2] Including public and private universities.

to the Mexican R&D institutions. In the fifth part, the level of concentration is analyzed. the Mexican Petroleum Institute (MIP) is studied in the sixth part, in terms of its technological knowledge production and its relationship with PEMEX. Finally, the main findings and conclusions are presented in the last part.

1. Methodology and Data

The information used in this study consists of patents granted by BANAPA – MIIP (Mexico Patent Office) and by USPTO to asignees from Mexican private and public Universities and R&D Institutions.

Mexico Data.
Data (1980-2007) was taken from the Banapa-Mexican Institute of Industrial Property (MIIP)
The databases that were used for the applied and granted patents of the study were:

- Country of residence of asignee
- Dates of patent applied
- Dates of patent grant
- International Clasification of WIPO and USPTO classifications according to the concordance USPTO.

US Data:
Data (1980-2002) was taken from the NBER Patent Citations Database updated by B. Hall in December 2004. The rest (2003-2007) was taken from USPTO.
The sections of the database that were used for the patents granted to the studied countries were:

- Country of residence of asignee
- Dates of patent application
- Dates of patent grant
- USPTO classifications it belongs to
- Backward citations in USPTO patents
- Forward citations in USPTO patents

Given that USPTO is not a hierarchical classification system, Jaffe and Trajtenberg (2004) grouped all classifications into six main technological categories: Chemicals, Computers and Communications, Drugs, Electric and Electronics, Mechanical, and Others.

2. Patterns of Mexican patenting

In spite of the adhesion of Mexico to the NAFTA and the global economy fourteen years ago, the inventive activity of Mexican residents (BANAPA-Mexico) and Mexican asignees in USPTO remains very low. The average number of patents per year per resident inside Mexico was 164 during 1980-2007, while the number was 44 in USPTO for the same period. There is not a significant change in patenting activity after NAFTA. There were 4,432 patents granted in BANAPA and 1,184 in USPTO during the period 1980-2007 (Table 1).

Table 1. BANAPA and USPTO: Total Patent Grants to Mexican Assignees According to Type, 1980-2007

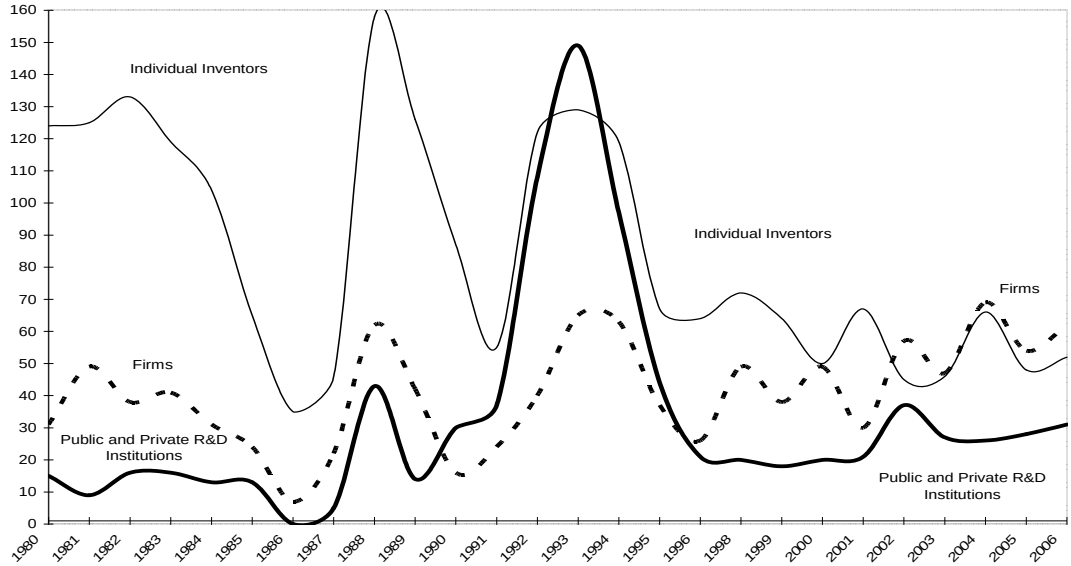
Type of assignee		BANAPA			USPTO		
		Number	Percentage	Average	Number	Percentage	Average
1	Individual Inventors	2331	52.6	86.3	679	57.3	25.1
2	Firms	1170	26.4	43.3	413	34.9	15.3
3	R&D Institutions	931	21.0	34.5	92	7.8	3.4
Total Patents		4432	100	164.1	1184	100	43.9

Source: BANAPA-IMPI, Mexico, 2008; USPTO, USA, 2008.

