

Open Access Policies in Latin America, the Caribbean and the European Union

Progress Towards a Political Dialogue

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Report

Open Access Policies in Latin America, the Caribbean and the European Union: Progress Towards a Political Dialogue

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Pilar Rico-Castro
Laura Bonora

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Pilar Rico-Castro and Laura Bonora

ACRONYMS AND ABBREVIATIONS

AmeliCA	Open Knowledge for Latin America and the Global South
ANID	National Research and Development Agency of Chile
ANII	National Research and Innovation Agency of Uruguay
APC	Article Processing Charge
CACES	Council for Quality Assurance in Higher Education of Ecuador
CAPES	Coordination of Development Senior Level Personnel of Brazil
EC	European Commission
CEDIA	Ecuadorian Corporation for the Development of Research and the Academy of Ecuador
CELAC	Community of Latin American and Caribbean States
CILAC	Latin America and the Caribbean Science Open Forum
CLACSO	Latin American Social Science Council
CAN	National Accreditation Commission of Chile
CNPq	National Council for Scientific and Technological Development of Brazil
COAR	Confederation of Open Access Repositories
COARA	Coalition for Advancing Research Assessment
CONACyT	National Council of Science and Technology of El Salvador
CONACyT	National Council of Science and Technology of Mexico
CONAE	National Commission for Space Activities Argentina
CONARE	National Council of Vice-Chancellors of Costa Rica
CONCYTEC	National Council of Science, Technology and Innovation of Peru
CONICET	National Scientific and Technical Research Council of Argentina
CTCAP	Commission for the Scientific and Technological Development of Central America and Panama
STI	Science, Technology and Innovation

DIAMAS	Developing Institutional Open Access Publishing Models to Advance Scholarly Communication (project funded by the Horizon Europe programme)
DOAJ	Directory of Open Access Scientific and Scholarly Journals and Periodicals
EOSC	European Open Science Cloud
ERA	European Research Area
EU	European Union
FAIR	Findable, Accessible, Interoperable, Reusable
FAPs	Brazilian Research Support Foundations
FECYT	Spanish Foundation for Science and Technology
Finep	Studies and Projects Funder of Brazil
FOLEC	Latin American Forum on Scientific Evaluation
HE	Horizon Europe
H2020	Horizon 2020
IBICT	Brazilian Institute of Science and Technology Information
ISSN	International Standard Serial Number
LAC	Latin America and the Caribbean
LA Referencia	The Federated Network of Institutional Repositories of Scientific Publications
Latindex	Regional Online Information System for Scientific Journals in Latin America, the Caribbean, Spain and Portugal
MCTI	Ministry of Science, Technology and Innovation of Brazil
MEC	Ministry of Education and Culture of Uruguay
MICITT	Ministry of Science, Innovation, Technology and Telecommunications of Costa Rica
MinCiencia	Ministry of Science, Technology, Knowledge and Innovation of Chile
MINCIENCIAS	Ministry of Science, Technology and Innovation of Colombia
MINCyT	Ministry of Science, Technology and Innovation of Argentina
OA	Open Access

OAI-PMH	Open Archive Initiative-Protocol for Metadata Harvesting
OECD	Organisation for Economic Co-operation and Development
IEO	Organisation of Ibero-American States for Education, Science and Culture
ONCYT	National Science and Technology Agencies
OpenAIRE	Open Access Infrastructure Research for Europe
OpenDOAR	Directory of Open Access Repositories
ORCID	Open Researcher and Contributor ID
ORE	Open Research Europe
EAP	Economically Active Population
GDP	Gross Domestic Product
Redalyc	Diamond Open Access scientific journal network
RedCLARA	Latin American Cooperation Network for Advanced Networking
RICyT	Science and Technology Indicators Network -Ibero-American and Inter-American
SciELO	Online Scientific Electronic Library
SENACyT	National Ministry of Science, Technology and Innovation of Panama
SENESCYT	Ministry of Higher Education, Science, Technology and Innovation of Ecuador
UNESCO	United Nations Educational, Scientific and Cultural Organisation

1. INTRODUCTION

1.1. Open access public policies

Public policies are *whatever governments decide to do or not to do to solve a public problem* (Dye 1992). In the specific field of science, technology and innovation (STI), **public R&D&I policies**¹ are all of the direct actions of the public authorities, through specific programmes, which influence the elements of the research, technological development and business innovation production system and modify the conditions under which those who finance, produce and evaluate scientific and technological knowledge carry out their activities (Rico-Castro and Morera, 2009). This has traditionally taken the form of decisions affecting: (1) the governance of science, technology and innovation; (2) the allocation of greater or fewer economic and human resources to scientific research, technological development and product and process improvement activities; (3) how these resources are distributed among the different knowledge disciplines; (4) the types of programmes and specific mechanisms devised for the distribution of funds; (5) the career paths and working conditions established for research personnel; (6) the types of organisations in which they carry out their work; (7) the systems for evaluating scientific and academic performance; and (8) their specific incentives (Rico-Castro and Morera, 2009).

At the beginning of the 21st century, the difficulty and high costs of accessing publicly funded scientific content was identified as a global public problem that needed to be addressed. Accordingly, R&D&I policies broadened their focus to direct their attention also on improving the system of communication of research results and on solving the dysfunctions and heavy economic burdens generated by the huge market for scholarly publishing in public R&D systems, giving rise to **open access policies**. These were marked as priorities, first by the European Union (EU)², then by the EU's Member States³, the Organization for Economic Cooperation and Development (OECD)^{4 5 6} and the United Nations Educational, Scientific and Cultural Organisation (UNESCO)⁷. (Rico-Castro 2019). The framing of the public problem and the design of the first actions aimed at solving it were strongly influenced by the diagnosis of the academic libraries' collective that complained to the public authorities about the burdensome conditions, imposed by the large commercial publishers, that they had to deal with to provide their researchers with access to publicly funded journals and research articles. This narrative connected very effectively with R&D decision-makers, who opened a space within science and technology policy agendas to address this problem, assuming that open access policies would contribute to eliminate the economic costs of accessing scientific resources, reduce the dependence of universities and R&D centres on commercial providers, avoid the loss of results (especially research data), increase and improve the transparency of the scientific process, increase the visibility and impact of research results and favour the dissemination of knowledge to the society.

¹ In this report the terms "science and technology" and "R&D" are treated as synonyms. In this report the terms "science, technology and innovation", "R&D&I" and "STI" are treated as synonyms.

² See <https://www.openaire.eu/ec-policies-and-mandates>

³ See <https://www.openaire.eu/os-eu-countries>

⁴ OECD. Making Open Science a Reality (2015): <https://doi.org/10.1787/5jrs2f963zs1-en>

⁵ OECD. Open Science: <https://www.oecd.org/sti/inno/open-science.htm>

⁶ Recommendation of the Council on Enhancing Access to and Sharing of Data (October 2021) <https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0463>

⁷ UNESCO's Recommendation on Open Science (2021): https://unesdoc.unesco.org/ark:/48223/pf0000379949_spa

In this context, the first movements in favour of open access arose, giving rise to the *Budapest OA Initiative* (2002), the *Bethesda Statement on OA Publishing* (2003) and the *Berlin Declaration on OA in the Sciences and Humanities* (2003), all of which defined OA as online access to all scientific information free of charge to the reader and under licences allowing its use by researchers, companies and citizens, without economic, legal or technological barriers. To achieve this, the Budapest Declaration outlined two complementary strategies: (1) self-archiving in institutional or subject repositories of articles previously published in academic journals; and (2) publication in journals whose business model was not subscription access but open access. Throughout this study we will see that the open access policies designed by Latin American and Caribbean (LAC) countries and the EU demand, with greater or lesser efficiency, that publicly funded work published in academic journals be deposited in open access repositories, making these platforms the ultimate destination of research results.

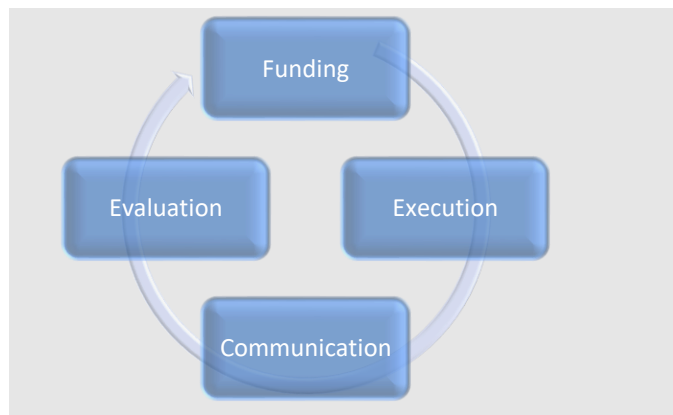
By the middle of the second decade of the 21st century, the first open access policies in the European context had succeeded in changing the process of communicating research results, but their effectiveness was less than expected and they generated new dysfunctions not foreseen in their initial design. Firstly, the open access mandates addressed to the beneficiaries of public grants were answered by commercial publishers with the tightening of copyright assignment provisions in publishing contracts that authors have to accept to see their works published. These provisions resulted in publishers' holding the economic rights emanating from the publications for periods longer than the embargoes permitted by open access mandates. Based on such rights, publishers expressly prohibited the deposition of the final version accepted for publication within the deadlines set by research funding agencies. This resulted in grant recipients being caught between two set of obligations which were hard to reconcile: the deposition and open access obligation within a certain time limit, issued by their research funding agency, and the prohibition to do so, imposed by publishers. As an attempt of publishers to take economic advantage of the situation, commercial journals increasingly began to accept article processing charges (APCs) in exchange for allowing authors to provide immediate open access to their publications. Thus, commercial publishers adapted their business models to reap the benefits offered by OA mandates through the creation of the so-called hybrid scholarly journal model, i.e., subscription access journals that accept open access articles in exchange for APCs, experienced tremendous growth. Therefore, open access policies, far from making access to scientific content cheaper, had the unintended effect of standardising and significantly increasing the hitherto virtually non-existent costs of publishing. Secondly, these early open access policies developed by research funding agencies and research performing organizations did not include any coordination mechanism with research assessment agencies that would link the scientific performance with the degree of compliance with self-archiving mandates. On the contrary, the main real incentive continued to be to publish as many papers as possible in journals with the highest possible impact. Thus, the obligations on the beneficiaries of public research funding were neither monitored nor consistent with the production incentives. Mandates and incentives were and are often incompatible.

It is in this context that the concept of *open science* arose. Used by the European Commission in the document *Open Innovation, Open Science, Open to the World*, published in 2016 (European Commission 2016) and initially called *science 2.0*, open science is a plural concept not only covering open access policies to scientific publications and research data, but also other initiatives such as the FAIR⁸ management of the latter to make them findable, accessible, interoperable and reusable, the promotion of free software

⁸ Acronym for Findable, Accessible, Interoperable, Reusable.

as a working tool and as a result of research activity, the inclusion of new groups in the design and performing of research projects through citizen science, the promotion of open educational resources, the extension of open *peer review* practices and, above all, the revision of the system of incentives and recognition through new ways of assessing research performance. These elements involve opening up the entire scientific process as much and as early as possible and broadening the spectrum of research results beyond scientific publications, including data, protocols, code, methodologies, software, etc. The concept of open science has a systemic vocation because it aims to comprehensively and coherently modify the four processes in which scientific activity is structured: (1) funding; (2) implementation; (3) communication; and (4) evaluation of research, overcoming the partial view, focused exclusively on the communication process, offered by open access policies.

Illustration 1. The concept of open science has a systemic vocation because it aims to modify the four processes comprehensively and coherently in which scientific activity is structured:



Source: Compiled by the author.

Currently, open access policies are located within open science strategies or policies.

1.2. Objective of this study

Latin America and the Caribbean is a strategic region for the EU and a natural partner for collaboration in the development of research and innovation policy priorities such as open science.

This paper **focuses** on open access policies for scientific production in Latin America and the Caribbean and in the European Union.

Its **general objective** is to increase knowledge in order to achieve greater alignment between the policies of open access to scientific results between both regions. Its specific objectives are:

Its general objective is to increase knowledge in order to achieve greater alignment between the policies of open access to scientific results between both regions. Its specific objectives are:

- (1) To describe the movement that has taken place in Latin America and the Caribbean in favour of open access to scientific content through its major regional initiatives.
- (2) To understand the context in which STI public action is developed in each of the countries / regions under study. To this end, STI governance systems are described, and funding, performing and assessment institutions are clearly identified.
- (3) To determine the deployment level of open access policies in the countries / regions covered by this study. To analyse their existence, content and scope, and the maturity level of the digital infrastructures for communication and preservation of research outputs is described: open access repositories, academic journals and curricular information management systems.
- (4) To analyse the common challenges and convergence paths faced by both regions that facilitates a policy dialogue between the EU and LAC.
- (5) Propose specific recommendations for joint policy action and establish a preliminary roadmap towards a more coordinated intra-LAC and EU-LAC collaboration that will contribute to strengthening the relationship between the two regions by jointly strengthening overall open science practices in research and innovation and, in particular, open access in scientific results.

1.3. Methodology and structure of the document

The conceptual framework underlying this study is that public policymaking is a process that requires a political decision and technical implementation tools, which takes place in a given institutional framework, with certain social problems that respond to a complex economic, social and technological environment. Therefore, in each of the countries/regions studied, the legal and institutional context explaining regional evolution and governance of STI systems has been analysed in as much detail as possible and the key actors within the national ecosystems have been identified: who are the funders, who implements and who evaluates S&T activities. This is followed by a description of the status of open access policies and the degree of maturity of the digital infrastructures required for their implementation.

Publicly available documentary sources, mainly legal texts, official documents, and academic literature on the study subject were used to produce the work. National experts from the different countries analysed also collaborated in the drafting of the chapters (see acknowledgements). Their corrections and refinements have been invaluable in ensuring that the information for each of the countries is accurate and up to date.

This report contains sixteen chapters and eight annexes. After the introduction, the second chapter addresses regional open access initiatives in Latin America and the Caribbean, starting with the policy statements that form the region's own narrative and conceptual framework, then moving on to detail the specific initiatives that have facilitated governance coordination and created digital infrastructure networks that are now an international hallmark.

Chapters three to fourteen analyse the open access policies of Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Mexico, Panama, Peru, Uruguay, and the European Union, respectively. They are all written following a common descriptive scheme

(see table 1). First, the institutional framework within which each country's STI policies are embedded is discussed. This analyses, on the one hand, the governance of R&D activities, i.e., the legal framework, the institutions that make up the legal framework and the documentary instruments on which it is based (plans, strategies, etc.). It also analyses the institutions responsible for funding research and the types of grants and programmes they manage, which entities carry out research and development, how many there are, their profile within the system and which entities evaluate scientific and research performance at individual and institutional level, including the process and purposes of such evaluation. Summary sheet on open access policies in Latin American and Caribbean countries for each country, it explains how far they have progressed, which institution(s) is/are leading public action to promote open access and what the policy consists of. Thirdly, a description is provided of the developmental status of the digital infrastructures necessary for the implementation of open access policies in each country: repositories, journals, and curriculum management systems. For repositories, the analysis addresses their number, whether public funds finance them, whether there is a national content aggregator, who manages it and what services it provides. For the journals, the analysis determines whether they have a support service (quality assessment, funding, digital publishing platform, etc.), the number of journals, whether or not there is a national SciELO node, and the number of journals registered in Latindex catalogue 2.0, in SciELO, Redalyc and DOAJ. The analysis of curriculum management systems addresses their (non-) existence, their main function, and the number of profiles they contain.

Table 1. Structure of the country sheets. Chapters 3 to 14

INSTITUTIONAL FRAMEWORK OF STI ACTIVITY	
Governance	
	Legal framework describing it.
	Institutions that make up the legal framework, from highest to lowest hierarchical rank.
	Documentary instruments on which the legal framework is based: plan, strategy, etc.
Research Funding	
	Description of the funding institution(s).
	Types of assistance and programmes they manage.
Research Performing	
	Description, type and number of entities engaged in R&D.
Research Assessment	
	Description of the institution(s) responsible for the evaluation of scientific and research merit at individual and institutional level, if applicable.
	Description of the research assessment process and purpose.
OPEN ACCESS POLICY	
	(Non-) existence of open access policy / policies.
	Responsible entity / entities.
	Level of development.
	Description of its contents.
OPEN ACCESS DIGITAL PLATFORMS	
Repositories	
	Description of the population and its type.
	Funding mechanisms.
	(Non-) existence of national content aggregator. If so, who manages it and what services it provides.
Journals	
	Description of the population and its type.
	Funding mechanisms.
	Existence of support services at institutional or national level (quality assessment, funding, digital publishing platforms, etc.).
	Number of national journals and profile (e.g., degree of professionalisation).
	Existence of national SciELO node.
	Number of journals registered in Latindex catalogue 2.0, in SciELO and in Redalyc.
Curriculum management systems	
	Description of the platform and purpose.
	Number of profiles it contains.

Source: Compiled by the author.

For each country/region analysed, a cover factsheet was drawn up to graphically present their most important indicators: the country's relative R&D effort in terms of GDP, the number of researchers expressed as individuals per thousand economically active population (EAP), the number of institutional repositories and the number of open access journals. For the first two indicators the Ibero-american and Inter-American Science and Technology Indicators Network (RICYT) was used as a data source. For the number of repositories the Directory of Open Access Repositories (OpenDOAR) was used as a data source.⁹ The source for the number of open access journals the Directory of Open Access Scientific and Academic Journals (DOAJ) was used as a source.¹⁰ The authors are aware that these last two sources do not accurately reflect the situation in LAC countries, as shown by the information sources analysed in the section *Open Access Digital Platforms*: LA Referencia and national sources for the number of repositories and Latindex, SciELO and Redalyc for the number of open access journals. However, we have decided to use them as headline data because they are robust, timely and are the only two that enabled us to cover almost all the countries in the region and, therefore, to make comparisons. The cover factsheet also contains a graphical visualisation of the existence or non-existence of national policy, legal framework and institutional policies on open access, the existence or non-existence of national repositories and national journals aggregators, and a curriculum management system.

Table 2. Sources used for the indicators of this report

SOURCES USED	
European Commission	
	European Union research funding programmes conditions.
DOAJ	
	No. of journals in open access.
Latindex (catalogue 2.0)	
	No. of journals in open access.
Redalyc	
	No. of journals in open access.
SciELO	
	No. of journals in open access.
LA Referencia	
	No. of documents in open access.
	Name of the national aggregator in each country.
	Countries that have a national aggregator.
OpenAIRE	
	Number of "Journal archives" collected by OpenAIRE.
	Number of repositories collected by OpenAIRE.
	Countries with a repository collected by OpenAIRE.
OpenDOAR	
	No. of institutional repositories.
	No. of Open Access Repositories.

⁹ See <https://v2.sherpa.ac.uk/opensoar/>

¹⁰ See <https://doaj.org/>

RICYT	
	Country's relative R&D effort as a share of GDP.
	Number of researchers, expressed in natural persons per 1,000 persons of the economically active population (EAP).

Source: Compiled by the authors.

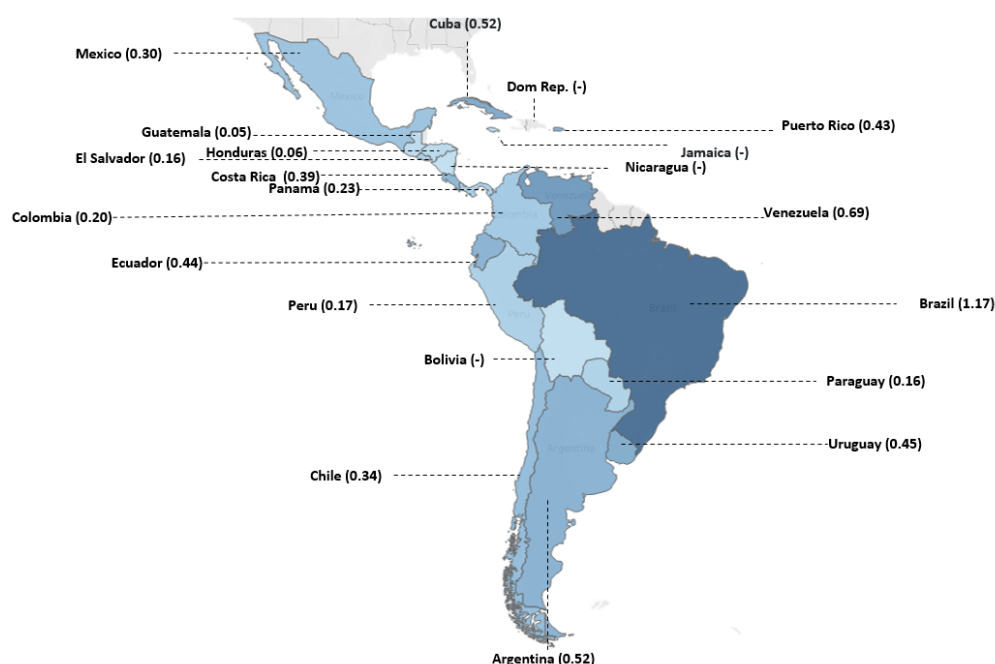
Chapter fifteen addresses the common challenges faced by LAC and EU countries in designing their open access policies, while chapter sixteen lists policy recommendations that should be addressed in the political dialogue.

2. REGIONAL OPEN ACCESS INITIATIVES IN LATIN AMERICA AND THE CARIBBEAN

Latin America and the Caribbean is a geographical region of the American continent defined by the United Nations¹¹ comprising a total of 52 countries¹², dependent territories and overseas departments, with a combined area of 20.4 million km² and a total of 658 million inhabitants¹³.

The average percentage of gross domestic product (GDP) spent on R&D investment in LAC is 0.65% in 2020¹⁴. All countries in the region show figures below 1% except Brazil, which is an exception with 1.17%. This is followed by Venezuela with 0.69%, Cuba and Argentina with investments of 0.52%, and Uruguay with 0.45% (see figure 1).

Figure 1. Country's relative R&D effort as a percentage of GDP, 2020



Note: Reference year for Honduras, 2019; Costa Rica, 2018; Puerto Rico, 2015; and Ecuador, 2014. Remaining countries, 2020.

Source: Compiled by the authors based on RICYT data. Access date: December 2022.

¹¹ See <https://unstats.un.org/unsd/methodology/m49/>

¹² These are: Anguilla, Antigua and Barbuda, Argentina, Aruba, Bahamas, Barbados, Belize, Bolivia, Bonaire, San Eustaquio y Saba, Brazil, Chile, Colombia, Costa Rica, Cuba, Curacao, Dominica, Ecuador, El Salvador, South Georgia and the South Sandwich Islands, Grenada, Guadalupe, Guatemala, French Guyana, Guyana, Haiti, Honduras, Bouvet Island, Cayman Islands, Falkland Islands, Turks and Caicos Islands, British Virgin Islands, United States Virgin Islands, Jamaica, Martinique, Mexico, Montserrat, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Dominican Republic, Saint Kitts and Nevis, Saint Barthélemy, Saint Martin (French part), Saint Martin (Dutch part), Saint Vincent and the Grenadines, Saint Lucia, Suriname, Trinidad and Tobago, Uruguay and Venezuela.

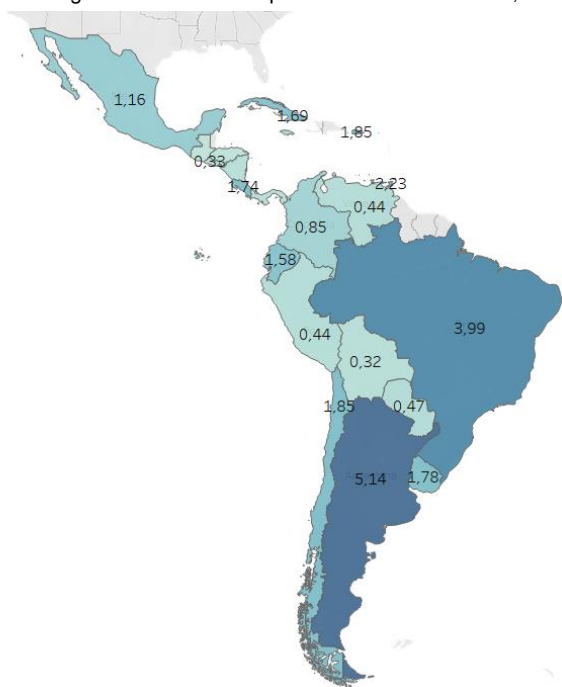
¹³ See <https://data.worldbank.org/indicator/SP.POP.TOTL?locations=ZJ>

¹⁴ Source: RICYT

http://app.ricyt.org/ui/v3/comparative.html?indicator=GASTOxPBI&start_year=2011&end_year=2020

In terms of research personnel (Figure 2), the countries showing the greatest effort in terms of human resources are Argentina, Brazil and Trinidad and Tobago with 5.14, 3.99 and 2.23 researchers per thousand economically active population respectively, followed by Chile and Puerto Rico (1.85), Uruguay (1.78), Costa Rica (1.74), Cuba (1.69), Ecuador (1.58) and Mexico (1.16).

Figure 2. Researchers per thousand labour force, 2020



Note: Reference year for El Salvador, Guatemala and Honduras, 2019; for Brazil and Costa Rica, 2018; for Jamaica and Panama, 2017; for Puerto Rico, 2015; for Ecuador and Bolivia, 2014; and for Nicaragua, 2012. Remaining countries 2020.

Source: Compiled by the authors based on RICYT data. Access date: December 2022.

The public discourse in favour of open access and open science in Latin America and the Caribbean has been decisively shaped over the last two decades through policy statements and the implementation of concrete initiatives that have facilitated the existence of institutions and networks of digital infrastructures that are now international benchmarks.

In the area of public statements, the following are of note (in chronological order): The Santo Domingo Declaration *Science for the 21st Century: A New Vision and Framework for Action*¹⁵, adopted at the Latin American and Caribbean Regional Consultation Meeting of the World Conference on Science, organised by UNESCO and published by the Organisation of Ibero-American States for Education, Science and Culture (OEI)¹⁶ in 1999. This high-level policy document does not explicitly talk about open access, but it lays the

¹⁵ See <https://rieoei.org/historico/documentos/rie20a12.htm>

¹⁶ See <https://oei.int/>

groundwork for the coordination of STI actions in the region and introduces a narrative consistent with what will later become open access and open science policies. They recognise the importance of scientific research and technological development as levers for economic and social development, provide a democratic vision of science and set out three common goals for LAC countries: (1) expansion of the group of individuals who benefit directly from advances in scientific and technological research; (2) expansion of access to science, understood as a central component of culture; (3) social control of science and technology and its orientation based on collective and explicit moral and political choices (OEI, 1999).

