

Women Inventors

Patenting in Mexico

HOW ARE WE DOING?

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CENTRO DE ANÁLISIS PARA LA INVESTIGACIÓN
EN INNOVACIÓN



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Centro de Análisis para la Investigación en Innovación, A.C., 2018

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Note to Readers

Women inventors Patenting in Mexico

This research is an effort by the organized civil society Centro de Análisis para la Investigación A.C. (CAIINNO), without political interest other than to influence Mexican public policies by using its own material, economic and human resources.

This research analyzes key aspects of **industrial property** in Mexico, specifically pertaining the field of inventions and women's participation in it. In spite of the effort that obtaining this information represented, it has its limitations while remaining useful to decision makers and researchers. Given that there are several aspects necessary to achieve an optimal environment to create more inventions and innovation, this research extends on women inventors while focusing on the following:

- 1. Budgets for science and technology institutions in each of the Mexican states and women's participation in them.**
- 2. Women's participation in Committees on Science and Technology in each of the states' Congress.**
- 3. Overview of filed and granted patents in Mexico, comparing mexicans' achievements with that of foreigners.**
- 4. How active and participant women inventors have been.**

This project stems from CAIINNO®'s first publication in 2017, “Panorama de la propiedad intelectual en México: otra perspectiva”, which attempted to be a first approach to the description of Mexican inventors.¹ Several relevant topics were identified in it, out of which, the most relevant may be the small amount of female participation in all types of inventions. Taking advantage of the fact 2018's topic for world intellectual property day was gender, the “Banco de invenciones por género en México a nivel estatal”,² was created. A substantial effort was required to obtain information and data necessary [the Instituto Mexicano de la Propiedad intelectual (Mexican Institute of Intellectual Property or IMPI, by its Spanish initials) does not classify data by gender, and to determine the gender of each patent owner.

¹ CAIINNO, *Panorama de la propiedad intelectual en México: otra perspectiva*, disponible en: <http://www.caiinno.org/wp-content/uploads/2016/08/Estado-general-de-la-propiedad-intelectual-en-M%C3%A9xico.pdf>

² CAIINNO, *Banco de Invenciones por género en México a nivel estatal*, disponible en: <http://www.caiinno.org/invenciones-y-genero/>

The results were alarming for two reasons. The first one was not surprising given the fact that while the United States Patent and Trademark Office celebrated 10 million patents in 2018,³ Mexico is still far from reaching at least 1 million or even a 100 thousand patents. The second cannot be described as a surprise either, since there was no previous data concerning it: the little or non-participation of women in inventions.

Methodology

1. Available information was searched for and retrieved from various official sources.
2. When information was non-existent or insufficient, several information requests were filed. In some states it was necessary to present more than one request since not all information solicited was delivered or documents were presented in an unreadable format.
3. All information was gathered, filtered and analyzed to obtain the format presented in this research.

General Overview:

The last few years have been difficult for Mexican economy; this has affected local and federal budgets significantly.⁴ However, the reaction to this phenomenon has been far from homogenous since budgets have significantly reduced in some states in Mexico and dramatically increased in others. An example of this is the contrast between the states of Sinaloa, where the budget decreased, and Yucatán, where the Secretary for Science and Technology (*Secretaría de Ciencia y Tecnología*) was created and the budget increased.

Between 2015 and 2016, almost half the states (14 out of a total of 32) reduced their budgets. Out of these states, 6 decreased it by more than 20 per cent. A few of the states increased their budgets but only 4 did so by more than 20 percent. However, by pairing the percentages to the figures they represent, it was possible to find substantial contrast since in 2016, only 15 states had a budget greater than 20 million pesos (1,075,2679 dollars adjusted for inflation). At the other end of the spectrum, *Campeche was the state with the least amount of resources allocated to its Council* with a figure equivalent to less than one million pesos for the entire year. This sheds light on each state's reaction to budget cuts and other economic problems.