3. Patenting in R&D Institutions in Mexico

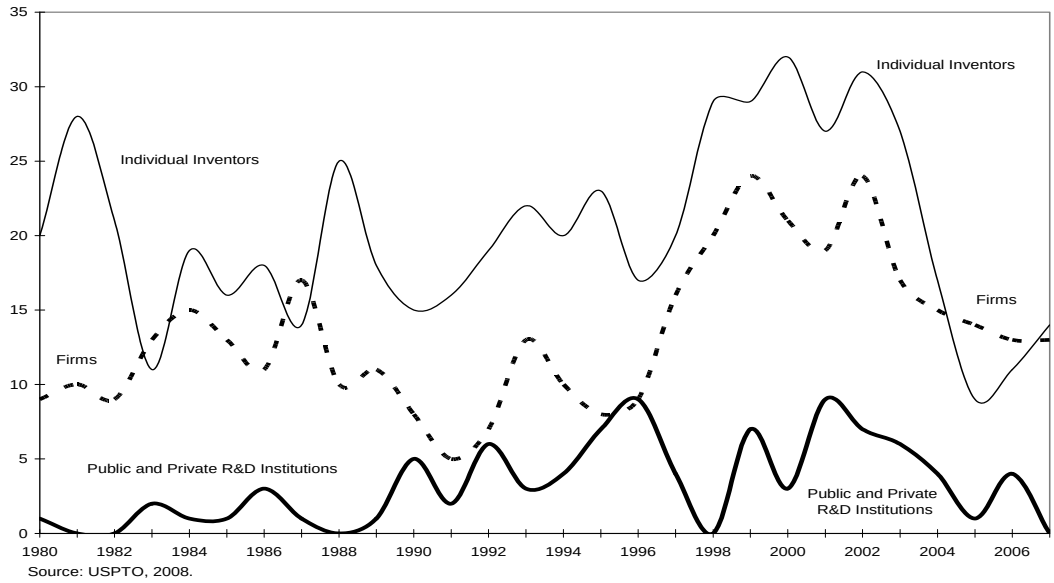
The share of patents belonging to private and public R&D institutions in both cases, BANAPA and USPTO, is lower in relation to individual inventors and enterprises. **Graphs 1 and 2** show the predominace of individual inventors: more than half of the patents granted in both cases. Indeed, patenting in private and public R&D institutions is remarkably low (an average of 34 patents per year in BANAPA and 3.4 patents in USPTO during the period: 1980-2007 (Table1).

Graph 1. BANAPA: Patent Grants to Mexican Public and Private R&D Institutions by type of assignee, 1980-2007



Source: BANAPA-IMPI, México, 2008.

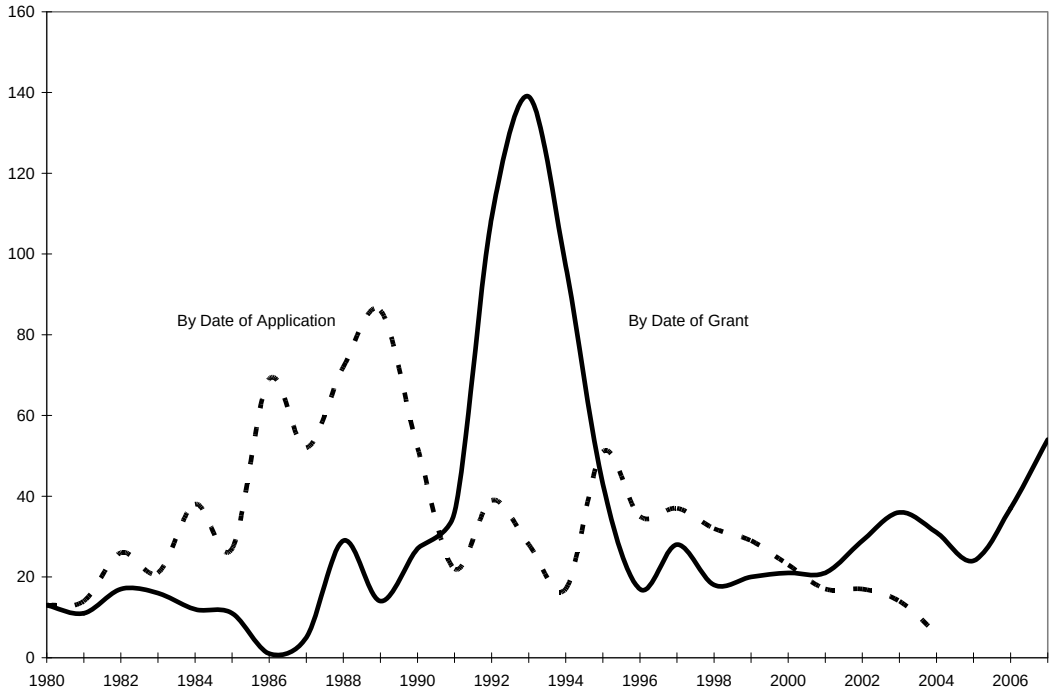
Graph 2. USPTO: Patent Grants to Mexican Public and Private R&D Institutions by type of assignee, 1980-2007



