



A PROPOSED METHODOLOGY IN BIBLIOMETRICS FOR PROMOTING R & I: A PATENT PERSPECTIVE

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Introduction

- Mexican Institute of Industrial Property
- Patents are a source of information used only in recent years, particularly in quantitative research;
- the indicators and mathematical models of bibliometrics, such as:
 - Concentration index of Pratt,
 - Lotka's law,
 - Collaborative coefficient,
 - Degree of collaboration and
 - Law of elitism
- There are yield results that identify research opportunities in certain areas of science and technology, especially in R&I.

- Research based on bibliometrics provide a methodology for identifying areas of opportunity in the R & I through patents.
- The content of patents is extremely important for promoting the transfer of technology as well as developing new products and processes.
- The relationship of research with the development of patents and the inventive yield (OECD, 2009) have been closely related -as mentioned above- to the academic research and it often leads to the generation of a patent,
- this is possible because it is first developed a theoretical and methodological background, and then the technical evaluation of its acceptance in a given environment, which leads to a premise of the knowledge society, where it is important to use knowledge to get an economic reward.

- The bibliometric principles going to help the change of the relationship between government-industry-academy
- When performing bibliometric studies in this valuable source of information, the production of the inventors and owners can be obtained through Lotka's law, however,
- for purposes of this research this law is applied only to inventors, as they present the intellectual part of the invention, out of this information it can be obtained an average of the most productive inventors out of which it is possible to obtain the consistency and influence of them,
- it is possible to determine the inventiveness of triple helix and therefore the R & I.

- Moreover, it is extremely important to run this model to owners as information to provide is the financial capacity supplied to the R & I,
- The development of ranking by assigning the International Patent Classification makes possible not only to obtain the level of concentration - dispersion, also the level of exploitation of each section and class.

