

Communication

# The Positive Impact of the Open Access Scientific Publishing in Chile

Miguel Segovia <sup>1</sup>, Felipe M. Galleguillos Madrid <sup>2</sup> , Carlos Portillo <sup>2</sup> , Ezequiel Martínez Rojas <sup>3</sup> , Sandra Gallegos <sup>1</sup>, Jonathan Castillo <sup>4</sup> , Iván Salazar <sup>5</sup>, Gonzalo R. Quezada <sup>6</sup>  and Norman Toro <sup>1,\*</sup> 

<sup>1</sup> Faculty of Engineering and Architecture, Universidad Arturo Prat, Iquique 1100000, Chile; misegovi@unap.cl (M.S.); chichined@gmail.com (S.G.)

<sup>2</sup> Centro de Desarrollo Energético Antofagasta, Universidad de Antofagasta, Antofagasta 1240000, Chile; felipe.galleguillos.madrid@uantof.cl (F.M.G.M.); carlos.portillo@uantof.cl (C.P.)

<sup>3</sup> Vice Rector's Office for Research and Innovation, Universidad Arturo Prat, Iquique 1100000, Chile; emartinezr@unap.cl

<sup>4</sup> Departamento de Ingeniería en Metalurgia, Universidad de Atacama, Av. Copayapu 485, Copiapó 1531772, Chile; jonathan.castillo@uda.cl

<sup>5</sup> Departamento de Ingeniería Civil, Universidad Católica del Norte, Antofagasta 1270709, Chile; isalazar@ucn.cl

<sup>6</sup> Escuela de Ingeniería Civil Química, Universidad del Bío-Bío, Concepción 4030000, Chile; grquezada@ubiobio.cl

\* Correspondence: notoro@unap.cl; Tel.: +56-975-387-250

**Abstract:** The letter represents the authors' opinion on the positive impact that allowing open access to scientific publications has on doctoral programmes, the careers of young researchers and the overall quality of university education in Chile.

**Keywords:** education; publications; doctoral programmes



**Citation:** Segovia, M.; Galleguillos Madrid, F.M.; Portillo, C.; Rojas, E.M.; Gallegos, S.; Castillo, J.; Salazar, I.; Quezada, G.R.; Toro, N. The Positive Impact of the Open Access Scientific Publishing in Chile. *Publications* **2024**, *12*, 41. <https://doi.org/10.3390/publications12040041>

Academic Editor: Andrew Kirby

Received: 16 August 2024

Revised: 28 October 2024

Accepted: 1 November 2024

Published: 11 November 2024



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## Dear Editor

Tertiary education is considered essential for fostering knowledge and innovation, which in turn impacts economic growth [1]. Several member countries of the Organisation for Economic Co-operation and Development (OECD) have placed greater emphasis on improving the quality of education [2,3]. In Chile, the Ministry of Education has stated that having high-quality education and equitable access for the entire population is of utmost importance, as it is a fundamental element for promoting economic and social inclusion and reducing levels of inequality [4]. For these reasons, in recent years, local universities have focused on developing doctoral programmes aimed at addressing local economic, social, and cultural challenges [5]. For instance, in northern Chile, universities such as Universidad Católica del Norte, Universidad de Antofagasta, and Universidad Arturo Prat have focused on establishing research centres and postgraduate programmes aimed at solving regional issues, with mining being a major economic focus, along with, more recently, energy, particularly solar energy. These issues include water scarcity in the region, the development of new mining technologies, solar technologies, and the promotion of circular economic initiatives. One example is the Circular Economy Centre, whose network includes various scientific and educational institutions, such as Andes Pacific Technology Access (APTA), Know Hub Chile, Pontificia Universidad Católica de Chile (PUC), Universidad Arturo Prat (UNAP), Universidad Católica del Norte (UCN), Universidad de Antofagasta (UANTOF), Universidad de Atacama (UDA), Universidad de Chile (UCH), Universidad de Santiago de Chile (USACH), and Universidad de Tarapacá (UTA), among other partners [6]. These initiatives require advanced human capital that is highly skilled in research and scientific and technological production in the various fields of knowledge involved in the local market. As in other countries worldwide, these measures

have initiated regulatory processes aimed at establishing quality assurance mechanisms [7] (currently regulated by the National Accreditation Commission, in accordance with Law No. 21.186/2019 [8]).