Graph 3 shows the patents granted in BANAPA to 39 private and public R&D Institutions by date of aplications and grant during 1980-2007 (See Appendix 1)[3]. And Graph 4 presents the patents granted in USPTO to 15 private and public mexican R&D institutions during 1980-2007 arranged by date of applications and grant[4] (See Appendix **1**). Both graphs show a subperiod of increase in patent applications until the beginings of the 90s. This growth of aplications was transformed into patents granted with some lag (roughly 4 years for Mexico and USPTO between one and two years) and very concentrated between 1990 and 1996 for BANAPA and 1993 to 1997 for USPTO. After that, came an important drop in patenting in private and public R&D institutions.

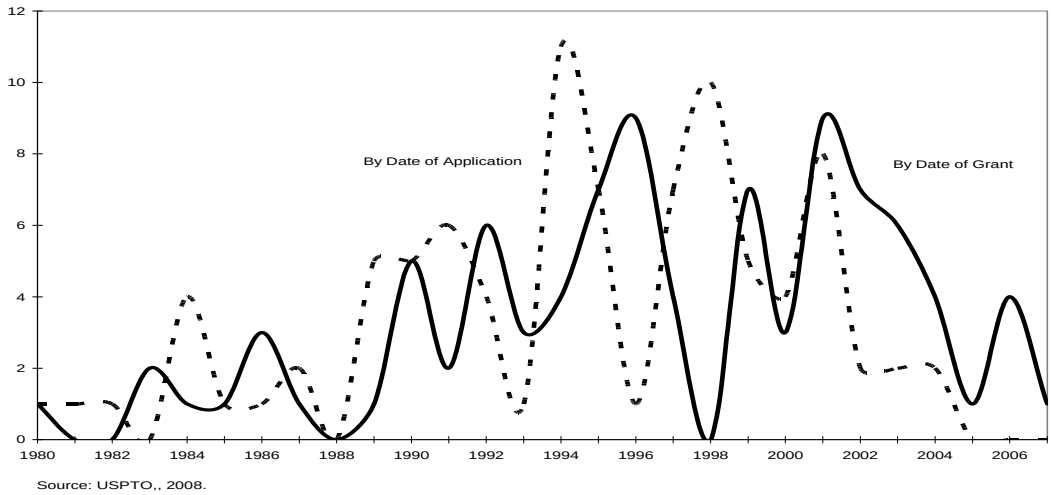
Graph 3. BANAPA: Patent grants of Mexican public and private R&D Institutions, 1980.2007. (By date of application and date of grant)

[3] 36 public and 3 private R&D Institutions.
[4] 14 public and 1 private R&D Institutions.



Source: BANAPA-IMPI, México,

Graph 4. USPTO: Patent grants of Mexican public and private R&D Institutions, 1980-2007. (By date of application and date of grant)



4. Patenting by technological fields.

Table 2 shows the patenting evolution in Mexico arranged by technological field in BANAPA and USPTO for the period under analisys:

First: the patenting activiy is dominated by chemestry in both patenting offices. But the concentration level is completely diferent: around 47 % in BANAPA and only 25 % in USPTO.

Secondly: The Electric-Electronic sector is ranked second in BANAPA with 15 %, followed by Other technologies with roughly 13 %. Meanwhile, Drugs and Pharma, and Mechanical have the same percentage (*22 %*) in USPTO.

Summing up, 75 % of BANAPA is made up of three technological fields: Chemical, Electric & Electronic and Others technologies. That contrasts with the pattern distribution of total Mexican patents where Chemical, Mechanical and Others make up 75 %[5]. Meanwhile, 68 % of USPTO is made up of Chemical, Drugs & Pharma, and Mechanical.

Another important fact of the private and public R&D institutions is that modern technological fields such as Communication-Computers, Electric-Electronics and Drugs and Pharma have a larger portion of patents in USPTO (39 %) than in BANAPA (31%).

[5] Aboites and Soria (1999) chapter iv.

