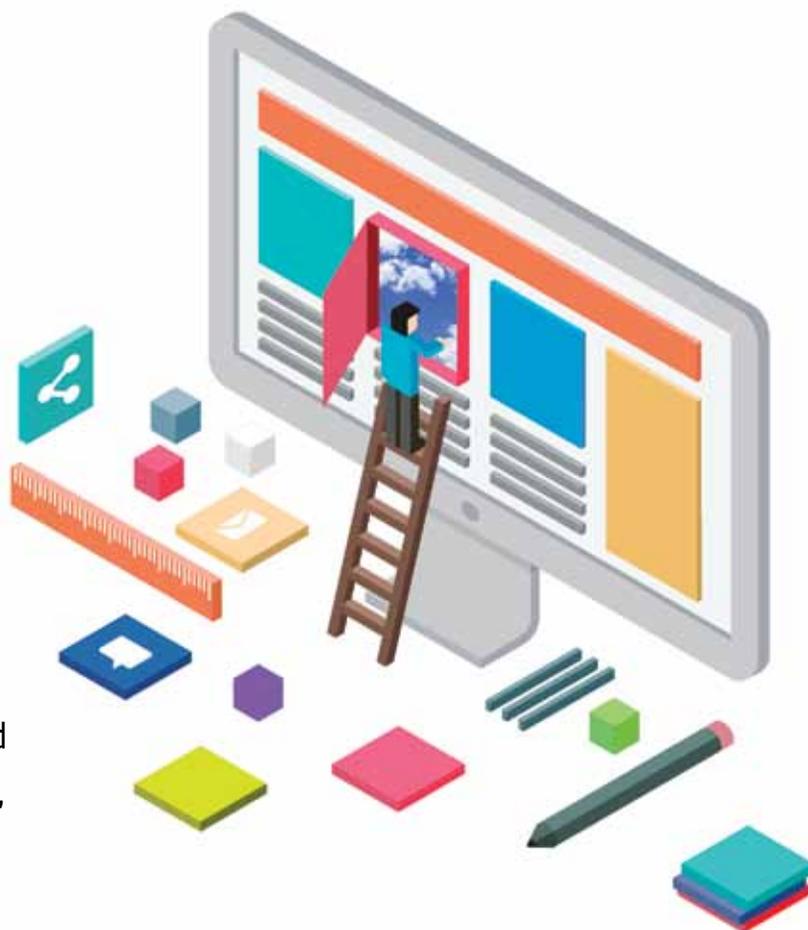


ACCESSIBLE SCIENTIFIC OUTPUT

Open access to articles published by Brazilian journals is important, but its impact is still limited

Fabício Marques



Brazil stands out on the international landscape when it comes to open access, a movement launched in the early 2000s with the aim of making scientific output freely available online. According to data compiled by Spanish research group Scimago, 33.5% of the Brazilian articles indexed in the Scopus database in 2016 were published in journals whose content is free to read online as soon as it is published, under a model known as the “golden road.” This is the largest proportion among the 15 nations with the highest volume of scientific output recorded on Scopus. Brazil is also top of the list of nations with the highest number of open access scientific journals (*see charts on page 47*).

Brazilian engagement with open access, which contrasts with the traditional model of subscription-only access, began even before the movement was established internationally. The Scientific Electronic Library Online (SciELO), a

program funded by FAPESP and supported by the Brazilian National Council for Scientific and Technological Development (CNPq), was established in 1997. It now features 283 Brazilian journals, whose 300,000 articles were downloaded an average of 810,000 times per day in the first eight months of 2017.

According to SciELO coordinator Abel Packer, the program has helped to professionalize and internationalize dozens of Brazilian journals, allowing them to be indexed in international databases and giving greater visibility to Brazilian scientific output. “It is also cheaper to publish in a journal linked to SciELO, because profit is not the main objective,” he adds. The estimated average cost of the review and publication process for journals indexed on SciELO is US\$500 per article. The cost doubles if the paper needs to be translated into English. “Several studies indicate an international average of more than US\$1,200 to publish articles in gold open access journals,” says Packer.

Methods of free publication

Open access models for scientific journals

GOLDEN ROAD

Journals provide free online access to articles as soon as they are published. Many charge authors a fee, others are subsidized

GREEN ROAD

Copies of articles published in closed journals are archived in institutional online repositories by the authors

HYBRID ROAD

Closed journals charge authors an extra fee to make their articles freely available on the journal website

BRONZE ROAD

Articles are available on journal websites, but with no license that qualifies them as open access

PREPRINTS

Papers not yet submitted to peer review are made available on open preprint servers before being sent to a journal

“The cost rises to US\$2,500 for hybrid journals,” adds the SciELO coordinator, referring to subscription-only journals that offer free access to papers on their websites if the author pays an extra fee.