The *Salvador Declaration on Open Access: The Developing World Perspective*¹⁷ was developed and signed in 2005 by the Network of Latin American and Caribbean Social Science Virtual Libraries of CLACSO's Network of Member Centres in Salvador de Bahia, Brazil. This document contains a clear definition of what open access is and a defence of its benefits and urges governments to make it a priority in STI policies. This *Declaration* is often cited as the first major discursive milestone that marked the design of open access policies in the region (Aguirre-Ligüera, Maldini, Feo and Fontans 2022).

The *CLACSO General Assembly Declaration on Open Access to Knowledge Managed as a Common Good*¹⁸ was signed in 2015 in Medellín (Colombia). It addresses the problem faced by public STI systems due to the change of business model initiated by commercial publishers from subscription-based access to open access with APCs and calls for the need to rely on public and interoperable digital infrastructures, journals and repositories as a solution to address it. Its importance lies in the fact that it defined the model of scientific communication that has come to be known as non-commercial open access.

The *Mexico Declaration in Defence of the Latin American Open Access Ecosystem* was published by Latindex, Redalyc, CLACSO and the *Brazilian Institute of Science and Technology Information* (IBICT) in 2017¹⁹. It goes deeper into the need to defend a non-commercial open access model in the region and strongly underlines the public commitment of all the institutions involved to achieving it.

Subsequently, the *Panama Declaration on Open Science* (2018)²⁰ was made public by members of the university and civil society organisations gathered in Panama City at a side event of the Open Science Forum of Latin America and the Caribbean (CILAC)²¹, 2018. This declaration was a very important milestone in two respects. Firstly, it introduced for the first time the concept of open science by placing under it actions to promote open access to research results. Secondly, it showed that support for this type of initiative in the region is not exclusive to preserve of the social and human sciences, but that the experimental sciences also have a significant role to play in the construction of the social discourse in favour of open access and open science.

All these declarations have provided important support and a coherent framework of legitimacy to the institutions and networks that have put into practice the effective development of digital infrastructures that have positioned LAC as the region where all open access policies are based on deposit in national, institutional or thematic repositories

¹⁷ See <http://biblioteca.clacso.edu.ar/gsd/collect/clacso/index/assoc/D771.dir/12Decla.pdf>

¹⁸ See <https://www.clacso.org.ar/conferencia2015/documentos/asamblea/declaraciones/4-Declaracion-de-CLACSO-sobre%20el-acceso-abierto-al-conocimiento-gestionado-como-un-bien-comun.pdf>

¹⁹ See <http://amelica.org/index.php/2020/06/12/acceso-abierto-no-comercial-y-la-declaracion-de-mexico/>

²⁰ See <https://forocilac.org/declaracion-de-panama-sobre-ciencia-abierta/>

²¹ See <https://forocilac.org/>

and which, in addition, leads the model of academic publishing based on diamond academic journals, without payment for reading or publishing, with non-commercial open licences (Aguirre-Ligüera, Maldini, Feo and Fontans 2022). These institutions and digital infrastructure networks are LA Referencia, Latindex, SciELO, Redalyc and CLACSO.

2.1. LA Referencia

The Federated Network of Institutional Repositories of Scientific Publications (LA Referencia)²² is the Latin American network for collaboration and coordination of open access and open science policies, founded through political agreements signed by the senior authorities for science, technology and education of the member governments. Its mission is to support national open access policies in Latin America, to promote free and open access to the full text of all publicly funded research results and to make their scientific production visible through institutional repositories. It is a unique forum for political and technical discussion in the region because it consists of government representatives with the capacity to design not only political strategies, but also technical solutions to the challenges of implementing open access policies. This makes LA Referencia the key initiative in terms of governance and coordination of these policies at regional level.

To achieve its objectives LA Referencia operates a federated network structure of national nodes whose objectives are: (1) to offer publicly funded Ibero-American scientific output in open access through the cooperation and coordination of a federated network of national aggregators of institutional repositories; (2) to maintain guidelines and standards of quality, interoperability and best practices for information retrieval; (3) to make available to national aggregators a collection platform with value added services and to provide the necessary instruments for cooperation and interoperability with other related platforms; (4) to generate new projects and initiatives that facilitate better services, technological updating and coordination of public policies for open access at regional level.

LA Referencia was set up in 2010 as a project coordinated by the Latin American Cooperation of Advanced Networks (RedCLARA) and financed by the Public Goods Fund of the Inter-American Development Bank (IDB). The initial aim was to reach agreements to establish common policies, coordinate federated access to scientific resources and design interoperability standards. Since 2012, it has been a private non-profit association managed by RedCLARA and governed by a Board of Directors consisting of representatives of the main national STI agencies of the member countries. The LA Referencia member countries at the date of publication of this report are Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Spain, Mexico, Panama, Peru and Uruguay. The Network provides access to more than 3.7 million open access scientific documents from more than 400 institutions.

²² See <https://www.lareferencia.info/>

Figure 3. Latin American country members of LA Referencia and their national nodes



Source: LA Referencia.

LA Referencia maintains active relations of collaboration and understanding with other related organisations and initiatives. It has been a member of the **OpenAIRE 2020** consortium²³ (2015-2018) and the **OpenAIRE Advance** consortium²⁴ (2028-2020), where it was involved in software development activities and technological tools such as the statistics module, part of the web services and joint proofs of concept. It is also a member of the **Confederation of Open Access Repositories COAR**²⁵ and it actively participates on the COAR steering committee. Finally, in May 2022, LA Referencia signed a collaboration agreement with **Redalyc**²⁶ to promote mutual information enrichment protocols based on metadata interoperability between diamond journals and open access repositories.

2.2. CTCAP

The **Commission for the Scientific and Technological Development of Central America and Panama (CTCAP)**²⁷ is a high level technical and political body of collegiate decision-making whose objective is to coordinate and integrate science, technology and innovation policies of the Central American sub-region, Panama and the Dominican Republic. It was created in 1975 by the Organisation of American States (OEA)²⁸ within the Central American Integration System (SICA)²⁹. The latter is an official forum of Heads of State and Government created for the collaboration in developing policies that promote

²³ See <https://www.openaire.eu/openaire2020-project>

²⁴ See <https://www.openaire.eu/advance/>

²⁵ See <https://coar-repositories.org/>

²⁶ See <https://www.lareferencia.info/es/blog-masonry/noticias/item/299-la-referencia-firma-acuerdo-redalyc>

²⁷ Ver en <https://www.sica.int/ctcap/inicio>

²⁸ Ver en <https://www.oas.org/es/>

²⁹ Ver en <https://www.sica.int/>

peace, freedom, democracy and development as essential underlying values. CTCAP countries are: Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama and the Dominican Republic.

CTCAP brings together and formally links the highest authorities of the sub-region's governments responsible for science and technology.

It is structured around a technical secretariat and a temporary presidency. The former is responsible for the management, support, coordination and follow-up of the decisions adopted to fulfil the plans, policies, strategies, actions, programmes and scientific and technological and innovation projects agreed upon by the member countries. It has its permanent headquarters in the Republic of Guatemala and is currently under the responsibility of the National Secretariat of Science and Technology (Senacyt)³⁰. The pro tempore presidency is exercised on a rotating basis for a period of six months by a SICA member state.

CTCAP's Strategic Plan 2020-2025³¹ establishes 18 joint lines of work, including coordination on open access under the heading *OER regional databases, open science, open scientific literature in academic journals*. This priority has its correspondence in an intensive collaboration among the technical teams of the national STI bodies in open access training and in developing initiatives to share licences for to scientific resources access.

2.3. Latindex

Latindex, the Regional Online Information System for Scientific Journals in Latin America, the Caribbean, Spain and Portugal,³² is a platform that offers free information on all scientific journals produced in the region and establishes editorial quality criteria for academic publishing. Created in 1995 at the National Autonomous University of Mexico (UNAM), it became a regional cooperation network in 1997 with the aim of disseminating, making accessible and raising the quality of academic journals published in the region through shared work. It offers two information services: (1) Directory, available since 1997, is an exhaustive list that registers academic journals published in the countries of the region. As of the date of this report, it has 22,392 titles, 76% of which are from countries in the LAC region. For each journal, it provides basic identification data, such as title, year of publication, publishing institution, specialist discipline, frequency, price and contact details; and (2) Catalogue 2.0, available since 2018, consists of electronic journals that meet the 38 established editorial quality criteria of Latindex³³. These relate to basic elements of the journals, presentation, management and editorial policy, content and electronic publishing and are published on the platform's website. As of the date of this report, it has 2,976 titles, 66% of which are from countries in the LAC region.

Latindex operates on the basis of regional cooperation through a responsible institution in each participating country. The network consists of 24 institutions that are responsible for updating the Directory data. This decentralization facilitates the completeness and proximity

³⁰ Ver en <https://senacyt.gob.gt/portal/index.php>

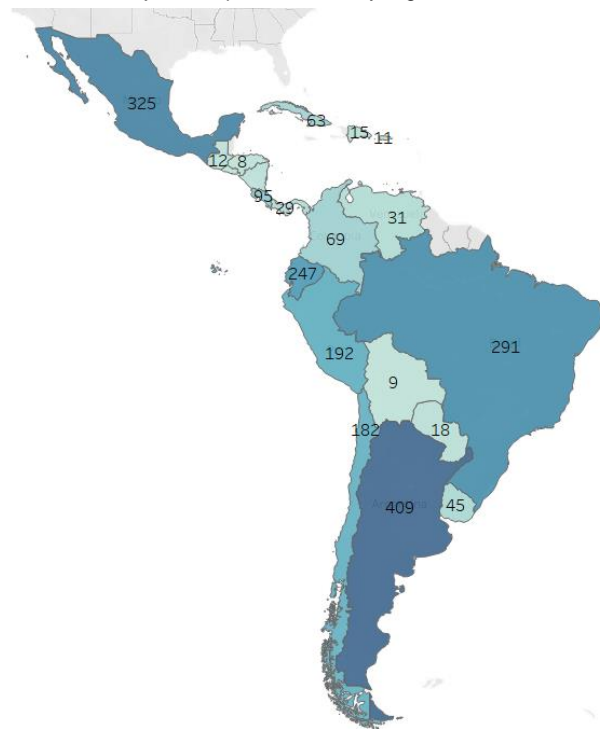
³¹ Ver en https://www.sica.int/documentos/plan-estrategico-regional-de-la-comision-para-el-desarrollo-cientifico-y-tecnologico-de-centroamerica-panama-y-republica-dominicana-ctcap_1_130772.html

³² See <https://www.latindex.org/>

³³ See <https://www.latindex.org/latindex/postulacion/postulacionCatalogo>

of data collection and evaluation and is effective in ensuring the representativeness of academic journals from all countries in the region, even those with reduced or weak scientific publication systems. Latindex is the most inclusive and comprehensive source of information on academic journals in Latin America, the Caribbean, Spain and Portugal and this comprehensive coverage is considered its greatest strength (Alperin 2014).

Figure 4. Number of academic journals per LAC country registered in Latindex (catalogue 2.0)



Source: Compiled by authors based on Latindex data. Access date: December 2022.

2.4. SciELO

The SciELO **Scientific Electronic Library Online** is a service for academic journals that includes (1) a methodology for the preparation, storage, dissemination and evaluation of scientific literature in electronic format; (2) an electronic publishing platform; (3) a metadata validator based on its own XML-JATS standard; (4) a content indexing service; (5) an advanced search engine; and (6) a set of bibliometric indicators called SciELO Citation Index, that are integrated to the Web of Science (WoS) platform and available since January 2014.

This initiative was launched in 1997 by the Latin American and Caribbean Centre for Health Sciences Information (BIREME), with support from the *Fundação de Amparo à Pesquisa do Estado de São Paulo* (Fapesp). Its main objective is to increase the quality and dissemination of open access scientific output by improving and extending the means of evaluation and publication of scholarly contributions. Although originally serving only health science journals, as of the date of this report, it offers open access to more than 1 million articles published in 1,300 journals in all disciplines, published in 13 LAC countries (see Figure 5), in Spain, Portugal and South Africa. SciELO's work is structured in a

decentralised format, through national nodes that manage the evaluation and indexing of journals published within their geographical areas.

Figure 5. 6: Number of academic journals per LAC country part of the SciELO network.



Source: Compiled by authors based on SciELO data. Access date: December 2022.

2.5. Redalyc

The **Diamond Open Access scientific journal network (Redalyc)**³⁴ is an open infrastructure for open-access scientific journals without article processing charges (diamond open access) that includes: (1) an electronic publishing and editing platform; (2) an indexing system for titles of proven scientific and editorial quality; (3) a metadata standardisation service; (4) statistics for each indexed journal, including particularly comprehensive data on author affiliations, national and international collaborations and production profiles for each journal, institution and country; and (5) an OAI-PMH data provider that ensures the interoperability of Redalyc journals with open access repositories and enables them to automatically retrieve the scientific output of their institutions.

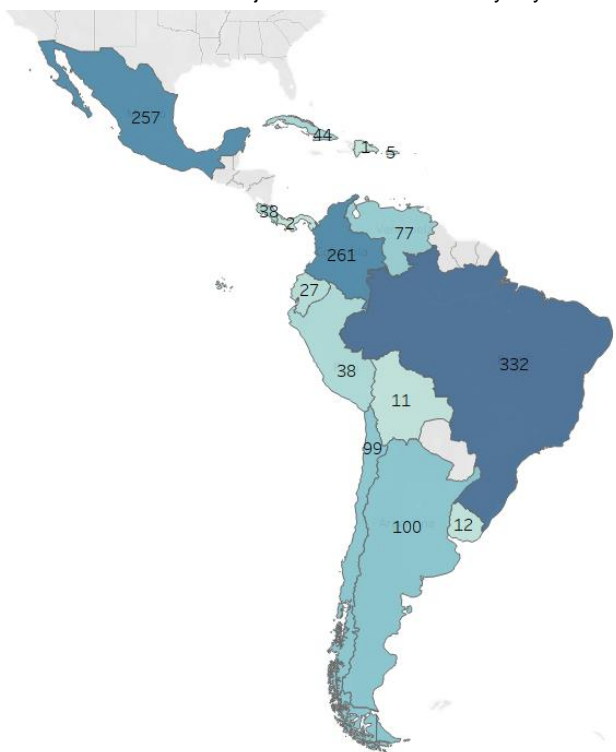
This initiative emerged in 2003 as an academic project of the Autonomous University of the State of Mexico (UAEM) with the aim of giving visibility, consolidating and improving the editorial quality of journals of the Social Sciences and the Humanities in the Latin American region. In 2006 it was opened to all areas of knowledge and extended its geographical range to include journals from Spain and Portugal. It continues to be supported by the

³⁴ See <https://www.redalyc.org/>

UAEM and, since 2019, has launched a strategy of clear commitment to the diamond model as the only way to implement a viable open access strategy. Redalyc guarantees that the journals published and/or indexed on its platform: (1) maintain proven editorial and scientific quality practices; (2) publish in XML-JATS digital format; (3) follow an open access business model, with no article processing fees; (4) share the vision of overcoming the current evaluation of research performance based on bibliometric indicators of the academic journals in which the papers are published and of promoting the inclusion of local science and linguistic diversity for the common good.

Redalyc offers access to 1,518 certified online electronic academic journals, broken down by discipline, published by 716 institutions from 27 countries, with a combined total of 779,591 articles. Brazil, Mexico and Colombia are the countries with the highest number of academic journals in Redalyc (see figure 6).

Figure 6: Number of academic journals indexed in Redalyc by LAC countries.



Source: Compiled by authors, based on Redalyc data. Access date: December 2022.

In November 2018, Redalyc and CLACSO jointly launched the creation of **AmeliCA**³⁵ at the *UNESCO Special Forum on Democratisation of Academic Knowledge: The Challenges for Open Access to Knowledge*. This is a LAC region-specific strategy for the coordinated implementation of open access and open science policies across the region based on its strengths, good practices and lessons learned. This strategy, supported by UNESCO, seeks to be a regional counterpoint to the model advocated by cOAalition S³⁶ through

³⁵ See <http://amelica.org/>

³⁶ See <https://www.coalition-s.org/>

PlanS³⁷ and to provide a collaborative, sustainable, protected and non-commercial solution for open knowledge in Latin America and the Global South. Like PlanS, this strategy focuses on academic journals as the essential vehicle through which scientific communities communicate their research results, although it differs diametrically from PlanS in its defence of a public and free model of scientific publishing, as opposed to the inclusion of the interests of large commercial publishers within PlanS. AmeliCA's strategy is based on ten fundamental principles: (1) scientific knowledge generated with public funds is a common good and access to it is a universal right; (2) the open publishing model should be enhanced, owned by the academy, non-profit, sustainable, with responsible metrics, and should not include article processing charges (APC); (3) open access has no future or meaning without an evolution in research evaluation systems that value the publication on its own merits and not where it is published; (4) the consolidation of open access requires the transition to digital scientific communication; (5) the economic investment in open access must be consistent with its benefit to society; (6) the sustainability of open access must be based on cooperative work schemes and horizontal coverage of costs; (7) it is necessary to recognize the diversity of scientific academic journals and stop the pressures that seek to homogenize them; (8) academic journals must allow authors to retain the rights to their work and remove their embargo policies; (9) the societal impact of science is the basis for the existence of open access; (10) it is necessary to respect the different dynamics of generation and circulation of knowledge by area, especially in the case of the Social Sciences and the Humanities.

AmeliCA, like PlanS, has developed a self-assessment tool so that all journals worldwide can verify their degree of compliance with these principles. All Redalyc academic journals are automatically certified. This initiative was recognised with the SPARC Innovation Award 2019.

2.6. CLACSO

The Latin American Council for Social Sciences (CLACSO)³⁸ is an international non-governmental institution with associative status at UNESCO, created in 1967, whose main lines of action include the promotion of open access and the democratisation of knowledge. At the date of this study, it brings together 836 research and postgraduate centres in the social sciences and humanities in 55 countries in Latin America and other continents. Its aims are: (1) to promote social research to combat poverty and inequality, to strengthen human rights and democratic participation; (2) to encourage, from the contributions of academic research and critical thinking, to the promotion of sustainable development policies in economic, social and environmental terms; (3) to build bridges between social research and public policies, promoting innovative, creative and viable actions in response to the great social, educational, cultural and environmental challenges of Latin America and the Caribbean; (4) to support the formation of networks of researchers and institutions working in the field of the social sciences and humanities; (5) to strengthen the processes of academic internationalisation in Latin America and the Caribbean; (6) to expand South-South and North-South cooperation and academic dialogue; (7) to stimulate the development and consolidation of the social sciences and critical thinking in the poorest countries of Latin America and the Caribbean; (8) to be involved in the national and regional public debate, providing the perspectives and contributions of results-based social research; (9) to collaborate in the training of government agents, social activists and media

³⁷ See <https://www.coalition-s.org/why-plan-s/>

³⁸ See <https://www.clacso.org/institucional/>

professionals in social, educational, cultural and environmental issues, bringing them closer to the problems addressed by the social sciences and to the evidence provided by social research; (10) to generate conditions of open access to Latin American and Caribbean academic output, contributing to the democratisation of access to knowledge and enabling it to be more actively used by public policy makers, social and citizens' organisations, the press and the university system itself.

To achieve its objectives, CLACSO has a large number of working groups, including the **working group Open Knowledge as a Common Good**³⁹ made up of twenty-seven experts of recognized prestige from ten different countries. This group proposes the need to approach the implementation of open access policies taking account of the analysis of the different models of academic publishing (commercial models *versus* diamond model) and their respective predominance in Europe and Latin America.

Another initiative developed within CLACSO is the **Latin American Forum on Scientific Evaluation (FOLEC)**⁴⁰. This is a regional space for debate and exchange on the meanings, policies and practices of scientific merit assessment processes in the region. The work is developed through forums and seminars in which CLACSO articulates and promotes reflection in conjunction with the National Science and Technology Organisations (ONCYT) of the LAC countries and other partner institutions. This is how FOLEC aims to promote a change in the incentive and recognition systems for research work, consistent with the open science paradigm and to reward open, common and public knowledge practices and their link to democratising and sustainable models, committed to social problems. It seeks to share experiences and find points of agreement to build and strengthen evaluation instruments that can be applied to the scientific systems of the LAC countries. Its partners include LA Referencias, AmeliCA, Redalyc, Latindex and SciELO. In June 2022, it published the declaration *A New Academic and Scientific Assessment for Socially Relevant Science in Latin America and the Caribbean*⁴¹. This is a common statement of principles for responsible academic assessment, produced from and for Latin America and the Caribbean. Through this statement, CLACSO-FOLEC is seeking to promote the implementation of these principles by the ONCYTs, scientific institutions and higher education institutions in the region.

³⁹ See <https://www.clacso.org/grupos-de-trabajo/grupos-de-trabajo-2019-2022/?pag=detalle&refe=4&ficha=1724>

⁴⁰ See <https://www.clacso.org/folec/>

⁴¹ See <https://biblioteca-repositorio.clacso.edu.ar/bitstream/CLACSO/169563/1/Declaracion-CLACSO-FOLEC-version-extendida.pdf>

3. Argentina



0.52%
R&D
expenditure/GDP*

5.14%
Research
staff/EAP in
(0/00)*

65
Institutional
repositories

361
Open access
journals



National OA
policy



OA legal
framework



Institutional OA
policies



National repository
aggregator



National journal
aggregator



Curriculum
management
system

Source: [Law 26899](#); and [Regulation of Law 26.899](#).

Data: Compiled by author based on [RICyT](#), [LA Referencia](#), [OpenDOAR](#) and [DOAJ](#).

Note: Data referring to 2020. No. of researchers per thousand of labour force (0/00).

The **Science, Technology and Innovation Law (25.467) of 2001** regulates the advisory, planning, coordination, execution and assessment bodies of the Argentine STI system at the different administrative levels, their membership and their powers.

Argentina has a **strong national open access policy** supported by its legal framework. The **Law on open access institutional digital repositories (26.899) of 2013** establishes obligations for institutions and for research personnel.

All public entities of the National STI System must develop open access institutional digital repositories. Research personnel whose research activity is publicly funded must deposit a copy of the final version of their scientific-technological output accepted for publication in the corresponding institutional open access repository within six months for scientific literature and within five years for primary research data.



The [National System of Digital Repositories](#) is the national aggregator of open access repositories. It establishes guidelines for technological interoperability, sets common policies, standards and protocols to all its members, and funds the creation, development, and maintenance of repositories.



The Argentine Centre for Scientific and Technological Information ([CAICYT](#)) of CONICET supports scientific information management and scholarly publishing initiatives.



[CVar](#) is the unified standardised national register of curricular data of researchers in Argentina. It contains more than 100,000 CVs and it is used as a tool for the application of R&D&I projects public calls.

3.1. Institutional framework

Argentina is the second largest country in the LAC area, after Brazil. It is a decentralised federal state of 23 provinces and the Autonomous City of Buenos Aires. These 24 jurisdictions are self-governing districts with competences in several areas, including science, technology and innovation. This decentralization is reflected in the institutional and governance framework of its national STI system.

Governance

The **Law on Science, Technology and Innovation** (25.467) of 2001⁴² establishes the political advisory, planning, coordination, performing and evaluation bodies at the different administrative levels, their composition and their powers. It also sets out the STI competences to be developed at the national and at the provincial level.

The **Ministry of Science, Technology and Innovation (MINCyT)**⁴³ is defined in the Law as the highest-level body responsible for defining STI policies, research funding, research infrastructures provision, promoting the relationship between the academic and productive systems and knowledge dissemination. MINCyT is made up of three major units: the Department of Scientific and Technological Coordination⁴⁴, the Department of Planning and Policies in Science, Technology and Innovation⁴⁵, and the Undersecretariat for the Federalisation of Science, Technology and Innovation⁴⁶.

MINCyT is part of other coordination bodies of the national STI system established in the Law. At the national level, the **Scientific and Technological Cabinet (GACTEC)** is chaired by the head of the Cabinet of Ministers and is made up of all ministers and all secretaries of state engaged in STI related activities. Its task is to establish the national priorities through a National Science, Technology and Innovation Plan, to provide it with an annual budget and to evaluate its performance. At the territorial level, some provincial governments have specific agencies for STI promotion and coordination activities among which the Scientific Research Commission of the Province of Buenos Aires (CIC)⁴⁷ and the Ministry of Science and Technology of the Province of Cordoba stand out⁴⁸. The **Federal Council of Science and Technology (COFECyT)**⁴⁹, chaired by the MINCyT, coordinates national and regional policies, priorities and activities to guarantee a harmonious development of STI activities throughout the country.

The Law establishes the **National Science, Technology and Innovation Plan (PNCTI)** as the instrument for the definition, organization and communication of STI policies, strategies and implementation mechanisms to the stakeholders of the National Science, Technology and Innovation System. In 2020, the **Innovative Argentina Plan 2020**⁵⁰ came to its end. As of the date of this report, a draft of the new **National Plan for Science, Technology and Innovation 2030 (PNCTI)**⁵¹ was published in September 2020. This new PNCTI encompass a comprehensive definition of the current context for the formulation of the

⁴² See <http://servicios.infoleg.gob.ar/infolegInternet/verNorma.do?id=69045>

⁴³ See <https://www.argentina.gob.ar/ciencia>

⁴⁴ See <https://www.argentina.gob.ar/ciencia/sact>

⁴⁵ See <https://www.argentina.gob.ar/ciencia/seppCTI>

⁴⁶ See <https://www.argentina.gob.ar/ciencia/subsecretaria-de-federalizacion-de-la-ciencia-tecnologia-e-innovacion>

⁴⁷ See <https://www.cic.gba.gob.ar>

⁴⁸ See <https://mincyt.cba.gov.ar/>

⁴⁹ See <https://www.argentina.gob.ar/ciencia/cofecyt>

⁵⁰ See <https://www.argentina.gob.ar/sites/default/files/pai2020.pdf>

⁵¹ See <https://www.argentina.gob.ar/ciencia/plan-nacional-cti/plan-cti>

National STI Plan and a description of its underlying policies and strategies. The PNCTI addresses national, territorial, cross-cutting and institutional change agendas.