³ USPTO, *Ten million patents site*, disponible en : <https://10millionpatents.uspto.gov/>

⁴ Revista Ciencia UNAM, *Complicado panorama presupuestal para la ciencia en México*, disponible en: <http://ciencia.unam.mx/leer/705/complicado-panorama-presupuestal-para-la-ciencia-en-mexico>

After revising the Índice Nacional de Ciencia, Tecnología e Innovación 2015 (National Index for Science, Technology and Innovation), published by CAIINNO⁷, it was possible to identify that some of the states that reduced their budget for institutions dedicated to science and technology are among the top ten (Nuevo León, Chihuahua, Coahuila, Querétaro, Morelos and Sonora). This could have repercussions in achieving previously set goals and in future versions of this index.

Another important aspect to consider is the investment and contribution made by CONACYT (Consejo Nacional de Ciencia y Tecnología or National Council of Science and Technology) It was also possible to observe that this investment can differ by several millions of pesos from one state to another. While data suggests there is a cause or direct impact on the number of patents and women inventors, it is not possible to determine if this is true given that it was outside this research's scope.

2 to 3 casualties: Mexicans vs foreigners

HOW ARE WE DOING?

We often hear that patents for an invention indicate technological innovation⁵; partly because of the perception that they promote economic and technological development. According to the Global Innovation Index, inventions (patents and utility models) are part of the indicators⁶ used to rank worldwide innovation. Mexico ranked on the 58th place in 2017.

Data shows that the percentage of patent application filed by Mexicans in contrast to that of foreigners has increased but is still very low in comparison. While in 2006 Mexicans' patent applications represented 3.86 percent of the total, by 2016 this percentage had almost doubled to 7.52 percent.

The information also showed the percentage of patents granted to Mexicans reached its historically highest number in 2016 at 4.92 percent. However, it is important to keep in mind that, in recent history (2004-2015), the percentage of patents granted to foreigners has never been under 95 percent and reached its highest at 98.6% in 2006.

Lastly, after evaluating the rate of success for patents granted⁷ to Mexicans, it was

⁵ OMPI, "R&D, Innovation and Patents", disponible en : <http://www.wipo.int/patent-law/en/developments/research.html>

⁶ OMPI, "Global Innovation Index 2017 Innovation Feeding the world", p. 53, disponible en: http://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2017.pdf

⁷ This was calculated by considering the average amount of time necessary to apply for a patent from the moment the application is filed to the moment it is granted or rejected, which is about 3 to 5 years. The minimum time considered to obtain a definitive answer, which is 3 years, was used to calculate the rate of success of each year. This rate of success was

evident that it was inferior to that of foreigners. Between 2007 and 2017, the lowest rate of success for foreigners was 57.5 percent and the highest was 89.5 percent. Meanwhile the worst year for patents granted to Mexicans was 2014 with a percentage of 28.6 and the best year during the period of reference was 2009 when the percentage reached 37.1 of patents granted in relation to the amount of patent applications filed for three years prior. A decrease in rate of success for patent applications filed by foreigners between 2012 and 2016 is also noteworthy.

These results are significant and to a certain extent, alarming, especially because after observing an increase in the amount of patent applications filed by Mexicans in recent years, an increase in the amount of patents granted is expected. Yet, this is not the case. While it true that increasing the number of applications is important, the notion that this is the indicator to be most concerned about and not the number of patents granted should be reconsidered.

Regarding Gender Issues

Revising women's participation in each of the states' congress is worthwhile given that these institutions are key to the topic at hand. By 2018, every state congress had a committee specialized on topics related to science and technology.

It was possible to identify that 50% of members were women in approximately half of these committees where laws related to women's participation in research, development and invention activities are presumably being discussed.

Another fundamental aspect in this medium is the government entity focused on the design and implementation of public policies related to science, technology and, in some cases, innovation. According to the latest revision, 6 of them were directed by women. This does not mean that the goal should be equal distribution of men and women in this position since this decision is not made by any other specific organization but rather, each state makes the decision independently by virtue of its sovereignty.

