

***University Entrepreneurship: Legislation and public policies. A study of Mexican University KTOs and a proposal for the promotion and fostering of protected technological innovation to boost the country's competitiveness and economic development***

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**Abstract:** The *National Development Plan 2013-2018*<sup>1</sup>, objective 3.5, proposes "To make scientific, technological and innovation development pillars for sustainable economic and social progress". *The Science and Technology Law* envisages innovation as a transcendent and binding element that will allow the increase of productivity and competitiveness of the productive and service sectors. The *Special Program on Science, Technology and Innovation 2014-2018*, aligned with objective 3.5 of the *NDP*, establishes (objective 2) "To contribute to the formation and strengthening of high-level human capital". The *Innovative Development Programme 2013-2018* sets the guidelines for a policy of industrial development and innovation, which seeks to achieve sustained economic growth, to boost commerce and services sectors growth, to consolidate and strengthen entrepreneurs and MSMEs, as well as organisms of the social sector of the economy; in an environment of free competition, moving towards a comprehensive regulatory improvement, coupled with an increase in trade and investment flows. Sectoral objective 1 establishes "to develop a policy of industrial development and innovation that promotes balanced economic growth in sectors, regions and enterprises"; and (objective 2) "to implement a policy that promotes innovation in the trade and services sector, with emphasis on knowledge-intensive companies".<sup>2</sup> The *2013-2018 Protected Innovation Programme*<sup>3</sup>, issued by the Ministry of Economy and the Mexican Institute of Industrial Property (MIPI), **in its 3.2.3. strategy establishes the obligation to strengthen the link between business incubators and patenting centres**, without clearly determining any qualitative mechanisms to achieve this goal. **This work presents a way to achieve it**, in line with the following Sustainable Development Goals (SDGs), of the United Nations 2030 Agenda: 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all; 9. Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation; 17. Strengthen the means of implementation and revitalise the global partnership for sustainable development.

**Key words:** Innovation, intellectual property, patenting centre, public policy, quadruple helix.

## INTRODUCTION

For more than ten years, there has been talk about patenting centres in Mexico (CePats)<sup>4</sup>: whether a new collaboration agreement has been signed between the MIPI and certain Higher Education Institution (HEIs) or research centre, whether the number

<sup>1</sup> During the Presidential term of Enrique Peña Nieto.

<sup>2</sup> Secretaría de Economía, *Programa de Desarrollo Innovador 2013-2018* (Mexico City: Author, 2013), <http://www.gob.mx/se/acciones-y-programas/reglas-de-operacion-e-informes-del-sector-economia-programa-de-desarrollo-innovador-2013-2018-prodeinn>

<sup>3</sup> Secretaría de Economía-Instituto Mexicano de la Propiedad Industrial, *Programa de Innovación Protegida 2013-2018. Logros 2016* (Mexico City: Author, 2016).

<sup>4</sup> Office that performs intellectual property rights management activities comprising, in a first instance, the identification of projects that are susceptible of protection, advice to carry out searches of the state of the art, as well as searches of antecedents of distinctive signs, the drafting of patent applications by the inventors or, where appropriate, the filing of applications for distinctive signs. It also provides advice on copyright procedures or plant breeder's rights.

of patent applications by Mexicans has increased, whether the training of human resources in matters of industrial property, technology management and entrepreneurship is adequate and sufficient to innovate, placing the country in a prominent place in terms of competitiveness and economic development ...

The concept "patenting centre" is reported for the first time in the *Report to the MIPI's Governing Board, 2004, First Ordinary Session, January-December 2003*.<sup>5</sup> Although the terminology used by the Institute to refer to these structures within universities, research centres, or government agencies aimed at the promotion of a patenting culture varies<sup>6</sup>, it is a fact that it is within the MIPI's attributions and rationale to provide support for the creation of this type of entities, which are key in the quadruple helix university-industry-government-civil society (U-I-G-CS), in line with the Mexican public policy for the optimisation of the National Innovation System (NIS).

CePats face great difficulty in being able to consolidate, and even evolve to the next step: technology transfer offices (TTOs) or, in a more modern way, knowledge transfer offices (KTOs). Some have advanced in their consolidation; there being more collaborative agreements signed than successful CePats. This document presents an improvement proposal, in order to make the administration of these CePats by the MIPI more efficient and effective, contributing to its strengthening and impact in the quadruple helix. CePats are actors in the IP System and the Mexican Innovation Ecosystem (MIE). The road towards innovation is not an easy one. Patenting does not necessarily imply innovation. These centres must work even harder to be innovative. The first step is consistent with the efforts made by the MIPI and its CePats network: raising the patenting level. Although still minimal, this indicator is already part of the "Prosperous Mexico" that the 2012-2018 sexennium public policy seeks to achieve: Creativity and inventiveness at the service of Mexicans, to put Mexico in a leading position in the international economy.

## **MAJOR PROBLEMS OF UNIVERSITY-INDUSTRY LINKAGE (U-I)<sup>7</sup>**

For more than a decade, Mexico has embarked on a series of structural reforms of a social, economic and political nature directed towards international competitiveness. But the enormous social and economic gap between Mexicans places the country among the first positions of inequality in the world (CONEVAL, 2012).

The goal of economic development, within the framework of international trade relations, has led countries, such as Mexico, to invest in strategic areas, leaving behind others: educational development, science and technology (Casas, 1999).

However, paradoxically, in the last few years, the strengthening of scientific activity and the construction of channels of linkage between HEIs and the private initiative as a mechanism for economic development (Riviezzo and Napolitano, 2010) have begun to be considered a governmental priority. The activities and processes for the generation of technological innovation originate in the companies, mainly. It has been shown that these also generate innovations linking themselves with different actors, such as those that produce knowledge, train human resources and develop technology: universities and research centres.