Research Funding

The STI funding agencies in Argentina are MINCyT, the National Agency for the Promotion of Research, Technological Development and Innovation, the National Council for Scientific and Technical Research (CONICET) and those science and technology organisations and National Universities with specific budgets and funding calls.

MINCyT is the largest STI funding agency in Argentina. It manages regularly public open competitive calls for proposals for financing innovative projects, technological entrepreneurship, research activities, training and attracting talent, and infrastructure and equipment modernisation⁵². For the submission of proposals, MINCyT has developed the Project Management System (PMS)⁵³. This is an online platform for applicants and beneficiaries to manage the submission process and their projects at the execution stage.

The **National Agency for the Promotion of Research, Technological Development and Innovation (R&D&I Agency)**⁵⁴ is a decentralised public national entity under the MINCyT and with administrative independence. Its task is to finance scientific and technological research and innovation projects for knowledge generation and for improving the productive system. It manages three funds: the Fund for Scientific and Technological Research (FONCyT)⁵⁵, to support basic and applied research projects and activities to generate new scientific, technological and innovative knowledge at public and private non-profit institutions; the Argentine Technological Fund (FONTAR)⁵⁶, to support **technological innovation projects for improving the productivity of the private sector**; and the Argentine Sectoral Fund (FONARSEC)⁵⁷, to support **knowledge transfer and strength the link between the scientific and technological sector and the socio-productive sector** in order to contribute to the solution of social and economic problems. The budget for these funds comes directly from the National Treasury, the Inter-American Development Bank (IDB), the International Bank for Reconstruction and Development (IBRD), the Development Bank of Latin America (CAF) and the Central American Bank for Economic Integration (CABEI), as well as reimbursable financing from cooperation agreements with national and international organisations or institutions.

The **National Council for Scientific and Technical Research (CONICET)**⁵⁸ is a self-governing body of the National State under the auspices of the MINCyT created in 1958. Its role is to promote and implement scientific and technological activities throughout the national territory and in the different areas of knowledge. It funds public calls to support scientific and technological research projects, the financing of institutes, laboratories and research centres, scientific and technological exchange, and cooperation activities at the national and the international level, internships and scholarships, awards and credits to support scientific research.

⁵² See <https://www.argentina.gob.ar/ciencia/financiamiento/convocatorias-abiertas-mincyt>

⁵³ See <http://sgp.mincyt.gob.ar/SGP/Seguridad/Login.aspx>

⁵⁴ See <https://www.argentina.gob.ar/ciencia/agencia>

⁵⁵ See <https://www.argentina.gob.ar/ciencia/agencia/fondo-para-la-investigacion-cientifica-y-tecnologica-foncyt>

⁵⁶ See <https://www.argentina.gob.ar/ciencia/agencia/fondo-tecnologico-argentino-fontar>

⁵⁷ See <https://www.argentina.gob.ar/ciencia/agencia/fondo-argentino-sectorial-fonarsec>

⁵⁸ See <https://www.conicet.gov.ar/conicet-descripcion/>

Research Performing

The bodies that conduct research in Argentina are public universities, private universities and Science and Technology Organisations (OCTs).

The Argentinean **university sector** comprises 66 public universities and 69 private universities. The most significant, in terms of size and importance, are the University of Buenos Aires, with more than 30,000 students, and the National University of La Plata, with more than 10,000 students.

In addition to being a funding agent, the main body for the implementation of scientific and technological activities in Argentina is **CONICET**. As of the date of this study, more than 11,000 researchers, more than 10,800 doctoral and postdoctoral fellows, more than 2,700 technicians and research support professionals and approximately 1,300 administrative and administrative staff work in CONICET. It has a total of 16 scientific and technological centres (CCT), 11 research and transfer centres (CIT), one multidisciplinary research centre and more than 300 institutes and joint centres between CONICET, national universities and other institutions. Its activity focuses on four major knowledge areas: agricultural, engineering and materials sciences; life and health sciences; natural sciences; social sciences and humanities.

In addition to CONICET, there is a large population of 17 national **public research organisations** engaged in sectoral research. These are: the National Institute of Agricultural Technology (INTA)⁵⁹, the National Institute of Industrial Technology (INTI)⁶⁰, the National Atomic Energy Commission (CNEA)⁶¹, the National Commission for Space Activities (CONAE)⁶², the National Administration of Laboratories and Health Institutes (ANLIS)⁶³, the National Antarctic Directorate (DNA)⁶⁴, the National Institute for Fisheries Research and Development (INIDEP)⁶⁵, the Argentine Antarctic Institute (IAA)⁶⁶, the National Water Institute (INA)⁶⁷, the Institute of Scientific and Technical Research for Defence (CITEDEF)⁶⁸, the Argentine Geological Mining Service (SEGEMAR)⁶⁹, the Dr. Manuel Sadosky Foundation⁷⁰ (public-private foundation), the Argentine Nanotechnology Foundation (FAN)⁷¹, the National Geographical Institute, the Leloir Institute Foundation⁷², the National Institute for Seismic Prevention (INPRES)⁷³, the Naval Hydrography Service (SHN)⁷⁴ and the National Meteorological Service (SMN)⁷⁵.

⁵⁹ See <https://www.argentina.gob.ar/inta>

⁶⁰ See <https://www.argentina.gob.ar/inti>

⁶¹ See <https://www.argentina.gob.ar/cnea>

⁶² See <https://www.argentina.gob.ar/ciencia/conae>

⁶³ See <https://www.argentina.gob.ar/salud/anlis>

⁶⁴ See <https://www.cancilleria.gob.ar/es/iniciativas/dna/direccion-nacional-del-antartico>

⁶⁵ See <https://www.argentina.gob.ar/inidep>

⁶⁶ See <https://www.cancilleria.gob.ar/es/iniciativas/dna>

⁶⁷ See <https://www.argentina.gob.ar/ina>

⁶⁸ See <https://www.argentina.gob.ar/defensa/citedef>

⁶⁹ See <https://www.argentina.gob.ar/produccion/segemar>

⁷⁰ See <https://www.fundacionsadosky.org.ar/>

⁷¹ See <https://www.fan.org.ar/>

⁷² See <https://www.leloir.org.ar/>

⁷³ See <https://www.inpres.gob.ar/>

⁷⁴ See <http://www.hidro.gov.ar/>

⁷⁵ See <https://www.smn.gob.ar/>

The **Inter-institutional Council for Science and Technology (CICYT)**⁷⁶ embodies the highest-level representation of universities and national organisations involved in scientific and technological activities.

Finally, there is a **Register of Scientific and Technological Organisms and Entities (ROECyT)**⁷⁷, where research performing organizations are registered to be entitled for tax benefits for goods and services imports, as regulated by Law. There are 197⁷⁸ institutions registered.

Research Assessment

The Law regulates the evaluation of scientific and technological activity as a permanent obligation of the State. However, there is no national assessment agency but each funding or performing institution manages its own assessment processes under its own criteria. This leads to inconsistency, lack of coordination and overlapping of both processes and deadlines between assessment bodies and can even lead to contradictory and incongruent actions and redundant processes (Bilmes, Fushimi and Liaudat: (2019).

CONICET carries out peer review of scientific-technological personnel careers development of researchers and supporting staff, as well as for their grant programmes. CONICET also evaluates research projects. This is done with the support of Advisory Committees specifically set up for this work. It uses the SIGEVA Integrated Management and Evaluation System⁷⁹ as the technological management tool.

MINCyT carries out the **Institutional Evaluation Programme (PEI)**⁸⁰ through which it carries out permanent assessment of the institutions belonging to the National Science, Technology and Innovation System with the aim of guaranteeing continuous improvement. The PEI evaluates the performance of the R&D role both within the institution and in relation to its social and productive environment. This is a three staged work: self-evaluation, external evaluation, and improvement plan. Throughout the process, the institutions receive technical and financial support from MINCyT. As of the date of this report, there are 59 institutions awarded by the PEI.

3.2. Open access policy and legal framework

Argentina has a strong national open access policy to scientific literature and research data. It is set in the **Law on Open Access Institutional Digital Repositories: 26.899**⁸¹, adopted in 2013, and its implementing **regulation**⁸², adopted in 2016. This Law is addressed primarily to public research organizations and institutions of the National System of Science, Technology and Innovation that receive public funding. They are obliged to *develop their own or shared open-access institutional digital repositories, in which all scientific and technological output of their research personnel produced fully or partly financed with public funds must be deposited*. This includes journal articles, technical-

⁷⁶ See <https://www.argentina.gob.ar/ciencia/cicyt>

⁷⁷ See <https://www.argentina.gob.ar/ciencia/roecyt>

⁷⁸ See https://www.argentina.gob.ar/sites/default/files/registro_de_instituciones_roecyt_09-06-2021.pdf

⁷⁹ See <https://sigeva.conicet.gov.ar/>

⁸⁰ See <https://www.argentina.gob.ar/ciencia/pei>

⁸¹ See https://repositoriosdigitales.mincyt.gob.ar/files/Boletin_Oficial_Law_26899.pdf

⁸² See https://repositoriosdigitales.mincyt.gob.ar/files/Boletin_Oficial_Resolucion_753.pdf

scientific papers, theses, primary data or raw data, among others. In addition, they must establish policies for public access to primary research data and for its management and long-term preservation. In other words, the Law focuses on institutions and obliges them to have both open access repositories and institutional open access policies.

The Law also affects all research funding public calls, which are required to include in their contractual clauses the presentation of a management plan for primary data and a plan to guarantee the public availability of the expected results.

In addition, the Law and its regulation establishes that open access to scientific literature should be provided in no more than six months from the date of the official publication or approval by a competent authority. In the case of primary data, no more than five years from the collection date. It also entitles institutions to require their students and research personnel to immediately deposit their scientific-technological outputs, to publish the metadata in the repository and to provide access to the contents in periods shorter than those established by the Law.

MINCyT is the body responsible for ensuring full and proper compliance with this Law. To this end, it created the National System of Digital Repositories (SNRD) in 2011. The implementing regulations of Law 26.899 tasks MINCyT with the promotion, consolidation, coordination and dissemination of institutional and thematic digital repositories of science and technology, the responsibility of establishing interoperability standards and technical guidelines for digital preservation to be adopted by the repositories, as well as the technical tasks to implement them. In addition, MINCyT is responsible for providing open and unified access to the metadata, full texts and their primary data of the scientific-technological output held in the digital repositories and for evaluating the level of compliance with the Law.

There are universities and research centres that have their own institutional open access policy. At the date of publication of this report, MINCyT is working on an evaluating of the degree of compliance by research public institutions with the legal mandate that requires them to have open access infrastructures and policies.

Finally, in March 2021 the Department of Scientific and Technological Coordination of MINCyT created the Advisory Committee on Open Science and Citizen Science⁸³, which has written the document *Diagnosis and Roadmap for an Open Science Policy in Argentina*⁸⁴. Its objective is to design a national strategy to expand the open access policy towards open science, within the framework of the new context set by the UNESCO Recommendation. The document contains a specific proposal of lines of action focused on: (1) open access publishing; (2) open access books; (3) open access to primary research data, software and code; (4) citizen and participatory science; (5) open and collaborative infrastructures; (6) incentives for open science; and (7) open science monitoring.

⁸³ See <https://www.argentina.gob.ar/ciencia/comite-ciencia-abierta>

⁸⁴ See https://www.argentina.gob.ar/sites/default/files/2023/01/cac_final_document_-_english_version.pdf

3.3. Open access digital platforms

Argentina has a robust architecture of digital platforms for implementing its national and the institutional open access policies.

Repositories

In accordance with Law 26.899, all bodies conducting research in Argentina have (or must have) their own or a shared open access institutional repository and its own open access policy.

The **National System of Digital Repositories (SNRD)**⁸⁵ is the national network of digital repositories of science and technology. It was established by MINCYT in 2016, through the Resolution 753 E/2016 that develops Law 26.899, to guarantee the interoperability of all platforms through the establishment of common policies, standards, and protocols. At the date of this study, SNRD provides access to more than 366,000 open access resources from 45 repositories. These include the repositories of the National University of La Plata (which contributes 29.91% of the content), CONICET (22.85%), the Faculty of Humanities and Education Sciences at the La Plata National University (8.44%), the Cordoba National University (3.61%) and the Rosario National University (3.11%).

The services provided by the SNRD to the national repository community include support and funding for the creation and strengthening of digital repositories⁸⁶ and for the training of human resources for the development and management of repositories⁸⁷. To access the funding, the institution must meet some basic requirements, such as carrying out substantive activities linked to R&D&I and having an institutional open access policy.

The SNRD is the national node of LA Referencia.

Moreover, open access institutional repositories are harvested and aggregated in **the Unified Database (BDU)**⁸⁸. The BDU is a browser that brings together the information resources held by Argentine libraries and research centres and provides access to the full text of archived digital objects. The BDU has 504,338 records in the catalogue of 98 repositories from 46 institutions.

The **Electronic Library of Science and Technology (BECT)**⁸⁹ is an initiative managed by the MINCYT which seeks to provide licences for online access to scientific resources: academic journals, databases of bibliographical references, books, books, conference papers, etc. It has its own budget line within the national budget.

⁸⁵ See <https://repositoriosdigitales.mincyt.gob.ar/vufind/>

⁸⁶ See https://repositoriosdigitales.mincyt.gob.ar/files/fortalec_bd_bases_SNRD.pdf

⁸⁷ See https://repositoriosdigitales.mincyt.gob.ar/files/rrhh_bases_SNRD.pdf

⁸⁸ See <https://bdu.siu.edu.ar/>

⁸⁹ See <https://biblioteca.mincyt.gob.ar/>

Academic Journals

The national open access policy does not include academic journals. Initiatives to support national scholarly publishing services are not promoted by MINCyT but by CONICET.

The largest support for scientific academic journals in Argentina is provided by the **Argentine Centre for Scientific and Technological Information (CAICYT)**⁹⁰, a CONICET research institute dedicated to the management of scientific information and support for academic publishing. Its competences cover the inter-institutional coordination of initiatives related to bibliographical reference databases, open access to scientific communication, information infrastructures, controlled languages and bibliographical formats, among others. Regarding support for academic journals, it engages in the following actions:

The **Basic Core of Argentine Scientific Academic Journals (NBR)**⁹¹ is a service for the evaluation of national academic publications, in force since 1999, whose evaluation parameters are based on scientific and editorial quality international criteria and are established in CONICET Resolution 1640/05. The NBR has 338 awarded journals from all fields of knowledge. The outputs of the evaluation carried out by the NBR are used as a tool for CAICYT in its role as the SciELO Argentina national node⁹² and the National Collection Centre of Latindex⁹³.

The **Scientific and Technical Publications Portal (PPCT)**⁹⁴ is the editorial support service for scientific publications provided by CAICYT since 2009. Through the PPCT, academic journals have access to a professionalised, digital, open access space that supports the entire editorial process. The PPCT provides Argentine scientific academic journals editors with early stage advice and support for online manuscript reception, peer review, editing and electronic publication in order for them to achieve quality levels based on international standards and autonomy for online publishing.

CAICYT is also the **Argentine ISSN Centre**⁹⁵ (International Standard Serial Number). They are responsible for the identification of continuing resources published in the country, the assignment of the ISSN code, their registration in the ISSN international database and their dissemination.

Argentine academic journals have a significant presence in Latindex, with 409 academic journals in catalogue 2.0, in SciELO Argentina, with 96 indexed titles and in Redalyc, with a total of 100 academic journals. Regarding the International Directory of Open Access Journals (DOAJ), Argentina has a total of 361 indexed academic journals, which places it just behind Brazil and Colombia as the third Latin American country with the largest number of academic journals in this directory.

⁹⁰ See <http://www.caicyt-conicet.gov.ar/>

⁹¹ See <http://www.caicyt-conicet.gov.ar/sitio/comunicacion-cientifica/nucleo-basico/>

⁹² See <http://www.scielo.org.ar/scielo.php>

⁹³ See <https://latindex.org/latindex/inicio>

⁹⁴ See <http://www.caicyt-conicet.gov.ar/sitio/comunicacion-cientifica/ppct/>

⁹⁵ See <http://www.caicyt-conicet.gov.ar/sitio/comunicacion-cientifica/issnar/>

Table 3. Number of Argentinian academic journals in Latindex (catalogue 2.0), SciELO and Redalyc

	Latindex (catalogue 2.0)	SciELO Argentina	Redalyc	DOAJ
No. of journals	409	96	100	361

Source: Compiled by the authors based on data from Latindex, SciELO, Redalyc and DOAJ. Access date: December 2022.

Curriculum management systems

MINCYT manages the **Argentine Science and Technology Information System (SICYTAR)**⁹⁶, the official platform for access to information of public interest in science, technology and innovation in the country. It is an initiative that promotes transparency, access to public information and accountability, linked to open government policies, and is part of the Government Data Openness Plan. It offers information to citizens, scientists, entrepreneurs, government officials, journalists, and computer scientists. It contains information on what STI projects are being developed, who is carrying them out, what equipment they are working with, in which institutions they are being developed, what scientific data are available and what are the outcomes of these activities. This portal is supplied with information from research funding agencies, institutional repositories, research data repositories, content aggregators, and Curriculum Vitae (CVar) data.

The **CVar**⁹⁷ is the unified and standardised national register of the curricular data of the scientific and technological personnel of Argentine institutions. Its objective is to facilitate the management, organisation and maintenance of curricular information that provides research personnel with access to Argentine public research calls. CVar has the **My Printed CV**⁹⁸ application for managing printed versions of CVs registered in CVar for individuals and institutions.

⁹⁶ See <http://www.sicytar.mincyt.gob.ar/>

⁹⁷ See <http://cvar.sicytar.mincyt.gob.ar/>

⁹⁸ See <https://sicytar.mincyt.gob.ar/micvimpreso/>

4. Brazil



1.17%
R&D
expenditure/GDP*

3.99%
Research
staff/EAP in
(0/00)*

131
Institutional
repositories

1,642
Open access
journals



National OA
policy



OA legal
framework



Institutional OA
policies



National repository
aggregator



National journal
aggregator



Curriculum
management
system

Source: See [Open Access to Brazilian Research Data Manifesto for Citizen Science](#).

Data: Compiled by author based on [RICyT](#), [LA Referencia](#), [OpenDOAR](#) and [DOAJ](#).

Note: For R&D expenditure data referring to 2020 and for Research staff 2018. No. of researchers per thousand of labour force (0/00).

Brazil has **no legal framework specifically established to regulate the operation of the STI system**. The Ministry of Science, Technology and Innovation (MCTI) is the central body of the federal system, in which state-level bodies also play a major role.

Brazil **does not have a formally established national open access policy**. However, there are key actors at the STI system governance level that develop and maintain important **support initiatives**.

The Brazilian Institute for Science and Technology Information (IBICT) is the governmental body leading the open access policy agenda and the definition of open science in Brazil. It provides scientific information management services to institutional repositories and open access journals. The main funding bodies, Fapesp, CAPES and CNPq, have mandates that require open access through repositories to all scientific outputs wholly or partially funded by them.



[Oasisbr](#), the Brazilian Open Access Portal for Scientific Information, is the national aggregator of open access resources. It is managed by IBCT. It harvests scientific output and open access research data published in scientific journals, digital repositories, and libraries.



Rede [Cariniana](#) is a network for research data digital preservation services. It is managed by IBCT. It contains all the Brazilian journals of the SEER platform and of the SciELO Network, the Open Book Portal e-books, and the theses and dissertations of the Brazilian Digital Library of Theses and Dissertations.



[CV Lattes](#) is the national curriculum management system created and maintained by the CNPq. It is the national standard for recording the careers of students and researchers used by most R&D funding agencies, universities, and research centres.

4.1. Institutional framework

Brazil is a federal republic of 26 member states, a Federal District and 5,568 municipalities. The states have a wide level of management and governance autonomy. This explains the composition of its R&D&I system.

Governance

In Brazil, there is neither a national science law nor a comprehensive legal framework specifically established to regulate the operation of the whole multi-level science, technology and innovation system.

The **Ministry of Science, Technology and Innovation (MCTI)**⁹⁹ was created in 1985 as the main governing body of Brazil's federal science and technology system. Its current structure is defined in Law no. 14.074 of 14 October 2020¹⁰⁰. It is responsible for designing STI policies and coordinating relevant sectoral policies¹⁰¹. It is also responsible for the planning, coordination, supervision and control of STI activities, and its coordination with STI policy making at the states, the federal district and the municipalities level, with the society and with other federal government bodies.

The MCTI is structured in 4 operational units: the Department of Scientific Research and Education (SEPEF)¹⁰², the Department of Financial Structures and Projects (SEFIP)¹⁰³, the Department for the Coordination and Promotion of Science¹⁰⁴, and the Department of Entrepreneurship and Innovation¹⁰⁵. In addition to these four operational units, the MCTI has four internal advisory bodies: the National Council for Informatics and Automation, the National Council for the Control of Animal Experimentation (CONCEA), the Committee for the Coordination of Meteorology, Climatology and Hydrology Activities, the National Technical Commission for Biosecurity (CTNBio) and the **National Council for Science and Technology (CCT)**¹⁰⁶. The CCT was created by Law no. 9.257 of 1996 and reactivated by Decree in 2019. It is the highest advisory body to the President of the Republic for the formulation and implementation of national scientific and technological development policy.

Because of the decentralisation of STI competences in favour of the federal states, territorial coordination agencies are necessary. **The Conselho Nacional de Secretários Estaduais para Assuntos de Ciência, Tecnologia e Inovação (Consecti)**¹⁰⁷ brings together all the STI State Secretariats in the country, i.e., the public STI decision-makers in the 26 federal states and the Federal District, to coordinate their actions.

⁹⁹ See <https://www.gov.br/mcti/pt-br>

¹⁰⁰ See <https://www.in.gov.br/en/web/dou/-/lei-n-14.074-de-14-de-outubro-de-2020-282699172>

¹⁰¹ Information technology and automation, biosecurity, space, nuclear and the export sector for sensitive goods and services.

¹⁰² See <https://www.gov.br/mcti/pt-br/acao-a-informacao/institucional/composicao/secretaria-de-articulacao-e-promocao-da-ciencia>

¹⁰³ See <https://www.gov.br/mcti/pt-br/acao-a-informacao/institucional/composicao/secretaria-de-estruturas-financeiras-e-de-projetos>

¹⁰⁴ See <https://www.gov.br/mcti/pt-br/acao-a-informacao/institucional/composicao/secretaria-de-articulacao-e-promocao-da-ciencia>

¹⁰⁵ See <https://www.gov.br/mcti/pt-br/acao-a-informacao/institucional/composicao/secretaria-de-empresendedorismo-e-inovacao>

¹⁰⁶ See <http://www.mctic.gov.br/mctic/opencms/institucional/entidadesVinculadas/cct/index.html>

¹⁰⁷ See <https://www.consecti.org.br/>

Every four years, Brazil publishes a **National Science, Technology and Innovation Strategy**. It is currently in force the Strategy for 2016-2022¹⁰⁸. This document sets out the guidelines on which the national STI policy is based. It includes a detailed description of the national R&D&I system, public policies' advancements, strategic challenges for the coming years, and a description of the STI key areas for the national economy: aerospace and defence; water; food; biomes and bioeconomy; social sciences and technologies; climate; digital economy and society; energy; strategic minerals; nuclear; health; converging and enabling technologies.

Research Funding

Brazil has many research funding bodies. Research is financed not only at federal level but also at the states' level.

At federal level, the **MCTI** manages the National Fund for Science and Technology (FNDCT) and two of the main funding agencies of the STI system: the Projects and Studies Funding Agency (Finep) and the National Council for Scientific and Technological Development (CNPq).

The **National Fund for Scientific and Technological Development (FNDCT)**¹⁰⁹, created in 1969, is an accounting and financial fund that aims to finance innovation and scientific and technological development. The FNDCT has no staff or physical structure of its own. Finep acts as the executive department of the FNDCT and is responsible for all its administrative, budgetary, financial and accounting activities.

The **Projects and Studies Funding Agency (Finep)**¹¹⁰ is tasked with transforming Brazil through innovation, by promoting its economic and social development through funding for science, technology and innovation in companies, universities, technological institutes and other public or private institutions. It operates throughout the innovation chain and finances: (1) science and technology infrastructures; (2) scientific research projects; (3) research grants; (4) actions to promote innovative entrepreneurship; (5) societally relevant challenges; (6) ICT-business cooperation; (7) development of new products and processes; (8) innovation strategies and procurement of services; and (9) procurement of products from innovative companies. Funding calls are financed through investments, grants and loans channelled through different financial instruments: reimbursable finance, non-reimbursable finance, financial grants, business grants, capital investment funds and capital contributions. These financial instruments can be managed directly by Finep or managed on a decentralised basis through accredited financial agents and state and regional partners.

The **National Council for Scientific and Technological Development (CNPq)**¹¹¹ is a public foundation linked to the MCTI, created in 1951, which plays a key role in the formulation and strategy of science, technology and innovation public policies. Its main objective is to finance STI research activities and to promote the training of research personnel in all areas of knowledge. The CNPq is responsible for: (1) the collection, analysis, storage, dissemination and exchange of data and information on the development of science and technology; (2) proposing and implementing rules and instruments to

¹⁰⁸ See http://www.finep.gov.br/images/a-finep/Politica/16_03_2018_Estrategia_Nacional_de_Ciencia_Tecnologia_e_Inovacao_2016_2022.pdf

¹⁰⁹ See <http://www.finep.gov.br/a-finep-externo/fndct/fndct>

¹¹⁰ See <http://www.finep.gov.br/>

¹¹¹ See <https://www.gov.br/cnpq/pt-br>

support and encourage research and development activities and the dissemination and absorption of scientific and technological knowledge; (3) promoting the implementation of agreements, protocols, conventions, programmes and projects for the exchange and transfer of technology between public and private, national and international entities; (4) supporting, promoting and participating in scientific and technological meetings; (5) promoting and conducting studies on scientific and technological development; (6) providing technical assistance services in its area of expertise; (7) providing assistance in purchasing and importing equipment and inputs for use in scientific and technological research; and (8) accrediting institutions to import equipment and inputs for use in scientific and technological research; All these actions are essential for national development and for the recognition of Brazilian research institutions and researchers by the international scientific community.