It would be easy to conclude that the fact that the institution in charge of science and technology in a state is a secretariat is a sign of progress. However, in order to conclude so, it is necessary to know if this means the budget is higher, if the number of properly qualified

calculated by obtaining a percentage dividing the number of patents granted in *year t* by the number of patents filed in *year t-3*. IMPI, Frequently Asked Questions available at: <https://www.gob.mx/impi/acciones-y-programas/temas-de-interes-preguntas-frecuentes-patentes>

personnel increased and if the director's profile is suitable for this position. Knowing about public policies that have been developed and implemented as well as the results of these is also relevant. None of the aspects previously mentioned were included in this research's analysis. **The only state without an institution specialized on science and technology is Tlaxcala.**

Another fundamental topic for this research is education. To retrieve this information, the amount of scholarships for Doctorate, Master's degrees and Specialties granted by the CONACYT in each State during 2017. It was interesting to find out that **scholarships were equally distributed among men and women overall** in that year. This is important because the knowledge acquired in these levels of education can be critical to research and development activities that may result in inventions

It was also possible to **observe** a large gap in the number of scholarships granted. While 6,629 scholarships were granted in **Mexico City in 2017, only 63 were granted in the state of Campeche.** Although it was not part of this research, it is possible that there is a correlation between the number of graduate degree scholarships granted and the number of patents applications for an invention, since, as it will be seen shortly, the difference between these states in terms of inventions is relevant. Perhaps the effects of having granted scholarships to women will be observed in the medium term.

Lastly, there was still a significant gender gap in 2017 regarding **women's participation** at the **Sistema Nacional de Investigadores**, which aims at producing quality scientific, technological and innovative research in the country.

WOMEN INVENTORS IN MEXICO

Organizations such as IADB ⁸ have documented progress regarding women's involvement in STEM careers (Science, Technology, Engineering and Mathematics), however there is still a gap regarding several subjects. One of the IADB's most important findings in this regard which might serve as one of the explanations for the small number of women inventors is that a significant amount of women with career titles in S and T do not work in these areas.

This section is a response to the urge to know the number of women inventors since there is

⁸ Banco Interamericano de Desarrollo, , disponible en: <https://publications.iadb.org/bitstream/handle/11319/8863/Las-brechas-de-genero-en-ciencia-tecnologia-e-innovacion-en-America-Latina-y-el-Caribe.pdf?sequence=1&isAllowed=y>

no evidence of an updated document with similar information. The primary intention was to have data that reflected the results of developing public policies to increase the amount of women inventors, if there were any. This would also serve to identify existing problems and, if any were found, attend them to resolve them as soon as possible through new laws or policies.

Although this investigation has certain limitations due to the topic's nature and a lack of certain pieces of information, it remains a very useful tool. As proof of this, a reform effort toward the intellectual property legislation was presented based on the information here presented and on CAIINNO®'s participation. The initiative proposes to add paragraph g) to section XII, article 6 as follows:

Article 6o.

I a XII...

a) to f)

g) Design, implement and evaluate public policies which aim to promote and protect intellectual property rights, especially in the area of innovation and the creation of inventions at state level as well as public policies aimed at increasing female participation primarily in inventive step. With the purpose of achieving the former, agreements with other state or federal institutions as well as Mexican or foreign, public or private institutions can be contracted.

This attracted local and national media that presented articles about the subject's importance⁹. This is of the utmost importance given that **this proposal answers to a problem and an identified necessity**, which was, additionally, backed up with statistical data.

Methodology

The methodology to provide information about women inventors was the following:

Information requests were filed to the IMPI, these requests demanded the file numbers of all patent applications filed in 2014, 2015 and 2016.

After this verifying the information was correctly sorted, the patents were sorted according to the type of invention. For example, there was one section for patent applications, another for published patents and another to granted patents for each of the three years.

Next, each file was revised through the Sistema de Información de la Gaceta de la Propiedad Industrial (Mexico's Trademark search, SIGA by its initials in Spanish) in order to newly sort

⁹ MVS Noticias, "Piden reforma al IMPI para ampliar reconocimiento a creaciones de mexicanas", available at: <http://www.mvsnoticias.com/#!/noticias/piden-reforma-al-imp-i-para-ampliar-reconocimiento-a-creaciones-de-mexicanas-776>

the patents according to whether there was information about them available or not at the moment of the search.

With that list, files were revised once more to identify the type of information with which the trademark data bank is fed. There, it was possible to recognize whether there were any women inventors or not by reading the names. It was necessary to do a closer search in order to distinguish the inventor's gender in certain cases. In practically all of these cases, the inventor was found and their gender was confirmed.