In this context, the transfer of technology and knowledge play a fundamental and potentially facilitating role in the linking of activities; which, in the case of Mexico, is in a phase of development and constant evolution that allows to identify areas that are limiting, as well as opportunities, to be tackled within the following decades of implementation.

<sup>5</sup> Instituto Mexicano de la Propiedad Industrial (IMPI), *Informe Junta de Gobierno IMPI, 2004, Primera Sesión Ordinaria de 2004 de La H. Junta de Gobierno (January-December 2003)* (Mexico City: Author, 2004), 86.

<sup>6</sup> "Patenting Centre", "Intellectual Property Office", "Intellectual Property Advisory Centre", "Comprehensive Industrial Property Advisory Centre", to mention a few. Even in the collaboration agreements signed by the MIPI with various institutions there is no homogeneity or constancy in the use of these terms.

<sup>7</sup> Helena Valeria Calderón Argomedo., *et. al., Principales problemas de la vinculación Universidad-Empresa* (Mexico City: UAM, 2016).

Being, the U-I linkage, a process that involves several components, the problems and successes are related, at least, in three moments: 1) when the bonding starts or exists the necessity of some of the parties to relate with the other; 2) when there are already formal or informal mechanisms for such an approach, and the proposed project or objectives are put to the test; and 3) when, based on the implementation of the linkage, an evaluation is made on the same.

From these three dimensions, elements that inhibit or strengthen linkage can be determined; from an institutional dimension, to a political, economic or social one. The institutional dimension will have to do with the rules, norms that determine the way in which the organisations operate. Its political dimension will have to do with the interests of the participants to impact on the behaviour, whether or not they are linked. The economic dimension also influences: market, competitiveness, supply and demand flows. Finally, the social dimension can refer to the objectives or impacts to be achieved.

## **a) Linkage constraints according to stage**

### **a.1) At the beginning of the linkage:**

-The disdain or lack of interest that exists in many companies to take seriously the research that is carried out in HEIs, so it is difficult to see them as real partners in complex and ambitious projects with high social and economic impact.

-The lack of formal structure (legal framework, public policies and internal regulations) of the linking activities: The enjoyment of a formal structure to establish the framework within which such activities should be developed is essential. Research, development and implementation (R+D+i) activities are currently costly, and global trends show that companies are seeking knowledge partners to reduce costs and share risks; however, one of the basic characteristics that any company seeks is the existence of frames that provide certainty to such projects.

-The lack of communication between the actors: In the absence of this, the research and development projects of universities will not be oriented towards the resolution of those problems existing in the industry; simply because they do not know them.

-Lack of coincidence between supply and demand: In the HEIs research takes place for the resolution of very specific problems or issues that concern universities, not to solve real problems of the productive sector or companies. That is why, when trying to market technologies developed in universities, there are no customers, since there is no market for these technologies or innovations.

### **a.2) At the time of implementation:**

-Lack of clarity during negotiations: The absence of establishment of the terms and conditions at the time of conducting negotiations generates a lack of clarity not only in the purpose of the linkage, but in the execution of the project.

- Poor follow-up by the parties involved: Linkage projects often concentrate in the signature of an agreement that does not always reach a successful execution due to inadequate follow-up between the parties.

### **a.3) At the time of evaluation:**

- Failure to comply with established times: In companies, problems must be resolved expeditiously, not doing so involves losses; while in universities, projects last a lot and long terms are required to complete a project.

- Goal setting with parameters inappropriate to the context: Indicators to assess the success of the linking activities may not be appropriate or realistic, so that they do not match the expectations of the parties.

## **b) Linkage constraints according to type of actors**

### **b.1) Universities:**

-The stigma that exists about linking activities: A good number of researchers consider that collaborating with companies reduces research.

-The lack of infrastructure to carry out the linking activities: There is no adequate administrative system and there is an outdated infrastructure, in which the valuation of the TTI is unknown; and there is a lack of coordination between the research area and the administrative area.

### **b.2) Enterprises:**

-The lack of incentives to collaborate: According to the National Survey on Linkage in Higher Education Institutions (ENAVI, CIDE-SEP, 2010), the main obstacles for the establishment of collaborative activities, identified by companies, are translated into: 1. little interest from HEI; 2. the students do not comply with the profiles desired by the company; 3. excessive bureaucracy at the Institution. Whereas, for HEIs, inhibitory factors for the establishment of collaborative activities are concentrated in: 1. ignorance of supply for R&D, technological services, consulting; and 2. amount of investment required in the case of business incubators.

-The wrong perception of the companies on the HEIs: When the university is public, the entrepreneur considers that the university should not charge for the services that it provides. Likewise, the company distrusts the public university.

-Lack of experience in the linking activities: The company does not know how to value the costs of TTI and does not have expeditious communication channels.

- Science, technology and innovation are essential factors for development, so these inputs generated by the public university should be oriented primarily to micro, small and medium enterprises, since these are those that require technology-based projects to develop.

### **b.3) Government:**

- The scarce human resources and infrastructure available: R&D investment in both the public and private sectors (below 0.5% of GDP in 2012) is well below what is recorded in almost all OECD countries (OECD, 2015). This factor is in addition to the environment described above, where giving universities and research centres sufficient resources to effectively operate these types of activities will be essential to improve the efficiency and effectiveness of linking activities in Mexico.

-The lack of an adequate public policy at the national level that engages and encourages all involved: In the case of Mexico, federally implemented policies are highly sectoral and this prevents all those involved in the field of U-I to consider this activity as a goal to which they should be attached (see below, the case of the *Protected Innovation Program 2013-2018*, issued by the Ministry of Economy and the MIPI, where strategy 3.2.3 establishes the obligation to strengthen the link between business incubators and patenting centres, without clearly identifying the qualitative mechanisms to achieve this goal).