Most open access journals in Brazil follow the golden road, providing access to all of their content free of charge. In this model, costs may be covered by charging authors an article processing charge (APC) or by grants from government agencies or research support entities. In Brazil, it is rare to charge authors fees; expenses are covered by funding from agencies such as the Brazilian Federal Agency for Support and Evaluation of Graduate Education (CAPES), CNPq, and FAPESP, as well as by the scientific societies and institutions that publish each journal. “More than half of the costs are funded by the institution that publishes the journal, which also provides facilities and staff,” says Packer. The resources FAPESP invests in the SciELO collection finance the online manuscript submission

PRACTICES AUTHORIZED BY CLOSED JOURNALS

The SHERPA/RoMEO website monitors the different self-archiving permissions offered by publishers. The main types are:

- The author may archive the post-print version in repositories (final version of paper after review)
- The author may only archive the pre-print version (last version of paper before review)
- The author may archive pre-print and post-print versions

MOST USED LICENSES

Open access articles have a Creative Commons license to guide users. The most important are:

CC-BY Allows unrestricted download and use of articles as long as the source is cited

CC-BY-NC Allows download and use of articles as long as the source is cited, for non-commercial use only.

CC-BY-NC-ND Allows download and use of articles for non-commercial use and with no changes to the material

Someone has to foot the bill for this model, which is getting more and more costly, says Rui Seabra, from ABEC

system, maintenance of the website and its database, and international dissemination. “SciELO’s average annual expenditure is US\$120 per article,” says Packer.

INCREASING COSTS

Open access is on the rise worldwide, driven by initiatives like the European Union’s decision to require all articles produced in its member states to be available for free by 2020. These types of actions, however, require funding to cover publication costs and put pressure on the budgets of universities and funding agencies. This fact has been demonstrated in the United Kingdom, whose Research Councils (RCUK) have demanded since 2014 that all scientific output produced by its associated institutions be made freely available via open access. As more and more researchers publish in journals that charge extra fees for open access articles, costs have increased. According to a study by the University of Birmingham, UK universities spent £33 million (US\$44 million) on open access publishing in 2015—equal to around 20% of all publication expenses. “Open access is an irreversible trend, but someone has to foot the bill, which is getting more and more costly,” says Rui Seabra Ferreira Júnior, president of the Brazilian Association of Scientific Publishers (ABEC).

According to a study led by American researcher Heather Piwowar of the University of Pittsburgh and shared on the PeerJ Preprints repository in August, only 12% of open access articles are published via Brazil’s prevailing model, the golden road. Another 17% follow the “green road,” where researchers archive a copy of scientific papers they publish in closed access journals in a database run by their institution, access to which is freely available to the public. Some journals allow the authors to share the final version of the paper, while others only allow the pre-review version to be made available in such databases.

About 13% of the articles in the sample were classified as following the hybrid road, where closed access journals charge the author an extra fee to share the article publicly online. Publisher Elsevier recently switched to the hybrid model. “We decided to be more flexible, so that each author can decide how they want to publish their article,” says Dante Cid, Elsevier’s vice-president of academ-

Well-ranked Brazilian journals

Journal Citation Reports 2016 impact factor

TITLE	IMPACT FACTOR
MEMÓRIAS DO INSTITUTO OSWALDO CRUZ	2.605
JOURNAL OF MATERIALS RESEARCH AND TECHNOLOGY	2.359
DIABETOLOGY & METABOLIC SYNDROME	2.347
JORNAL DE PEDIATRIA	2.081
REVISTA BRASILEIRA DE PSIQUIATRIA	2.049
BRAZILIAN JOURNAL OF MEDICAL AND BIOLOGICAL RESEARCH	1.578
JORNAL BRASILEIRO DE PNEUMOLOGIA	1.496
BRAZILIAN JOURNAL OF INFECTIOUS DISEASES	1.468
JOURNAL OF VENOMOUS ANIMALS AND TOXINS INCLUDING TROPICAL DISEASES	1.447
REVISTA DE SAÚDE PÚBLICA	1.353
JOURNAL OF APPLIED ORAL SCIENCE	1.342
BRAZILIAN ORAL RESEARCH	1.331
JOURNAL OF THE BRAZILIAN SOCIETY OF MECHANICAL SCIENCES AND ENGINEERING	1.235
BRAZILIAN JOURNAL OF PHYSICAL THERAPY	1.226
NEOTROPICAL ICHTHYOLOGY	1.203

SOURCE JCR / THOMSON REUTERS

ic relations in Latin America. A study by PeerJ Preprints noted the existence of a fourth model, dubbed the “bronze road,” referring to the 58% of freely accessed articles from closed access journals that published the article publicly online with no formal license to do so.