Table 2. BANAPA and USPTO: Patent Grants to Mexican Public and Private R&D Institutions by Technological Field, 1980-2007

Technological Field		BANAPA		USPTO	
		Number	Percentage	Number	Percentage
1	Computing and Communications	98	10.7	4	4.3
2	Electrical and Electronic	139	15.2	12	13.0
3	Medicines and Pharmaceuticals	47	5.1	20	21.7
4	Chemical	429	46.8	23	25.0
5	Mechanical	81	8.8	20	21.7
6	Other Technologies	122	13.3	13	14.1
Total		916	100	92	100

Fuente: BANAPA-IMPI, Mexico, 2008; USPTO, 2008

5. Patenting concentration level

A very import feature of Mexican patenting R&D institutions in both patent offices is their high level of concentration. In Mexico 5 institutions hold roughly 88 % of all patents granted, and 74% in USPTO (Table 3). However, the positions of the private and public R&D institutions in each set is different. Two thirds of patents at BANAPA belong to the energy sector (Mexican Petroleum Institute and Electricity Research Institute) while this same institutions reach only 10 % of patenting in USPTO. In USPTO the concentration is less. Effectively, the Condumex R&D center has 23% of the total patents granted to Mexican R&D institutions in USPTO. This R&D center belongs to Carso Global Telecom, and is ranked 424th in the global Fortune 500 (2008).

Table 3. BANAPA and USPTO: Top Patenting and Concentration in Mexican Public and Private R&D Institutions, 1980-2007

Institution		BANAPA		USPTO	
I. Top patenting public and private R&D institutions		Patents	Position	Patents	Position
1	Instituto Mexicano del Petróleo/ National Petroleum Institute (Public)	553	*1*	9	*5*
2	UNAM/ National Autonomous Universtity of Mexico (Public)	109	*2*	10	*4*
3	Centro de Investigación y Desarrollo Condumex / Condumex Research and Development Center (Private)	53	*3*	21	*1*
4	Instituto de Investigaciones Eléctricas / Electricity Research Institute (Public)	50	*4*	0	-
5	Instituto Politécnico Nacional / National Polytechnic Institute (Public)	37	*5*	20	*2*
7	Instituto Mexicano de Investigaciones Siderúrgicas / Institute for Steal and Iron Research* (Public)	5*	-	11	*3*
II. Top patenting and other public and private R&D instotitions		Number	Percentage	Number	Percentage
1	Subtotal: Top patenting public and private R&D institutions	802	86.1	71	77.2
2	Subtotal: Other public and private R&D institutions: BANAPA (34) and USPTO (10)	129	13.9	21	22.8
3	Total public and private R&D institutions patent grants in BANAPA and USPTO	931	100	92	100

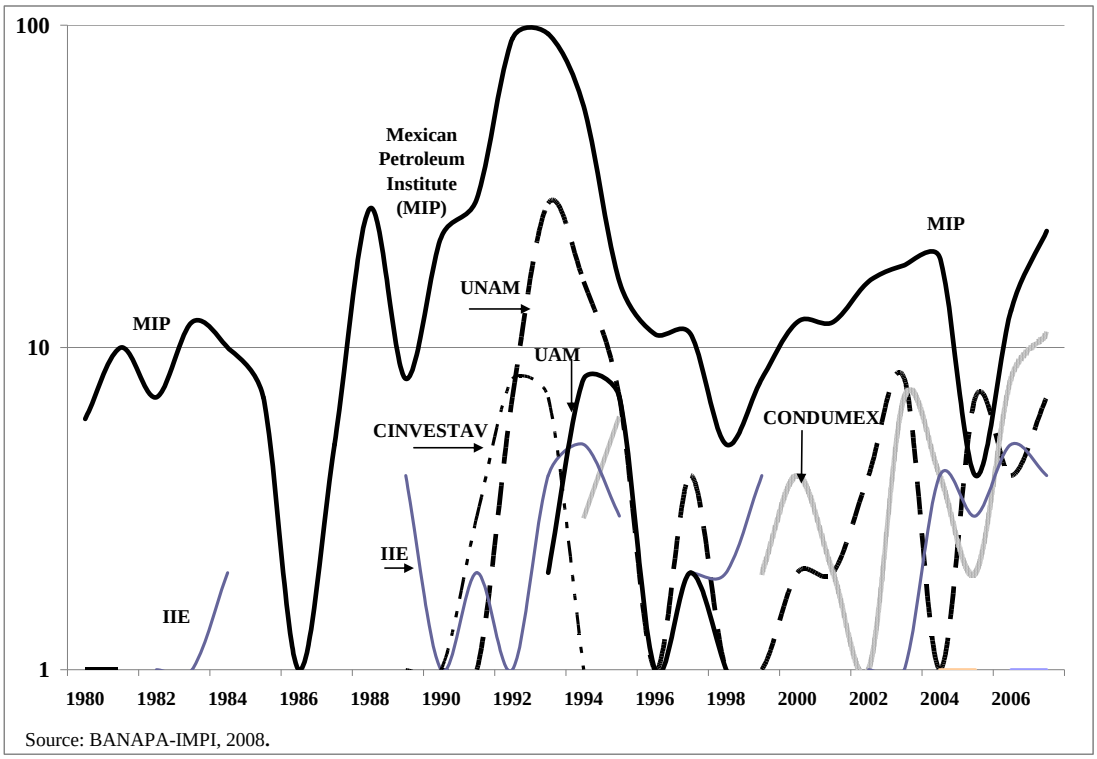
Source: BANAPA-IMPI, Mexico, 2008; and USPTO, USA, 2008.