-The lack of international promotion of Mexican universities: There are areas of STI in Mexican universities that could be exported to other countries. Here, the government must support Mexican researchers to give lectures and courses abroad in areas of knowledge where there is leadership.

### **c) Constraints according to the purpose of the link:**

-The lack of high complexity linkage activities: The activities that are more developed are those of low complexity.

-The lack of evolution in the objectives of the parties involved: Traditionally, it is still considered that the purpose of the University is the training of professionals through education, while the company is seen as self-sufficient regarding research activities and development.

## CEPATs AS BINDING ENTITIES IN THE INTERRELATION UNIVERSITY-INDUSTRY-GOVERNMENT-CIVIL SOCIETY (U-I-G-CS) IN MEXICO: ITS JUSTIFICATION WITHIN A PUBLIC POLICY OF PROTECTED INNOVATION

This work relates to the following SDGs: Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all<sup>8</sup>; Objective 9: Build resilient infrastructures, promote inclusive and sustainable industrialization and foster innovation<sup>9</sup>.

It is aligned with the MIPI's mission<sup>10</sup>: It promotes private investment, job creation, economic development and the country's competitiveness. And, with its institutional objective: "That the industrial and commercial activities of the country use the industrial property system as an element of legal protection in the distinction and improvement of its goods and services".<sup>11</sup> The proposal is justified in relation to several of the Institute's powers, according to article 3. of the Decree that creates it.<sup>12</sup> It is linked to the following themes of the *National Development Plan 2013-2018*<sup>13</sup> (*NDP 2013-2018*):

- a) Goals: Prosperous Mexico.
- b) Transversal strategies: Democratize productivity; and Close and modern government.
- c) Strengthening of the public service and public trust: Productive management in the public sector.

Scheme of the <i>National Development Plan 2013-2018</i>					
<b>General objective</b>	Bringing Mexico to its full potential				
<b>Five national goals</b>	I. Mexico in peace	II. Inclusive Mexico	III. Mexico with quality education	IV. Prosperous Mexico	V. Mexico with global responsibility
<b>Three transversal strategies</b>	i) Democratize productivity				
	ii) Close and modern government				
	(iii) Gender perspective				

Source: Author's self-elaboration, based on *National Development Plan 2012-2018*, Government of the Republic.

The *NDP 2013-2018*, objective 3.5, proposes "To make scientific, technological and innovation development pillars for sustainable economic and social progress". The *Law on Science and Technology* (LCyT<sup>14</sup>) envisages innovation as a transcendent and binding element that will allow the increase of productivity and competitiveness of the productive and service sectors. The *Special Programme on Science, Technology and Innovation 2014-2018* (PECiTI<sup>15</sup>), aligned with objective 3.5 of the *NDP*, establishes in its objective 2. "To contribute to the formation and strengthening of high level human capital". The *Innovative Development Programme 2013-2018* (PRODEINN<sup>16</sup>)

<sup>8</sup> Objectives: 8.2 Achieve higher levels of economic productivity through diversification, technological modernisation and innovation, inter alia by focusing on high added value and labour-intensive sectors; 8.3 Promote development-oriented policies that support productive activities, decent jobs, entrepreneurship, creativity and innovation, and encourage the formalisation and growth of micro-enterprises and small and medium-sized enterprises, including through access to financial services.

<sup>9</sup> Objectives 9.5 To increase scientific research and improve the technological capacity of industrial sectors in all countries, in particular developing countries, inter alia by fostering innovation and considerably increasing the number of people working in research by 2030 and development per million inhabitants and public and private expenditure on research and development; 9.b Support the development of national technologies, research and innovation in developing countries, including ensuring a regulatory environment conducive to industrial diversification and the addition of value to commodities, among other things.

<sup>10</sup> Mission: "To ensure that the intervention of the State in the field of the protection of industrial property rights gives its owners the legal security necessary for the legitimate use of their creative and inventive capacity to promote private investment, job creation, economic development, and in general, the country's competitiveness."

<sup>11</sup> Retrieved from <https://www.gob.mx/impi/acciones-y-programas/conoce-el-mpi-que-es-el-mpi>

<sup>12</sup> Poder Ejecutivo Federal, *Decreto por el que se crea el Instituto Mexicano de la Propiedad Industrial* (México: DOF, 1993).

<sup>13</sup> During the Presidential term of Enrique Peña Nieto.

<sup>14</sup> Acronym in Spanish.

<sup>15</sup> Acronym in Spanish.

<sup>16</sup> Acronym in Spanish.

contemplates the guidelines of a policy of industrial promotion and innovation, which seeks to achieve sustained economic growth, boost the growth of commerce and services sector, consolidate and strengthen entrepreneurs and MIPYMES, as well as organisms of the social sector of the economy; in an environment of free competition, moving towards a comprehensive regulatory improvement, coupled with an increase in trade and investment flows. This Programme establishes, in its sectoral objective 1, "to develop a policy of industrial development and innovation that promotes balanced economic growth by sectors, regions and companies"; likewise, objective 2 proposes "to implement a policy that promotes innovation in the commerce and services sector, with an emphasis on knowledge-intensive companies".<sup>17</sup>

The ***Protected Innovation Programme 2013-2018***<sup>18</sup> (*PIP*<sup>19</sup>), issued by the Ministry of Economy (SE<sup>20</sup>) and the MIPI, in its strategy 3.2.3. **establishes the obligation to strengthen the link between business incubators and patenting centres, without clearly determining the qualitative mechanisms to achieve this goal. This work offers a way to achieve this: through the total technology management model (TTMM) for CePats, and the technological platform** that, for the purposes of this document, exemplifies it.