In Chile, doctoral training is relatively recent, as universities have long focused on undergraduate and master's education, which have served as entry points for many private universities [5]. Through state bodies such as the National Agency for Research and Development (ANID), professionals in the country can apply for doctoral scholarships both nationally and internationally (despite a 6.2% decrease in ANID scholarships between 2015 and 2023, postgraduate scholarship investment increased by 8.65% between 2020 and 2023). These scholarships help cover living costs, tuition fees, doctoral programme registration, travel expenses, and reagent purchases. However, the differences in the amounts awarded for scholarships abroad versus those within Chile are dramatically disproportionate, considering that the cost of living in Chile is at parity (1:1) with Spain. The monetary income required to support the living costs of doctoral students in Chile can be over 100% lower than that of Chilean students studying in Japan, even though Tokyo is only 30% more expensive than Antofagasta, Chile. Nevertheless, these initiatives help promote the training of new doctoral candidates and the local growth of science and technology. Scholarship allocation criteria are based on merit in the scientific field, with great value placed on the number of publications in scientific journals, book chapters, technical notes, etc. [9].

In this context, open access to scientific publications has proven to be a highly efficient mechanism that significantly aids the rapid development of doctoral students throughout Chile, as it facilitates timely graduation (within four years), a critical KPI for accrediting doctoral programmes in Chile. Furthermore, several universities in the country currently need to increase their annual publication rates in the Web of Science (WoS) database, as they receive fiscal contributions that help fund their operations and maintenance (O&M) processes and improve their positions in national and international rankings, as well as help them to meet current accreditation standards set by the CNA. Given this scenario, Chilean universities promote scientific production by supporting some of the costs associated with language translations and open access publication fees (APCs), the latter being a mechanism implemented over the past two years.

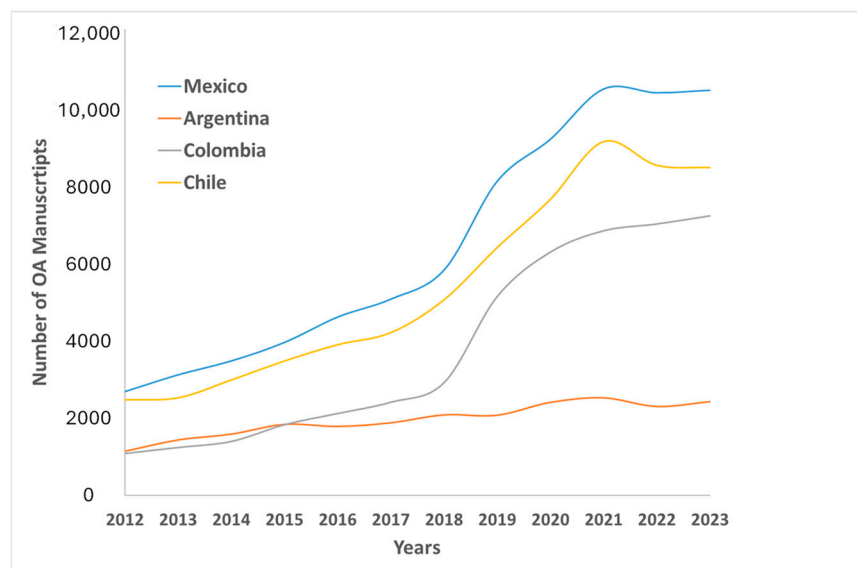
It is important to highlight the steady growth of open science in the number of WoS publications produced throughout Chile. Table 1 shows the total number of publications in the "Article" category, where open access publications represented 48% of the total in 2012, while in the most recent year (2023), they accounted for 64% (see Figure 1). The same trend is observed in publications categorised as "Review", where open access publications represented 47% of the total in 2012 and 70% in 2023 (see Tables 1 and 2).