*This is a Top institution at USPTO (third place), while at BANAPA it is not (only 5 patents registered and in position 14 of the list, see Apendix 1).

The main Mexican universities (UNAM and National Polytechnic Institute) and MIP also have signicant presence among the top patenters in USPTO. UNAM has the second position in BANAPA and the fourth in USPTO, while MPI has the fifth position in BANAPA and the second in USPTO showing a very important contribution of Mexican private and public R&D Institutions to domestic and foreign patenting.

Finally, even though the Mexican Institute for Steel and Iron Research (MISR) reached an important position in USPTO (third) most of its patents were granted in the eighties, during an *Import Substitution Industrialization* period. But in the last decade patenting in USPTO has been marginal. After these institutions the patenting of private and public universities and R&D Institutions in Mexico is sporadic and not coherent (See Graphic 5).

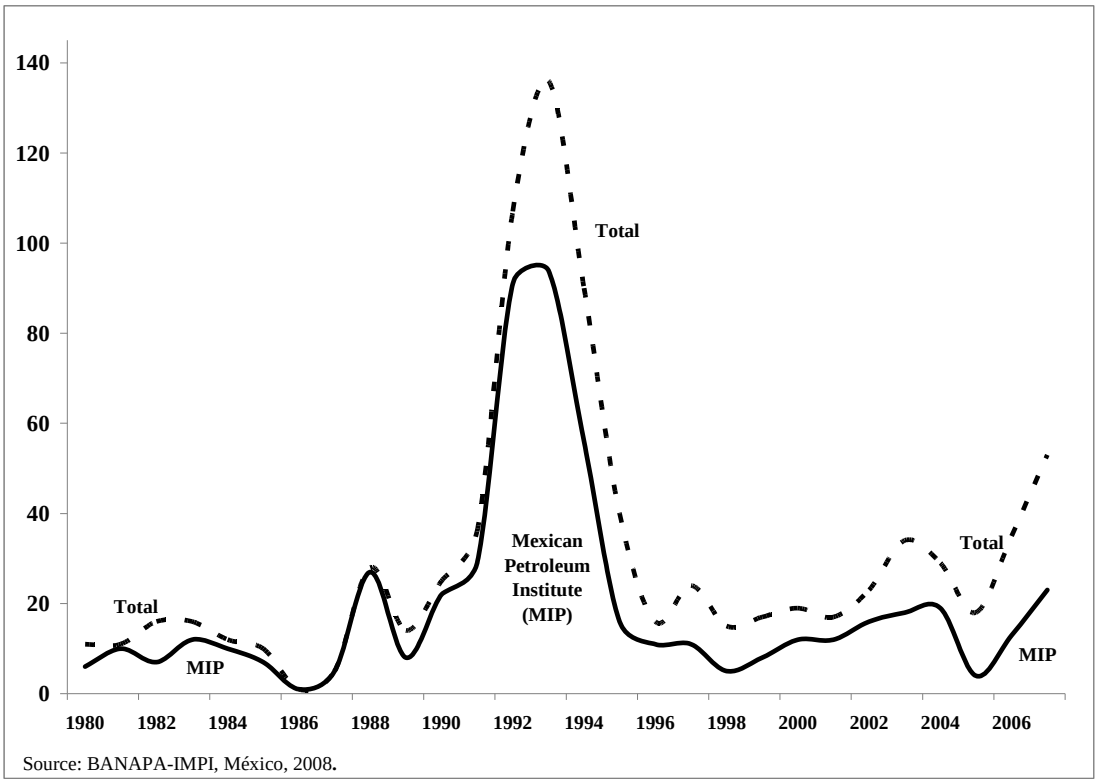
Graph 5. BANAPA: Patent Grants to Mexican Petroleum Institute and other Mexican Public and Private R&D Institutions, 1980-2007 (Semilog)



Source: BANAPA-IMPI, 2008.

Given their remarkable presence, patenting institutions in the energy sector require more attention, but one of them in particular: the MIP. Graph 6 evidences that Mexican Petroleum Institute patenting (553 patents) shape the profile the patenting of private and public universities and R&D Institutions in all period. But these strong prescense of MIP contrast with their patenting in USPTO (¡only 9!, roughly one each tree years). This patenting pattern in the Mexican energy sector suggests that the oil industry strategy is certainly locked inside the domestic market being crude oil the sole export product. In addition the patenting activity seem not have relation with the framework intelectual property (TRIPs) give that the activity remain very low.

Graph 6. BANAPA: Total Patent Grants to Mexican Petroleum Institute and other Mexican Public and Private R&D Institutions, 1980-2007



Source: BANAPA-IMPI, México, 2008.