The MIPI has promoted the creation and consolidation of CePats, in order to build the necessary capacities to promote the protection, appropriation and management of IP in Mexico. It has created the SE-CONACYT Innovation Fund<sup>21</sup> (May 2010) as an instrument of public innovation policy, as well as the Intersectoral Committee for Innovation (CII<sup>22</sup>), which seeks to develop a systemic strategy for the strengthening of protection and exploitation of innovation, including, among other things, the strengthening of CePats.

### **Congruence of actions carried out by the MIPI in relation to the *NDP 2013-2018*, the *PRODEINN 2013-2018*, and the *PIP 2013-2018***

#### **Alignment to national targets**

The MIPI's institutional programme, the *PIP 2013-2018*, will contribute to the *NDP 2013-2018*, through objectives, strategies and lines of action aligned to the national goal "Prosperous Mexico"; in addition, the transversal strategies "Democratize productivity" and "Close and modern government" have been considered for the development of the *PIP*. The MIPI, as a member of the coordinated sector of the Ministry of Economy, identifies and aligns its institutional program to *PRODEINN 2013-2018* so that the industrial and commercial activities of the country use the IP System as an element of legal protection in the distinction and improvement of goods and services.

<sup>17</sup> Secretaría de Economía, *Programa de Desarrollo Innovador 2013-2018* (Mexico City: Author, 2013), <http://www.gob.mx/se/acciones-y-programas/reglas-de-operacion-e-informes-del-sector-economia-programa-de-desarrollo-innovador-2013-2018-prodeinn>

<sup>18</sup> Secretaría de Economía-Instituto Mexicano de la Propiedad Industrial, *Programa de Innovación Protegida 2013-2018*. Logros 2016 (Mexico City: Author, 2016).

<sup>19</sup> Acronym in Spanish.

<sup>20</sup> Acronym in Spanish.

<sup>21</sup> Ministry of Economy-Science and Technology National Council Innovation Fund.

<sup>22</sup> Acronym in Spanish.

Alignment of the institutional objectives to the <i>PND 2013-2018</i>			<i>PIP 2013-2018</i>
National goal	National goal objective	National strategy	<i>PIP 2013-2018</i> objective
Prosperous Mexico	4.8 To develop the country's strategic sectors.	4.8.1 To reactivate a policy of economic development aimed at increasing the productivity of the dynamic and traditional sectors of the Mexican economy, in a regional and sectorally balanced manner.	1. To strengthen the Industrial Property System that favours legal certainty. 3. To promote and make society aware of the benefits of Industrial Property.
Prosperous Mexico	4.8 To develop the country's strategic sectors.	4.8.3 To direct and streamline public spending to strengthen the internal market.	2. To improve the the IMPI's services that demand the dynamics of protection of innovation. 4. To favour the protection of productive knowledge and discourage unfair competition.
Mexico with global responsibility	5.3 To reaffirm the country's commitment to free trade, capital mobility and productive integration.	5.3.1 To promote and deepen the trade liberalisation policy to encourage the participation of Mexico in the global economy.	5. To strengthen the international presence in the field of Intellectual Property.

Source: Author's self-elaboration, based on *Agreement approving the Protected Innovation Programme 2013-2018*, DOF: 05/09/2014

Alignment of institutional objectives to <i>PRODEINN 2013-2018</i>		<i>PIP 2013-2018</i>
Sector objective	Sectoral strategy	<i>PIP 2013-2018</i> Objective
1. To develop a policy of industrial promotion and innovation that promotes balanced economic growth by sectors, regions and companies.	1.6 To promote innovation in the sectors, under the scheme of academia, private sector and government (triple helix) participation.	1. To strengthen the Industrial Property System that favours legal certainty. 3. To promote and make society aware of the benefits of Industrial Property.
	1.7 To align the Ministry's programs and instruments and other units to the requirements of the sectors.	
2. To implement a policy that promotes innovation in the trade and services sector, with emphasis on knowledge-intensive companies.	2.7 To align the Ministry's programs and instruments and other agencies to the requirements of the services sector.	2. To improve the MIPI's services that demand the dynamics of protection of innovation.
		4. To favour the protection of productive knowledge and discourage unfair competition.
5. To increase international trade and investment flows, as well as the national content of exports.	5.2 To safeguard Mexico's commercial and investment interests in global markets.	5. To strengthen the international presence in the field of Intellectual Property.

Source: Author's self-elaboration, based on *Agreement approving the Protected Innovation Programme 2013-2018*, DOF: 05/09/2014

The IMPI is responsible for the creation of CePats within universities, research centres, government agencies, industrial associations and any other institution that may benefit from the granting of legal protection to IP through the granting of patents for invention and others legal figures.<sup>23</sup> These centres are dedicated to the research, dissemination and teaching (in the case of educational institutions) related to IP, and some, offer services to the general public (completing the quadruple helix). CePats arise as a necessity (created by the globalisation of the economy, high global competitiveness, the opening of frontiers and by the great flow of technological and scientific information) for the great majority of companies and for independent researchers and inventors. The MIPI, via CePats, contributes to the strengthening of the Mexican IP system, protecting creativity and inventiveness. They are managed and governed by the institutions or bodies that host them, but receive support from the Institute to advise, train and organise events to promote the culture of IP. Thus, both the IMPI and the institutions or bodies involved, fulfil the commitment to spread knowledge in the field, with the goal of making the Mexican economy and heritage in IP grow.

