

Sometimes more is less: An analysis of research institutions in Chile

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Introduction

The international ranking of universities and institutions, such as the Shanghai Jiao Tong University, Times Higher Education Supplement and Scimago's Ranking Iberoamericano have become of great interest, not only to administrators, but also to potential students searching for a better education (Ioannidis et al, 2007). In the particular case of Chile, three national university rankings are published annually that analyze their performance considering various aspects. However, the research productivity of each university is poorly evaluated as it only considers the total number of papers published and in some cases the total number of citations. In addition, these rankings exclude research institutions that do not form undergraduate students. Therefore, I analyzed all Chilean institutions that have a scientific output to verify their position within the national rankings.

Methodology

Using the ISI Web of Science database, a query was made on July 12th, 2010 that searched for records that were indexed from 2002-2006 and that were registered to Chile. The documents were analyzed according to institution, total citations, h- and hKA-index (Hirsch, 2005; Krauskopf, 2009). This study only considered the research institutions that published more than 130 papers in the 5-year period. Records categorized as "meeting abstracts", "book reviews", "art exhibit" and corrections were discarded.

Results

A total of 15,646 papers were published in the Web of Science database by Chile during the 5-year period studied. An analysis of the institutions involved in the generation of these papers revealed that half of this amount is accountable to just two universities, Universidad de Chile (30.7%) and Pontificia Universidad Catolica de Chile (19.4%) (Table 1). Furthermore, these two universities also exhibited the highest number of accumulated citations and h-index value. Conversely, the Centro de Estudios Cientificos, Universidad de Tarapaca and Universidad del Bio Bio contributed to the Chilean scientific paper productivity with 1.1%, 1% and 0.9%, respectively

Table 1. Total number of papers and accumulated citations considered for h- and hKA-index. Average cites per paper was estimated using data for the estimation of h- and hKA-index.

Institution	Total records	Total citations	h-index	Records hKA	Total citations hKA	hKA-index	Avg cites/paper	Avg cites/paper hKA
Universidad de Chile	4805	46460	69	2649	28628	43	9.7	7.2
Pontificia Universidad Catolica de Chile	3040	40878	71	1670	14828	42	13.4	8.9
Universidad de Concepcion	1897	20775	54	1170	8599	31	11.0	7.5
European Southern Observatory	952	22792	66	312	3746	24	23.9	12.0
Universidad de Santiago	846	6498	31	527	3376	24	7.7	6.4
Universidad Austral de Chile	790	6409	32	522	2817	22	8.1	5.6
Universidad Tecnica Federico Santa Maria	510	4538	25	315	2243	19	8.9	7.2
Universidad Catolica del Norte	387	3311	27	200	1610	18	8.6	8.1
Pontificia Universidad Catolica Valparaiso	368	2795	21	206	1421	18	7.4	6.9
Universidad de la Frontera	308	2325	20	182	122	13	7.5	4.5
Universidad de Talca	250	1604	19	171	942	15	6.4	5.5
Universidad de Valparaiso	210	1754	18	101	416	10	8.4	4.1
Universidad de Antofagasta	185	1256	16	130	665	13	6.8	5.1
Universidad Andres Bello	168	1851	21	88	897	15	11.0	10.2
Centro de Estudios Cientificos	166	3872	33	58	1280	22	23.3	22.1
Universidad de Tarapaca	152	814	15	66	295	8	5.4	4.5
Universidad del Bio Bio	133	550	11	63	241	9	4.1	3.8

To establish whether these data was the outcome of a collaboration network, the hKA-index was estimated. Thus, the new evaluation was made considering only the papers that registered a corresponding author to each of the 17 institutions. As a result, there was a decrease in the number of papers that was a consequence of the research from a particular institution, which ranged

from 32.9% for the European Southern Observatory to 70.3% from Universidad de Antofagasta. The case of the European Southern Observatory is not surprising as it is an inter-governmental organization with 15 member countries that manages three observatories in Chile. Consequently, peers from different institutions or countries benefit from these observatories.

An interesting result was observed when the average citations/paper ratio was established using the complete data set and compared with data use to estimate the hKA-index. The most skewed decrease was established for the European Southern Observatory (from 23.9 to 12 citations/paper) in contrast to Centro de Estudios Científicos (from 23.3 to 22.1 citations/paper), which is a private non-profit research institution. Since Pontificia Universidad Católica de Chile and Universidad de Chile ranked 3rd and 6th place respectively in the average citations/paper ratio, I analyzed how many papers had never been cited that might have a diluting effect on this ratio. As shown on Figure 1, Universidad de Chile is the 2nd university with the lowest percentage of papers without citations (8.4%) followed on an 8th place by Pontificia Universidad Católica de Chile (16.3%). It is worth pointing out that the Centro de Estudios Científicos had only 1.8% of its papers without citations.

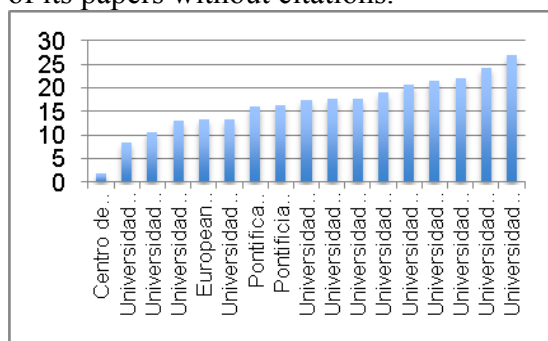


Figure 1. Percentage of published papers within the time period 2002-2006 that has not been cited.

Conclusions

Research universities in Chile have been ranked in the past by the number of papers published each year, misleading the general public as to which university has a better scientific output. I have presented data that shows that institutions that are responsible for half of the papers of a country are not necessarily the ones with the highest citations/paper ratio. Furthermore, a considerable percentage of the papers from these institutions has never been cited. Thus, there is an urgent need to reformulate the parameters considered to evaluate research institutions in Chile.

References

- Hirsch JE (2005) An index to quantify an individual's scientific research output. *Proceedings of the National Academy of Sciences USA*, 102: 16569-16572
- Ioannidis JPA, Patsopoulos NA, Kavvoura FK, Tatsioni A, Evangelou E, Kouri I, Contopoulos-Ioannidis DG, Liberopoulos G (2007) International ranking systems for universities and institutions: a critical appraisal. *BMC Medicine*, 5:30+
- Krauskopf E (2009) Making friends in high places? *Astronomy & Geophysics*, 50:6.12+