6. The preponderant role of the MIP in patenting

The Mexican Petroleum Institute is essentially the R&D and technological service departament of the Mexican Petroleum (PEMEX). This is a state-owned petroleum company that has extracted an average of 3.3 million barrels of crude per day from the Gulf of Mexico during the last decade. This enterprise, which is the bigest in the mexican economy, ranks 42nd in the global Fortune 500. Almost all the R&D activity of the MPI depends on PEMEX´s demand and financing.

One outstanding R&D activity from the MPI is the inventive activity in the generation and improvement of new catalysts. Roughy 47 % of the R&D budget is devoted to inventive activity in catalysts to feed PEMEX refineries which produce around 90% of domestic consumption of fuel, diesesl, turbosine, etc.

The list of catalysts which have been a comercial success in PEMEX refineries is found in Table 4. The catalysts in Table 4 represent the production of patents derived from the push-demand policy of PEMEX. There are roughly three more patents for every succesful catalyst that makes is to the Industrial Demonstration stage.

It is highly important to note in Table 4 that during the last yeast there have not been an incorporation of ne patents codified MPI catalysts in PEMEX refineries. Indeed, the available information ends in 2006, but the last catalyst patent dates back to 2002. This shows that the business link based in the improvement and production of new catalysts is weakening. This weakening started in the late 90´s (after NAFTA) but gains momentum after the first five years.

Table 4:
MIP Patents of Catalysts incorporated by PEMEX-Refinery through Technology Partners, 1976-2006

No.	Patents Catalyst	Process	Technology Partner	Date for Industrial Demonstration	Expiration
1	IMP-DSD-1(U)	HDS	UOP	1976	1984
2	IMP-DSD-1(K)	HDS	UCI	1979	1995
3	IMP-DSD-2	HDS	Exim-Gro(MX)	1981	1986
4	IMP-OM-1	Sweetening	Pyosa (MX)	1982	1987
5	IMP-TPC-1	Polymerization	UCI	1983	In use
6	IMP-OM-2	Sweetening	Pyosa (MX)	1983	1987
7	IMP-RNA-1	Platforming	Criterion	1983	In use
8	IMP-DSD-3	HDS	Criterion	1984	1988
9	IMP-DSD-5	HDS	UCI	1984	1993
10	IMP-AN-1	Aacrylonitrile	UCI	1985	1993
11	IMP-Oscar Monroy-1 (M)	Sweetenigng	UOP	1985	In use
12	IMP-DSD-4	HDS	Katalco	1986	1989
13	IMP-RNA-2	Platforming	Criterion	1986	In use
14	IMP-DZ-1	Aacrylonitrile	UCI	1988	1993
15	IMP-DSD-3(+)	HDS	Criterion	1988	In use
16	IMP-DSD-5(E)	HDS	UCI	1988	1996
17	IMP-DSD-5E(+)	HDS	UCI	1989	In use
18	IMP-FCC-06 (R)	FCC	Engelhard	1989	1996
19	IMP-I0-01	FCC Additives	Intercat	1989	1989
20	IMP-I0-02	FCC Additives.	Intercat	1989	1993
21	IMP-FCC-05	FCC	Engelhard	1989	1997
22	IMP-FCC-06	FCC	Engelhard	1990	1996
23	IMP-TPC-1(+)	Polimerización	UCI	1990	1991
24	IMP-DSD-11	HDS	Criterion	1991	In use
25	IMP-I0-03	FCC Aditives.	Intercat	1991	1995
26	IMP-DSD-10	HDS	UCI	1993	In use
27	IMP-FCC-05 (MD)	FCC	Engelhard	1993	In use
28	IMP-FCC-05 (R)	FCC	Engelhard	1993	In use
29	IMP-PC-500	FCC Additives.	Intercat	1993	In use
30	IMP-RNA-4	Reformación	Criterion	1993	In use
31	IMP-RESOX-01	FCC Aditivos.	Intercat	1994	Suspended
32	IMP-DSD-1(D)	HDS	UCI	1995	1998
33	IMP-FCC-51	FCC	Grace	1995	In use
34	IMP-I0-04	FCC Additives	Intercat	1995	In use

35	IMP-DSD-14	HDS	Criterion	1996	In use
36	IMP-FCC-11	FCC	Engelhard	1996	In use
37	IMP-FCC-12	FCC	Engelhard	1996	1997
38	IMP-FCC-12 (R)	FCC	Engelhard	1997	In use
39	IMP-OM-4	Sweetening	UOP	1997	In use
40	IMP-RNA-1(M)	Platformation	Acreon	1997	In use
41	IMP-DSD-17	HDS	Acreon	1998	In use
42	IMP-FCC-51 (Precision)	FCC	Grace	2000	In use
43	IMP-DSD-14+	HDS	Criterion	2002	In use

Source: Self Elaboration based on "*Prospective and Retros pective Analysis of the catalyst business line inside the IMP"*, 1998. Information regarding recent years was supplied by the Catalyst Solutions Management

Half of this volume is exported to the US. These foreign sales represent 43 % of the government income.