Universities and research centres support the scientific, technological and commercial activities of their community, contributing to the strengthening of the country's economic development. The MIPI trains the staff in charge of attending these centres. Among the activities they carry out there are:

- Dissemination of IP culture.
- Preliminary assessment of the technology.
- Drafting of patent, utility model and industrial designs applications.
- Filing of applications for inventions and distinctive signs before the MIPI.

The IE in Mexico has the following actors:

- 44 CePats.
- 117 KTOs recognised by the SE<sup>24</sup> and CONACYT<sup>25</sup>.
- 34 business accelerators recognised in the INADEM<sup>26</sup> platform.
- 50 high impact business incubators recognised in the INADEM platform.
- 7 highly specialised workshops recognised in the INADEM platform.
- 18 technological parks which are members of the Mexican Network of Science and Technology Parks.
- 32 innovation state agendas.

These linking units in the Mexico's NIS have been conforming since 2002, first in a somewhat experimental and rudimentary way; today, driven by the public policy established for the 2012-2018 sexennium.

Of the 44 established CePats, 20 can be found in HEIs, either public (14) or private (6). Of the public ones, all have TTOs or TLU<sup>27</sup>; the private ones, only 4.

	NAME OF CEPAT	WITH TTO/TLU
1	INMEGEN	
2	ULSA	
3	UNAM	YES
4	IMP	
5	COMECYT	
6	SEDENA	

<sup>23</sup> Utility models, industrial designs, circuit diagrams, trade marks, trade names and business advertisements.

<sup>24</sup> Ministry of Economy.

<sup>25</sup> Science and Technology National Council.

<sup>26</sup> Entrepreneur National Institute.

<sup>27</sup> Technological Linkage Units.

7	IPN	YES
8	CONALEP	
9	INCMNSZ	
10	UP	
11	ITESM GDL	YES
12	ITESO	YES
13	UABC	YES
14	UAS	YES
15	UDG	YES
16	UNSON	YES
17	CIMAV	
18	CIQA	
19	ITESM NL	YES
20	UANL CIETT	YES
21	COTACYT	
22	COECYT	
23	COQCT	
24	UTM	YES
25	ANÁHUAC	YES
26	UACH	YES
27	UJAT	YES
28	UTTAB	YES
29	UAEM	YES
30	BUAP	YES
31	UPP	YES
32	INEEL	
33	CRODE ORIZABA	
34	CRODE CELAYA	
35	CRODE CHICHUAHUA	
36	CRODE MÉRIDA	
37	COMIMSA	
38	INFOTEC	
39	CIO	
40	CICY	
41	CIATEJ	
42	CICESE	
43	CIBNOR	
44	CIAD	
45	CIMAV	

Source: Author's self-elaboration.

## PROPOSAL

**Problem that originates the proposal:** There is a gap in the national public policy on innovation, which establishes the obligation to strengthen the link between business incubators and patenting centres, but without clearly determining the qualitative mechanisms to achieve this goal; as well as the lack of an *ad hoc* management model for CePats.

**Rationale:** It is necessary to overcome this gap by providing suggestions, mechanisms and tools aimed at an efficient and effective management of CePats, which contributes to the linking of the four-axis U-I-G-CS, in line with a public policy for the optimisation of the national system of IP and IE.

**General objective:** To offer an improvement proposal (technological tool) that contributes to make the management of CePats supported by IMPI more effective and efficient.

**Description of the proposal:** To conceive and implement a tool (**technological platform**) that favours communication and information flows between the MIPI and its CePats, and among themselves, as part of a **Total Technology Management Model for CePats (TTMM)**. If successful, this platform could be opened to the participation of other centres that are not currently part of the MIPI system, as well as various national and/or overseas TTOs. This system will encourage the sharing of good practices through successful knowledge management. The proposal is theoretical, since it is not yet being implemented, but it is feasible to be implemented in a short time. The development of the tool, as well as the corresponding pilot tests, should be considered prior to launch.

**The TTMM:** Comprehensive model that includes elements of public policy to support CePats, and transforming them into sustainable business units. It includes IP management, as well as technology management and entrepreneurship activities. Activities and recommendations:

- Work plans and strategic plans (planning and a vision for the future).
- Training and professionalisation of its personnel regarding the use of databases and basic software, as well as in more sophisticated software that allows greater depth and efficiency in the searches of technological information. Also, in advanced patent drafting by technical area, elaboration of contracts, technological foresight and design of strategies to convert scientific articles and postgraduate theses in patent applications.
- CePat's rules of operation that provide users, as well as the CePat's personnel, with certainty as to the scope of obligations and responsibilities. It is necessary to contemplate policies for the handling of information derived from inventions.
- Promotion of pro-patenting initiatives, encouraging the active participation of CePats within the NIS.
- Creation of a Trust, CePat-specific, such as FINNOVA<sup>28</sup>, with contributions from MIPI, SE and CONACYT.
- Given the heterogeneity of CePats, to encourage the establishment of differentiated goals for each centre, which would allow the generation of metrics that will result in the evaluation of their performance.
- To encourage HEIs and research centres to consider CePats not only as tools for the achievement of their substantive functions, but as cost-effective sources of own resources, with an institutional budget.
- To encourage that CePats establish links or alliances with TTOs for the transfer and commercialization of IP that is generated in their institutions.
- To report, on the part of CePats, in the proposed technological platform, the results obtained.

#### **Objectives of the technological platform (SisCePat):**

1. To improve channels of communication and linkage between MIPI and CePats, as well as between them; even encouraging the participation of civil society entities (users), so as to create a clearer and more direct communication channel between the parties.
2. To raise awareness among those involved in CePats, or actors of the IP and EI system, of its multiple benefits and to create links between them, considering the concept of "quadruple helix"; which favours the sharing of best practices.
3. To provide tools for IP protection to the institution where each CePat is housed, in order to generate portfolios that can be commercialised.