Methodology

- Analyzed 1,041 patents
- Which resulted in a study of 2,320 inventors,

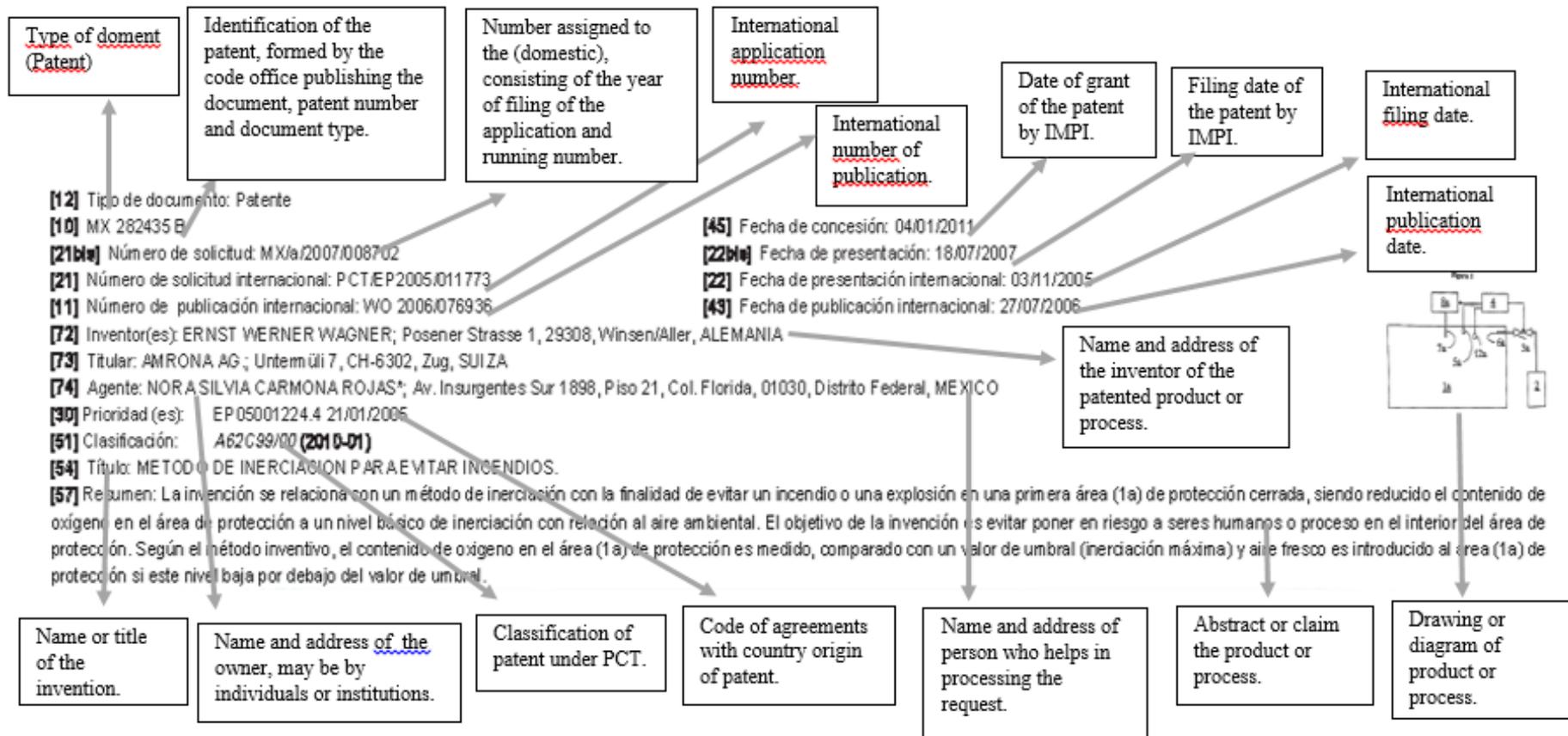


Figure 1. Description of patenting in Mexico

Table 1- Bibliometric indicators and mathematical models in patents

Indicators or model	Description	Obtain patent data	Use of Information
Concentration Index of Pratt (themed)	Concentration ratio across given classification IPC	International Patent Classification	Themed areas developed
Concentration Index of Pratt (geographic)	Concentration ratio of a geographical area of the states of origin of the inventors and countries for headlines.	Source inventor and headline	Geographic areas developed
Lotka's Law	Percentage contributed by each inventor and headlines in the development of patents.	First inventor mention,	The frequency of inventions productivity.

Price's law of elitism	The elite core of the total population of the inventors and headlines in patent generation.	First inventor and sometimes for headlines	Core of most productive inventors
Collaborative coefficient	Level of collaboration in patents, in relation to their inventor.	Participatory inventors developing patent in the	Collaboration between inventors
Degree of collaboration	Proportion of documents with multiple invention.	Participatory inventors developing patent in the	Collaboration between inventors