Open access publication increases the chance that an article will be read, but it does not guarantee a greater impact. Citation of Brazilian journals is low, but there are signs of growth. The impact factor (IF) increased for more than half of the 122 Brazilian journals included in the 2016 Journal Citation Reports (JCR), with five achieving an IF greater than 2. This means that the articles in these journals were cited in other publications just over twice each, on average, over the last two years. Only a third of the Brazilian journals listed in the JCR have an IF above 1—for the rest, the average is less than one citation per article. Five years ago, only 17 Brazilian journals had an IF greater than 1. As a point of comparison, globally renowned open access journal *PLOS ONE* had an IF of 2.806 in 2016.

HOW IS EACH MODEL PERFORMING?

The advancement of open access has encouraged researchers to study which model leads to the greatest impact. A study by Heather Piwowar found that open access articles are cited 18% more on average than papers indexed in the Web of Science (WoS) database, but this varies depending on the model. Green and hybrid open access articles are cited 30% more than the global average, while gold open access publications, common in Brazil, are 17% below the global citation average.

A Spanish paper published in *Scientometrics* in May analyzed the influence of articles published in 2009 and indexed in the WoS database, concluding that of 173 research topics, those published via gold open access had less impact than those only available by subscription, while the impact was greater in just 36 topics. SciELO coordinator Abel Packer says that the study is biased; many of the journals it classifies as golden road publications are very heterogeneous and have not been indexed for long, meaning

they are not suitable for direct comparison with closed access journals, most of which have been indexed for many years.

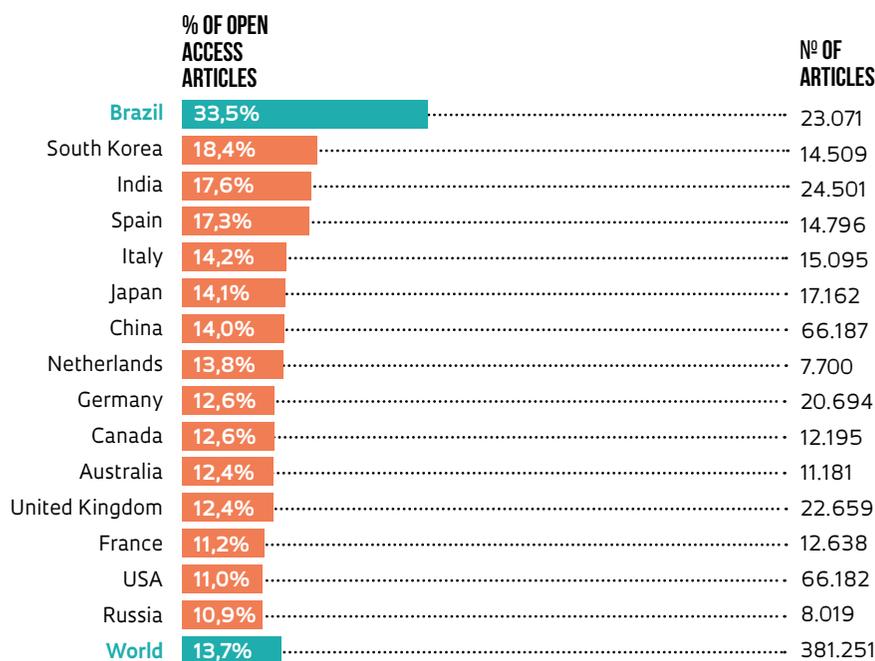
Ferreira Júnior, from ABEC, distinguishes research results that should be published in international journals from those with a regional scope that are better suited to national periodicals. “Some scientific output is strategically important to Brazilian science and society, but does not meet the criteria for publication in high-impact international journals, which only accept very innovative papers at the forefront of knowledge.” One such example is Brazilian agriculture journal *Pesquisa Agropecuária Brasileira*, published by the Brazilian Agricultural Research Corporation (EMBRAPA) since 1966, which has an IF of 0.542. “Its impact is not high by international or even CAPES standards, but it is a strategically important journal because agribusiness is the flagship of the Brazilian economy.” This idea of regional output that is disregarded by high-impact journals has never been analyzed. “There are no studies on rejected articles in this context,” says Abel Packer.

To increase the impact of their journals, publishers try to attract articles with innovative content. It is not an easy task. One complaint made by publishers is that the Qualis System, used by CAPES to classify journals that publish papers written by graduate students, gives more weight to articles published in journals from developed countries, which prevents the progress of Brazilian journals.