In addition to these bodies, the **Senior Staff Development Coordination Body (Capes)**¹¹² is a Foundation of the Ministry of Education (MEC) whose mission is to strengthen R&D human resources through master's and doctoral studies funding in Brazil, investments in senior personnel's training, both at home and abroad, and international scientific cooperation promotion. To this end, it manages scholarships in all areas of knowledge, but especially in those considered priorities for the country.

At federal level, individual states have funding agencies called **Research Support Foundations (FAPs)**. The oldest and most important one is the São Paulo State Research Support Foundation (Fapesp)¹¹³, created in 1960, which manages scholarships and research grants. In the 1990s, Brazilian states replicated the Fapesp model and regional STI systems expanded. The **National Council of State Foundations for the Protection of Research (CONFAP)**¹¹⁴ is a non-profit organisation, created in 2006, that brings together 27 research support foundations (FAPs) from the Brazilian states. It aims to promote better coordination of their interests, to increase the autonomy of these state funding bodies and to ensure the regularity and effective financial performing of the budget allocations of the FAPs. CONFAP works to build regular alliances between the FAPs and national and international organisations promoting and encouraging the development of R&D&I, as well as partnerships with the business sector.

Research Performing

The organisations that carry out research activity in Brazil are the universities, the MCTI research institutes, the Federal Institutes of Education, Science and Technology (IFE) and the state institutes of science, technology and innovation. The **university sector** is responsible for most of the research carried out in the country. There are 66 federal universities and 43 state universities. In addition, there is a large population of public research centres. First, there are 20 **research institutes under the MCTI**¹¹⁵ whose

¹¹² See <https://www.gov.br/capes/pt-br>

¹¹³ See <https://www.fapesp.br>

¹¹⁴ See <https://confap.org.br/>

¹¹⁵ These are: the National Institute of Water, the National Institute of the Atlantic Forest, the National Institute of Research of the Pantanal, the National Institute of the Semi-arid, the National Institute of Space Research, the National Institute of Research of the Amazon, the National Institute of Technology, the Brazilian Institute of Information in Science and Technology, the Centre for Strategic Technologies of the Northeast, the Renato Archer Information Technology Centre, the Centre for Mineral Technology, the Brazilian Centre for Physical Research, the National Centre for Natural Disaster Monitoring and Alerts, the National Laboratory of Scientific Computing, the National Laboratory of Astrophysics, the Emilio Goeldi Museum of Pará, the Museum of Astronomy and Related Sciences, the National Observatory, the Commission for the Coordination of Meteorology, Climatology and Hydrology Activities, and the National Biosafety Technical Commission.

research is focused on specific sectoral areas. Then, there are 38 **federal institutes of education, science and technology (IFE)**¹¹⁶, created by law¹¹⁷ in 2008.

Research Assessment

In Brazil, there are no common research assessment practices, nor a standardised pathway for access to and remaining in the research career.

Since 1998, the **Senior Staff Development Coordination Body (Capes)** has managed regular calls for evaluation of the National Postgraduate System. This evaluation ensures the quality of Master's and doctoral courses in the country. This helps to identify regional asymmetries and strategic areas of knowledge, to guide the creation and expansion of postgraduate programmes in the national territory and contributes to quality postgraduate education for teachers at all levels of education as well as for qualified human resources outside the academic environment. However, neither researchers' scientific performance assessment nor rewards and incentives setting are included among its functions.

4.2. Open access policy and legal framework

Brazil does not have a national open access policy at federal level, although there have been significant legal initiatives and there are important institutional initiatives that deserve to be highlighted.

In 2007 and 2011 there were attempts to pass laws regulating open access to scientific content, but despite the support shown by public science and technology bodies, they did not successfully complete the necessary procedures for approval. Despite this, the country's most important funding bodies Fapesp, CAPES and CNPq have specific mandates that require self-archive in an open access repository to all research outputs wholly or partially funded by these institutions (Cabrera Peña 2015, Babini and Rovelli 2020).

This commitment of public entities to the governance of the STI system has been endorsed in the ***Fifth Open Governance National Action Plan of Brazil (2021-2023)***¹¹⁸ published by the Brazilian government, which includes among its 12 commitments: *building a proposal for a research assessment model to promote open science as an alternative to the models applied in Brazil, based on international experiences adapted to the Brazilian*

¹¹⁶ These are: the Federal Institute of Acre, the Federal Institute of Alagoas, the Federal Institute of Amapá, the Federal Institute of Amazonas, the Federal Institute of Bahia, the Baiano Federal Institute, the Federal Institute of Brasília, the Federal Institute of Ceará, the Federal Institute of Espírito Santo, the Federal Institute of Goiás, the Goiano Federal Institute, the Federal Institute of Maranhão, the Federal Institute of Minas Gerais, the Federal Institute of North Minas Gerais, the Federal Institute of Southeast Minas Gerais, the Federal Institute of South Minas Gerais, the Federal Institute of the Mining Triangle, the Federal Institute of Mato Grosso, the Federal Institute of Mato Grosso do Sul, the Federal Institute of Pará, the Federal Institute of Paraíba, the Federal Institute of Pernambuco, the Federal Institute of the Pernambuco Sertão, the Federal Institute of Piauí, the Federal Institute of Paraná, the Federal Institute of Rio de Janeiro, the Fluminense Federal Institute, the Federal Institute of Rio Grande do Norte, the Federal Institute of Rio Grande do Sul, the Farroupilha Federal Institute, the Sul-rio-grandense Federal Institute, the Rondônia Federal Institute, the Roraima Federal Institute, the Santa Catarina Federal Institute, the Catarinense Federal Institute, the São Paulo Federal Institute, the Federal Institute of Sergipe, and the Federal Institute of Tocantins.

¹¹⁷ See http://www.planalto.gov.br/ccivil_03/_Ato2007-2010/2008/Lei/L11892.htm

¹¹⁸ See <https://observatorioplanificacion.cepal.org/es/planes/quinto-plano-nacional-de-acao-do-governo-aberto-do-brasil-2021-2023>

context. The public problems that this 8th commitment aims to address are the existence of barriers to the implementation of research assessment guidelines and metrics to foster open science practices implemented by the funding agencies CNPq, CAPES, FINEP and the FAPs, the lack of metrics that favour open science practices and the limited interoperability of scientific platforms related to scientific activity. To address these problems, in 2021-23 Brazil will define alternative metrics for research assessment, design guidelines for the allocation of R&D public funding, work in awareness raising about the benefits of open science among the academic community and create a Brazilian science observatory.

The institution responsible for these actions is the **Brazilian Institute of Science and Technology Information (IBICT)**¹¹⁹. The IBICT is a government institution, under the MCTI, which leads the agenda of open access policies and the definition of open science in Brazil. It works on the development of information products and services for Brazilian research community and research performing institutions. Its services comprise training for research in information sciences, the creation of digital libraries, automatic harvesting of scientific records, dissemination of theses and dissertations, technical and editorial support for electronic open access academic journals, and support for the creation of open access institutional repositories. These products and services make Brazil the fifth country in the world in terms of the number of digital repositories and the third in terms of the number of open access periodicals.

With respect to research data, in the **4th Open Governance National Action Plan of Brazil**¹²⁰, commitment 3 refers to *establishing governance mechanisms for scientific data for the advancement of open science in Brazil*. The commitment seeks to promote progress in the processes related to making research data openly available to the scientific community by improving governance instruments. The commitment is officially coordinated by Empresa Brasileira de Pesquisa Agropecuária (Embrapa)¹²¹, with the collaboration of a network of governmental and civil society institutions including MCTIC, IBICT, Capes, CNPq, Fundação Oswaldo Cruz (Fiocruz)¹²², University of Brasília (UnB)¹²³, Open Knowledge Foundation (OKBR)¹²⁴, Brazilian Association of Scientific Editors (ABEC)¹²⁵ and National Network of Education and Research (RNP)¹²⁶.

Furthermore, funding agencies are starting to include a requirement for the development of data management plans to grantees. The federal research agency of the State of São Paulo (Fapesp) has included this obligation in its calls for thematic projects since 2018 and promotes a data management network involving the state's seven public universities. Similarly, research data management, including the use of repositories, is becoming part of the research policies of universities and research institutions (Babini and Rovelli 2020).

¹¹⁹ See <https://www.gov.br/ibict/pt-br>

¹²⁰ See <https://www.gov.br/cgu/pt-br/governo-aberto/a-ogp/planos-de-acao/4o-plano-de-acao-brasileiro/4-plano-acao-nacional-espanhol-atualizado2020.pdf>

¹²¹ See <https://www.embrapa.br/>

¹²² See <https://portal.fiocruz.br/es>

¹²³ See <https://www.unb.br/>

¹²⁴ See <https://ok.org.br/>

¹²⁵ See <https://www.abecbrasil.org.br/>

¹²⁶ See <https://www.rnp.br/>

4.3. Open access digital platforms

Repositories

IBICT promotes the creation of institutional repositories in Brazilian universities and research institutes, disseminates the use of open source software and contributes with training for the creation and management of institutional repositories. In Brazil there are 113 institutional repositories of scientific publications, 11 research data repositories and 1 national repository, **Deposita**¹²⁷, created by the IBCT for gathering and disseminating the scientific output of those institutions that do not yet have their own repository. These resources are aggregated in the **Brazilian Open Access Portal for Scientific Information Oasisbr**¹²⁸, the national aggregator of open access resources managed by IBCT with financial support from Finep. Oasisbr harvests open access scientific output and research data published in academic journals, digital repositories of scientific publications, digital repositories of research data and digital libraries of theses and dissertations, preprint servers, scientific book portals and digital monograph libraries. Oasisbr represents Brazil in LA Referencia. Oasisbr uses a single interface to provide access to more than 4 million research outputs: scientific articles, books, book chapters, conference papers, research datasets, preprints, dissertations, theses, graduate monographs, etc. It also provides access to the scientific content held in the Portuguese Open Access Scientific Repository (RCAAP). Oasisbr works to bring together, give visibility and provide with open access to a large part of the scientific content produced by researchers working in Brazilian and Portuguese institutions.

One of the resources harvested by Oasisbr is the **Brazilian Digital Library of Theses and Dissertations (BDTD)**¹²⁹, a digital resource developed by IBICT in 2002 that holds the existing thesis and dissertation information systems of 130 Brazilian teaching and research institutions and encourages the registration and publication of theses and dissertations produced in the country and abroad on electronic media, giving greater visibility to national scientific output. As of the date of this report, it has more than 200,000 theses and more than 560,000 dissertations.

Regarding research data management, in 2019 IBICT and CNPq launched **Lattes Data**¹³⁰ the national research data repository created to collect, store and disseminate scientific datasets generated in CNPq-funded projects, enabling sharing and reuse by the scientific community, the storage of research data and long-term accessibility to the data. In the future, the repository will also be available for the submission of research data from researchers not funded by CNPq, through agreements signed with other institutions under the National Consortium for Open Science (CoNCienciaA)¹³¹.

In addition, in 2012, IBICT created the **Cariniana Network**¹³² a network of digital storage services for research data. It is a decentralised infrastructure that uses distributed computing resources and requires the participation of the custodian institutions and their infrastructure to ensure permanent access and monitored storage of digital documents. At its inception, the initiative received funding from Finep and joined Stanford University's

¹²⁷ See <https://www.deposita.ibict.br/>

¹²⁸ See <https://oasisbr.ibict.br/vufind/>

¹²⁹ See <https://bdtb.ibict.br/vufind/>

¹³⁰ See <https://lattesdata.cnpq.br/>

¹³¹ See <https://www.gov.br/ibict/pt-br/central-de-conteudos/noticias/2022/marco-2022/consorcio-nacional-para-ciencia-aberta-conciencia-sera-lancado-no-dia-22>

¹³² See <http://cariniana.ibict.br/>

LOCKSS Programme. This also enabled the content of the international publications of the institutions involved in the initiative to be preserved and its services to be extended to include the storage of institutional e-journals using OJS, the storage of institutional repositories in DSpace software and the storage of research data repositories in Dataverse. Since then, the Cariniana Network has emerged as one of the main references for digital preservation in Brazil. Cariniana maintains the research group Studies and Practices in Digital Storage, Driade, recognised in the CNPq's Directory of Research Groups, and recommends and disseminates software tools that are being implemented internationally, testing best practices for their management and control of functional requirements that facilitate the adoption of distributed digital preservation systems in Brazil.

At the date of this report, there are 13 partner institutions in the Cariniana Network which serves 150 institutions with open access publications, such as the SciELO Network.

Academic Journals

In Brazil there is remarkable public support for the publication of national academic journals. Brazilian academic journals have mainly been publicly funded, either through direct subsidies or through the support of digital infrastructures and editorial work provided by public universities and research institutes. (Ramírez and Samoilovich, 2021).

Among the Brazilian initiatives aimed at fostering academic publishing, the **Scientific Electronic Library Online**, SciELO¹³³ is the most noteworthy. Launched in 1997 as a research project funded by Fapesp, its initial objective was to create a metadata aggregator and complete texts from academic journals that met minimum quality standards. Today, SciELO has expanded its activity to 15 further countries and has become a service platform for academic journals and publishers to publish directly on it, without requiring the parallel development of digital publishing infrastructures. This service is complementary to the quality certification and indexing services and gives SciELO the character of a large publisher, which leads to significant cost savings in the publication of open access journals. (Ramírez and Samoilovich, 2021).

In addition, IBCT manages several support services for national scientific academic journals. First, the **Directory of Editorial Policies of Brazilian Scientific Journals (Diadorim)**, a service that aims to identify, systematise, and make available the information on those editorial policies established by Brazilian publishers regarding right retention and permissions for self-archiving in institutional repositories. It is an important source of information for authors to select a scientific journal that meets their specific needs and thus avoid possible publication agreement's breaching. Secondly, the **Electronic Journal Publication System (SEER)**, launched in 2003, through which IBICT provides publishing services to research performing institutions using **Open Journal Systems (OJS)** software.

The importance of these actions is reflected in the position reached by Brazil in DOAJ, the main global directory that registers open access journals, where the country ranks third in the world among those with the highest number of open access scientific academic journals. Brazilian academic journals also have a significant presence in Latindex, with 291 academic journals in catalogue 2.0, in SciELO Brazil, with 316 indexed titles and in Redalyc, with a total of 332 academic journals.

¹³³ See <https://scielo.org/es/>

Table 4. Number of Brazilian journals in Latindex (catalogue 2.0), SciELO, Redalyc and DOAJ.

	Latindex (catalogue 2.0)	SciELO Brazil	Redalyc	DOAJ
No. of journals	291	316	332	1,642

Source: Compiled by the authors based on data from Latindex, SciELO, Redalyc and DOAJ. Access date: December 2022.

Curriculum management systems

The CNPq manages the **Lattes platform** which brings together in a single information system the databases of (1) curricula, (2) research groups, and (3) institutions. Its coverage is not limited to the scope of CNPq but also covers other federal and state funding agencies, state science and technology support foundations, higher education institutions, and research institutes.

CV Lattes¹³⁴ is the national curriculum management system. It is the standard for recording the careers of students and researchers used by most of the country's funding institutions, universities and research institutes. It's notorious for being a comprehensive and reliable information platform. Its use has become mandatory for applicants of R&D funding calls. It is a strategic digital infrastructure, not only for planning and management activities, but also for MCTI and other government agencies policy formulation.

The **Directory of Research Groups** contains information on active research groups, researchers, lines of research, sectors involved, knowledge specialisation, scientific and technological outputs, and interactions with the productive sector. The individual information of the group participants is extracted from their Lattes CVs.

The **Directory of Institutions** is designed to promote the organisations of the National STI System to the status of users of the Lattes Platform. It registers every organisation or entity related to CNPq. Data public availability provides CNPq's activities with transparency and reliability, strengthens communication channels between researchers and institutions, and is a source of information for further studies and research. As its information is cumulative, it also plays an important role in preserving the memory of research activity in the country.

¹³⁴ See <https://lattes.cnpq.br/>

5. Chile



0.34%

Gasto de I+D/PIB*

1.85%

Personal investigador/PEA en (0/00)*

21

Repositorios institucionales

150

Revistas de acceso abierto



National OA policy



OA legal framework



Institutional OA policies



National repository aggregator



National journal aggregator



Curriculum management system

Source: See [ANID's Open Access Policy for Scientific Information and Publicly Funded Research Data](#).

Data: Compiled by author based on [RICyT](#), [LA Referencia](#), [OpenDOAR](#) and [DOAJ](#).

Note: Data referring to 2020. No. of researchers per thousand of labour force (0/00).

The **national STI system** in Chile is regulated by Law 21.105, enacted in **2018**. It abolishes CONICYT and creates the Ministry of Science, Technology, Knowledge and Innovation and the National Agency for Research and Development (ANID) to succeed it.

Since **2022**, Chile has a **national open access policy** that requires the **deposit in open access** of ANID-funded publications and data in institutional repositories. It also allows for **gold publishing venues** journals of the SciELO network.

ANID is responsible for the design, implementation and evaluation of the Chilean open access policy. The latter is a component of the National Infrastructure for Access to Scientific Information (INA); a national ecosystem of scientific information that has different services, instruments and mechanisms of collaboration and public-private articulation between ANID, the CINCEL Corporation and public and private universities. The INA includes the ANID Scientific Production Repository, the National Center of the ISSN Network, the SciELO-Chile journal collection, the Researcher's Portal and

REPOSITORIO ANID

The [ANID institutional repository](#) hosts, preserves, promotes access and the visibility of the research outputs generated in projects and grants awarded by the Agency.



ANID is the coordinating body of the [ISSN](#) National Centre.



ANID also manages the [SciELO](#) Chile collection.

PORTAL INVESTIGADOR
Investigadores y su
Productividad Científica

The [Researcher Portal](#) is a platform developed by ANID to manage the profiles of researchers and their scientific production. This system enables ANID to monitor national scientific output financed with public funds.

5.1. Institutional framework

Governance

Governance of the national STI system in Chile is regulated by **Law 21.105**¹³⁵, enacted in 2018. This legal framework defines the composition and functions of the different agents of the Chilean R&D&I system, as well as the instruments on which government action promoting is based. The main novelty is that it repeals the former National Commission for Scientific and Technological Research (CONICYT) and creates the Ministry of Science, Technology, Knowledge and Innovation and the National Agency for Research and Development, which will become, for all intents and purposes, the successor entities. It also creates two new bodies - the National Council for Science, Technology, Knowledge and Innovation for Development and the Interministerial Committee for Science, Technology, Knowledge and Innovation - and three essential instruments - the National Strategy for Science, Technology, Knowledge and Innovation for Development, the National Policy for Science, Technology, Knowledge and Innovation and its Action Plan.

The **Ministry of Science, Technology, Knowledge and Innovation (MinCiencia)**¹³⁶ is the highest body responsible for promoting the development of science, technology, knowledge and science and innovation through the design, formulation, coordination, implementation and evaluation of STI policies, plans and programmes. It is also the body responsible for coordinating the operation of all the agents comprising the National Science, Technology, Knowledge and Innovation System, at sectoral and geographical levels. For coordination at territorial level, the Ministry of Science has Regional Ministerial Departments (SEREMI) which oversee the coordinated implementation of STI policy at regional level throughout the country. The SEREMIs are grouped into 5 macro-zones: North, Central, South Central, South and Southern¹³⁷. Each is headed by a Regional Ministerial Secretary who represents the Ministry in one or more regions.

Within the MinCiencia, the Law creates the **National Council of Science, Technology, Knowledge and Innovation for Development (Consejo Nacional CTCI)**¹³⁸ as an autonomous body whose legal mandate is to directly advise the President in the prospective analysis of national and international development trends, to formulate proposals to strengthen and develop the Chilean STI System and, above all, to develop the *National Strategy for Science, Technology, Knowledge and Innovation for Development*¹³⁹.

The **Interministerial Committee on Science, Technology, Knowledge and Innovation** is a body for coordination, information, orientation and agreement on STI public policies, made up of the heads of the Ministries of Science, Technology, Knowledge and Innovation, Finance, Economy, Development and Tourism and Education. As defined by the Law, it is the body responsible for the development, implementation and monitoring of the *National Science, Technology, Knowledge and Innovation Policy* and its *Action Plan*.

¹³⁵ See <https://www.bcn.cl/leychile/navegar?idNorma=1121682>

¹³⁶ See <https://www.minciencia.gob.cl/el-ministerio/mision-y-vision/>

¹³⁷ See <https://ayuda.anid.cl/hc/es/articles/360048066052--Cu%C3%A1les-son-las-Macrozonas-del-Ministerio-de-Ciencia-Tecnolog%C3%ADa-Conocimiento-e-Innovaci%C3%B3n->

¹³⁸ See <https://www.consejoctci.cl/>

¹³⁹ See <https://docs.consejoctci.cl/documento/estrategia-nacional-de-ciencia-tecnologia-conocimiento-e-innovacion-para-el-desarrollo-de-chile-2022/>

The **National Agency for Research and Development (ANID)**¹⁴⁰ is created as a body with legal personality and its own assets, which subrogates CONICYT. The agency is related to the Presidency of the Republic through the MinCiencia and has the function of managing and delivering the programmes and instruments for promoting, fostering and developing research in all areas of knowledge, technological development and scientific-technological innovation, in accordance with the policies defined by the Ministry.

On the design, planning and evaluation of STI policies, Law 21.105 establishes three hierarchically related mechanisms with different time frames: (1) a National Science, Technology, Knowledge and Innovation Strategy for Development; (2) a National Science, Technology, Knowledge and Innovation Policy; and (3) an Action Plan.

The **National Strategy for Science, Technology, Knowledge and Innovation for Development**¹⁴¹ is the document that addresses the long-term challenges and opportunities for the development of the country and its regions. Its *raison d'être* is to generate a framework to guide public policies and their supporting instruments. It is drawn up by the CTCI National Council and approved by the President of the Republic. It contains a diagnosis of global trends and a prospective analysis of the opportunities and challenges for the integral, inclusive and sustainable development of Chile in the global scenario; proposals for the development of the country, at national and regional level, based on the promotion of science, technology and innovation; and specific objectives and indicators for monitoring and evaluating the performance and development of the STI system in the medium and long term. The **National Strategy 2022**, published in May this year, is currently in force.

The **National Science, Technology, Knowledge and Innovation Policy**¹⁴² is the document that establishes the general objectives of public STI policies for the respective presidential term. It provides a systemic look at the short and medium term and its goals and lines of action must be in harmony with the *National Strategy*, regional development strategies and sectoral strategic challenges. The policy is put forward by the Minister of Science, Technology, Knowledge and Innovation to the President of the Republic. The *National Policy 2020-2022*¹⁴³ is currently in force, built on 4 priorities: linking with society, the future, strengthening the ecosystem and institutional capacities.

The **Action Plan** is the document through which the effective implementation of the *National Policy* is put into practice. The *Plan* contains the specific action programmes, the public bodies responsible for their implementation, the deadlines, targets and evaluation indicators. The *Plan* also states how it will be implemented in each of the country's regions. As of the date of this report, the *Action Plan 2020-2022*¹⁴⁴ is currently in force and contains 118 initiatives, of which 69 are continuity initiatives, 18 include modifications or strengthening actions and 31 are new initiatives.

¹⁴⁰ See <https://www.anid.cl>

¹⁴¹ See <https://www.consejoctci.cl/estrategiactci2022/>

¹⁴² See <https://www.minciencia.gob.cl/politicactci/>

¹⁴³ See https://www.minciencia.gob.cl/politicactci/documentos/Politica-Nacional-CTCi_Chile-2020.pdf

¹⁴⁴ See https://www.minciencia.gob.cl/politicactci/documentos/Politica-Nacional-CTCi_Plan_Accion_Chile_2020.pdf

Research Funding

The **National Agency for Research and Development (ANID)**¹⁴⁵ is the government body responsible for managing and delivering programmes and instruments for promoting, encouraging and developing research in all areas of knowledge, technological development and scientific-technological innovation, in accordance with the policies defined by the Ministry in the *Strategy, Policy and Plan*.

ANID is structured in five sub-directorates, each of which manages public support in its area of competence. (1) The human capital sub-directorate manages postgraduate scholarships for studies in Chile and abroad. (2) The research projects sub-directorate manages programmes that finance scientific or technological research projects, programmes that promote new researchers and post-doctoral projects. (3) The sub-directorate of centres and associative research has a total of 14 grant programmes to fund groups of excellent researchers, non-profit institutions and universities in partnership with other actors in the ecosystem. (4) The sub-directorate for applied research and innovation finances pre-competitive research and development activities oriented towards innovation, science and technology-based entrepreneurship, public innovation challenges, recruitment of advanced human capital and knowledge transfer. (5) The networks, strategy and knowledge sub-directorate designs, executes and finances the different instruments that support the management of national infrastructures and services for scientific research, technological development, territorial and international linkage instruments, institutional strengthening and the development of natural laboratories, together with strengthening mechanisms, programs and instruments for access to knowledge.

During 2021, ANID awarded a total of 11,214 public grants¹⁴⁶. The funds which supply ANID¹⁴⁷ as a funding agency come from the annual budget of the Chilean state and the **National Fund for Scientific and Technological Development (FONDECYT)**, regulated by Law 21.105 and dependent on the Ministry of Science.

Research Performing

The institutions that carry out scientific and technological research activities in Chile are universities, public technological and research institutes, and private institutions.

Regarding the university sector, the Ministry of Education¹⁴⁸ provides a **public register of officially recognised Higher Education Institutions (HEIs)**¹⁴⁹ with a total of 59 universities (in addition to 35 professional institutes and 50 technical training centres). The most notable are the Universidad de Chile and the Pontificia Universidad Católica de Chile, founded in 1842 and 1888 respectively. Of these 59 universities, only 18 are state universities. There is 1 university for each region, except for the metropolitan region which currently has 3 state universities). In addition, 30 universities are part of the **Council of Rectors of Chilean Universities (CRUCH)** consisting of the 18 state universities and 12 private universities that are called "traditional universities". CRUCH is a collegiate, autonomous body, with legal personality under public law, created by law on 14 August 1954 to coordinate the country's university work and improve the performance and quality of university education. CRUCH member universities responsible for most of Chile's research.

