Research Trends

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Iranian universities pushing ahead

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Funding cross-border research

Funding issues can also play a part, encouraging internationalization in some regions while stifling it in others. Professor Stenberg says: "In the European Community, scientific research money is dedicated to fund collaborative research projects between scientists from different member states. The US government does not have such a mandate, per se."

Professor Thill agrees: "The structure of national research funding agencies in the USA is such that there are few funding opportunities for cross-national research." And, even where opportunities do exist, it can take a long time before research can even begin. Professor Stenberg explains that in his experience, "it took at least two, and usually more, years of planning and negotiating to get funded."

Internationalism as national policy

Ranking second in our table is Chile. Atilio Bustos González, Director Sistema de Biblioteca from the Pontificia Universidad Católica de Valparaíso in Chile, is not at all surprised by Chile's high ranking: "The research community in Chile is small, with just 2.96 researchers per 1,000 citizens of working age. Therefore, international collaboration is mandatory. We even have a national agency of research and universities, CONICYT, to stimulate international collaboration."

Part of this high level of international collaboration can be attributed to astrophysics, one of the main areas of output and impact of Chilean research. Bustos González explains: "European South Observatory and Cerro Tololo (USA Observatory) are the main astrophysical installations in the southern hemisphere. American and European researchers work together with Chile on projects financed by these governments. This results in many international publications. The main countries with which Chile collaborates are the USA, Spain, Germany, France, England, Brazil and Argentina."

Another contributing factor is that many researchers are educated abroad. "For many years, the nation's strategy for developing researchers has been to stimulate education in developed countries. One consequence of this strategy is that Chilean researchers often publish with their international colleagues," he adds.

While the nature of contemporary research questions often demands collaboration with researchers across national boundaries, many countries are also forced by geographical limitations or encouraged by national policies to pursue more internationalization than others. The size and resources of a country have a clear effect on the frequency with which local researchers will seek foreign collaborators, but in those regions where government policy restricts or slows the ability of researchers to reach out, even research topics that require international collaboration can be stifled.

Useful links:

In Issue 11, Jamo Saarti at Kuopio University, Finland, also underlined the importance of international collaboration in research, especially with regard to improving institutional rankings.

References

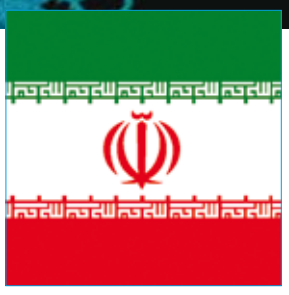
(1) Leydesdorff, L. and Wagner, C.S. (2008) 'International collaboration in science and the formation of a core group', Informetrics, 2, pp. 317–325.

(2) **Rees, M. (October 30, 2008) 'International collaboration is part of science's DNA', Nature, 456, p. 31**.

Regional focus

Iranian universities pushing ahead

JUDITH KAMALSKI



Europe may have eclipsed the Middle East during the Renaissance, but as the number of publications from Iran grows, a revival seems to be gathering pace. It has been suggested that this may be related to the importance that Iran attaches to the development of nuclear technology. Another reason could be the positive effects of reformist president Mohammad Khatami, who has shown a strong commitment to higher education *(1)*.

In a recent study *(2)*, Zouhayr Hayati and Saeideh Ebrahimy analyzed the scientific output produced by institutes and organizations in Iran, motivated by the observation that the "recent policy of government officials to increase participation has substantially increased the number of Iranian scholars in international journals."

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They compared universities to research institutes and other organizations and found that there was no difference in the citation impact of the papers produced by the three groups, but there was a difference in quantity: universities produce more papers.

Productivity reaps citations

Using Scopus data, Research Trends identified the top-five prolific and cited Iranian universities and institutes in 2007 (see Tables 1 and 2 respectively).