The link of MIP with the oil industry has been remarkable. The oil indusry is dominated by PEMEX the bigest public enterprise , specially in the production a new knowledge for refining industry. However, after the nafata, the R&D activity and the corresponding patenting declined significatly.

Conclusions

Although the number of Mexican patents granted (BANAPA and USPTO) is very low, the most important patenting activity in private and public universities and R&D Institutions comes from monopolies, public (PEMEX) and private (CONDUMEX). And their activities is linked to business. The role of universities is considerably lower and weakly linked to industry.

The patenting in BANAPA is highly concentrated among few private and public universities and R&D Institutions. More than 50% of patents (in the chemical and Other technologies) are registred to MIP wich is the R&D department of PEMEX, the most important public enterprise in the mexican economy for the last 25 years.

The case in USPTO is different. The top player is a private research center (CONDUMEX) with 21 patents in Computer-Communication, and Electric-Electronic. Condumex is the R&D center of most important private enterprise in the Mexican economy.

V. Bibliography

Aboites, J., J. Beltrán O., T y J. M. Domínguez E. (2003), *Innovación e impacto de la catálisis en el IMP: Retrospectiva y retos*, Siglo XXI, México.

Basberg, B. (1987), "Patents and the measurement of technological change: A survey of the literature", *Research Policy* núm. 16, nos. 2-4.

Ciceri, H. N. y A. Mercado (2003), "Resultados de una estrategia de generación de capacidades tecnológicas en México: el caso del IMP", *Ciencia y Desarrollo*, Vol. XVII, Núm. 100, México.

Cohen, L., J. Duberley, y J. McAuley (1999a), "Fuelling Discovery or Monitoring Productivity: Research Scientists Changing Perceptions of Management". *Organization*, num 6, vol. 3.

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scout, P., y M. Trow (1994) *La nueva producción de conocimiento; La dinámica de la ciencia y la investigación en las sociedades contemporáneas*, Ediciones Pomares-Corredor, Barcelona.

Griliches, Z. (1990), "Patent statistics as economic indicators: A survey", Journal of Economic Literature, Vol. 28, No. 4.

Hall B. H., A. B. Jaffe, and M. Trajtenberg (2002), "The NBER Patent-Citation Data File: Lessons, Insights, and Methodological Tools" in Jaffe A. B. and M. Trajtenberg, (eds.), *Patents, Citations & Innovations.* A Window on the Knowledge Economy. MIT.

Jaffe A. B. and M. Trajtenberg, (2002), *Patents, Citations & Innovations.* A Window on the Knowledge Economy. MIT.

Rath, A.itav (1998), *Towards Greater Effectiveness of Industrial Research Institutions: Some Tools and Trends*, New Age International Ltd., New Dehli.

Rush, H., Arnold, E., Bessant, J. y M. Hobday (1998), "Strategic planning in research and technology institutes" *R & D Management 28,* 2, UK-USA

Rush, H., Arnold, E., Bessant, J., Hobday, M. y R. Murray (1996), *Technology Institutes: Strategies for Best Practice*, International Thomson Business Press, London.

Soria López, Manuel (2004), *La organización de la innovación tecnológica: Los catalizadores del Instituto Mexicano del Petróleo*, Tesis de Doctorado en Estudios Organizacionales, División de Ciencias Sociales y Humanidades, UAM Iztapalapa, México.

Appendix 1. BANAPA and USPTO: Patent Grants to Mexican Public and Private R&D Institutions, 1980-2007