¹⁴⁵ See <https://www.anid.cl>

¹⁴⁶ See <https://www.anid.cl/blog/2022/06/24/anid-publica-actualizacion-de-su-compendio-estadistico/>

¹⁴⁷ See <http://www.dipres.gob.cl/597/w3-multipropertyvalues-25235-25771.html>

¹⁴⁸ See <https://www.mineduc.cl/>

¹⁴⁹ See <https://www.ayudamineduc.cl/ficha/instituciones-vigentes-reconocidas-por-el-mineduc>

Regarding the Public Research and Technology Institutes sector, the *National Policy 2020-2022* includes a total of 13, all devoted to sectoral research and dependent on the corresponding ministry. These are: the Natural Resources Information Centre (CIREN), under the Ministry of Economy; the Chilean Nuclear Energy Commission (CChEN), under the Ministry of Energy; the Chile Foundation, an institution with state and private participation (ITT Corporation and BHP Billiton); the Chilean Antarctic Institute (INACH), under the Ministry of Foreign Affairs; the Institute for the Promotion of Fisheries (IFOP), under the Ministry of Economy; the Agricultural Research Institute (INIA), under the Ministry of Agriculture; the Forestry Institute (INFOR), under the Ministry of Economy; the Military Geographical Institute (IGM), under the Ministry of Defence; the National Hydraulic Institute (INH), under the Ministry of Public Works; the National Institute for Standardisation (INN), under the Ministry of Economy; the Aero-photogrammetric Service of the Chilean Air Force (SAF), under the Ministry of Defence; the Hydrographic and Oceanographic Service of the Chilean Navy (SHOA), under the Ministry of Defence; and the National Geology and Mining Service (Sernageomin). This group of institutions are essential within the STI policy ecosystem and beneficiaries of research funding calls.

Research Assessment

The Ministry of Education encourages the accreditation of the quality of Chilean universities. This is achieved through the **National Accreditation Commission (CNA)**¹⁵⁰, an autonomous body created in 2006 by Law 21.091¹⁵¹, with its own legal personality and assets, whose function is to evaluate, accredit and promote the quality of universities, professional institutes, and autonomous technical training centres, as well as the degree courses and programmes they offer. As of the date of this study, there are 47 Chilean universities accredited by the CNA. This accreditation is not required for the provision of regulated training and is not binding for the validity of qualifications. Its function is to enable institutions and their students to obtain public grants and scholarships.

The CNA accredits postgraduate programmes in accordance with the provisions of the Law on Quality Assurance in Higher Education No. 20.129¹⁵², which establishes the need for evaluation criteria for master's, doctoral and speciality programmes. The process involves 19 Area Committees of researchers recognised in their area who establish guidelines for the output expected of the research staff comprising the academic staff of the programmes to be evaluated. Scientific output can be oriented as individual or group work.

Moreover, ANID has its own committees to evaluate the output of applicants for public grants, which include the Evaluation Groups¹⁵³. They are a collegiate body of expert researchers in the different scientific and technological areas whose function is to support the processes of evaluation and selection of the proposals submitted to the calls for FONDECYT research projects and the monitoring and control of the projects being implemented. They define the curricular evaluation criteria by subject area and by the nature of each competition. The criteria may include scientific output, contribution or link with society and the environment¹⁵⁴.

¹⁵⁰ See <https://www.cnachile.cl>

¹⁵¹ See https://www.cnachile.cl/Documentos%20de%20Paginas/LEY-20129_17-NOV-2006.pdf

¹⁵² See <https://www.cnachile.cl/Paginas/Acreditacion-Postgrado.aspx>

¹⁵³ See <https://s3.amazonaws.com/documentos.anid.cl/proyecto-investigacion/2023/regular/postulacion/GuiaEvaluacionFondecyt.pdf>

¹⁵⁴ Example: <https://s3.amazonaws.com/documentos.anid.cl/proyecto-investigacion/2023/regular/postulacion/Bases.pdf>

5.2. Open access policy

Chile has a robust national policy of open access to scientific literature and publicly funded research data¹⁵⁵. This policy was published in 2022 by ANID, the entity responsible for its design, implementation, and the research assessment. The ANID unit responsible for coordinating the necessary mechanisms to ensure compliance with this policy, guide researchers and facilitate the search and retrieval of open content is the Networks, Strategy and Knowledge Sub-Directorate (REC)¹⁵⁶.

The Chilean national open access policy establishes that all beneficiaries of public grants managed by ANID must deposit, in open access format, a machine-readable electronic copy of the final version of their scientific production in ANID's Scientific Production Repository, no later than six months from the date of publication. Authors who publish articles in SciELO-Chile or the SciELO network are exempt from the requirement. On research data management, it establishes the obligation to submit a research data management plan, to ensure the public availability of research data. They must comply with FAIR principles and must be deposited in ANID's repository or in institutional and/or disciplinary repositories. In case of non-compliance, the present and future transfers of funds from ANID to beneficiaries may be affected. The ultimate objectives of this policy are to achieve economies of scale, to strengthen scientific output, to increase the visibility, transparency and integrity of research and to ensure public access to publicly funded scientific information.

For the development of this policy, ANID carried out a diagnosis of the initial situation, including a participatory public consultation, the results of which were published in November 2020. For its drafting, ANID relied on a group of experts who proposed a roadmap to address the challenges raised. The document *Open Research Data. Science is made by all of us*¹⁵⁷ published in 2014 by former CONICYT also played an important role in its drafting. Besides, the drafting of the policy brought together previous long-standing public initiatives to strengthen the national scientific information ecosystem under a single framework. This facilitated the adoption of the text. Those initiatives were the promotion of open access academic journals such as SciELO-Chile, the strengthening of institutional repositories, and the management of access to scientific resources through the Electronic Library of Scientific Information (BEIC).

In addition to the national policy, a representative number of Chilean universities have institutional open access policies, most of them linked to the operation of their open access infrastructures.

¹⁵⁵ See

https://s3.amazonaws.com/documentos.anid.cl/estudios/Politica_acceso_a_informacion_cientifica_2022.pdf

¹⁵⁶ See <https://www.anid.cl/redes-estrategia-y-conocimiento/>

¹⁵⁷ See <http://datoscientificos.cl/files/manual-2014.pdf>

5.3. Open access digital platforms

ANID is the government body responsible for the management of the main digital infrastructures needed to implement open access policies, which are organized and articulated in the National Infrastructure for Access to the **Scientific Information System (SIC)**¹⁵⁸, whose purpose is to facilitate access to national and international scientific information: the ANID Scientific Production Repository, the National ISSN Network Centre, support for the evaluation of journals in Latindex, the SciELO-Chile network, the Researcher's Portal, the Electronic Library of Scientific Information (BEIC) and Dataciencia.

Academic Repositories

Chile has a population of 21¹⁵⁹ open access institutional repositories belonging to universities, technological institutes, and public institutions. The most important of these repositories is the **ANID Scientific Production Repository**¹⁶⁰, created to host, preserve, and disseminate all the scientific output funded by the Agency. The repository is organised in communities that match the structure of the Agency's funding programmes and departments. At the date of this report, it has 103,594 documents in open access, including research projects funded by ANID, which can be consulted by scientific discipline, institution and Chilean regions. The Repository provides technological coverage for the open access mandate and the obligation of the grants recipients managed by ANID to deposit a copy of their research results. Researchers not using the ANID repository must inform ANID of the URLs or persistent identifiers of documents and datasets published in other repositories. ANID's institutional repository is currently the national node representing Chile in LA Referencia.

In addition, ANID is generating instruments and services to ensure that institutions respond to the principles of open science and guarantee compliance with the demands of the ANID access policy. To this end, in 2021 it granted 12 universities funding through the InES (Innovation in Higher Education) instrument for a period of two years to strengthen their institutional capacities in open science, one of the most important dimensions being the implementation of technological infrastructure that complies with international interoperability standards. A challenge for the implementation of this pillar is to agree on common practices, policies and quality standards to integrate scientific information, as well as to prepare the metadata in the local repositories so that they are correctly identified, harvested and validated to ensure its quality and retrieve. With the above, ANID is leading the creation of a national access node through a content aggregator that connects all national production with LA Referencia.

In April 2022, ANID and 14 universities created an ORCID-Chile consortium that seeks to extend the use of persistent identifiers in the digital platforms for open science. The existence of ORCID-Chile provides the opportunity to establish an institutional space for the exchange of experiences and resources aligned with the ongoing efforts to implement an interoperable and robust national infrastructure for access to scientific information.

¹⁵⁸ See <https://informacioncientifica.cl/>

¹⁵⁹ Source: [OpenDOAR](#)

¹⁶⁰ See <http://repositorio.conicyt.cl/>

Journals

National academic journals have been a fundamental objective of Chile's policies promoting access to scientific knowledge.

ANID is the body that coordinates the **ISSN Network National Centre**, the only agency responsible for assigning ISSN numbers to serial publications or any other continuing resource and/or integrated resource published in Chile; for maintaining and updating the local ISSN VIRTUA database and monitoring the publications to which ISSN has been assigned to measure compliance with the regulations and thus to validate the registration definitively in the database. Other functions include disseminating and promoting the system and liaising with the publishing communities in the country. In doing so, they provide essential support to national academic journals in terms of their indexing and interoperability potential.

Furthermore, since 1988, ANID has a call for proposals entitled **Scientific Academic Journals Publication Fund Competition**, specifically aimed at improving the professionalisation and overall quality of academic journals and/or national scientific publications indexed in the Web of Science, SCOPUS and SciELO Chile, through the improvement of the electronic version of the academic journals.

ANID provides a support service to publishers of Chilean academic journals to be evaluated on the **Latindex** platform and has been the **national node of SciELO Chile**¹⁶¹ since 1998, an initiative to which it gives considerable support. It offers publishing institutions training in technical skills in scientific publishing and support in the form of strategies to increase the quality and visibility of publications.

These policies have a direct and palpable reflection in the presence of Chilean scientific academic journals in the initiatives of the LAC region: there are 182 academic journals in the Latindex catalogue 2.0, 132 titles in SciELO Chile, 99 academic journals in Redalyc and 150 titles in DOAJ.

Table 5. Number of Chilean academic journals in Latindex (catalogue 2.0), SciELO Redalyc and DOAJ

	Latindex (catalogue 2.0)	SciELO Chile	Redalyc	DOAJ
No. of academic journals	182	132	99	150

Source: Compiled by the authors based on data from Latindex, SciELO, Redalyc and DOAJ. Access date: December 2022.

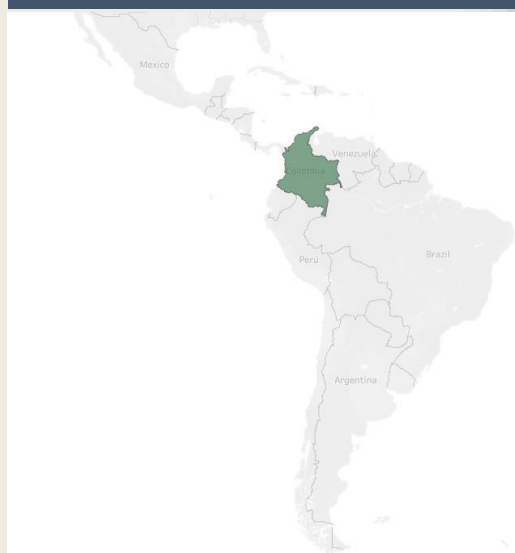
Curriculum management systems

Chile has the **Researcher's Portal**¹⁶², a platform developed by ANID to manage the profiles of its research staff and their scientific output. This system enables ANID to access information on the research performance of both staff and institutions achieved with the funds invested in research, to enhance the visibility of research staff, to standardise curriculum data and to avoid duplication of effort in the research field.

¹⁶¹ See <https://www.scielo.cl/>

¹⁶² See <https://investigadores.anid.cl/>

6. Colombia



0.20%
R&D
expenditure/GDP*

0.85%
Research
staff/EAP in
(0/00)*

99
Institutional
repositories

428
Open access
journals



National OA
policy



OA legal
framework



Institutional OA
policies



National repository
aggregator



National journal
aggregator



Curriculum
management
system

Source: [National Open Science Policy 2022-2031](#)

Data: Compiled by author based on [RICyT](#), [LA Referencia](#), [OpenDOAR](#) and [DOAJ](#).

Note: Data referring to 2020. No. of researchers per thousand of labour force (0/00).

Law 2.162 of 6 December 2021 created the Ministry of Science, Technology and Innovation (Minciencias), replacing Colciencias, and Decree 1.666 of 6 December 2021 modifies the National Science, Technology and Innovation System.

In August 2022, Minciencias published its **National Open Science Policy 2022-2031**. It is a very ambitious initiative whose essential implementation elements are the open scientific knowledge and open infrastructures.

Minciencias is the institution that manages the services necessary for the implementation of the National Open Science Policy and the Open Access Guidelines: the Colombian Scientific Information Network, the journal assessment and accreditation system, Publindex, and the national curriculum information management system CVLAC. The latter two platforms are undergoing standardisation and normalisation.



The [Colombian Network of Scientific Information](#) is the national aggregator of open access repositories. Its objective is to enhance the access, visibility, circulation and management of Colombian scientific information and to be a key element in supporting the implementation of the open access policy.



[Publindex](#) is the National System of Indexation and Standardisation of Specialised Journals, managed by Minciencias, through which Colombian scientific journals are evaluated and classified. It allows access to the full text of scientific articles through its search engine.



[CVLAC](#) (Curriculum Vitae for Latin America and the Caribbean) is a tool managed by Minciencias, for the registration, updating and viewing of the curricular information of research personnel.

6.1. Institutional framework

Governance

The legal framework that structures the governance of the Colombian STI system consists of **Law 2.162 of 6 December 2021**¹⁶³ *through which the Ministry of Science, Technology and Innovation is created, and other provisions are issued* and **Decree 1.666 of 6 December 2021**¹⁶⁴ *which modifies the National Science, Technology and Innovation System (SNCT)*.

The **Ministry of Science, Technology and Innovation (Minciencias)**¹⁶⁵ is the highest-level body established in Law as responsible for the governance of STI policy. It replaces the long-standing Administrative Department of Science, Technology and Innovation (Colciencias), which disappears in this legal restructuring. The competences of Minciencias include: (1) managing the National Science, Technology and Innovation System (SNCTI), leading and coordinating public and private, regional, national and international organisations that facilitate the development of a knowledge society; (2) designing, formulating, coordinating, promoting the implementation and evaluating public policy, plans, programmes and strategies aimed at promoting, strengthening and developing science, technology and innovation; (3) formulating and coordinating the design, performing and assessment of the National Science, Technology and Innovation Plan; and (4) managing the National Fund for Financing Science, Technology and Innovation "Francisco José de Caldas Fund". Three advisory bodies are located within Minciencias: CONACTI, the CCN and the CNB.

The **National Council for Science, Technology and Innovation Policy (CONACTI)** is the strategic thinking body whose main function is to advise the National Government and the National Science, Technology and Innovation System. It consists of ministers from all STI portfolios and representatives from the scientific and innovation field; it is responsible for the creation of Technical Committees, technical bodies managing the development of detailed action plans in their thematic areas of competence.

The **National Science Council (NSC)** is a consultative body of high-level researchers whose mission is to provide ongoing advice to the Government and the Ministry of Science and to provide a scientific perspective on issues of interest to the National Government and/or society.

The **National Bioethics Council (CNB)** is the advisory and consultative body of the National Government responsible for formulating, articulating and resolving the dilemmas posed by research and intervention on life, health and the environment, as well as the construction and implementation of policies in matters concerning Bioethics.

In addition to these advisory bodies, there are also the **Departmental Councils of Science, Technology and Innovation (CODECTI)**. These are the bodies responsible for coordinating STI strategies, advice and guidance at regional level, with the departmental and capital district governments.

¹⁶³ See

<https://dapre.presidencia.gov.co/normativa/normativa/LEY%202162%20DEL%206%20DE%20DICIEMBRE%20DE%202021.pdf>

¹⁶⁴ See https://www.funcionpublica.gov.co/eva/gestornormativo/norma_pdf.php?i=173951

¹⁶⁵ See <https://minciencias.gov.co/>

The public agenda for STI is expressed in the **National Science, Technology and Innovation Policy** document. The *Policy* for the period 2021-2030¹⁶⁶ has been drawn up by the National Council for Economic and Social Policy (CONPES)¹⁶⁷, an advisory body to the Government in all aspects related to the economic and social development of the country that holds the highest national authority in planning by carrying out studies and approving documents on the development of specific public policies. The overall objective of the National STI Policy 2021-2023 is to *increase the contribution of STI to the social, economic, environmental and sustainable development of the country with a differential, territorial and participatory approach, in order to contribute to achieving cultural changes that promote a knowledge society*. Following a diagnosis of the situation of the Colombian system, it defines the national strategy for the period in question, based on six strategic priorities: (1) to foster vocations, training and skilled employment in Colombian society; (2) to develop an enabling environment for knowledge generation; (3) to increase the use of knowledge in the country; (4) to increase the valuation and social appropriation of knowledge; (5) to improve the multilevel governance of the National Science, Technology and Innovation System; and (6) to increase the volume, efficiency and evaluation of funding.

Research Funding

The bodies responsible for public funding of STI activities in Colombia are the Minciencias and the Collegiate Administration and Decision-Making Body (OCAD).

Minciencias manages the "**Fondo Francisco José de Caldas**" **National Financing Fund for Science, Technology and Innovation (FFJC)**¹⁶⁸. Created in 2009 and managed by Colciencias until the creation of Minciencias, the FFJC is a financial mechanism that brings together resources from public, private, international and donor sources. This fund finances STI programmes, projects, entities and activities, signs special collaboration agreements and invests in venture capital funds and other financial instruments.

The **Collegiate Administration and Decision Making Body (OCAD)**¹⁶⁹ manages the **Science, Technology and Innovation Fund (FCTel)**¹⁷⁰ and is responsible for approving the terms of reference of its public calls for proposals and for the prioritisation and approval of the investment projects it finances. Its resources come from the General Royalties System (SGR)¹⁷¹, a funding scheme coordinated between territorial entities and the national government to which 10% of the resources that the Colombian state receives from the exploitation of non-renewable natural resources are allocated by constitutional mandate. The OCAD is made up of territorial governments, university representatives and the national government through Minciencias. Funding is awarded through competitive calls on a biennial schedule¹⁷² detailing the calls to be carried out. The strategic lines for the period 2021-2022 are as follows: (1) strengthening of the Territorial Science, Technology and Innovation System; (2) social buy-in of science and technology and vocations for the consolidation of a knowledge society; (3) training of high-level human capital for STI; (4) research for the advancement of knowledge and creation; (5) innovation for productivity, competitiveness and social development; and (6) science and technology for the environment and sustainable development.

¹⁶⁶ See <https://colaboracion.dnp.gov.co/CDT/Conpes/Econ%C3%B3micos/4069.pdf>

¹⁶⁷ See <https://www.dnp.gov.co/CONPES#>

¹⁶⁸ See <https://minciencias.gov.co/portafolio/fondo-fjc>

¹⁶⁹ See <https://minciencias.gov.co/node/1088>

¹⁷⁰ See <https://minciencias.gov.co/sites/default/files/upload/reglamentacion/actolegislativo-05-2011.pdf>

¹⁷¹ See <https://www.sgr.gov.co/>

¹⁷² See https://minciencias.gov.co/sites/default/files/publicacion_mod3_pc_actei_sgr_2021-2022_270222.pdf

In addition to these specific funds, **tax benefits**¹⁷³ are an instrument for financing STI activities in Colombia. Their aim is to encourage investment in R&D&I by companies in collaboration with recognised organisations within the system. To this end, tax deductions and discounts are granted to investing and executing entities, a VAT exemption is authorised for the import of equipment and elements and the participation of personnel in science, technology and innovation projects is encouraged through the fiscally beneficial treatment of such income. The body responsible for the administration and management of tax benefits in science, technology and innovation is the National Council for Tax Benefits in Science, Technology and Innovation (CNBT).

Research Performing

The agents engaging in STI activity in Colombia are universities, public research institutes, research centres, technological development centres and R&D&I business units. These organisations, which may be public, private or mixed, have access to the **InstituLAC** platform¹⁷⁴ whose purpose is to build a complete and organised computer base for the registration of the information of the research institutions to which the groups, researchers and academic journals are linked. Through this platform they are officially registered to access public support and accreditation services.

The university sector consists of 141 universities, of which 59 are public and 82 are private¹⁷⁵.

The institutions responsible for the implementation of the STI activity are officially recognised by the Ministry of Science and Technology following a prior activity assessment. This recognition makes it easier to obtain public funding for research. At the date of this report, there are 131 recognised institutions recognised engaged in science, technology and innovation activities:¹⁷⁶ 15 universities, 14 public research institutes, 20 technological development centres, 34 research centres, 30 innovative companies, 2 technology-based business incubators and 16 science centres (mainly museums and botanical gardens).

Research Assessment

Teachers and researchers working as public employees in state or official universities are evaluated by the Ministry of Education in accordance with the provisions of Decree 1.279 of 2002¹⁷⁷. Their salaries depend on the scores they obtain for their scientific output, academic training, academic management and teaching performance.

Research staff assigned to other institutions involved in STI activity (public research institutes, research centres, technological development centres and R&D&I business units) are not subject to individual assessment beyond the institutional accreditation process for obtaining recognition by Minciencias.

¹⁷³ See https://minciencias.gov.co/viceministerios/conocimiento/direccion_transferencia/beneficios-tributarios

¹⁷⁴ See <https://scienti.minciencias.gov.co/institulac2-war/>

¹⁷⁵ See <https://snies.mineduacion.gov.co/portal/>

¹⁷⁶ See https://minciencias.gov.co/sites/default/files/actores_reconocidos_junio_-_2022.xlsx

¹⁷⁷ See https://www.mineduacion.gov.co/1780/articles-86434_Archivo_pdf.pdf

6.2. Open access policy and legal framework

Colombia has a **National Open Science Policy**¹⁷⁸ as of August 2022. The main objective of this official document, published and endorsed by the highest authority of Minciencias, is to *increase the access, visibility, reproducibility and use of data, resources, output and results of research activity in Colombia*. The *Policy* undertakes an extensive review of the initiatives promoting open science in the world, in the Latin American region and in Colombia and delves into the background of Minciencias that has made its crystallisation possible: **resolutions 166**¹⁷⁹ and **167**¹⁸⁰ of 2019, which, respectively, establish the Colombian Scientific Information Network and adopt the guidelines for an Open Science Policy in Colombia and **resolution 361**¹⁸¹ of 2020 which specifies the intellectual property clause to be included in public calls, invitations, contracts and agreements entered into by Minciencias. The latter stipulates that research personnel receiving public funding for scientific research and technological development activities must make data, procedures and intermediate elements that are communicable and potentially useful to other researchers available to the state and to other researchers and make the pre-publication versions of scientific work open access. Subsequently, the *Policy* justifies its appropriateness, analyses the conceptual framework of open science and makes a diagnosis of the Colombian situation. Finally, it defines its objectives, its action plan and its monitoring and research assessment mechanisms.

The *Policy*'s action plan consists of 5 specific objectives: (1) to expand the adoption and implementation of policies, regulations, directives, guidelines, protocols and procedures in the strategic institutions of the country's open science model, which would strengthen their governance; (2) to create a culture of openness, dialogue, inclusion and social responsibility of the those producing scientific knowledge in the country that generates solutions to the problems and needs of the population; (3) to establish a system of metrics and incentives that promote, value and recognize the Open Science practices, processes and results of the Colombian scientific community and integrate it into the models and systems of metrics and incentives of the existing STI activities in the country; (4) to strengthen the knowledge, skills and expertise of the strategic Open Science actors in the country; and (5) to optimize the use and enhance the available Colombian infrastructures to advance open science practices and processes, as well as to communicate and access scientific, technological and innovation results of interest to Colombia.

This last object summarises the open access policy and is structured in three strategic actions, the first of which is to *implement an interoperable infrastructure of research information systems, institutional repositories and public and private databases to manage the unified registry and open access to national data and knowledge production*. In order to complete this action, the following goals are set: (1) to increase the programme of institutional repositories of the Colombian Network of Scientific Information; (2) to include the other research outputs recognised by Minciencias; (3) to strengthen the national repository to aggregate information from institutional repositories under the guidelines and coordination of the Network; (4) to progressively increase the percentage of scientific publications and research data financed with public funds in open access; and (5) to generate the technical conditions to guarantee the reuse of the data.

¹⁷⁸ See

https://minciencias.gov.co/pdf/pdfreader?url=https://minciencias.gov.co/sites/default/files/politica_nacional_de_ciencia_abierta_-2022_-_version_aprobada.pdf

¹⁷⁹ See https://minciencias.gov.co/sites/default/files/upload/reglamentacion/resolucion_0166-2019.pdf

¹⁸⁰ See https://minciencias.gov.co/sites/default/files/upload/reglamentacion/resolucion_0167-2019.pdf

¹⁸¹ See https://minciencias.gov.co/sites/default/files/upload/reglamentacion/resolucion_0361-2020.pdf

As of the publication of this study, Minciencias is in consultation with national and international experts to design the guidelines for the culture of openness and management of scientific publications, open research data management and guidelines on metadata and data management plans. The institutional research data repository is expected to be implemented soon.

Besides the national policy, there are **three universities with an institutional open access policy**: the El Rosario University¹⁸², the Antioquía University¹⁸³, and the Nacional University¹⁸⁴.

6.3. Open access digital platforms

Repositories

Open access repositories are the core element of Colombia's open access policy. The national node managing the digital platforms is the **Colombian Network of Scientific Information**¹⁸⁵. Managed by Minciencias, it promotes open access to scientific knowledge and research data, encourages the use of national scientific production, connects and coordinates scientific information services, collections and knowledge and manages Colombia's scientific documentary assets. As of the publication of this study, the Network has 87 linked institutions, which together host more than 200,000 research output items from 65 institutional repositories in different regions of the country, including the National University of Colombia (which contributes 28% of the total scientific output deposited in the Network), the University of Rosario and the University of Antioquia (which contribute 7.1% and 5.7% respectively). The Network is the national node representing Colombia in LA Referencia.