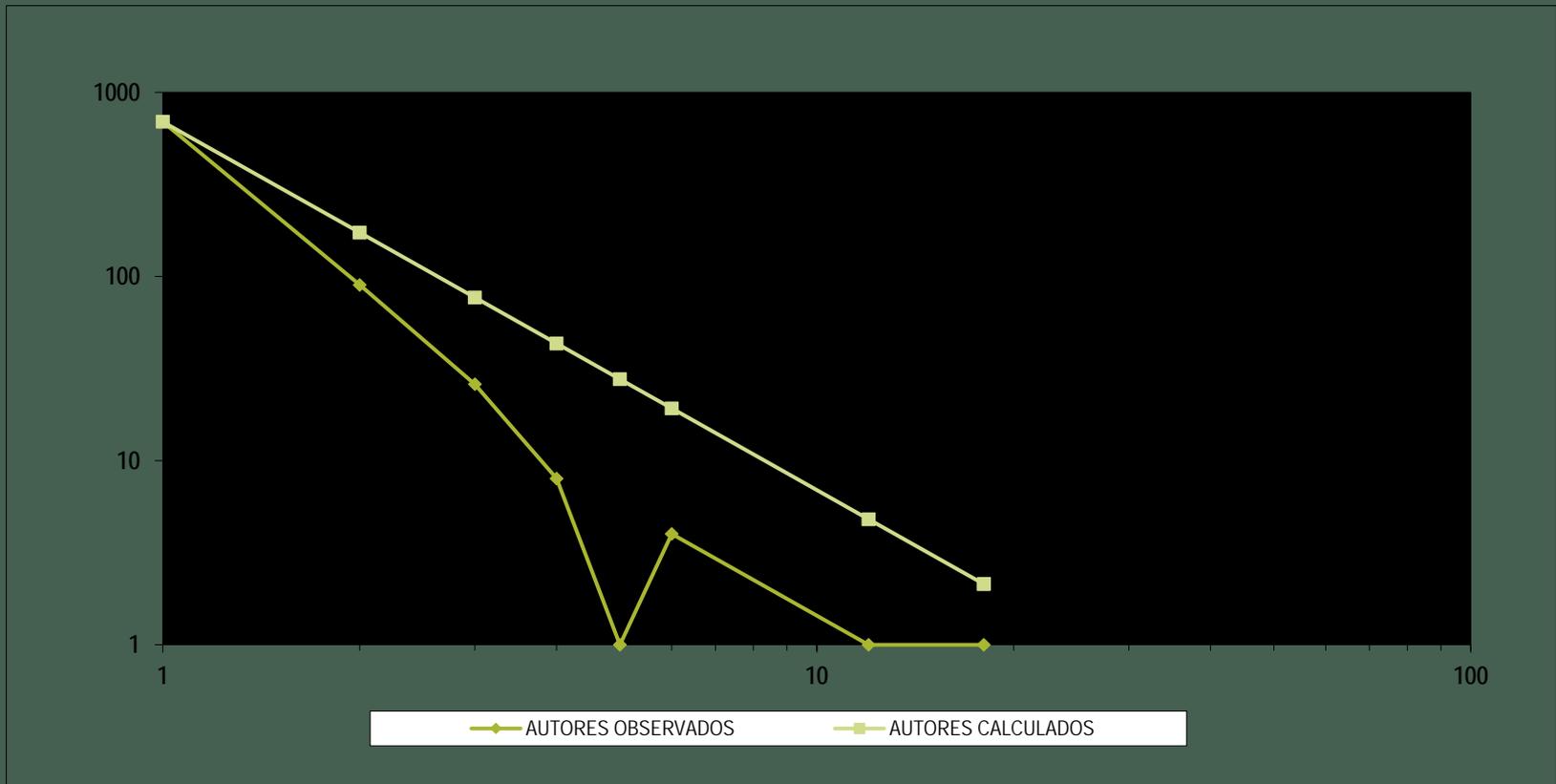
Lotka's Law

$$1/(n)^2 = \text{inventions} / (\text{Inventors observed})^2 = 2 / 692^2 = \underline{173.00}$$