	Institution	Type	BANAPA		USPTO	
			Number	Percentage	Number	Percentage
1	Instituto Mexicano del Petróleo/ National Petroleum Institute	Public	553	59.4	9	9.8
2	UNAM/ National Autonomous Universtity of Mexico	Public	109	11.7	10	10.9
3	Centro de Investigación y Desarrollo Condumex / Condumex Research and Development Center	Private	53	5.7	21	22.8
4	Instituto de Investigaciones Eléctricas / Electricity Research Institute	Public	50	5.4	0	0.0
5	CINVESTAV / Research and Advanced Studies Center of the National Polytechnic Institute	Public	27	2.9	0	0.0
6	UAM / Metropolitan Autonomous University	Public	22	2.4	1	1.1
7	Centro de Investigación en Química Aplicada / Research Center for Applied Chemistry	Public	16	1.7	2	2.2
8	CONACYT / National Counsil for Science and Technology	Public	11	1.2	1	1.1
9	Instituto Politécnico Nacional / National Polytechnic Institute	Public	10	1.1	20	21.7
10	Instituto Nacional de Investigaciones Nucleares / National Institute for Nuclear Research	Public	7	0.8	2	2.2
11	Centro de Investigación y Asistencia en Tecnología y Diseño del Estado de Jalisco / Research and Assistance Center on Technology and Design of the State of Jalisco	Public	6	0.6	0	0.0
12	Centro de Investigación y Asistencia en Tecnología y Diseño del Estado de Querétaro / Research and Assistance Center on Technology and Design of the State of Queretaro	Public	6	0.6	7	7.6
13	Universidad Autónoma de Nuevo León / Autonomous University of Nuevo Leon	Public	6	0.6	2	2.2
14	Universidad de Guanajuato / University of Guanajuato	Public	6	0.6	0	0.0
15	Instituto Mexicano de Investigaciones Siderúrgicas / Institute for Steal and Iron Research	Public	5	0.5	11	12.0
16	Sria. de Salud Direc. Gral. de Investigacion y desarrollo / Ministry of Health Research and Development Directorate	Public	5	0.5	0	0.0
17	Benemerita Universidad Autónoma de Puebla / Worthy Autonomous University of Puebla	Public	4	0.4	0	0.0
18	Colegio de Post-graduados / Post Graduate School	Public	3	0.3	0	0.0
19	Insituto Mexicano del Transporte / Mexican Transport Institute	Public	3	0.3	0	0.0
20	Instituto Nacional de La Nutrición "Salvador Zubiran" / Salvador Subiran National Institute of Nutrition	Public	3	0.3	0	0.0

Appendix 1. BANAPA and USPTO: Patent Grants to Mexican Public and Private R&D Institutions, 1980-2007 (continued…)

21	Universidad Autónoma de Yucatán / Autonomous University of Yucatan	Public	3	0.3	0	0.0
22	Centro de Investigacion Cientifica de Yucatan, A.C./ Scientific Reseaarch Institute of Yucatan	Public	2	0.2	0	0.0
23	Centro de Investigaciones Biologicas de Baja California Sur /Biology Research Center of Baja California Sur	Public	2	0.2	0	0.0
24	Centro de Investigaciones Biológicas del Noreste / NorthEast Center for Biology Research	Public	2	0.2	0	0.0
25	Instituto Nacional de Cardiología "Ignacio Chávez" / Ignacio Chavez National Institute of Cardiology	Public	2	0.2	0	0.0
26	Universidad Tecnológica de Nezahualcoyotl / Technology University of Nezahualcoyotl	Public	2	0.2	0	0.0
27	Centro de Investigación Científica y de Educación Superior de Ensenada / Scientific Research and Higher Education Center of Ensenada	Public	1	0.1	2	2.2
28	Centro de Investigacion en Materiales Avanzados, S.C./ Advanced Materials Research Center	Private	1	0.1	0	0.0
29	Centro de Investigación y Desarrollo de Telecomunicaciones / Telecommunications Research and Development Center	Public	1	0.1	0	0.0
30	Instituto Bioclón, S.A. de C.V. / Bioclon Institute	Private	1	0.1	0	0.0
31	Instituto de Ecologia, A.C./ Institute of Ecology	Public	1	0.1	1	1.1
32	Instituto de Investigacion y desarrollo Quimico-Biologico,Sa / Chemical and Biological Research and Development Institute	Public	1	0.1	0	0.0
33	Instituto de Madera, Celusosa y Papel de La Universidad de G./ Wood, Cululose and Paper Institute of the University of Guadalajara	Public	1	0.1	0	0.0
34	Instituto Francés de Investigaciones Cientificas de la UAM / French Institute for Research of the MAU	Public	1	0.1	0	0.0
35	Instituto Mexicano de Investicaciones Tecnologicas, A.C.	Public	1	0.1	1	1.1
36	Instituto Mexicano de Tecnología del Agua / Mexican Institute of Water Technology	Public	1	0.1	0	0.0
37	Instituto Nacional de Astrofísica Óptica / National Institute of Optical Astrophysics	Public	1	0.1	0	0.0
38	Instituto Tecnológico y de Estudios Superiores de Monterrey / Monterrey Institute of Technology and Higher Education	Private	1	0.1	1	1.1
39	Universidad Autónoma de Tamaulipas / Autonomous University of Tamaulipas	Public	1	0.1	0	0.0
40	Instituto Mexicano de Investigaciones de Manufacturas Metal Mecánicas/ Mexican Institute of Metal and Mechanical Manufacturing Research	Public	0	0.0	1	1.1
	Total		931	100	92	100

Source: BANAPA-IMPI, México, 2008, and USPTO, USA, 2008.

List of tables

List of Graphs

Appendix