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<sup>28</sup> Sectoral Innovation Fund (granted by CONACYT).

4. To promote and disseminate the culture of IP to strengthen the IP system in Mexico, contributing to raise the level of technology in the country.
5. To provide the users of the technological platform with specific and useful information by technical and/or technological field.

**Means:**

a) Human: MIPI's personnel working in the Divisional Directorate for Promotion and Information Technology Services, in the Divisional Directorate of Information Systems and Technology and the Divisional Directorate of Regional Offices.

It is suggested to have two or three people attending the CePat: One with experience in a technical area, and another with a legal and/or market view. Any of them may be responsible for the CePat.

b) Material and economic (infrastructure):

*Financing*: The CePat can be managed and maintained with the own resources of the institution or organisation that houses it. The services offered by the MIPI and support to the CePats are free, including the use of the technological information and linking platform that is proposed. At a later stage, this tool could generate resources coming from memberships (registration of interested persons who are not necessarily part of the CePat staff), even belonging to national and/or international TTOs networks, willing to pay a fee to receive certain services via the platform.

*Physical space*: A specific work area, easily accessible, near or within the Institution's library (in the case of universities).

*Equipment*: At least two computers with internet access; one to carry out the administrative functions of CePat, and another to support the implementation of online consultations and procedures by users. Telephone, office furniture, printing and video projection equipment; auditorium.

*Economic*: Annual budget provided by the institution that houses it.

*Technological*: In addition to the hardware, specialised software is needed to search for technological information; example: Thomson Innovation.

**Benefits**: The services provided by a CePat are:

a) Advice on the filling of applications: CePat's staff advises anyone who requires it, by telephone, in person or via e-mail, regarding the filling of requests for search of technological information, search for distinctive signs, drafting of applications for inventions, applications for distinctive signs, etc.

b) IP Training: CePat staff should receive continuous training in this area in order to better meet the demand for applications and to plan updating courses and seminars in their centres. These courses and seminars can be oriented towards teachers, researchers and students, in the case of universities, or towards the general public.

c) Dissemination on MIPI's services: The CePat must distribute information on the services provided by the MIPI, for which it will receive periodic promotional material.

**Activity reports**: It consists of a report of activities that allows the MIPI to monitor progress in the dissemination of services and the dissemination of IP knowledge. At the same time, the MIPI reports on the overall results and on those successful strategies carried out in other CePats (exchange of best practices). The sending of such information by CePat must be requested within the first five days after the month reported. (See in **Annexes** the form for activities report).

**Benefited population**: Researchers, teachers, students, entrepreneurs, general public (users of the IP System and IE).

**Statistics**: The implementation of the technological platform (website) will allow carrying out statistical studies that show the interest of users in specific technological fields. It will be possible to measure preferences and trends, which is extremely useful for informed decision-making, either by CePats or by MIPI, or other government agencies.

**Quality control**: The SisCePat must be a quality service and product (information) (international standards) that meets the needs of its users. It should be

monitored through questionnaires that evaluate the service provided. Technical support is essential for the user, and should be available in ample hours of attention. Consideration should be given to the handling of sensitive data, so that legislation on transparency and access to information, as well as personal data, should be taken into account.

**Scope of the proposal:** A positive impact is expected at a national level, so the participation of the MIPI's Regional Offices is important and necessary. If the platform is successful, by properly linking its users, it may be possible to open it to the participation of international actors.

**Legal basis of CePats:** Legal support between the institution or organisation hosting a CePat and the MIPI is the collaboration agreement signed by the parties, which establishes rights and obligations. The CePats must have rules to decide on the ownership of the IP that they generate.

**Requirements SisCePat:** This aspect refers to what is in itself the design and technical characteristics of the proposed technological platform. It includes several sections and graphics. They include: 1. Forms to be requested by CePats; 2. Development of reports to be requested by the offices and areas of the MIPI involved; 3. Generation of statistics; 4. Forum; 5. Banner for publication of contents; 6. Directory; 7. Glossary of terms. 8. Generation of electronic mail.

## CONCLUSIONS

The MIPI administers 23 of the 44 established CePats. The most recent centre is located at Universidad Panamericana, Mexico City (March 2017).

According to a diagnosis on CePats<sup>29</sup>, the offer of IP management services is provided by three types of units: CePats, TTOs and private offices; which favour Mexico's competitiveness, strengthening its IE. These organisations should be complementary, in order to increase the level of patenting in the country.

The CePats focus on the supply of knowledge and its registration according to the corresponding IP types. TTOs specialise in demand, transferring knowledge, so these units are a bridge between the supply of knowledge and the demand for knowledge in the market. The *ad hoc* management model for CePats, which is suggested in this paper, implies a total, all-encompassing vision of this process, as well as IP, including linked entrepreneurship activities.

CePats are not private, they are located inside research centres, public universities, or KTOs. Due to the rules that govern them, they do not charge for the services they provide. Occasionally, they attend to externalities, to which he charges them; but this does not make them self-sustaining. They do not receive economic support from public agencies, but they do receive training, and depend on the budget of the institutions to which they are attached. Some receive support from the State Science and Technology Secretariats and Councils.

They present lack of planning, objectives, strategies and unclear lines of action. Therefore, it is urgent to shore up the existing public policies so that CePats can perform their role in the IE.

They must have adequate staff, both in number and professional profile, to carry out the following technological management activities:

- o Search and analysis of technological information.
- o IP protection strategy.
- o Drafting of applications for inventions.
- o Filing of applications for inventions.
- o Technology surveillance.

<sup>29</sup> Consultores Internacionales, S.C., *Diagnóstico y diseño del modelo integral de centros de patentamiento - CePats* (Mexico City: Secretaría de Economía-CONACYT-Instituto Mexicano de la Propiedad Industrial, 2016), 176.