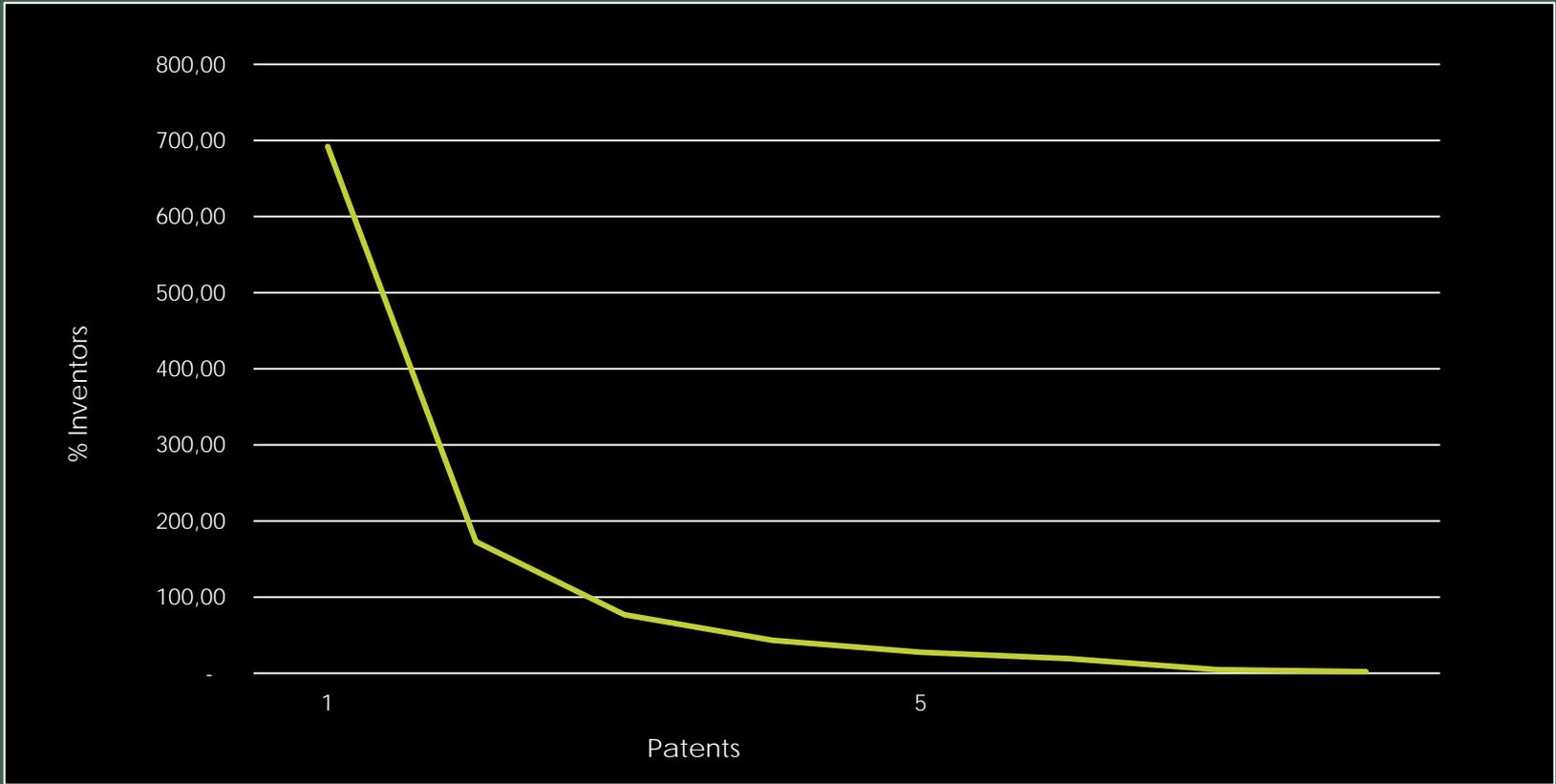
A	B	C	D	E	F	G	H	I	
CONTRIB	AUT.OBSER	ACU.OBSER	s(x)	1/(n) ²	TEOR.ACU.	f(x)	f(x) - s(x)	/f(x) - s(x)/	
1	692	692	0.8408262	692.00	692.00	0.66603626	-0.1747900	0.1747900	← D.MÁXIMA
2	90	782	0.9501823	173.00	865.00	0.83254533	-0.1176369	0.1176369	
3	26	808	0.9817740	76.89	941.89	0.90654936	-0.0752246	0.0752246	
4	8	816	0.9914945	43.25	985.14	0.94817662	-0.0433179	0.0433179	
5	1	817	0.9927096	27.68	1,012.82	0.97481807	-0.0178915	0.0178915	
6	4	821	0.9975699	19.22	1,032.04	0.99331908	-0.0042508	0.0042508	
12	1	822	0.9987849	4.81	1,036.85	0.99794433	-0.0008406	0.0008406	
18	1	823	1.0000000	2.14	1,038.98	1.00000000	0.0000000	0.0000000	
TOTALES		823		1,038.98					

Analysis and discussion of results

Lotka



0.0568182 < 0.1747900



Price's law of elitism

- The population (N) of an elite block is equal to its square root, this should yield the elite core of the total population (Gorbea Portal, 2005) the formula is:

- $n = \sqrt{N} = 28.68$

- Statistical Model Checking with Kolgoromov - Smirnov: This formula compares the observed cumulative distribution with the theoretical, its formula is (Gorbea Portal, 2005).

$$D = \text{máxima} [f(x) - s(x)]$$

- Replacing:
- $K-S = 1.63 / \sqrt{n} \quad n = 0.1747$
- $K-S = 1.63 / \sqrt{0.1747} = 0.0568182 \quad \gamma D = \text{Maximum} \quad 0.1747900$

Concentration Index of Pratt (themed)

- Tampering theory of classification in the IPC is about identifying the elements of knowledge (objects of study), the units of knowledge and the system of understanding being analyzed (Smiraglia, 2009, p. 10).
- Thus, the structure of the IPC can be seen in Table 3, where it is graphically explained the distinction to which you want to reach when assigning a rating, along with that of an alphanumeric code as the application of Pratt made from the Class.