Top-five prolific institutes	Number of articles in 2007
1. University of Tehran	2,006
2. Sharif University of Technology	1,122
3. Daneshgahe Azad Eslami	1,011
4. Daneshgahe Tarbiat Modares	879
5. Amirkabir University of Technology	746

Table 1 – Scientific output of the most prolific institutes in Iran in 2007
Source: Scopus

Top-five cited institutes	Citations, two-year rolling
1. University of Tehran	1,960
2. Daneshgahe Tarbiat Modares	1,260
3. Sharif University of Technology	1,135
4. Daneshgahe Azad Eslami	1,027
5. Shiraz University	778

Table 2 – Number of citations in 2007 to publications from 2005 and 2006 for the most-cited institutes in Iran
Source: Scopus

There is little difference between the two Tables; the most productive institutes are typically also the most cited.

Indeed, Hayati and Ebrahimy show a positive correlation between an institute's scientific output and the number of citations for all three groups (Pearson's correlation = 0.94). They also found that the average number of citations per article – a measure of the impact these articles have had in the scientific community – was higher for more productive institutes (Pearson's correlation = 0.21).

When trying to replicate these correlations with Scopus data, we investigated articles published in 2005 and 2006, and citations to those articles in 2007. We did not distinguish between the three groups of institutions. We found a very strong positive correlation between article output and citations received (0.94), but this can hardly be considered surprising; as the number of articles written increases, it is a given that the number of citations will also increase.

To show that the number of citations per article rises as the number of articles that are published increases, there would need to be a positive correlation between output and citations per article. In Hayati and Ebrahimy's study the Pearson's correlation was low, and in this present study it is lower still, at a mere 0.0002. Taken together, this suggests that no such relationship between productivity and citation impact exists for universities and research institutes in Iran.

Attracting international attention

When looking at international collaboration, we see the same pattern. If an institute publishes many papers, the number of international collaborations is also high (Pearson's correlation = 0.73). However, when we look at the correlation between the number of papers and the percentage of articles that are written in collaboration with international partners, the correlation becomes less convincing (Pearson's correlation = 0.53).

In a broader context, Iran as a whole is on the right track. Figure 1 illustrates how the number of Iranian articles published has shown year-on-year growth of 25% over the last 12 years.

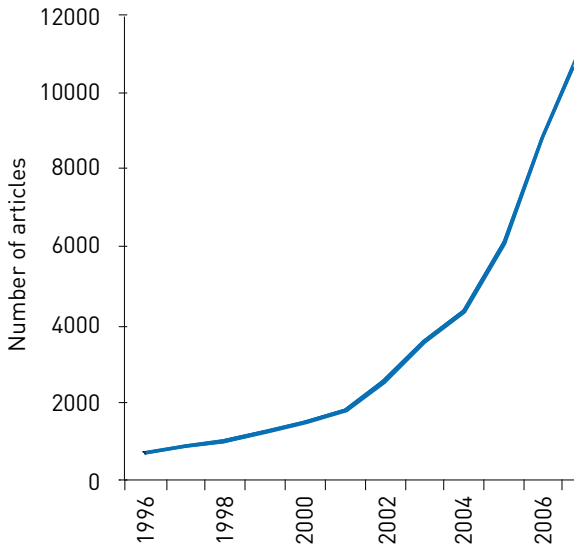

Figure 1 – Number of articles from Iran published between 1996 and 2007
Source: Scopus

Figure 2 shows how citations to Iranian research have also increased over the same time period, and that this increase cannot solely be explained by increased self-citations from Iran. Internationally, Iranian research is being cited more and more.