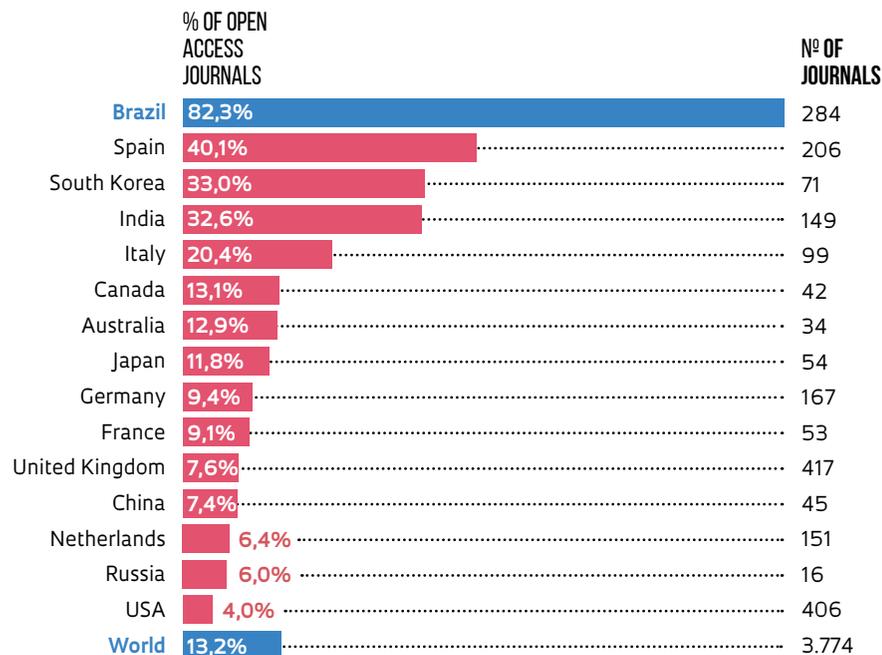
ABEC’s Ferreira Júnior believes a national publishing policy is needed. “The federal government helps finance national journals, but CAPES better evaluates researchers who send their best articles abroad,” he says. In Europe or the United States, governments are not involved in publishing policies. “In China, the government invested in strengthening a group of journals that helped to grow the country’s scientific output,” says Ferreira. According to CAPES evaluation director Rita Barradas Barata, the institution evaluates journals based on circulation potential and impact, without distinguishing between open or closed access. In some areas, especially in the humanities and applied social sciences, where indexing in international databases is less frequent, presence in the SciELO database is “strongly valued as an indicator of journal quality.” However, Rita mentions, there are impor-

The model in 15 nations

Articles in gold open access journals* published by the countries with the highest scientific output in 2016**



Gold open access journals* published by the countries with the highest scientific output in 2016**



*Journals that offer free online access to articles as soon as they are published **Indexed on the Scopus database

SOURCE SCIMAGO

tant scientific publications produced by commercial publishers with a restricted open access policy. “There is no reason to prevent researchers from publishing in prestigious journals just because they are not open access.”

Two years ago, the SciELO library introduced new rules to increase the international influence of its journals, such as requiring that 75% of its indexed articles were in English—previously it had been 60%—and increasing the number of authors and reviewers with foreign affiliations (see Pesquisa FAPESP, issue No. 227). Paulo Sentelhas, a professor at the Luiz de Queiroz College of Agriculture at the University of São Paulo (ESALQ-USP) and editor-in-chief of *Scientia Agricola*, says that internationalization yields results, but is not without its problems. The ESALQ-USP journal has been part of the SciELO collection since its inception and today has an IF of 1.108—the highest of all Brazilian agronomy journals. In 2003, it decided to only publish articles in English. “There was a backlash, and the number of papers submitted fell at first,” he recalls. “Gradually, the journal became more well-known, and we started attracting more authors from abroad.” Today, 65% of the reviewers who evaluate its articles are from outside Brazil, compared to 5% in the early 2000s. “Publishing articles in English gave us access to foreign reviewers, which was instrumental in improving the quality of the journal.” He maintains that the more internationalized Brazilian publications will benefit from the advancement of open access. “From 2020, when researchers from Europe will have to publish via open access, there will be more opportunities for our best journals to attract quality articles from abroad,” he predicts. ■

Project

Development and operation of the SciELO collection for the period from November 1, 2016 to October 31, 2019 (No. 15/26964-1) **Grant Mechanism** Regular Research Grant **Principal Investigator** Abel Laerte Packer (UNIFESP Support Foundation) **Investment** R\$21,756,884.07 (for the whole project).

Scientific articles

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