- o Response to official actions, amendments and maintenance of industrial property titles.

Linking efforts are critical. The signing of collaboration agreements for the creation of CePats does not guarantee its success. The strengthening of an IP culture among students, teachers and researchers is not automatic.

CePats do not use specialised software (Orbit, Thomson or Clarivate). Knowledge of management of public databases is poor. Many times they do not have the necessary technical equipment or software. This should be corrected.

Organisationally, for a CePat to function properly, it must have:

- o Medium and long-term strategic plan, with objectives and actions to be carried out such as: promotion of the culture of protection of IP, in general, and registration and protection of the generated IP; as well as its transfer, commercialisation and/or licensing.

- o Annual work plan, with defined goals and indicators. These goals will be different according to the context of each centre, but the methodology for measurement should be the same.

- o A specific CePat website.

- o Infrastructure that allows CePat to operate properly, performing its functions.

Thus, we verify the value of the proposal of this work: **Conceive and implement a tool (technological platform) that favours the communication and flows of information between the MIPI and its CePats**; in accordance with what has already been proposed in this development, which encourages the exchange of best practices making use of successful knowledge management.

With regard to the distribution of royalties, this point is generally not considered in the institutions' regulations; it is not considered to be fair for the inventor (researcher or student) to receive these. It is recognised the merit of its invention, being the institution the beneficiary. However, this situation will change, given the amendments to the *Law on Science and Technology*<sup>30</sup>, the *Federal Law on Administrative Responsibilities of Public Servants*<sup>31</sup>. The Decree specifies:

First article. Articles 40 Bis and 51 of the *Science and Technology Law* are hereby amended to read as follows:

Article 51.

I. The basic guidelines and conditions of strategic partnerships, technological alliances, consortia, linking and knowledge transfer units, new technology-based companies or innovation networks, involving the participation of educational institutions, centres and entities, with without contribution in the capital stock in the companies in question. For this purpose, the following shall be taken into account:

...

c) **The benefits derived from intellectual property generated with the participation of the staff of the institution, centre or entity in the mentioned figures, will be granted in accordance with what is established in this Law and in the guidelines that the government, without prejudice to the benefits of a labour nature that correspond to such personnel.**

<sup>30</sup> Last reform published DOF 08-12-2015.

<sup>31</sup> Last reform published DOF 18-07-2016. *DECRETO por el que se reforman diversas disposiciones de la Ley de Ciencia y Tecnología y de la Ley Federal de Responsabilidades Administrativas de los Servidores Públicos* (Mexico City: DOF, 2015).

d) **The participation of the staff of the institution, centre or entity** in the figures referred to in this article, in the terms of this Law, **does not imply that it has a conflict of interest.**

...

- I. The terms and requirements for the incorporation and participation of personnel of institutions, centres and entities in strategic partnerships, technological alliances, consortia, linking and knowledge transfer units, new technology-based companies or innovation networks. ... The terms, requirements and criteria referred to in this section shall be established by the governing bodies or equivalent of educational institutions, centres and entities through general rules that must be issued for this purpose and which shall consist of preventive measures aimed at to prevent its personnel from incurring the conflict of interests referred to in the applicable provisions on the administrative responsibilities of public servants. **The governing bodies or equivalent will also determine what is related to intellectual property rights and the benefits that correspond to educational institutions, centres and entities** in relation to the provisions of this article. **In order to promote the commercialisation of the intellectual and industrial property rights of institutions, centres and entities, the governing bodies or equivalent will approve the guidelines that will allow researchers, academics and specialised personnel to generate up to 70% of the royalties that are generated.** [The translation and highlighting is from the author].

The MIPI should promote an efficient and effective management of intellectual and technological property, in order to overcome the lags they still have. The MIPI-SE-CONACYT Trust, mentioned above, constitutes a measure of support, with the idea that CePats can be self-sustaining. Since the resources that CePats receive from their institutions or that enter through the services they offer are scarce, in order to be sustainable they can opt for other alternatives that generate extra income; here we can consider the topics on entrepreneurship, promoting innovative leaders within CePats, aimed at clear collaboration with OTTs to market their IP. The utility of the proposed technological platform (SisCePat), in addition to linking these entities, can allow them to generate extra income.