After completing the previous steps, new categories for this gender patent pool were created with the purpose of obtaining even more information.

It is relevant to point out, that months of endeavor and more than two years' worth of work have a rate of error due to intellectual property's features, specifically in the field of inventions. This is further detailed in the section below where this research's statistic information is available.

Due to the fact that the government requires citizen support from an organized civil society to analyze the large amount of information available, the objective of this project is to contribute information and collaborate with the public sector in designing better and more public policies. This practice is part of what will allow Mexico to move forward with practices similar to those conducted in developed countries where civil society contributes its knowledge and information.

Limitations and Clarifications

In this case there are several limitations to this research that should be considered without them significantly affecting final results.

It was impossible to find information from every file provided by IMPI on SIGA, which implies that there is a **rate of error** on the final results. However, as it can be seen below, this does not impact the final results substantially in terms of percentages.

The information handed over by the IMPI through the information requests filed for this investigation was the only information used. A few inconsistencies between the numbers in the information the institute handed over and the numbers published on publications called **IMPI en cifras** or on their annual reports¹⁰. **CAIINNO®** is not responsible for this. Given that

¹⁰ Instituto Mexicano de la Propiedad Industrial, "Informe Anual del IMPI", available at: <https://www.gob.mx/impi/documentos/informe-anual-del-impi>

the file numbers necessary to carry out the investigation were available in the information handed over by the IMPI as a result of the requests, this was the information used. Exposing these inconsistencies is worthwhile because this work also represents transparency and the use of open data.

It was impossible to confirm if the cases where women inventors' names appeared in more than one of the applications were due to the fact that the same woman had participated in more than one invention. Therefore, this might have happened. This level of precision was not a part of this research since the priority was to identify the number of inventions in which women had participated.

Glossary

With the purpose of better understanding the impact of female participation, information was classified the following ways:

1. **Mixed teams** (male and women inventors: inventions where at least one of the participants is a woman)
2. **Female participants only**: Inventions where inventors are exclusively women.
3. **Total**: The sum of inventions by mixed teams and by female participants only.

	Granted Patents								
	Mixed Teams			Female Participants Only			Total		
	2014	2015	2016	2014	2015	2016	2014	2015	2016
Baja California	0	0	1	0	0	0	0	0	1
Chihuahua	5	4	2	0	1	0	5	5	2
Coahuila	2	2	4	0	0	2	2	2	6
Guanajuato	0	2	3	0	0	1	0	2	4
Jalisco	5	9	5	1	5	2	6	14	7
Mexico City	43	39	67	8	11	6	51	50	73
Michoacan	1	0	0	0	0	0	1	0	0
Morelos	2	8	10	0	1	1	2	9	11
Nayarit	1	0	0	0	0	0	1	0	0
Nuevo Leon	7	11	10	3	3	2	10	14	12
Oaxaca	0	2	1	0	0	0	0	2	1
Puebla	4	5	0	0	0	0	4	5	0
Queretaro	4	4	5	0	2	0	4	6	5
San Luis Potosi	0	1	1	0	0	0	0	1	1
Sonora	1	0	1	0	0	0	1	0	1
State of Mexico	7	3	7	5	1	5	12	4	12
Tamaulipas	0	1	0	0	0	0	0	1	0
Veracruz	0	0	0	0	0	1	0	0	1
Yucatan	0	0	3	0	0	0	0	0	3