Academic Journals

Open access journals have also received significant support from the public authorities. The **National System of Indexation and Standardisation of Specialised Journals (Publindex)**¹⁸⁶ is a system, created in 2003, for the research assessment and classification of Colombian academic journals. This service is coordinated through annual calls that seek to improve the quality of national scientific publications through the analysis of editorial management, visibility and impact criteria. Academic journals that pass the assessment process are classified and indexed by Minciencias. Publindex can be used to download the full texts of articles and journals indexed in its search engine¹⁸⁷ and to carry out exhaustive search by title, ISSN, area of knowledge, year, author, title, subject or keywords. Publication in these academic journals is considered an indication of the scientific quality of the work submitted for evaluation by the Ministry of Education.

¹⁸² See <https://editorial.urosario.edu.co/politi-de-acceso-abierto>

¹⁸³ See <https://www.udea.edu.co/wps/portal/udea/web/inicio/investigacion/ciencia-abierta/ciencia-abierta/contenido/asmenulateral/politicas>

¹⁸⁴ See <https://zenodo.org/record/7324983>

¹⁸⁵ See <https://redcol.minciencias.gov.co/>

¹⁸⁶ See <https://scienti.minciencias.gov.co/publindex/>

¹⁸⁷ See <https://scienti.minciencias.gov.co/publindex/#/revistasPublindex/buscador>

In addition, SciELO **Colombia**¹⁸⁸ also receives public support. It has a National Consultative Committee consisting of Minciencias, the Pan American Health Organization-Colombia Representation, the National University of Colombia and representatives of the national publishers.

In general, Colombian academic journals have a notable presence in Latindex, with 69 academic journals in catalogue 2.0, in SciELO Colombia, with 203 indexed titles and in Redalyc, where there are a total of 261 academic journals. Regarding the DOAJ, Colombia has a total of 428 indexed journals, placing it just behind Brazil as the second Latin American country with the most academic journals in this directory.

Table 6. Number of Colombian academic journals in Latindex (catalogue 2.0), SciELO and Redalyc

	Latindex (catalogue 2.0)	SciELO Colombia	Redalyc	DOAJ
No. of academic journals	69	203	261	428

Source: Compiled by the authors based on data from Latindex, SciELO, Redalyc and DOAJ. Access date: December 2022.

Curriculum management systems

CvLAC (Curriculum Vitae for Latin America and the Caribbean)¹⁸⁹ is the permanent register of curricula vitae of research personnel, academic communities, and experts of the Colombian STI system that serves as a tool for communicating merits for submission to the calls for admission to the peer review information service and to the calls for the recognition and measurement of Colombian scientific or technological research groups. This tool, implemented in 2002 and managed by Minciencias, increases the national and international visibility of research staff. It is a database for the selection of peer reviewers from higher education, research, and innovation institutions. It also enables the areas of interest and the results obtained by the research staff to be made known and is a space for the exchange of ideas and the development of potential research projects; it is a useful tool for applying for public calls for proposals. The tool is used for queries, through its search engine, on the activities and results in science and technology of Colombian researchers and groups, using search terms such as names, surnames, academic level, region or city, keywords, areas, sub-areas and knowledge or technology specialists, sectors of application and research outputs¹⁹⁰.

¹⁸⁸ See <http://www.scielo.org.co/?lng=es>

¹⁸⁹ See https://scienti.minciencias.gov.co/cvlac/Login/pre_s_login.do

¹⁹⁰ See <https://scienti.minciencias.gov.co/ciencia-war/>

7. Costa Rica



0.39%
R&D
expenditure/GDP*

1.74%
Research staff/EAP
in (0/00)*

9
Institutional
repositories

73
Open access
journals



National OA
policy



OA legal
framework



Institutional OA
policies



National repository
aggregator



National journal
aggregator



Curriculum
management
system

Source: See the [National Plan for Science, Technology and Innovation \(PNCTI\) 2022-2027](#).

Data: Compiled by author based on [RICyT](#), [LA Referencia](#), [OpenDOAR](#) and [DOAJ](#).

Note: Data referring to 2018. No. of researchers per thousand of labour force (0/00).

The national STI system in Costa Rica is regulated by **Law 7.169 on Scientific and Technological Promotion and Development** of 1990, amended in 2012, 2019 and 2021. This legal framework defines the composition and functions of the different agents and instruments on which government action is based.

Costa Rica **does not have a national open access policy**, although it does have some **institutional policies** within the public university sector. CONARE open access regulation is expected to be published soon.

The University of Costa Rica, the National University and the Technological Institute of Costa Rica also have policies to promote the depositing of the results of publicly funded research in open access repositories. All of them, together with the State Distance Learning University and the National Technical University of Costa Rica, are working with CONARE on the design of a national policy.



The National **Kímul** aggregator is an open access tool, promoted by CONARE, whose objective is to offer online access to national academic and scientific output. To do so, it harvests institutional repositories in Costa Rica and validates the quality of their metadata.



SciELO Costa Rica is managed by the National Library of Health and Social Security and has a total of 48 indexed titles in different subject areas: agricultural sciences, biological sciences, health sciences, exact and earth sciences, social sciences, humanities, engineering and linguistics.



The National Information System of Science and Technology (**SINCYT**), managed by the Ministry of Science, Innovation, Technology and Telecommunications (MICITT), enables the integration of national information on research, publications, human capital, research projects, research centres and technological equipment of laboratories.

7.1. Institutional framework

Governance

The national STI system in Costa Rica is regulated by **Law 7169 on Scientific and Technological Promotion and Development**,¹⁹¹ enacted in 1990 and amended in 2012, 2019 and 2021. This legal framework is used to define the composition and functions of the different agents of the Costa Rican R&D&I system and the instruments on which government action is based. The **Ministry of Science, Innovation, Technology and Telecommunications (MICITT)**¹⁹² is the governing body of the STI, whose powers include: (1) defining public policy on science, technology and innovation and contributing to the integration of this policy with the country's overall economic and social policy; (2) coordinating the work of the National Science, Technology and Innovation System; (3) preparing, implementing and monitoring the National Science and Technology Plan; (4) supporting and financing actions to promote science, technology and innovation that are considered to be of national interest; and (5) managing and organising the National Science and Technology Information System (SINCYT), as a means of supporting the quantification of the national or foreign, public or private, budgetary or extra-budgetary resources allocated to science, technology and innovation activities and as a source of information.

The **Costa Rican Innovation and Research Promotion Agency**¹⁹³ was created in the legal reform of 2021¹⁹⁴ and replaced the National Council for Scientific and Technological Research¹⁹⁵ as the body responsible for promoting innovation and scientific and technological development in the country. It manages instruments, programmes and other public policy guidelines issued by the Executive through the MICITT to encourage: (1) basic research, applied research and technological development; (2) innovation; (3) innovative and technology-based entrepreneurship; (4) technology transfer; and (5) human capital specialised in science, technology and innovation. Its work is aligned with the National Science and Technology Plan. Its resources come mainly from the Ministry of Science, Innovation, Technology and Telecommunications, which transfers at least 14% of the Ministry's budget to it.

STI policy is planned through the **National Plan for Science, Technology and Innovation (PNCTI) 2022-2027**¹⁹⁶. This document responds to the guidelines set out in the National Policy for a Knowledge-Based Society and Economy 2022-2050 (PNSEBC) and, in particular, to those targeting the development of science, technology and innovation. It defines its mission as to *steer the science, technology and innovation sector towards a knowledge-based society and economy for sustainable, equitable and supportive socioeconomic development*. The Plan defines three strategic areas: (1) human talent; (2) knowledge generation; and (3) transformative innovation. These areas will, in turn, be structured in three cross-cutting themes and two emerging themes: (1) Bioeconomy; (2) Digital technologies; (3) Artificial intelligence; (4) Human health and life sciences research; and (6) Aerospace development.

¹⁹¹ See

http://www.pgrweb.go.cr/scij/Busqueda/Normativa/Normas/nrm_texto_completo.aspx?nValor1=1&nValor2=11908

¹⁹² See <https://www.micitt.go.cr/>

¹⁹³ See <http://www.promotora.go.cr/web/>

¹⁹⁴ See

http://www.pgrweb.go.cr/scij/Busqueda/Normativa/Normas/nrm_texto_completo.aspx?nValor1=1&nValor2=94421&nValor3=0

¹⁹⁵ See <http://www.conicit.go.cr/>

¹⁹⁶ See https://www.micitt.go.cr/wp-content/uploads/2022/06/Plan_Nacional_Ciencia_Tecnologia_Innovacion_2022-2027.pdf

Research Funding

MICITT is the institution that manages the public funding of science and technology activities. This takes place through public grant calls designed and managed by the **Costa Rican Innovation and Research Promotion Agency**. Its resources come from the Science and Technology Incentive Fund, the ProPYME Fund, as well as funds from agreements and international cooperation.

The **National Council of Vice-Chancellors (CONARE)**¹⁹⁷ also funds cross-cutting science and technology activities conducted by Costa Rican universities.

In Costa Rica, **Universities** are the entities that receive the R&D funding from the above mentioned national bodies and distribute the funds to their researchers. They also devote part of their resources to STI funding activities.

Research Performing

The most important bodies engaged in research are the public **universities** of the country. Between 70% and 80%¹⁹⁸ of research in Costa Rica is conducted by these five bodies: University of Costa Rica, National University, Technological Institute of Costa Rica, State Distance Learning University and National Technical University. Together they make up **CONARE** which supports inter-university coordination and allocates resources from the Special Fund for the Financing of Higher Education.

There are also **public research centres** such as the Costa Rican Institute for Research and Education in Nutrition and Health (INCIENSA)¹⁹⁹, the Tropical Agricultural Research and Higher Education Centre (CATIE)²⁰⁰ or the National Biodiversity Institute (INBio)²⁰¹. The country's companies collaborate with these institutions in technological development activities.

The data for spending on STI activities show that approximately 48% is spent by universities (public and private), 37% by business, 13% by the public sector and the rest by private non-profit organisations (Source: RICYT).²⁰²

Research Assessment

In Costa Rica there is not nationally research assessment system established system of evaluation and incentivisation of scientific production.

CONARE also has individual and institutional performance assessment tools, used by its member universities to measure the results of the science, technology and innovation activities conducted by their staff.

The **National Information System of Science and Technology (SINCYT)**²⁰³ is the tool that collects national data on research, publications, human capital, research projects,

¹⁹⁷ See <https://www.conare.ac.cr/>

¹⁹⁸ See <https://kimuk.conare.ac.cr/Content/aabierto>

¹⁹⁹ See <https://www.inciensa.sa.cr/>

²⁰⁰ See <https://www.catie.ac.cr/>

²⁰¹ See <http://www.inbio.ac.cr>

²⁰² See <http://www.ricyt.org/category/indicadores/>

²⁰³ See <https://www.sincyt.go.cr/>

research centres and laboratory technology equipment, to provide the population with open access to relevant data and the centralisation of this information at national level.

For its part, **MICITT**²⁰⁴ manages the evaluation and monitoring of the National Science, Technology and Innovation Plan and regularly publishes data on national science, technology and innovation data.

7.2. Open access policy and legal framework

As of the date of this report, Costa Rica does not have a national open access policy, although it does have some important institutional initiatives.

At national level, neither Law 7169 nor PNCTI 2022-2027 include elements related to open access. However, **CONARE** is working on the design of a national policy in this area. To do this, five public universities in Costa Rica (University of Costa Rica, National University, Technological Institute of Costa Rica, State Distance Learning University and National Technical University) are actively collaborating and significant progress is expected to be announced soon.

At institutional level, the **University of Costa Rica**²⁰⁵ has Resolution No. VI-2970-2011²⁰⁶, approving the general guidelines on the dissemination of the scientific information of the University of Costa Rica and the *Research Regulations*²⁰⁷, which promote deposits in open access repositories.

The **National University**²⁰⁸ has a *Policy for the Preservation of Institutional Academic Assets*²⁰⁹ and an *Institutional Policy for the Use of Free Software*²¹⁰. The first encourages open access and promotes a culture of publication and free dissemination of institutional academic assets, with due observance of the regulation of intellectual property rights. While the latter aims to approve the promotion and adoption of the use of free and open source software in the university environment.

The **Technological Institute of Costa Rica**²¹¹ has an *Open Access and Reuse Policy*²¹² based on the principles of the Budapest Declaration.

Costa Rica is one of the most active contributors to the coordination of open science initiatives within **CTCAP**.

²⁰⁴ See https://www.micitt.go.cr/wp-content/uploads/2022/04/indicadores_2017_compressed_1.pdf

²⁰⁵ See <https://vinv.ucr.ac.cr/es/tags/politicas-de-acceso-abierto-en-la-universidad-de-costa-rica>

²⁰⁶ See https://ijj.ucr.ac.cr/wp-content/uploads/bsk-pdf-manager/resolucion_de_la_vicerrectoria_de_investigacion_sobre_derechos_de_autor_vi-2970-2011_54.pdf

²⁰⁷ See https://vinv.ucr.ac.cr/sites/default/files/files/investigacion_ucr.pdf

²⁰⁸ See <https://www.una.ac.cr/>

²⁰⁹ See <https://documentos.una.ac.cr/handle/unadocs/3424>

²¹⁰ See <https://documentos.una.ac.cr/handle/unadocs/3262>

²¹¹ See <https://www.tec.ac.cr/>

²¹² See https://revistas.tec.ac.cr/index.php/tec_marcha/politicas

7.3. Open access digital platforms

Repositories

Repositories are key elements of institutional open access public policies. All public universities have their own institutional repository. **CONARE** is the entity responsible for ensuring the quality of these platforms through quality assessment²¹³ and aggregation in Kimuk.

The **Kímuk National Repository**²¹⁴ is the national open access aggregator promoted by CONARE whose objective is to enhance the online visibility of national academic and scientific output. Kimuk houses a total of 85,513 documents from 9 repositories of 9 Costa Rican institutions: University of Costa Rica, National University, Technological Institute of Costa Rica, State Distance Learning University, National Technical University, National Council of Vice-Chancellors, the Tropical Agricultural Research and Higher Education Centre, LEAD University, Public Law Consultants.

Most of the documents available in Kímuk are research articles (65%) and master's theses (9.0%) and undergraduate dissertations (8.3%). Furthermore, 80% of the total number of documents are from the University of Costa Rica (47,338 documents) and the National University (21,004). 99% of the documents are published in open access.

Academic Journals

CONARE evaluates the scientific and editorial quality of Costa Rican academic journals through a public and periodic call for papers²¹⁵, based on standards, to which academic journals apply on a voluntary basis.

The following public universities have academic journal portals: University of Costa Rica²¹⁶, National University²¹⁷, Technological Institute of Costa Rica²¹⁸, State Distance Learning University²¹⁹ and National Technical University²²⁰ evaluate the quality of their publications at institutional level and index them in their repositories. Through them, the academic journals are included in Kimuk.

SciELO Costa Rica²²¹ is managed by the National Library of Health and Social Security (BINASSS).²²² At its inception in 2000, the SciELO Costa Rica collection only added academic journals in the health area. In 2010 it was opened to all areas of knowledge.

Costa Rican journals have a significant presence in Latindex, with 95 academic journals in catalogue 2.0, in SciELO Costa Rica, with 49 indexed titles and in Redalyc, where there is a total of 38 journals. In DOAJ, Costa Rica has a total of 73 indexed journals.

²¹³ See <https://conocimientoabierto.conare.ac.cr/index.php/evaluacion-de-repositorios/>

²¹⁴ See <https://kimuk.conare.ac.cr/>

²¹⁵ See <https://conocimientoabierto.conare.ac.cr/index.php/evaluacion-de-revistas/>

²¹⁶ See <https://revistas.ucr.ac.cr/>

²¹⁷ See <https://www.revistas.una.ac.cr/>

²¹⁸ See <https://repositoriotec.tec.ac.cr/handle/2238/3940>

²¹⁹ See <https://revistas.uned.ac.cr/>

²²⁰ See <https://revistas.utn.ac.cr/>

²²¹ See <https://www.scielo.sa.cr/scielo.php>

²²² See <https://www.binasss.sa.cr/>

Table 7. Number of Costa Rican academic journals in Latindex (catalogue 2.0), SciELO, Redalyc and DOAJ.

	Latindex (catalogue 2.0)	SciELO Costa Rica	Redalyc	DOAJ
No. of academic journals	95	49	38	73

Source: Compiled by the authors based on data from Latindex, SciELO, Redalyc and DOAJ. Access date: December 2022.

Curriculum management systems

Costa Rica has no national-level curriculum management system. At institutional level, some universities, such as the University of Costa Rica and the National University,²²³ have databases of the profiles of their research staff linked to their scientific publications and the research projects in which they have participated.

²²³ See www.redacademica.una.ac.cr

8. Ecuador



0.44%
R&D
expenditure/GDP*

1.58%
Research
staff/EAP in
(0/00)*

65
Institutional
repositories

87
Open access
journals



National OA
policy



OA legal
framework



Institutional OA
policies



National repository
aggregator



National journal
aggregator



Curriculum
management
system

Source: See [Organic Code of the Knowledge and Innovation Social Economy](#).

Data: Compiled by author based on [RICyT](#), [LA Referencia](#), [OpenDOAR](#) and [DOAJ](#).

Note: Data referring to 2014. No. of researchers per thousand of labour force (0/00)

The **Organic Code of the Knowledge, Creativity and Innovation Social Economy**, approved in **2016**, is the legal framework that structures the composition and governance of the National System of Science, Technology, Innovation and Ancestral Knowledge (CTIySA).

Ecuador does not have a national open access policy as such, although it has some **significant initiatives** set out in the Organic Code of the Knowledge and Innovation Social Economy and in the CTIySA Plan, developed by the Ministry of Telecommunications.

Open access initiatives in Ecuador are based on the hegemony of SENESCYT as a key entity in the governance of the STI system and on institutional repositories as an implementation element. The Ecuadorian Corporation for the Development of Research and the Academy (CEDIA) is the entity that manages the Ecuadorian Open Access Repository Network (RRAAE) and the Ecuadorian Researchers' Repository (REDI).

rraae

The [RRAAE](#) is the national aggregator of open access repositories in Ecuador. Managed by CEDIA, its objective is to facilitate the management, decentralisation, organisation, preservation and interoperability of open access digital content generated by institutions in the country's academic and scientific community.

SciELO Ecuador

The [SciELO](#) Ecuador collection is the main initiative promoting academic journals developed in the country. Managed by SENESCYT, it comprises 26 titles, of which applied social sciences and engineering account for more than 70% of the total number of indexed journals.

redi RED DE INVESTIGADORES

The Ecuadorian Researchers' Repository ([REDI](#)) is the national system for curriculum information management. It aims to bring together research staff data in a standardised format, facilitate access to public calls for proposals and enable specialised searches to be carried out.

8.1. Institutional framework

Governance

The national STI system is called the *National System of Science, Technology, Innovation and Ancestral Knowledge* (CTIySA) and is enshrined in the Constitution of the Republic of Ecuador. The **Organic Code of the Knowledge, Creativity and Innovation Social Economy**²²⁴, approved in 2016, is the legal framework that structures its composition and governance, as well as its coordination with the National Education System, the Higher Education System and the National Culture System.

The **Department of Higher Education, Science, Technology and Innovation (SENESCYT)**²²⁵ is the highest governing body of the Ecuadorian STIySA system. Its role is to steer public policy on higher education, science, technology, innovation and ancestral knowledge, coordinating its application with the organisations that make up the system. Its competencies include: (1) defining and approving strategies, guidelines and mechanisms for the implementation of the public policy of the higher education, science, technology and innovation system; (2) approving plans, programmes and projects in higher education, university, polytechnic, technical and technological education; (3) strengthening human talent and research, innovation and technology transfer; and (4) financing, monitoring and evaluating plans, programmes and projects of scientific research, innovation and technology transfer.

The **National Consultative Committee of the Knowledge, Creativity, Innovation and Ancestral Knowledge Social Economy** is a body for consultation and advice on the policies coordinating the National CTIySA system with the decentralised work of the Regional Advisory Committees for Higher Education, Science, Technology, Innovation and Ancestral Knowledge and with those involved in knowledge, creativity and innovation in social economy.

The **Regional Advisory Committees for Higher Education, Science, Technology, Innovation and Ancestral Knowledge** are consultative bodies for the regional administrative area in which they are located, for coordination of its work with the work of the Executive, the members of the CTIySA System and the productive entities.

The science, technology and innovation policy are coordinated through the **Science, Technology, Innovation and Ancestral Knowledge Plan**. In 2021 SENESCYT published a *preliminary document*²²⁶ of the *Plan* that contains a long-term vision of the Ecuadorian STI&SSA system until 2050, a diagnosis of the national situation and 12 lines of action: (1) enhancing the governance of the CTIySA National System by strengthening the institutional framework and the sustainability of its policies; (2) timely, sustainable, efficient and transparent financing of science, technology and innovation with public and private resources and international cooperation; (3) promoting a greater access to quality higher education to ensure the availability of more qualified human talent to develop R&D&i and reduce social and productive gaps; (4) promoting an education system that fosters R&D&i skills and capacities aimed at solving the social, economic and productive problems of the country; (5) promoting the culture of science and its importance as a human right and an engine of sustainable endogenous development; (6) strengthening, recovering and

²²⁴ See https://www.gob.ec/sites/default/files/regulations/2019-02/Documento_C%C3%B3digo-Org%C3%A1nico-Econom%C3%ADa-Social-Conocimientos-Creatividad-Innovaci%C3%B3n.pdf

²²⁵ See <https://www.educacionsuperior.gob.ec/>

²²⁶ See https://www.bivica.org/files/5879_Plan%20Nacional%20SENESCYT.pdf

systematising ancestral knowledge to respond to social, environmental and economic problems and opportunities; (7) ensuring decent working conditions, gender equality, distribution of researchers and recognition of human talent dedicated to R&D&I by expanding the incentives system; (8) strengthening the management, knowledge and sustainability capacities of those engaged in science, technology and innovation to respond to social and productive needs and opportunities; (9) generating capacities regarding the use and knowledge of intellectual rights; (10) promoting the strengthening of spaces, infrastructures and equipment for the relevant development of R&D&I; (11) democratising access to and benefits of science, technology and innovation; and (12) ensuring the availability of centralised and comprehensive information on science, technology, innovation and ancestral knowledge.

Research Funding

SENESCYT is the institution that manages the public funding of science and technology activities in Ecuador. To this end, it uses public calls to fund scientific research and technological development programmes in the different areas of knowledge. In order to obtain funding, projects must respond to national problems and needs with a territorial scope and must favour social and productive development and the comprehensive training of society and those involved in the CRIySA system.

In 2018, SENESCYT launched the “INÉDITA” National Research Financing Programme, whose objective was to finance research and/or technological development projects through competitive calls in two formats, institutional and collaborative, in seven areas of research: health and welfare; agriculture and livestock; environment, biodiversity and climate change; energy and materials; industrial development; inclusive territory and society; and information and communication technologies.

In addition, those implementing the Science, Technology, Innovation and Ancestral Knowledge System have their own calls to support scientific activity, for which they have international funding sources.

Research Performing

The entities that carry out research activity in Ecuador are the universities and the Public Research Institutes.

The **Universities** are regulated by the Organic Law on Higher Education (LOES)²²⁷, approved in 2010, which establishes the functioning of the institutions that make up the Higher Education System. There is a total of 60 universities in Ecuador, 31 of which are public.

In addition, there are a 8 **public research institutes (PRI)** that are the key agencies in the country for guaranteeing responsible research in accordance with the legal regulations that establish that the State must guarantee the permanent operation of institutes related to public health, biodiversity, agricultural research, fisheries, geology, mining and metallurgy, energy efficiency and renewable energy, oceanography, space studies, Antarctic polar studies, cartography and geography, meteorology and hydrology, statistics and censuses and cultural heritage. The PRIs are autonomous administrative and financial organisations whose purpose is to promote, coordinate, implement and foster scientific research

²²⁷ See <https://www.ces.gob.ec/documentos/Normativa/LOES.pdf>

processes and to generate and transfer technological development. These are: (1) the National Institute of Public Health Research (INSPI)²²⁸, (2) the Institute of Geological and Energy Research (IIGE)²²⁹, (3) the National Institute of Meteorology and Hydrology (INAMHI)²³⁰, (4) the National Institute of Cultural Heritage (INPC)²³¹, (5) the National Institute of Agricultural Research (INIAP)²³², (6) the Public Institute of Aquaculture and Fisheries Research (IPIAP)²³³, (7) the National Institute of Biodiversity (INABIO)²³⁴ and (8) the National Institute of Statistics and Census (INEC)²³⁵.

The **Ecuadorian Corporation for the Development of Research and the Academy (CEDIA)**²³⁶ is a private non-profit entity, created in 2002 as a consortium of universities and R&D&I institutions and which became a corporation in 2021. It is an umbrella organisation for research organisations, and it supports SENESCYT in its task of implementing Ecuadorian STI policies. Its objective is to promote the exploration and results of innovative projects that link Ecuadorian institutions. To this end, they link researchers, teachers and students through projects, competitions and scientific development initiatives and offer IT-related services. CEDIA currently has 64 member institutions, including not only universities and research institutes but also polytechnics and colleges.

Research Assessment

SENESCYT is the institutions responsible for evaluating scientific performance through a system of accreditation of research staff²³⁷ and of innovation spaces and agents²³⁸. The individual accreditation is a necessary requirement for entry to a research career in public institutions that are not part of the higher education system and for access to specific benefits and incentives. This applies to both national and foreign researchers performing their activities in Ecuador. Three parameters are applied to measure the fulfilment of requirements and to assess international quality standards and criteria: academic background, publications and research experience. Certification lasts five years and is renewable for equivalent periods.

The **Higher Education Quality Assurance Council (CACES)**²³⁹ is a public technical body, with its own legal status and assets, whose task is to ensure the quality of higher education through the evaluation and accreditation of higher education institutions and their education programmes.

