A Closer Look at Latin American Research

New research shines a light on trends in scientific output in five Latin American countries

INASP, 2010

Policy-makers in five Latin American countries are set to benefit from a recent study into the research output of their scientific communities. The study, a collaboration between the Cuban Ministry of Higher Education, the National Center for Scientific Research and INASP, sets out research trends in Cuba, Ecuador, Bolivia, Nicaragua and Honduras between 1996 and 2008 – a period of rapid growth in research output across the region. Findings will not only help decision-makers in these countries identify where their strengths lie, but will also show where policy may help fill research gaps.

The study answered six key questions:

- How have research publication patterns changed over the last ten years in the selected countries?
- What is the number of research publications produced per country per year?
- What are the top research institutions in each country, as ranked by publication output?
- What is the breakdown of research publications by subject area?
- How has this research been cited by others in their research publications?
- What are the changing patterns of international research collaboration, as indicated by multi-author publications with different country affiliation per author?

Key Findings by Country: Bolivia

- Bolivian scientific production is mainly concentrated on agriculture and biological sciences, although environmental sciences, immunology and microbiology, earth and planetary science, veterinary and social sciences are also highly productive and visible.
- The Major University of San Andres and the Major University of San Simon are the two most productive Bolivian institutions. The most productive authors mainly belong to these two institutions.
- Well known American and British journals publish a large number of Bolivian papers.
- The USA, France, Belgium and the UK are Bolivia's main scientific partners.

Key Findings by Country: Cuba

- Cuban scientific production has a clear biomedical orientation.
- The most active and visible areas of research are pharmacology, toxicology and pharmacy, immunology and microbiology, agriculture and biological sciences, chemistry and biochemistry, genetics and molecular biology.
- The University of Havana is the most productive institution of the country, and the core of most productive authors shows high levels of visibility.
- A high proportion of the scientific production is published in Cuban less-cited journals, which is probably the cause of the low impact of the country in a high number of subject areas. Spain, Mexico and Brazil, are Cuba's main scientific partners.

Why Latin America?

Latin America is of particular interest, not only because the five countries in the study partake in initiatives by INASP and other organisations that promote the importance of research, but because the region experienced unusually high rates of scientific research growth during the study period. During this time, scientific production increased internationally by 67.8 per cent. For Latin America, the figure was 190.5 per cent (see Fig 1).

Furthermore, scientific production increased year on year during the study period, and almost 70 per cent of its published articles were cited at least one time. Three times more articles were published in Latin America in 2008 than in 1996, and in 2006, 2007 and 2008 it published more than 3 per cent of the world's scientific production.

A bibliometric approach

To get a more detailed understanding of developments, the study contrasted research activity and visibility in the studied countries with those of a control group of eight countries at a similar level of development in Latin America (Guatemala and El Salvador), Asia (Bangladesh and Vietnam) and Africa (Ghana, Kenya, Rwanda and Tanzania). This enabled findings to be compared to trends not only at a regional level but also internationally.

Key Findings by Country: Honduras

- In Honduras, agriculture and biological sciences is the most productive, active and visible research area. Other high performers include immunology and microbiology, economics econometrics and finance, environmental sciences, neuroscience, medicine and veterinary science.
- The National Autonomous University of Honduras is the leading institution.
- The most prolific authors are headed by the Honduran neuroscientist Marco T. Medina, with important research on epilepsy.
- Honduran papers are basically published in journals edited by the USA. However, the Spanish journal Revista de Neurología is at the top of this ranking.
- The USA is clearly the main scientific partner, followed by Mexico and Costa Rica.

Key Findings by Country: Ecuador

- Medicine and agriculture and biological sciences are the two main subject areas in Ecuadorian scientific production.
- The greatest output is in agriculture and biological sciences, environmental sciences, earth and planetary science, immunology and microbiology, and physics and astronomy.
- The University of San Francisco de Quito, and the Catholic University of Ecuador are the most productive institutions of the country.
- There is no strong core of Ecuadorian productive authors, which is the result of a high level of international collaboration where the leader authors are from international institutions. Although the Revista Ecuatoriana de Neurologia is the journal leader in the scientific production of Ecuador, a large proportion of papers is published in other well known journals. The USA, the UK and France are Ecuador's main scientific partners.