Nivel de descripción	Disposición	Código	Sección
1°	Section	A	Human necessities
2°	NA	[A-AR]	Agriculture
3°	Class	A01	Agriculture; forestry; animal husbandry; hunting; trapping; fishing
4°	Subclass	A01C	Planting; sowing; fertilising
5°	Group	A01 C 1/04	Arranging seed on carriers, e. g. on tapes, on cords.

Concentration Index of Pratt (geographic)

- In applying Pratt index for obtaining the concentration - dispersion of the origin of the inventors, that its application is possible to obtain the concentration – dispersion of the owners.

Table 4. Concentration Index of Pratt

Concentration Index of Pratt	Results
Themed	0.47
Geographic	0.66

Table 5. Concentration Index of Pratt (geographic)

DESCRIPTOR	FRECUENCY (f)	RANGO r
Chiapas	1	1
Guerrero	1	2
Hidalgo	1	3
Alemania	1	4
Bahamas	1	5
Italia	1	6
Liechtenstein	1	7
Luxemburgo	1	8
Francia	2	9
Países Bajos	3	10
Omitted for space		
E. U. A	17	24
Suiza	18	25
Chihuahua	20	26
Guanajuato	22	27
Coahuila	30	28
Morelos	31	29
Puebla	42	30
Querétaro	56	31
Jalisco	72	32
Estado de México	74	33
Nuevo León	89	34
Distrito Federal	412	35

Table 6. Results indicators

Indicators or model	Results
Price's law of elitism	28.68
Collaborative coefficient	0.345
Degree of collaboration	0.54

Conclusions

- The importance of the development of policies, especially in the allocation of funding in relation to the explanation of the results of this analysis, in order to promote the R & I in government, public and private universities, and the also describes companies.
- The application of mathematical Lotka's law was widely dispersed in this sample, this may be the size, because although it is not very large, the data can show significant changes if the sample is enlarged. Also, it is found that the constancy of the inventors is similar to that of the authors in the production of scientific articles in the humanities and social sciences.
- However, if they have a noticeable difference in their production, since the patent exists more likely to work in a team, this may be the knowledge and experiences that inventors have further contribute and improve the production of a patentes.

- An interesting observation to the IPC with much relevance in the area of library and information studies, is the way how to organize the thematic areas.
- Since there are sections in which only placed materials or techniques without further description section and class, this varies according to the area in question, in addition to statements such as "not otherwise provided for", this is due to two situations that leave room to incorporate new areas, however, while upgrades are made and gaps are created in the future will become more difficult to recover.
- This field contains the information that a professional has a very important job, because you can make adjustments to the IPC best not to fall into confusion when seeking Patent Classification.
- With the proposals the above analysis it can be said that the operation and implementation of the IPC will be easier, and correct some errors in the representation of the content.

- Although the data used in this practice are somewhat different from those used in these studies was very fruitful, as doors research opened and therefore innovation, where the field of bibliometric studies has a wide range of research, to provide the relevant authorities with the results for improved national and state policies.
- In this sense it is important to emphasize the knowledge and improving the systems that manage patents, such as patent offices and WIPO (Snieška & Gasparėnienė, 2013), the correct description of this source of information helps to develop more assessments but especially even deeper, with a view to improving the quality of life in developing countries, is also a way to improve and expand intellectual capital, and strengthen guidelines on the government-industry-academia relationship.
- In other words, if the process for the application and granting of patents is enhanced, improving the national economy, increasing the know-how and will be directly proportional in attracting public and private finance in projects of this court, which increase R & I.

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