²²⁸ See <https://www.investigacionsalud.gob.ec/>

²²⁹ See <https://www.geoenergia.gob.ec/>

²³⁰ See <https://www.inamhi.gob.ec/>

²³¹ See <https://www.patrimoniocultural.gob.ec/>

²³² See <https://www.iniap.gob.ec/>

²³³ See <https://www.gob.ec/ipiap>

²³⁴ See <http://inabio.biodiversidad.gob.ec/>

²³⁵ See <https://www.ecuadorencifras.gob.ec>

²³⁶ See <https://www.cedia.edu.ec/>

²³⁷ See <https://www.gob.ec/senescyt/tramites/registro-personas-naturales-relacionadas-investigacion-desarrollo-tecnologico>

²³⁸ See <https://www.gob.ec/senescyt/tramites/acreditacion-espacios-agentes-innovacion>

²³⁹ See <https://www.caces.gob.ec/>

8.2. Open access policy and legal framework

Ecuador does not currently have a national open access policy as such, although it has some important initiatives in this area.

Article 4 (1) of the **Organic Code of the Knowledge, Creativity and Innovation Social Economy** provides that *knowledge is a public good to which access shall be free, with no restrictions other than those established in this Code, the Constitution, international treaties and the Law and its distribution shall be fair, equitable and democratic*. It also specifies that *the information and content of databases resulting from publicly funded research will be open access. The institutions or bodies responsible for such research shall make the information available through information technology*.

For its part, the preliminary document of the **Plan for Science, Technology, Innovation and Ancestral Knowledge (CTiySA)** contains a specific section on open science which includes the initiatives undertaken in this field. These include the development of regulations to promote the generation of institutional open access policies and the publication of publicly funded open access research papers in higher education institutions. These actions have been complemented by actions to promote open access institutional repositories.

Regarding research data, in 2019 the Ministry of Telecommunications (Mintel) issued its *Open Data Policy*²⁴⁰ that aims to consolidate the organisation and publication of data generated in public institutions to ensure that all output from state-funded R&D&I activities is freely transferred and used.

8.3. Open access digital platforms

Repositories

In recent years, Ecuador has launched several national initiatives to enhance open access institutional repositories, including the creation of a network of Digital Repositories.

The **Open Access Repository Network of Ecuador (RRAE)**²⁴¹ is Ecuador's national aggregator whose objective is to facilitate the management, decentralisation, organisation, preservation and interoperability of open access digital content generated in higher education institutions. The RRAE is managed by CEDIA and offers its members and member institutions regular harvesting of the metadata records of the repositories, validation of the quality of the information, grouping, integration and indexing and making all this information available to the public through the search portal. This facilitates information retrieval and access to documents in their original institutional repository. To join RRAE, institutions must commit to the standardisation of their metadata in accordance with international guidelines. The RRAE is the national node that is part of La Referencia and, as of the date of this report, has a total of 483,437 publications from 108 repositories and digital academic journals, from 66 institutions. Most of the publications contained in the RRAE are undergraduate dissertations and master's theses (75.6% and 10.7%

²⁴⁰ See <https://regulacion.mintel.gob.ec/datos-abiertos/>

²⁴¹ See <https://rrae.cedia.edu.ec/>

respectively). Other publication types collected are scientific articles, books and doctoral theses.

The **Ecuadorian Digital Library**²⁴² is a platform of services offered by the Consortium of University Libraries of Ecuador²⁴³, through which institutions obtain support and advice for the creation of open access repositories, training in all the bibliographical tools available on the market, the creation of scientific academic journals and academic publishing, library automation and web design. The Library also acts as a repository that collects and stores the research work conducted in the different academic institutions in Ecuador. It offers open access to more than 200,000 full-text records of research papers, bachelor's and master's theses and teaching material from different Ecuadorian universities, as well as the INIAP Library, SENESCYT, the National Library, the Ombudsman's Office, the Central Bank and the Public Defender's Office.

Academic Journals

Support for academic journals in Ecuador is provided through the centralised management of the ISSN and the implementation of the SciELO-Ecuador collection. Both services are provided centrally by SENESCYT.

SciELO Ecuador²⁴⁴ is the first initiative in the country for the dissemination of open access scientific academic journals online. Its objective is to increase the quality, access and national and international visibility of Ecuadorian scientific publications through their comprehensive presentation on the web. In 2015, SENESCYT was designated as the national coordinating institution of the SciELO-Ecuador collection. The collection includes scholarly journals from all areas of knowledge that predominantly publish original articles produced by scientific research and other original contributions of significance to the specific area of the journal. The SciELO-Ecuador evaluation criteria²⁴⁵ are adopted as part of the regional SciELO initiative and comprise an evaluation of the format and content of the journal.

Ecuadorian academic journals are present in Latindex, with 247 academic journals in catalogue 2.0, in SciELO Ecuador, with 29 indexed titles, in Redalyc, where a total of 27 academic journals are indexed and in DOAJ, with 87 titles.

Table 8. Number of Ecuadorian academic journals in Latindex (catalogue 2.0), SciELO, Redalyc and DOAJ

	Latindex (catalogue 2.0)	SciELO Ecuador	Redalyc	DOAJ
No. of academic journals	247	29	27	87

Source: Compiled by the authors based on data from Latindex, SciELO, Redalyc and DOAJ. Access date: December 2022.

²⁴² See <https://www.bibliotecasdeecuador.com/>

²⁴³ See <https://www.bibliotecasdeecuador.com/>

²⁴⁴ See <http://scielo.senescyt.gob.ec/>

²⁴⁵ See <https://www.educacionsuperior.gob.ec/wp-content/uploads/downloads/2019/02/GUIA-POLITICAS-CRITERIOS-DE-EVALUACION-DE-REVISTAS-PARA-INCLUSION-PERMANENCIA-EN-COLECCION-SCIELO-VersiOn-2019>

Curriculum management systems

Ecuador has a comprehensive scientific information management system named the **Ecuadorian Researchers' Repository (REDI)**²⁴⁶. This is a service managed by CEDIA whose main objective is to compile all the curricular information, scientific and academic output of research personnel in Ecuador. REDI adds academic merits such as theses, publications, projects, patents, or research datasets to the curricular profiles and enriches them with different sources. All this information is processed, validated, integrated and stored in a common curriculum model. The tool generates statistics and graphical views showing research trends and collaboration patterns. It also has a *researcher profile* section²⁴⁷ where the most relevant information is compiled, with an option to explore REDI to search for researchers with common scientific interests.

²⁴⁶ See <https://redi.cedia.edu.ec/>

²⁴⁷ See https://redi.cedia.edu.ec/#/total/authors/q=familynome:A*&fl=*&rows=10&wt=json&sort=familynome+asc

9. El Salvador



0.16%
R&D
expenditure/GDP*

0.33%
Research
staff/EAP in (0/00)*

9
Institutional
repositories

4
Open access
journals



National OA
policy



OA legal
framework



Institutional OA
policies



National repository
aggregator



National journal
aggregator



Curriculum
management
system

Source: see the [Policies of the Digital Repository of Science and Culture of El Salvador \(REDICCES\) \(REDICCES\)](#) y the [Open Access Policy of the Consortium of University Libraries \(Consortio de Bibliotecas Universitarias\)](#).

Data: Compiled by author based on [RICyT](#), [LA Referencia](#), [OpenDOAR](#) and [DOAJ](#).

Note: For R&D expenditure data referring to 2020 and for Research staff 2019. No. of researchers per thousand of labour force (0/00).

The institutional and governance framework of the science, technology and innovation system of the Republic of El Salvador is set out in Decree 234/2013 establishing the **Law on Scientific and Technological Development**.

El Salvador **does not have a national open access policy**, although it does have **institutional policies** within the university sector.

The open access policy of Salvadoran universities has relied on deposit in open access repositories as an implementation mechanism, with copyright assignment agreements taking precedence over embargo periods. El Salvador has promoted open access repositories through the Consortium of University Libraries of El Salvador (CBUES), responsible for the Science and Culture Digital Laboratory of El Salvador (REDICCES), and the national aggregator of open access repositories, ACCES. Journals have not been supported by the public authorities.



[ACCES](#) is the national aggregator of open access repositories. It reports to the Ministry of Education, the Vice-Ministry of Science and Technology and CBUES. Its purpose is to promote collaborative work between universities and research centres to integrate, disseminate, preserve and give visibility to their national scientific, academic and documentary output.



[REDICCES](#) is the central repository of El Salvador, created by CBUES, which gathers a large part of the scientific production generated in the country, in order to enhance its visibility, and increase its use and impact on the scientific and academic community, ensuring its access and long-term preservation.



The Salvadoran Researchers' Network ([REDISAL](#)), under the new CONACYT, contains a register of 1,000 researchers. This service facilitates the creation of networks of researchers in order to create the necessary research-friendly environment and to stimulate cooperative work between researchers.

9.1. Institutional framework

Governance

The institutional and governance framework of the science, technology and innovation system of the Republic of El Salvador is set out in Decree 234/2013 establishing the Law on Scientific and Technological Development²⁴⁸.

The **Ministry of Education, Science and Technology (MINED)**²⁴⁹, through the Department of Innovation, is the government body that manages the production of the National Policy for Scientific and Technological Development and promotes research and innovative activity at national level. It does so through the Digital Agenda (2020-2030)²⁵⁰ which presents a package of actions to integrate all actors involved in the country's development through innovation and the application of ICTs.

The Law created the new **National Council of Science and Technology (CONACyT)**²⁵¹ as a decentralised unit of MINED, reporting directly to the Vice-Ministry of Science and Technology, whose role is to be the state body that implements and delivers national STI policies. Its activity is under the remit of the National Innovation, Science and Technology Policy and the National Science and Technology Plan. The specific functions of the new CONACyT are: (1) to encourage the training of qualified human resources and research personnel for transformation and development; (2) to coordinate, organise and direct the National Observatory of Science and Technology; (3) to coordinate the bodies that make up the National System of Innovation, Science and Technology; (4) to develop activities that mainstream science and technology.

The **Observatory of Science and Technology (ONICT)**²⁵² aims to be the national body in El Salvador that produces and disseminates statistics and indicators on science and technology and the studies conducted by the various institutions of the national STI system. To this end, it designs science and technology indicators, collects, systematises and analyses the information needed as a basis for public decision-making, identifies causal relationships and conducts prospective studies to apply knowledge of science and technology to activities established as priorities for the benefit of society.

At the end of 2021, MINED launched the **National Higher Education Research Board (MNIES)**,²⁵³ whose function is to coordinate the production and dissemination of scientific knowledge results of higher education and to improve research rates in El Salvador.

The **National Innovation, Science and Technology Policy**²⁵⁴ aims to promote and coordinate scientific and technological research in order to contribute to sustainable development and social welfare. It was published in May 2018 and describes the context of this field of public action, the guidelines that will drive action to promote research activity, the legal framework, the vision and the principles on which they are based. In addition, it establishes 5 specific objectives: (1) generate public assets and strengthen the enabling

²⁴⁸ See https://siteal.iiep.unesco.org/sites/default/files/sit_accion_files/10032.pdf

²⁴⁹ See <https://www.mined.gob.sv/>

²⁵⁰ See <https://www.innovacion.gob.sv/>

²⁵¹ See <https://www.conacyt.gob.sv/>

²⁵² See https://www.conacyt.gob.sv/?page_id=3221

²⁵³ See <https://www.mined.gob.sv/2021/12/13/mined-lanza-mesa-nacional-de-investigacion-en-educacion-superior/>

²⁵⁴ See <https://www.transparencia.gob.sv/institutions/capres/documents/372512/download>

environment for R&D&I; (2) strengthen scientific research, technological development and pre-competitive innovation; (3) support business innovation to increase productivity and competitiveness with an emphasis on priority sectors; (4) stimulate innovative entrepreneurship; and (5) disseminate, promote and encourage the adoption of technologies and absorption through R&D&I in Salvadoran society. These objectives are accompanied by a total of 44 implementing strategies.

The National Innovation, Science and Technology Policy includes instruments for governance in STI-related issues, such as the Interministerial Committee for Science, Technology and Innovation, the STI Coordination Committee and the Advisory Council of the Interministerial Committee.

Research Funding

The **new CONACyT** is the public funding body for Science, Technology and Innovation in El Salvador. These grants are supported by the public budget allocated to MINED, in accordance with the provisions of the Incentives for Scientific and Technological Development Chapter of the Law on Scientific and Technological Development. Furthermore, the National Innovation, Science and Technology Policy establishes that funds to finance STI activities may come from co-financing schemes, competitive funds, international cooperation funds and corporate funds. The role of multilateral and bilateral international research funding agencies is considered of key importance in El Salvador's national STI policy, given the country's limited budgetary capacity.

The new CONACyT's calls are set out in a National Science and Technology Plan and are of two types. First, the grants programme seeks to strengthen the capacities of national human resources through master's and doctoral training, both in national and foreign institutions. Secondly, there are specific calls aimed at encouraging and funding scientific research by universities (public and private), research centres and companies. Within the latter group, grants from the Higher Education Research Fund (FIES)²⁵⁵ promote research projects in areas of interest to El Salvador (health, energy, food security and the environment) conducted by two or more Salvadoran R&D&I institutions, which must include a company.

Moreover, **MNIES** provides funding for Salvadoran research personnel through public, private and cooperation funds.

Research Performing

The bodies that carry out scientific research activities in El Salvador are universities, research institutes, the government and public and private companies.

The **university sector** consists of the University of El Salvador, the only public university in the country and 23 private universities.

The **research institutes** are focused on sectoral areas. These funds are the National Agricultural and Forestry Technology Centre (CENTA)²⁵⁶ the National Centre for Research in Social Sciences and Humanities (CENICSH), the National Centre for Scientific Research

²⁵⁵ See <https://www.mined.gob.sv/descarga/instructivo-FIES-2017.pdf>

²⁵⁶ See www.centa.gob.sv

of El Salvador (CICES)²⁵⁷ the National Institute of Health of El Salvador (INS),²⁵⁸ and the Salvadoran Foundation for Economic and Social Development (FUSADES)²⁵⁹

According to data published by RICyT²⁶⁰, universities and research institutes are responsible for the largest share of R&D expenditure (40.2%), while government and public and private companies account for 29.9% and 29.8% of expenditure respectively.

Research Assessment

The **new CONACyT** is the body that monitors, evaluates and delivers the National Innovation, Science and Technology Policy, the National Science and Technology Plan and the actions necessary to contribute to the coordination of the organisations that make up the National STI System. Likewise, the recently launched **MNIES** is working on the production of a national proposal for the evaluation of scientific merit for Salvadoran research personnel through a national incentive policy, which is referred to in the **Research, Science, Technology and Innovation Policy of the University of El Salvador**²⁶¹.

9.2. Open access policy and legal framework

El Salvador does not have a national open access policy, although there are institutional policies that encourage publication in open access repositories.

At national level, both the Law on Scientific and Technological Development and the National Innovation, Science and Technology Policy omit any reference to open access. This absence of a national policy contrasts with initiatives launched in recent years in areas related to open access, such as the **National Policy for the Advancement of Science and Technology**, which aims to disseminate science at all levels of society, or the **National Digital Agenda 2020-2030**²⁶², comprising a set of actions that seek to integrate all actors involved in the country's development through innovation and the application of ICTs. One of the priorities of the National Digital Agenda is innovation, education and competitiveness. This priority seeks to boost technology education, competitiveness and access to broadband services. Through the National Digital Agenda, El Salvador is developing a **Research, Development and Innovation (R&D&I) Strategy**²⁶³, which is expected to include some specific reference to open access to scientific content.

At the institutional level, the **Consortium of University Libraries of El Salvador (CBUES)**²⁶⁴ was created in 2011 to manage the pooled purchase of digital resources and move towards a collaborative provision of library services in the digital environment, through the joint provision of bibliographical databases, collections of electronic academic journals, full text reference works, collections of historical documents or literary classics in

²⁵⁷ See <http://www.cienciaytecnologia.edu.sv/>

²⁵⁸ See <http://ins.salud.gob.sv/>

²⁵⁹ See <https://fusades.org/>

²⁶⁰ See <http://www.ricyt.org/category/indicadores/>

²⁶¹ See <https://sic.ues.edu.sv/storage/app/media/ultimopoliticasdeinvestigacionencienciaytecnologiauescsu.pdf>

²⁶² See <https://www.innovacion.gob.sv/>

²⁶³ See <https://www.innovacion.gob.sv/innovacion.php>

²⁶⁴ See <http://www.cbues.org.sv/>

electronic format, etc. A total of 13 institutions belong to this consortium: 10 universities, including the University of El Salvador, 2 Colleges and the National Library.

CBUES has an open access policy²⁶⁵ in which it recommends that member institutions develop their own terms of reference clearly specifying the institutional position and establishing the necessary measures for members of their academic community to deposit their documents in an open access repository. To this end, they offer technical support through advice on how to develop such policies and technological support through the national REDICCES repository.

Within the university sector, there are 3 universities with active open access policies: **Universidad Centroamericana José Simeón Cañas**²⁶⁶, **Universidad Tecnológica de El Salvador**²⁶⁷ and **Universidad Francisco Gavidia**²⁶⁸. They all require, to a greater or lesser extent, the deposit of research results in open access repositories, respecting the editorial embargo periods in force. There are also 4 universities that actively publish in open access despite not having an institutional mandate: Universidad de El Salvador, Universidad Don Bosco, Universidad Evangélica de El Salvador and Universidad Católica de El Salvador.

El Salvador is an active member of **CTCAP** and its political and technical institutions work actively in the coordinated development and implementation of actions in favour of open access.

9.3. Open access digital platforms

Repositories

In 2012, the CBUES created the **Digital Repository of Science and Culture of El Salvador (REDICCES)**²⁶⁹ and made it available to all research staff and higher education institutions, universities and research centres. REDICCES is El Salvador's central repository that brings together all the scientific output generated in the country. Its aim is to enhance its visibility, increase its use and impact on the scientific and academic community and ensure its long-term access and preservation. REDICCES has a robust policy on repository, content access, long-term digital preservation, metadata and services²⁷⁰.

In addition, there is a total of 7 universities have an open access institutional repository.

In 2018, the Ministry of Education, the Vice-Ministry of Science and Technology and the CBUES launched the national **Access to Science and Culture of El Salvador (ACCES)**²⁷¹ repository aggregator for which they received technical support from LA Referencia. The main objective of ACCES is to centralise, preserve and promote the academic, historical and scientific production of El Salvador in open access. It aims to facilitate online access and give greater visibility to the academic, scientific and documentary output of in El Salvador in the different higher education institutions, research centres and other relevant

²⁶⁵ See <http://www.redicces.org.sv/jspui/handle/10972/1762>

²⁶⁶ See http://repositorio.uca.edu.sv/jspui/L_acc.pdf

²⁶⁷ See https://biblioteca2.utec.edu.sv/entorno/index.php/entorno/acceso_abieto

²⁶⁸ See <https://ri.ufg.edu.sv/jspui/AccessoAbiertoUFG.pdf>

²⁶⁹ See <http://www.redicces.org.sv/jspui/>

²⁷⁰ See <http://www.redicces.org.sv/jspui/handle/10972/1761>

²⁷¹ See <http://www.acces.org.sv/vufind/>

bodies in the country, such as government institutions and non-governmental organisations that contribute to the country's scientific and technological development²⁷². It has a total of 8 resources that, ranked in order of the number of publications they contribute, are: the University of El Salvador, the Consortium of University Libraries of El Salvador²⁷³, the Universidad Centroamericana José Simeón Cañas, the Universidad Don Bosco, the Universidad Tecnológica de El Salvador, the Universidad Francisco Gavidia, the Universidad Evangélica de El Salvador and the Universidad Católica de El Salvador. These 8 repositories contribute more than 22,000 publications in open access, among which the most important are degree theses (with around 50% of the total number of publications), journal articles, master's theses, books and technical reports.

ACCES is the Salvadoran node of LA Referencia.

Academic Journals

Few academic journals are published in El Salvador, and they are not very professionalised, they suffer from a lack of financial resources and have not received support from the Salvadoran government or institutions. There is no SciELO node in El Salvador, nor is there a presence of Salvadoran academic journals in Redalyc. Only 5 titles appear in the Latindex 2.0 catalogue and 4 in DOAJ.

Table 9. Number of Salvadoran academic journals in Latindex (catalogue 2.0), SciELO, Redalyc and DOAJ

	Latindex (catalogue 2.0)	SciELO	Redalyc	DOAJ
No. of academic journals	5	0	0	4

Source: Compiled by the authors based on data from Latindex, SciELO, Redalyc and DOAJ. Access date: December 2022.

Curriculum management systems

Within the new CONACyT there is the **Network of Salvadoran Researchers (REDISAL)**²⁷⁴. This network facilitates the registration of national scientific researchers and aims to create networks of research personnel, to establish an environment conducive to research and to encourage cooperative work between national researchers and foreign scientists.

REDISAL has 1,000 personal records, classified into six scientific research areas: natural and exact sciences, engineering and technology, medical sciences, agricultural sciences, social sciences and humanities. Registration in the directory is voluntary, so REDISAL does not contain all research personnel in El Salvador.

²⁷² See <http://www.acces.org.sv/vufind/>

²⁷³ See <http://hdl.handle.net/10972/1761>

²⁷⁴ See <https://www.redisal.org.sv/>

10. Mexico



0.30%
R&D
expenditure/GDP*

1.16%
Research
staff/EAP in
(0/00)*

43
Institutional
repositories

202
Open access
journals



National OA
policy



OA legal
framework



Institutional OA
policies



National repository
aggregator



National journal
aggregator



Curriculum
management
system

Source: see [Science and Technology Law, 2014](#) and the [Technical Guidelines for National and Institutional Repositories](#).
Data: Compiled by author based on [RICyT](#), [LA Referencia](#), [OpenDOAR](#) and [DOAJ](#).
Note: Data referring to 2020. No. of researchers per thousand of labour force (0/00).

The institutional and governance framework of its science, technology and innovation system is solidly established in the **Science and Technology Law 2020**.

Mexico has a national **open access policy** grounded in a solid legal framework and the role of CONACyT as the institution responsible for its implementation.

The Mexican open access policy points to repositories as its basic implementation unit. Likewise, academic journals have received significant public support despite not being expressly included in the Science Act. In Mexico there are two aggregators of open access repositories: the Mexican Network of Institutional Repositories (REMERI), and the National Repository (RIACTIs). Academic journals receive support through a scientific and editorial quality certification service developed by CONACyT.



RIACTIs is a centralised digital platform that aggregates information from all Mexican institutional repositories.

REMERI

The Mexican Network of Institutional Repositories (**REMERI**) aims to create a federated network of digital repositories of higher education institutions.



The Classification System for Mexican Science and Technology Journals is the instrument for the periodic evaluation of scientific journals published in electronic format in Mexico. There are a total of 268 Mexican journals accredited by the **CRM CYT** system.

Curriculum Vitae Único (CVU)

The Curriculum Vitae Único (**CVU** - Single Curriculum Vitae) is the Mexican platform for the registration of curricular information of all research personnel participating in or benefiting from any of the CONACyT programmes.

10.1. Institutional framework

Governance

Mexico is a federal republic made up of 32 states. The institutional and governance framework of its science, technology and innovation system is set out in the Science and Technology Law 2020²⁷⁵.

The **General Council for Scientific Research, Technological Development and Innovation** is the highest body responsible for *establishing national policies for the advancement of scientific research and technological development in support of national development*. It is a very high-level body which powers include: (1) approving and updating the Special Programme for Science, Technology and Innovation; (2) defining strategic areas and priority programmes; (3) establishing the budget allocated to the different research lines and institutions of the national R&D&I system; and (4) modifying the institutional framework on which it is based if it deems it necessary. It is made up of the President of the Republic and 20 individuals, including the director of the National Council of Science and Technology (CONACyT) as executive secretary, 10 secretaries of state whose portfolios have specific powers related to science and technology, the coordinator of the Scientific and Technological Consultative Forum, the president of the Mexican Academy of Sciences, three representatives of the productive sector, a representative of the Public Research Centres, the secretary of the National Association of Universities and Institutions of Higher Education²⁷⁶ and two representatives of the scientific or technological community. In addition, the federal executive may invite other individuals to attend some sessions.

The **Scientific and Technological Consultative Forum**²⁷⁷ is the advisory and permanent body of the Executive Branch, the General Council for Scientific Research, Technological Development and Innovation, the Governing Board of CONACyT and the Legislative Branch in STI matters. It promotes dialogue between the members of the National Research System, the productive sector and the users of the STI system with the aim of strengthening collaborative ties.

The **National Council of Science and Technology (CONACyT)**²⁷⁸ is the Mexican government's institution responsible for designing and implementing public policies to promote scientific and technological research, development and technological modernisation in the country. Created in 1970, it defines the national R&D&I strategy, establishes the priority research lines, funds research activity and evaluates the research performance of institutions and scientific personnel.

Science, technology and innovation policy is articulated through the **Special Programme for Science, Technology and Innovation (PECITI)**²⁷⁹. This document reflects the Federal Government's STI strategy. The **PECITI 2021-2024** contains a diagnosis of the situation of the federal science, technology and innovation system and is written under the premise that the humanities, sciences, technologies, innovation processes and public and social access to knowledge are essential ingredients for improving the well-being and the economic, social, political, cultural and environmental conditions of life in Mexican society. It contains 6 priority objectives broken down into 33 priority strategies, further sub-divided into 241

²⁷⁵ See <https://www.diputados.gob.mx/LeyesBiblio/ref/lct.htm>

²⁷⁶ See <http://www.anuiex.mx/>

²⁷⁷ See <https://www.foroconsultivo.org.mx>

²⁷⁸ See <https://conacyt.mx/conacyt>

²⁷⁹ See <https://www.siiicyt.gob.mx/index.php/normatividad/nacional>

specific actions with specific monitoring indicators. The implementation and monitoring of PECITI is the responsibility of CONACyT. The Institutional Programme 2020-2024 is the document in which CONACyT establishes its objectives and concrete actions for developing the PECITI.

Research Funding

CONACyT is the body that funds research activity in Mexico. CONACyT has two units that manage different budget lines.

The **Deputy Directorate for Scientific Development (DADC)** is the unit that designs, organises and implements the specific research funding programmes for: (1) basic science and frontier research projects; (2) Strategic National Programmes (Pronaces) and National Research and Advocacy Projects (Pronaii) to address major national challenges with priority attention; (3) training and consolidation of the national scientific, technological and humanities community through the 12 scholarship programmes, the National System of Researchers and the Researchers for Mexico programme; (4) strengthening scientific infrastructure such as thematic research networks and the National Laboratories Network; (5) promoting scientific vocations and guaranteeing universal access to knowledge.