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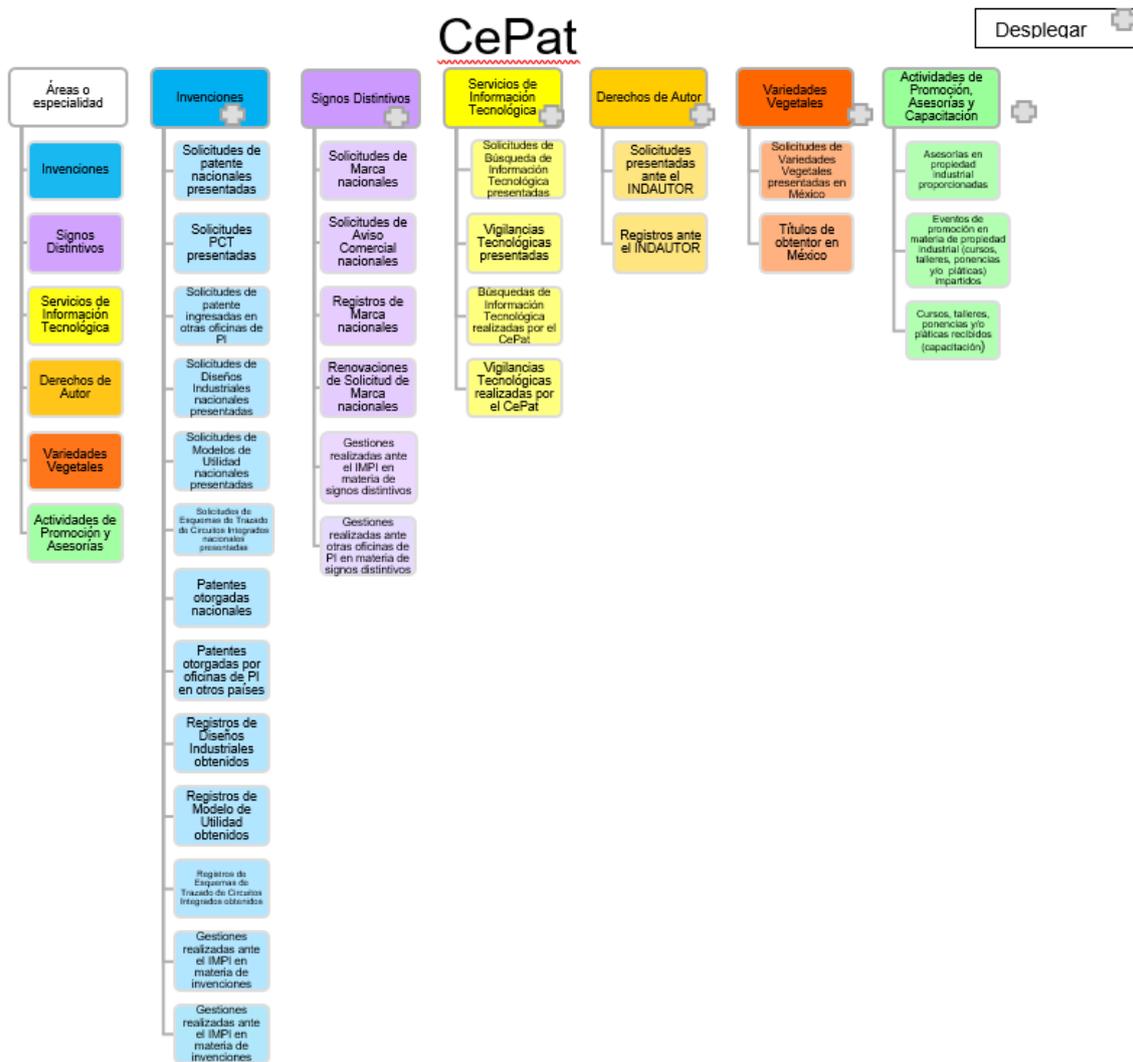
**ANNEXES**

**A. Report format for CePat's activities**

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	<b>CENTRO DE PATENTAMIENTO XXX</b>													
2														
3		<b>PERIODO DE REPORTE 2017</b>												
4	<b>ACCIONES REALIZADAS POR EL CEPAT</b>	<b>ENE</b>	<b>FEB</b>	<b>MAR</b>	<b>ABR</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AGO</b>	<b>SEP</b>	<b>OCT</b>	<b>NOV</b>	<b>DIC</b>	<b>TOTAL</b>
5	Solicitudes de patentes nacionales presentadas													0
6	Solicitudes PCT presentadas													0
7	Solicitudes de Patentes ingresadas en otras oficinas de PI													0
8	Solicitudes de Diseño Industrial nacionales presentadas													0
9	Solicitudes de Modelos de Utilidad nacionales presentadas													0
10	Solicitudes de Esquemas de Trazado de Circuitos Integrados nacionales presentadas													0
11	Patentes otorgadas nacionales													0
12	Patentes otorgadas por oficinas de PI en otros países													0
13	Registros de Modelo de Utilidad obtenidos													0
14	Registros de Diseño Industrial obtenidos													0
15	Registros de Esquemas de Trazado de Circuitos Integrados obtenidos													0
16	Gestiones realizadas ante el IMPI en materia de invenciones													0
17	Gestiones realizadas ante otras oficinas de PI en materia de invenciones													0
18	Solicitudes de Marca nacionales													0
19	Solicitudes de Aviso Comercial nacionales													0
20	Registros de Marcas nacionales													0
21	Renovaciones de Marca nacionales													0
22	Gestiones realizadas ante el IMPI en materia de signos distintivos													0
23	Gestiones realizadas ante otras oficinas de PI en materia de signos distintivos													0
24	Solicitudes de Búsqueda de Información Tecnológica presentadas													0
25	Búsquedas de Información Tecnológica realizadas por el CePat													0
26	Solicitudes de Vigilancia Tecnológica presentadas ante el IMPI													0
27	Vigilancias Tecnológicas realizadas por el CePat													0
28	Solicitudes ante el INDAUTOR													0
29	Registros ante el INDAUTOR													0
30	Solicitudes de Variedades Vegetales presentadas en México													0
31	Títulos de Obtentor en México													0
32	Asesorías en propiedad industrial proporcionadas													0
33	Eventos de promoción en materia de propiedad industrial (cursos, talleres, ponencias y/o pláticas) impartidos													0
34	Cursos, talleres, ponencias y/o pláticas recibidos (capacitación)													0
35	<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
36														
37														
38	<b>Eventos de Promoción impartidos</b>													
39	<b>Título</b>	<b>Asistentes</b>	<b>Fecha</b>											
40														
41														
42														
43														
44														
45														
46														
47														
48														
49	<b>Capacitación recibida</b>													
50	<b>Título</b>	<b>Asistentes</b>	<b>Fecha</b>											
51														
52														
53														
54														

Source: *Guía para la creación de Centros de Patentamiento*, SDSIT, DDPSIT, IMPI, 2017.

B. CePat's activities



Source: *Requerimientos Sistema CePats*. SDSIT, DDPSIT, IMPI, 2017.