**Table 1.** Number of WoS Article publications in Chile from 2012 to 2023.

Article	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Traditional Journal	5.722	5.880	6.681	7.404	8.237	8.597	9.460	11.952	13.610	14.655	13.018	12.946
Open Access	2.750	2.855	3.332	3.764	4.214	4.523	5.319	6.736	7.809	9.053	8.327	8.292

**Table 2.** Number of WoS Review publications in Chile from 2012 to 2023.

Review	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Traditional Journal	272	261	356	351	447	467	595	749	1014	1357	1264	1139
Open Access	128	155	201	180	247	251	335	461	669	958	885	798



**Figure 1.** A comparison of open access publication growth trends in Chile with those of Colombia, Mexico, and Argentina.

Figure 1 shows a substantial increase in the use of open access journals in countries such as Chile, Colombia, Argentina, and Mexico. This demonstrates a shifting trend in Latin American countries when it comes to publishing. However, these countries often lack direct support for covering open access fees.

Based on the results, the following conclusions can be drawn:

Open access publications have become a fundamental tool for improving the quality of, the visibility of, and easy access to scientific research published in high-impact scientific journals, which in the past was impossible to access due to high costs or the need for membership. Open access (OA) manuscripts tend to have a higher number of citations compared to journals that restrict access through paywalls (OA papers have 18% more citations). The increase in citation rates for OA articles ranged from 45% in philosophy to 91% in mathematics or science [10]. K. Antelman indicated that mathematics showed the highest rate of OA adoption, while philosophy studies have not embraced OA as effectively. On the other hand, political science studies experienced a significant increase in citations for OA articles, suggesting that OA benefits visibility and effective dissemination. However, the citation count does not extensively measure the impact and quality of research, being only an indicator of impact; today, the number of views or downloads of a manuscript can also be considered indicators supporting research quality and impact. Additionally, Benedict Probst et al. did not observe a significant increase in citation numbers, highlighting that the main impact lies in the development of technological applications rather than advancing academic research or basic science. Furthermore, Benedict Probst et al. noted that OA generated a 42% increase in the use of scientific articles in patent creation, benefiting small science and technology-based companies [11,12]. OA publications have an interesting economic impact, as they can reduce research management costs, allowing monetary and human resources to be allocated more effectively. However, the article processing charges (APCs) associated with OA can pose financial challenges for some researchers, particularly those from low-income institutions or countries. This highlights the need for funding mechanisms to support OA publishing by universities, as OA also aligns with ethical perspectives that promote equitable access to high-quality knowledge, substantially improving local community understanding and engagement with science [13]. Chun-Kai Huang et al. studied approximately 1207 institutions and found that in 2017, the world's leading institutions published between 80 and 90% of their manuscripts as OA papers. They also observed that Web of Science and Scopus tend to favour STEM disciplines and English-language publications, highlighting the need for inclusive frameworks that

consider disciplinary and regional differences. Open access (OA) in Brazil, despite the lack of a formal open science policy, has been promoted by numerous public educational and research institutions supporting OA across Latin America. In 1998, Brazil launched SciELO, a decentralised OA journal network spanning 16 countries, funded by FAPESP. Although Brazil lacks a national open science policy, its infrastructure of repositories and digital libraries has facilitated OA growth, gaining traction since the 1990s. Statistics show a decline in restricted-access articles over the past decade and an increase in OA adoption, particularly with gold OA, which accounted for 41% of articles in 2021. In Latin America, and especially in Brazil, OA has advanced equitable access to scientific knowledge through initiatives like SciELO, Redalyc, and Latindex. These infrastructures, largely funded by public sources and operated by universities and research centres, have allowed 90% of the region's journals to adopt the diamond OA model, which does not charge article processing fees (APCs). This model facilitates knowledge access for communities that might otherwise struggle to afford high-cost journal subscriptions, fostering inclusion and diversity in global science. In Latin America, 75% of scientific output comes from public universities, making OA essential to democratising access to science and disseminating research often absent from mainstream international circuits [14]. Open access publications have benefited developing countries like Chile [15]. Other countries have adopted OA policies such as Hungary, Brazil, India, Kenya, etc. [16,17]. Under this premise, open access is transforming academic development and focus, providing substantial support to young researchers and doctoral students in all areas of knowledge. This supports and enables young doctors' participation in academic training and perfectly aligns with the fulfilment of KPIs and standards for university accreditation required by bodies such as the National Accreditation Commission (CNA) in Chile [18].