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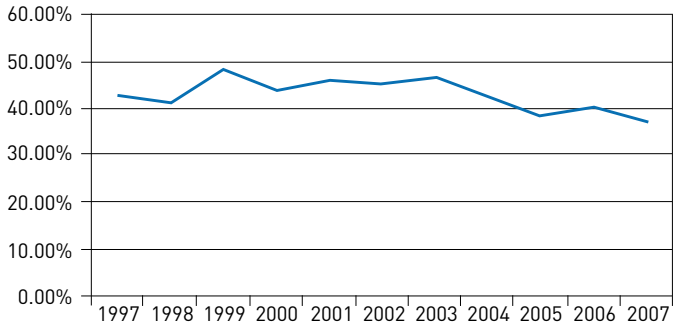


Figure 2 – Percentage of self-citations for Iran as a rolling two-year measure (citations in 2007 to articles published in 2005 and 2006)
Source: Scopus

Findings in both the article by Hayati and Ebrahimy and the present study show that Iranian institutes are on the right track when it comes to increasing the total number of articles and the total number of citations. Relatively speaking, citations per Iranian article remains constant, as there is not a strong correlation between increased output and the number of citations received per article. As global perceptions of Iranian science shift over the coming years, we may see Iran begin to take its place among the scientific nations of the world.

References
(1) Editorial 'Revival in Iran' (August 17, 2006) *Nature*, Issue 442, pp. 719–720
(2) Hayati Z. and Ebrahimi S. (2009) 'Correlation between quality and quantity in scientific production: A case study of Iranian organizations from 1997 to 2006', Scientometrics, Vol. 80 issue 3, pp. 625-636

People Focus

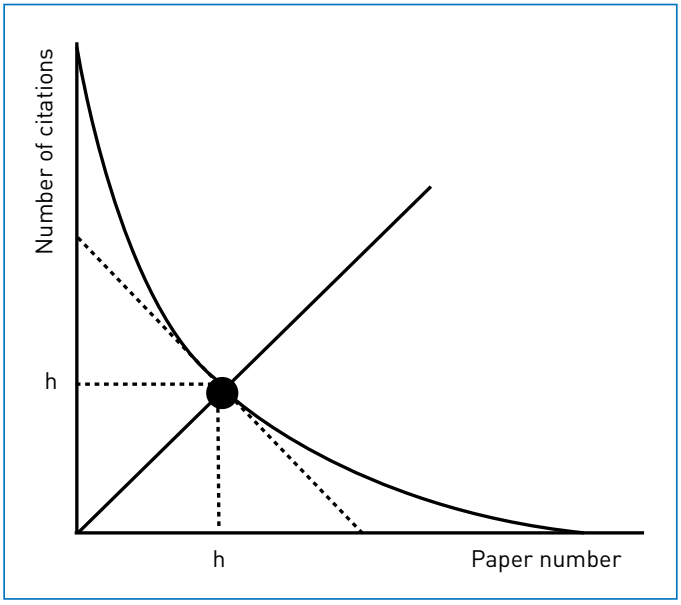
Jorge Hirsch: the man behind the metric

VICKY HAMPTON

The *h*-index, conceived in 2005, is the number of papers by a particular author that receive h or more citations. The letter 'h' stands for 'highly cited'. It has already become one of the most widely used metrics for research evaluation, and has been adopted by bibliometricians and non-bibliometricians alike. Professor Jorge Hirsch, whose academic career in physics has taken him from Buenos Aires to Chicago to San Diego, talks to Research Trends about where it all started.

Research Trends (RT): What triggered your interest in bibliometrics?
Professor Jorge Hirsch (JH): There were two main reasons: I had trouble getting papers accepted in journals with the highest Impact Factors because of the controversial nature of my research. Fortunately, there were journals with lower Impact Factors that did accept my papers. Nonetheless, they were well cited, meaning other researchers found them useful. A criterion often used in evaluating research achievement was to count papers published in high Impact-Factor journals; I wanted to provide an alternative criterion.

Secondly, I was on committees where I had to evaluate and compare research achievements of candidates for academic positions at my institution. I felt that too much weight was often placed on subjective criteria – such as letters of recommendation – rather than objective ones.



RT: How are bibliometrics perceived by physicists?
JH: Opinions are wide ranging: some hate them, some love

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