	Published Patents								
	Mixed Teams			Female Participants Only			Total		
	2014	2015	2016	2014	2015	2016	2014	2015	2016
Aguascalientes	3	0	0	0	0	0	3	0	0
Baja California	5	0	1	0	0	0	5	0	1
Chiapas	6	0	0	0	0	0	6	0	0
Chihuahua	3	0	1	0	0	0	3	0	1
Coahuila	3	0	0	2	0	0	5	0	0
Guanajuato	4	0	0	0	0	0	4	0	0
Hidalgo	7	0	1	0	0	0	7	0	1
Jalisco	5	0	2	5	0	0	10	0	2
Mexico City	48	2	3	7	1	0	55	3	3
Michoacan	2	0	0	0	0	0	2	0	0
Morelos	12	0	1	1	0	0	13	0	1
Nuevo Leon	4	1	2	1	0	0	5	1	2
Puebla	12	2	3	1	1	0	13	1	3
Queretaro	0	0	0	1	0	3	1	0	3
Quintana Roo	2	0	0	1	0	0	3	0	0
San Luis Potosi	6	0	0	0	0	0	6	0	0
Sinaloa	1	0	0	1	0	0	2	0	0
Sonora	9	0	0	1	0	0	10	0	0
State of Mexico	6	0	1	2	3	0	9	4	1
Tamaulipas	1	0	0	0	0	0	1	0	0
Veracruz	1	0	0	0	0	0	1	0	0
Yucatan	2	0	0	1	0	0	3	0	0

	Patent Applications								
	Mixed Teams			Female Participants Only			Total		
	2014	2015	2016	2014	2015	2016	2014	2015	2016
Aguascalientes	4	4	0	1	6	1	5	10	1
Baja California	5	2	3	0	0	0	5	2	3
Baja California Sur	0	0	1	0	0	0	0	0	1
Chiapas	6	3	2	0	0	0	6	3	2
Chihuahua	6	9	3	2	1	1	8	10	4
Coahuila	17	21	4	0	0	4	17	21	8
Colima	2	2	2	0	0	0	2	2	2
Durango	1	0	1	0	0	0	1	0	1
Guanajuato	13	12	5	3	6	2	16	18	7
Hidalgo	13	16	2	0	0	0	13	16	2
Jalisco	15	30	23	9	8	6	24	38	29
Mexico City	108	101	48	15	22	6	123	123	54
Michoacán	4	13	3	0	0	0	4	13	3
Morelos	13	17	7	0	0	1	13	17	8
Nayarit	0	2	1	0	0	0	0	2	1
Nuevo León	45	38	12	5	6	3	50	44	15
Oaxaca	1	2	1	0	0	0	1	2	1
Puebla	25	27	15	6	8	2	31	35	17
Queretaro	15	17	3	3	1	2	18	18	5
Quintana Roo	4	4	1	0	0	0	4	4	1
San Luis Potosi	5	1	2	0	0	0	5	1	2
Sinaloa	3	3	3	1	0	2	4	3	5
Sonora	15	9	6	0	0	0	15	9	6
State of Mexico	22	19	10	8	15	6	30	34	16
Tabasco	0	7	0	0	0	1	0	7	1
Tamaulipas	3	1	4	1	1	1	4	2	5
Tlaxcala	0	0	0	0	0	1	0	0	1
Veracruz	2	7	3	0	1	2	2	8	5
Yucatán	4	7	6	1	1	0	5	8	6
Zacatecas	0	1	0	0	0	0	0	1	0

Conclusions

- ✓ While it is possible to observe an **increase in the number of women inventors**, their participation is very small in comparison to the number of male inventors and even null in some states. This is alarming.
- ✓ It was impossible to identify if any existing policies regarding *science and technology* and *intellectual property* actually approach gender issues or if the results found here are expected by authorities or not.
- ✓ **Designing public policies** aimed at increasing the number of *women inventors* throughout the country is urgent.
- ✓ It is important that the public policies are designed with **nation-wide reach** since regarding both gender and total inventions analyzed here there are very few states, five on average, where 60% or more of the overall inventions, depending on the year are protected or in the process of being protected. This shows that the majority of the states have *fallen far behind* and data suggests that this gap is not closing.
- ✓ Reforms to federal and local legislations would be of very helpful to pressure institutions to create public policies with a dual perspective. Locally, working towards:
1. Increasing the number of women inventors, and; **2. Closing the gaps between states**.
- ✓ All efforts toward changing the current situation and improving this environment must not be limited to graduate and undergraduate education. Instead, they should be accompanied by policies to promote female participation in engineering and other related fields, particularly those labeled as STEM careers with the purpose of **changing the notion that these areas are more masculine**.
- ✓ **The participation of organized civil societies is key and necessary**, therefore change should not be provoked exclusively by the government. Instead, citizens should become involved in improving the country's conditions.

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- **Durango**

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