Free access to cutting-edge scientific information and results is crucial for conducting original and high-quality research in developing countries and for meeting quality standards in doctoral theses. Platforms like SciELO and Redalyc have been crucial in Latin America for democratising access to scientific knowledge, providing students with peer-reviewed studies relevant to their research fields. Clarivate Web of Science and Scopus have created a complex dilemma for researchers in developing countries. While OA increases accessibility by removing subscription costs for readers, it shifts publication fees to authors through article processing charges (APCs), which are becoming increasingly expensive. High APCs, such as those announced by *Nature* (up to 9000 euros per article), impose financial burdens on authors and their institutions, limiting their participation in the global scientific community. Despite these challenges, a survey shows strong support for OA in Latin America (71%) and Africa (78%), where many researchers believe OA should be standard academic practice. However, in regions like Mexico, which has significant OA infrastructure and national policies promoting OA, only 39% of scientists consider OA essential for publishing, revealing a complex perception. These fees exceed the budgets of many young researchers, considering that access to technology and research development budgets are already costly in developing countries, forcing them to seek alternatives in journals with lower APCs or in traditional journals with restricted access, limiting the dissemination of their work [10].

In Chile, where doctoral programmes are relatively recent, access to scientific resources through open access has allowed students to complete their research within the timelines set by their programmes, contributing to timely graduation, which is one of the most important indicators for the CNA. In many cases, doctoral programmes in Chile require the publication of articles in WoS-indexed Q1 or Q2 journals as a graduation requirement. Therefore, open access plays a fundamental role, as it accelerates access to previous studies needed for their research and facilitates timely publication in high-impact journals that ensure the greater visibility of their scientific contributions worldwide. A noteworthy example of the impact of open access journals is research related to solar energy in northern Chile, particularly in the Atacama Desert, one of the regions with the highest solar radiation on the planet. Researchers at the Energy Development Centre of the University of

Antofagasta have used open access platforms to rapidly disseminate their findings, which has contributed to improving the recognition of these institutions in international rankings, enabling the development and integration of innovative solar technologies, and generating significant impact both nationally and internationally.

Another important aspect that deserves attention is the perception that open access, by facilitating publication, can lead to the overproduction of scientific articles, sometimes at the expense of quality. This phenomenon, known as “Publish or Perish”, reflects the pressure that researchers face to publish many articles to advance their academic careers. While open access democratizes the publication process, concerns have been raised that some open access journals prioritise the payment of APCs over scientific rigour, which can affect the reputation of the research published. It is essential that universities provide young researchers with tools and training to select high-quality open access journals, avoiding those that operate under “predatory” models. Strengthening peer review policies in reputable OA journals is key to ensuring that open access publishing maintains the highest standards of scientific quality.

**Author Contributions:** All the authors wrote and revised the manuscript. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

**Data Availability Statement:** The raw data supporting the conclusions of this article will be made available by the authors on request.

**Acknowledgments:** The authors thank the FIA-UNAP NUEVA INGENIERÍA 2030 project Code 20ENIR-146999 for its support with this research. The authors would like to acknowledge the support of ANID-Chile through the research project FONDECYT Iniciación 11230550 and the ANID/FONDAP 1522A0006 Solar Energy Research Center SERC-Chile.

**Conflicts of Interest:** The authors declare no conflicts of interest.

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