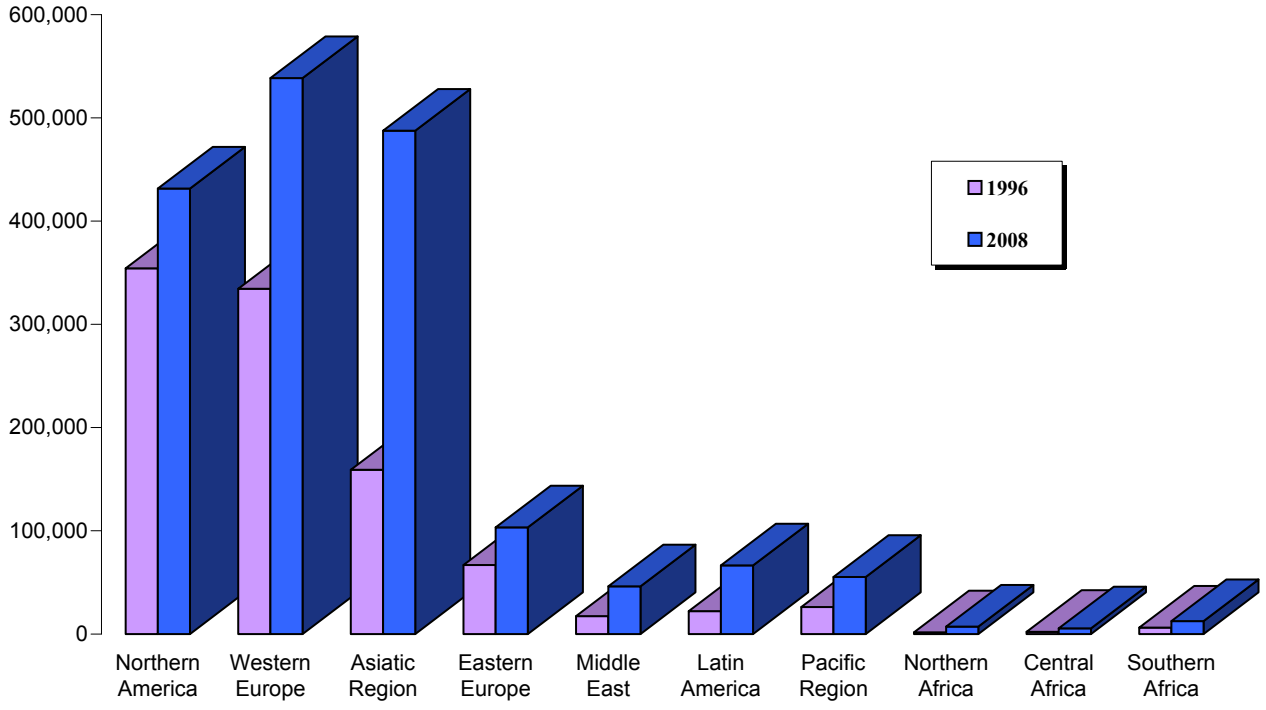

Fig. 1 World scientific output Scopus by region (SJCR 1996 and 2008)

Research took a bibliometric focus, concentrating on articles from high visibility journals taken from Scopus, the main Elsevier database for bibliometric research purposes, the scientometric tool SCImago Journal & Country Rank and the SCImago Institutions Rankings, the most recent tool created by the SCImago Research Group.

Articles were assessed using:

- quantitative indicators measuring a country's entire scientific publication (including total publication output and growth rate); and
- qualitative indicators to gauge the impact of research (including average number of citations by document).

Key Findings by Country: Nicaragua

- Medicine is the most productive subject area for Nicaragua. The best performances are mainly achieved in environmental sciences, immunology and microbiology, agriculture and biological sciences, earth and planetary science, social science and medicine.
- The National Autonomous University of Nicaragua (León) is the most prolific institution.
- The majority of the most prolific authors specialize in medical sciences.
- Nicaraguan papers are essentially published in journals edited by the USA and the UK
- The USA, Sweden and Costa Rica are Nicaragua's most important scientific partners.

Implications

The detailed findings of the study provide invaluable data for decision-makers within the five countries featured in the study. It is hoped that these findings will contribute to broader research into the changes in scientific output in developing countries to:

- provide data to inform future policy-making;
- create firmer links between trends in scientific output and policy decisions; and
- gauge the impact of specific policy decisions on scientific output.

However, the study also has implications for organisations across the globe, such as INASP, that are devising strategies for supporting the growth and dissemination of research in developing countries in that it demonstrates the value of bibliometric indicators in research evaluation policies.

Possible next steps include widening this research to incorporate all African partner countries or working with the Latin American countries featured here to extend the analysis conducted so far.

The role of increased access to information

The period covered in this research has been a time of great change in both production of, and access to, research information. The advent of online availability of information, improving internet connectivity and changes in scholarly publishing techniques have all contributed to more information being potentially available to more researchers.

There are a number of national and international access programmes that have specifically aimed to improve access to journals based information in order to help researchers undertake and improve their research and service delivery. Programmes like Research4Life[1] , EIFL[2], TEEAL[3] , our own Programme for the Enhancement of Research Information (PERii)[4] plus numerous others, have all contributed to more information being available to researchers in countries covered in this research.

But is there a direct correlation? Is the increasing production of research outputs related to the increasing availability of information?

Unfortunately, this seemingly simple question is more complex than it looks as clearly demonstrating a causal relationship between access and output is extremely difficult. Research communications (of which access to information and research output are both parts) is a complex system. Isolating a one aspect and exploring its singular contribution to the system as a whole is virtually impossible. Rather, analysis of the whole system in terms of components and outcomes of all its parts (knowledge, skills, infrastructure, access, attitudes, outputs, etc.) is a more fruitful line of enquiry. The research presented here does not attempt to do that.

Conclusions

Attribution vs. contribution

Increased production of research outputs and increased access to research information are both a feature of the improved research communication systems presented in this research. Exactly how they relate is not, at this time possible to say. They are both an observable feature of those systems and contribute to the improved research environment. Further research is required to fully understand these contributions.

Research directed by:

Dr. Ricardo Arencibia-Jorge
Network of Scientometric Studies for Higher Education, National Center for Scientific Research, Havana, Cuba

The full report is available at:
www.inasp.info/bibliometrics

Email: ricardo.arencibia@cnic.edu.cu for more information about the project, its methodology or future applications.

[1] Research4Life: www.research4life.org

[2] EIFL: www.eifl.net

[3] The Essential Electronic Agricultural Library (TEEAL): www.teeal.org/

[4] PERii: www.inasp.info/perii