CONACyT's **Deputy Directorate for Technological Development, Linkage and Innovation (DADTVI)** is the unit responsible for coordinating activities, efforts, programmes, projects, tools, budget and public policies related to the generation of technological development and innovation.

On the other hand, in addition to CONACyT, the **Ministry of Public Education**²⁸⁰ also promotes the development of technological development and innovation projects through programmes to strengthen public higher education institutions.

Research Performing

The entities that carry out scientific research in Mexico are all the educational institutions that make up the public and private higher education sector and the public research centres.

The **Higher Education System** of the Mexican Government consists of 10 sub-systems under the auspices of the **Ministry of Public Education (SEP)**²⁸¹ and receive federal and state funds for their operation: Federal Public Universities, State Public Universities, Technological Universities, State Public Universities with Charitable Support, Technological Institutes, Polytechnic Universities, Intercultural Universities, Public Teacher Training Colleges, Public Research Centres and other public institutions²⁸².

The private university sector is represented by the **Federation of Mexican Private Higher Education Institutions (FIMPES)**²⁸³, a non-profit civil association, founded in 1982 and with voluntary membership, comprising at the date of this report, 113 private higher education institutions, which together account for 17% of the country's student enrolment²⁸⁴.

²⁸⁰ See <https://www.gob.mx/sep>

²⁸¹ See <https://www.gob.mx/sep>

²⁸² See <https://www.educacionsuperior.sep.gob.mx/>

²⁸³ See <https://www.fimpes.org.mx/>

²⁸⁴ See <https://www.fimpes.org.mx/index.php/home/que-es-fimpes>

In addition to SEP and FIMPES, the **National Association of Universities and Higher Education Institutions (ANUIES)**²⁸⁵ has been one of the main non-governmental bodies promoting the formulation of national programmes, plans and policies for the development of higher education in Mexico. ANUIES was created in 1950 and consists of 207 universities and higher education institutions, both public and private, from all over the country²⁸⁶.

Among public universities, the National Autonomous University of Mexico (UNAM)²⁸⁷ is the largest university in Latin America and the Caribbean, with 369,607 students enrolled for the 2021-2022 academic year, 132 degree programmes and 42 postgraduate programmes and a total of six campuses.

The System of Public Research Centres (CPI)²⁸⁸, is a network created in the Science and Technology Law of 2002 and coordinated by CONACyT. It consists of 26 multidisciplinary scientific, technological and innovation research institutions plus a fund for the development of human resources and its mission is to promote the welfare of society through knowledge. A total of 2,506 researchers works in the CPI system. It is, after UNAM, the second most important force at the national level in the generation of knowledge and training of human capital (Gleaves López 2022).

CONACyT supports the infrastructure and maintenance of the CPIs and manages the public calls through which research staff can become part of the governing bodies of these institutions. Although they are constituted under different legal forms all the centres are considered parastate entities and are governed by the Science and Technology Law in force and their respective founding deeds. Most of these centres have created branches and sub-branches, bringing the total number of centres to 98, spread across most of the country. This has made the centres important elements of regional development and has led to them being supported by state governments to attract national and international investment (Gleaves Lopez 2022). The CPIs cover all fields of knowledge and, in addition to research, offer 230 academic programmes, including bachelor's, master's, master's and doctoral degrees.

Research Assessment

CONACyT is the body that evaluates the research performance of STI institutions and their research staff. It uses two instruments for this purpose: the System of Public Research Centres (CPI) and the National System of Researchers (SNI).

The **National System of Researchers**²⁸⁹ was created in 1984 to recognise and evaluate the work of people dedicated to producing scientific knowledge and technology. The evaluation is carried out by peers who analyse the quality and prestige of scientific contributions: articles, books, book chapters, dissemination products, extended reports, reviews, citations, group formation, scientific independence, technological development, technological transfers, innovation, intellectual property registrations, software

²⁸⁵ See <http://www.anui.es.mx/>

²⁸⁶ See <http://www.anui.es.mx/>

²⁸⁷ See <https://www.unam.mx/>

²⁸⁸ See <https://centrosconacyt.mx/>

²⁸⁹ See <https://conacyt.mx/sistema-nacional-de-investigadores/>

developments and technological packages. A total of 35,179 researchers throughout the country are registered in the SNI register for 2020²⁹⁰

The recognition consists in the awarding of the title of national researcher. This status comes with a specific financial endowment, the amount of which depends on the qualification obtained. The distinctions conferred by the SNI are classified into three categories: (1) national researcher candidate; (2) national researcher (level I, level II and level III); and (3) national researcher emeritus.

Public calls to join or renew SNI membership are published annually by CONACyT. Research personnel working in a Mexican public sector STI institution, in private centres registered in the National Register of Scientific and Technological Institutions and Companies (RENIECYT) that have a collaboration agreement with the SNI, or in foreign R&D institutions may apply.

10.2. Open access policy and legal framework

Mexico has an open access public policy that is anchored in a solid legal framework.

Since 2002, **the Constitution of the United Mexican States**²⁹¹ guarantees the right of everyone to enjoy the benefits of the development of science and technological innovation and establishes the State's obligation to support humanities, scientific, technological and innovation research and to guarantee open access to the information derived from it, for which it must provide sufficient resources and incentives. Furthermore, Article 3 of the latest reform of the Constitution of the United Mexican States on May 28, 2021²⁹² establishes that the State shall support scientific, humanistic and technological research and innovation, and shall guarantee open access to the information derived from it, for which it shall provide sufficient resources and incentives, in accordance with the bases of coordination, linkage and participation established by the laws on the matter.

The new **Law on Science and Technology and the Organic Law of the National Science and Technology Council**²⁹³ of 5 June 2002 include specific obligations for CONACyT regarding the implementation of the National Repository and the design of its technical parameters.

In 2014 the **Decree Law**²⁹⁴ was published, reforming various provisions of the Law on Science and Technology, the General Law on Education and the Organic Law of the CONACyT. It adds the following to this latter law: *Chapter X on Open Access, Access to Scientific, Technological and Innovation Information and the National Repository* for the definition of concepts of open access, the creation of the National Repository under CONACyT; the decree law also describes open access platforms as tools to bring scientific knowledge closer and technology to society and it is established that *researchers, technologists, academics and master's, doctorate and postdoctoral students, whose research is publicly funded or who have used public infrastructure, by personal decision may deposit or, where appropriate, expressly authorize the deposit of a copy of the final*

²⁹⁰ See <https://conacyt.mx/sistema-nacional-de-investigadores/archivo-historico/>

²⁹¹ See <https://www.diputados.gob.mx/LeyesBiblio/ref/cpeum.htm>

²⁹² See <https://www.diputados.gob.mx/LeyesBiblio/ref/cpeum.htm>

²⁹³ See www.diputados.gob.mx/LeyesBiblio/ref/ict/LCT_orig_05jun02.pdf

²⁹⁴ See https://www.diputados.gob.mx/LeyesBiblio/ref/ict/LCT_ref08_20may14.pdf

version accepted for publication, in Open Access through the National Repository (...). This voluntary mandate has been reinforced through subsequent legal reforms.

All these legal texts refer to academic publications when they talk about research results and none of them specifically talk about research data. However, the **PECITI 2021-2024** includes, in **Priority Objective 6**, a total of 5 priority strategies related to open access policy focused on strengthening repositories and open science digital infrastructures through the establishment of standards, coordination mechanisms and improved interoperability in which research data is directly and explicitly mentioned.

Besides, there are two universities that have an **institutional open access policy**: Universidad National Autonomous University of México (UNAM)²⁹⁵, and Autonomous University of the State of Mexico (UAMEX)²⁹⁶.

10.3. Open access digital platforms

Repositories

Open access repositories are a central element of Mexico's federal open access policy. The 2014 reform Decree²⁹⁷ assigned CONACyT the role of building the **National Repository for Open Access to Scientific, Technological and Innovation Information Resources**²⁹⁸ and authorised higher education institutions and Research Centres to set up institutional repositories, which could be by scientific and technological disciplines. The National Repository is the centralised digital platform that aggregates information from institutional repositories in which scientific, technological and innovation information resources are housed, such as scientific journal articles, research data, undergraduate and postgraduate theses, research protocols, conference proceedings, etc. without any financial, legal or technical barriers other than those imposed by internet access.

A year later, in 2015, CONACyT published the document *Technical Guidelines for the National Repository and Institutional Repositories*²⁹⁹, which established the actions to be followed for the preservation not only of academic publications but also of research data, the policies to regulate the security, storage, sustainability, management and preservation of information and the definition of technical requirements and quality and interoperability standards. In the document *Legal Guidelines on Open Science*³⁰⁰, published in 2017, CONACyT established the rules on intellectual property rights management applicable to the integration and operation of the National Repository and Institutional Repositories, the instruments of public communication of science and support for scientific publications and academic journals, among other instruments and policies, related to the open access policy (which is already beginning to be called open science).

²⁹⁵ See <https://www.unamenlinea.unam.mx/recurso/82924-lineamientos-generales-para-la-politica-de-acceso-abierto-de-la-unam>

²⁹⁶ See <http://ri.uaemex.mx/handle/20.500.11799/67004>

²⁹⁷ See https://www.diputados.gob.mx/LeyesBiblio/ref/lct/LCT_ref08_20may14.pdf

²⁹⁸ See <https://www.repositorionacionalci.mx/>

²⁹⁹ See <http://conacyt.gob.mx/siicyt/images/LinTecnicosRNYRI.pdf>

³⁰⁰ See <https://www.siicyt.gob.mx/index.php/normatividad/conacyt-normatividad/programas-vigentes-normatividad/lineamientos/lineamientos-juridicos-de-ciencia-abierta/3828-lineamientos-juridicos-de-ciencia-abierta/file>

For the development and consolidation of open access institutional repositories and the national repository and in accordance with the 2014 Decree Law, during the period 2015-2018 CONACyT published four public calls for proposals that benefited just over 100 public and private higher education institutions. The obligations of the beneficiary institutions included populating the National Repository with scientific, technological and innovation information resources, previously deposited in the repositories and harvested according to the established technical parameters. As of the date of this report, the National Repository aggregates 108 repositories that together hold 151,289 records. Furthermore, authors who do not have an institutional repository may deposit their research papers directly in the National Repository.

Institutional repositories are, furthermore, aggregated by the Mexican Network of Institutional Repositories (REMERI)³⁰¹.

The **Mexican Network of Institutional Repositories (REMERI)** was created in 2012 at the initiative of six founding institutions with the aim of creating a federated network of institutional and thematic open access repositories to integrate, disseminate, preserve and give visibility to the country's scientific, academic and documentary production and to build the national node that would represent Mexico's participation in LA Referencia. The project was developed in its first stage with research funding from CONACYT and later with the support and backing of the University Corporation for Internet Development (CUDI)³⁰². The objective of REMERI is to integrate a federated network of open access repositories of Mexican Higher Education Institutions (HEIs).

Since then, REMERI has been part of the CUDI Applications Committee and is the National Network representing Mexico in LA Referencia. Furthermore, the General and Technical Coordination of REMERI actively participates in other national and international open science projects and collaborates with Redalyc for the inclusion in its systems of open access scientific articles and with ANUIES in the coordination of the Commission of Repositories and Digital Educational Resources.

As of the date of this study, a total of 135 institutional, thematic and some data repositories belonging to 80 Mexican institutions have been harvested by REMERI and access to more than 1,000,000 documents is provided through a common interface and federated search based on international interoperability standards. Through REMERI, a total of 72 institutional repositories with just over 170,000 records are harvested by LA Referencia.

Mexico has 43 institutions that have registered their repositories in OpenDOAR.

Mexican institutional repositories mainly house undergraduate and postgraduate theses, followed by other academic publications (books, articles, reports, conference proceedings, etc.), educational resources, documentary heritage and other administrative documents. Regarding Research Data Repositories, two of the most important are those implemented by CIMMYT (*International Maize and Wheat Improvement Center*)³⁰³ and the National Autonomous University of Mexico (UNAM)³⁰⁴ which has the largest research dataset in Mexico: the High Performance Data and Computing Centre³⁰⁵, located at the Institute of

³⁰¹ See <http://www.remeri.org.mx/portal/index.html>

³⁰² See <https://cudi.edu.mx/acervos/presentacionescorporaci%C3%B3n-universitaria-para-el-desarrollo-de-internet-cudi>

³⁰³ See <https://data.cimmyt.org/dataverse/cimmytdataadvn>

³⁰⁴ See <https://www.unam.mx/>

³⁰⁵ See <https://www.c3.unam.mx/cienciasdatos.html>

Nuclear Sciences (ICN)³⁰⁶ and in which several university institutions in the areas of physics and astrophysics collaborate.

Academic Journals

Academic journals are highly significant in the Mexican context. CONACyT manages the **Classification System for Mexican Science and Technology Academic Journals (Sistema de Clasificación de Revistas Mexicanas de Ciencia y Tecnología (CRMCYT System))**³⁰⁷, a public policy instrument that, through the selective registration and periodic evaluation of scientific journals published in electronic format, seeks to raise their quality, visibility and impact, thus promoting the dissemination and reach of science and technology generated in the country.

Academic journals that wish to be evaluated apply voluntarily to the public calls for papers opened by CONACyT (the last one was in 2019). The evaluation is based on six dimensions: (1) editorial policy and management; (2) quality of content; (3) citation level; (4) compliance with publication frequency; (5) accessibility; and (6) international visibility. As of the date of this report, there are 268 academic journals in the system.

SciELO Mexico³⁰⁸ has been managed since 2004 by the Directorate General of Libraries and Digital Information Services (DGBSDI)³⁰⁹ of UNAM. Its selection policy includes the immediate admission of all those degrees that have been approved by the CRMCYT System. As of the date of this report, there are 155 current Mexican journals included in SciELO Mexico.

Latindex catalogue 2.0 includes 325 journals and DOAJ indexes a total of 202 Mexican titles. The presence of Mexican journals in Redalyc is highly significant: they contribute 257 titles, 20.4% of the total of the LAC database.

Table 10. Number of Mexican academic journals in Latindex (catalogue 2.0), SciELO, Redalyc and DOAJ

	Latindex (catalogue 2.0)	SciELO Mexico	Redalyc	DOAJ
No. of journals	325	155	257	202

Source: Compiled by the authors based on data from Latindex, SciELO, Redalyc and DOAJ. Access date: December 2022.

Mexican academic journals are strong in number and organisational capacity. However, their main difficulties are to do with technical issues (the XML JATS mark-up requirements) and economic sustainability. Because of this, they charge Article Processing Charge (APC) fees, which means that they do not comply with Redalyc policies. Both issues have a negative impact on open access and the positioning of academic journals and often lead to their disappearance. (Babini and Rovelli 2020).

In addition to these national open access journal indexes and portals, some higher education institutions, such as the University of Veracruz and the National Autonomous

³⁰⁶ See <https://www.nucleares.unam.mx/>
³⁰⁷ See <https://www.revistascytconacyt.mx/>
³⁰⁸ See <http://www.scielo.org.mx/scielo.php>
³⁰⁹ See <https://www.dgb.unam.mx/>

University of Mexico, have institutional platforms for publication and open access to their academic journals and other periodicals.

Finally, the **National Consortium of Scientific and Technological Information Resources (CONRICYT)**³¹⁰ is an entity created in September 2010, by CONACyT and the Founding Institutions, with the aim of facilitating access to scientific information in digital formats to the academic communities of Higher Education Institutions (HEIs) and research centres. To this end, a budget item was created within CONACyT's Institutional Fund (FOINS) for the purchase and subscription by consortium of electronic information resources from publishers and commercial database providers through a centralised model. In addition, operating parameters and models were established to provide R&D&I entities with access to specific resource packages and databases through collaboration agreements and/or resource allocation.

In 2020, CONACyT conducted an analysis of the use by beneficiary institutions of the scientific information resources, at that time contracted with 73 commercial publishers, based on which it was decided to cancel access and payment for resources that were not being used³¹¹. Instead, the use of repositories, academic journals and other open access sources is promoted under a public science and technology policy oriented towards the general welfare of the population, recognising science as a human right.

Curriculum management systems

Curriculum Vitae Único (CVU)³¹² is a platform implemented by CONACyT for the registration of curricular information of all natural persons participating in or benefiting from any of CONACyT's programmes. Having a CVU is one of the first entry requirements for opting for its calls for proposals, such as the National System of Researchers (SNI), scholarships, mixed funds, etc.

Access to the CVU Catalogue is not public - it is restricted by user accounts assigned to the beneficiary institutions or persons. As of the date of this report, the system has 1,238,580 records, of which a total of 35,179 are researchers registered in the SNI.

³¹⁰ See <https://www.conricyt.mx/>

³¹¹ CONACyT(2020). CONACyT Institutional Programme 2020-2024. See https://conacyt.mx/wp-content/uploads/conacyt/Programa_Institucional_Conacyt_2020-2024.pdf

³¹² See <https://conacyt.mx/servicios-en-linea/cvu-curriculum-vitae-unico/>

11. Panama



0.23%
R&D
expenditure/GDP*

0.31%
Research
staff/EAP in
(0/00)*

8
Institutional
repositories

5
Open access
journals



National OA
policy



OA legal
framework



Institutional OA
policies



National repository
aggregator



National journal
aggregator



Curriculum
management
system

Source: see the [National Strategic Plan for Science, Technology and Innovation \(PENCYT\) 2019–2024](#).

Data: Compiled by the author based on [RICyT](#), [LA Referencia](#), the Directorate of Scientific Research and Development of SENACYT. Note: For R&D expenditure data referring to 2020 and for Research staff 2017. No. of researchers per thousand of labour force (0/00).

The STI system in Panama is regulated by **Law 13 of 15 April 1997**, which establishes the guidelines and instruments for the development of science, technology and innovation, and its successive **amendments of 2005 and 2007**.

Panama **does not have a national open access policy**, although it does have **institutional initiatives** and open science **digital platforms**.

SENACyT is actively working to consolidate Panama's National Scientific, Technological and Innovative Knowledge Management System through the ABC Platform. It hosts an ecosystem of digital platforms that includes the PRICILA portal, CONECTO - the curriculum harmonisation service, the future national research data repository, and the future national journal portal.



The [ABC](#) platform is SENACyT's instrument for implementing open access and open science initiatives.



The Portal of Institutional Repositories of Science, Technology and Innovation of Open Literature ([PRICILA](#)) is the national aggregator of open access repositories. It has a total of 8 repositories and ensures their interoperability through a metadata validation service.



[CONECTO](#) is Panama's science and technology profiling system. It facilitates collaborative networks between scientists, students, teachers and society in general. It is not used as a curriculum standard for public R&D calls.

11.1. Institutional framework

Governance

The governance of the STI system in Panama is governed by the provisions of Law 13 of 15 April 1997³¹³, *which establishes the guidelines and instruments for the development of science, technology and innovation* and its successive amendments through Law 50 of 21 December 2005³¹⁴ and Law 55 of 14 December 2007³¹⁵.

This legal framework created the **Council for Science, Technology and Innovation (CICYT)** as the highest body in the National Science and Technology System and the coordinating body for all government entities involved in the management of STI policy: SENACYT and the ministries whose management includes a science, technology and innovation component.

Also regulated within the existing legal framework, the **National Secretariat of Science, Technology and Innovation (SENACyT)**³¹⁶ is the national institution responsible for the promotion, formulation, implementation and coordination of STI policies in Panama. Its objective is to strengthen, support, drive and promote the development of science, technology and innovation in order to raise productivity, competitiveness and modernisation in the private sector, the government, the academic and research sector and in the population in general. SENACyT reports to the Presidency of the Republic, advises it on STI matters and is Panama's representative in international organisations and science and technology agreements. Its highest representative is the national secretary of SENACYT, who is also the secretary of CICYT. SENACyT is structured in national sectoral commissions. Its functions are: (1) prepare the Science, Technology and Innovation Development Plan, review it, evaluate it and coordinate its implementation; (2) stimulate, coordinate and supervise the implementation of other actions aimed at scientific and technological development and the promotion of innovation; (3) stimulate the training of high level and quality human resources for research and development work; (4) establish mechanisms for linking science and technology generating centres and users; and (5) coordinate actions linked to international programmes in scientific cooperation and technological development and innovation.

In 2015, a document was published that, for the first and only time addressed the design of the national STI policy. The **National Science, Technology and Innovation Long-Term Policy** will be in place until 2040 (SENACyT, 2015). It provides the framework for the action of the Panamanian state to guide the development of science, technology and innovation over the next 25 years. The main objective of this policy was to help address the major challenges facing Panama until 2040. The definition of this policy and its revision guided the preparation and implementation of the PENCYT 2015-2019. The policy is published jointly with the PENCYT 2019-2024.

The science, technology and innovation policy are coordinated through the **Strategic Plan for Science and Technology (PENCYT)**³¹⁷ a document that develops the national STI strategy. Since the SENACyT's creation a total of 5 strategic plans have been adopted. The **PENCYT 2019-2024**, the fifth such instrument, is currently in force. It addresses an

³¹³ See <https://docs.panama.justia.com/federales/leyes/13-de-1997-apr-18-1997.pdf>

³¹⁴ See <https://docs.panama.justia.com/federales/leyes/50-de-2005-dec-23-2005.pdf>

³¹⁵ See <https://www.gacetaoficial.gob.pa/pdfTemp/25943/8096.pdf>

³¹⁶ See <https://www.senacyt.gob.pa/>

³¹⁷ See <https://www.senacyt.gob.pa/pencyt-2019-2024/>

analysis of the Panamanian STI context, its main benchmarks, the strategic objectives, the actions needed to implement them and the funding that will be allocated to achieve them. Specifically, the objectives of the PENCYT 2019-2024 are: (1) the training of advanced human resources; (2) the definition of priority sectors: agriculture, energy, water and environment, health, logistics and maritime sector, manufacturing industry, ICT industry and science, society, economy and public policies; (3) the definition of cross-cutting programmes: Research and innovation for the transformation of Panama, Social Engagement with Science and Governance of the National Science, Technology and Innovation System.

Research Funding

The funding agency for research activity in Panama is SENACyT³¹⁸. It manages public calls for proposals to finance STI activities with the budget of the National Fund for the Development of Science, Technology and Innovation (FONACITI). These calls respond to the priorities set out in the PENCYT and to national emergencies not covered by the strategic plans.

The funds for more and better trained research personnel, for research activities and to promote innovation are managed through the different Directorates in which SENACyT is structured: The Directorate of Scientific Research and Technological Development³¹⁹ finances scientific research projects to enhance national capacity, generate knowledge and facilitate technology transfer for Panama's human development. The **Directorate for Innovation in Science and Technology Learning**³²⁰ works to lay the foundations for the long-term development of science and technology by implementing programmes to modernise science and technology learning and by encouraging children and young people to develop their full potential in STI. The **Directorate for the Development of Scientific and Technological Capacities**³²¹ finances projects for the development of Panamanian human capital and encourages activities related to science and technology. The Directorate of Business Innovation³²² seeks through its calls for proposals to strengthen the competitiveness of companies in Panama by promoting their capacity for innovation.

Research Performing

The entities that carry out scientific research activities in Panama are universities, public research institutions and private institutions.

The university sector consists of 5 public universities, including the University of Panama³²³. The public research institutions sector consists of 9 organisations while the private institutions sector has 7.

In 2021, SENACyT launched a public call for aid for the creation of regional R&D centres, with the aim of opening up new qualified jobs for Panamanian research personnel, including those working outside the country and to ensure sustainable economic development in their regions through knowledge generation.

³¹⁸ See <https://www.senacyt.gob.pa/convocatorias-redireccion/>

³¹⁹ See <https://www.senacyt.gob.pa/investigacion-cientifica-y-desarrollo/>

³²⁰ See <https://www.senacyt.gob.pa/aprendizaje-y-popularizacion/>

³²¹ See <https://www.senacyt.gob.pa/direccion-de-desarrollo-de-capacidades-cientificas-y-tecnologicas>

³²² See <https://www.senacyt.gob.pa/innovacion-empresarial/>

³²³ See <https://www.up.ac.pa/>

In Panama, investment in and the execution of, research and development is led by the state, with very little participation by Panamanian companies. Furthermore, there are few links between academia and the productive sectors, or with social actors that could benefit from the knowledge generated³²⁴.

According to data published by RICyT³²⁵, the largest R&D expenditure is provided by private non-profit organisations (59%), followed by the public sector (28%) and universities and research institutes (12%).

Research Assessment

The body that evaluates research performance in Panama is SENACyT. The evaluation takes place through the **National Research System (SNI)**³²⁶, the instrument that evaluates and recognises merit and dedication in research work and technological development and excellence through incentives that include both financial stimuli and distinctions, awarded on the basis of the quality, production, significance and impact of research activity.

The SNI evaluates research personnel, research groups and research centres. In addition, its criteria cover the various tasks or the output of scientific and technological research and development activities. As of the date of this report, there are 202 institutions accredited by the SNI. The accreditations are valid for 3 years and after this period, the beneficiaries must undergo the assessment again.

11.2. Open access policy and legal framework

In Panama there is no national policy or legal framework that regulates open access to research results, although there are institutional initiatives and digital infrastructures that facilitate and promote it.

The *National Science, Technology and Innovation Long-Term Policy* mentions open science as a relevant element of the dimensions of change it addresses. However, no further direct reference to either open science or open access is included in the concrete objectives and specific measures to achieve them, either within the *Policy* or within the PENCYT 2019-2024.

In 2022, due to the pandemic, both SENACyT and Panamanian STI organisations highlighted the importance of collaborating on a regulatory framework to establish Open Science initiatives, strategies, policies and programmes at national level.

There are currently technical initiatives aimed at developing the technological infrastructures necessary for the implementation of an open access policy that will serve as an important starting point for a national positioning in this direction. On the one hand, the Access to Scientific Bibliography (ABC) platform³²⁷ is the instrument through which the **SENACyT** actively participates in initiatives with an open science approach, with special emphasis on open access. SENACyT **is developing** an initiative to consolidate the

³²⁴ See <https://www.senacyt.gob.pa/planificacion-estrategica/>

³²⁵ See <http://www.ricyt.org/category/indicadores/>

³²⁶ See <https://sni.senacyt.gob.pa/que-es-el-sni/>

³²⁷ See <https://abc.senacyt.gob.pa/>

National System of Scientific, Technological and Innovative Knowledge Management of Panama through an ecosystem of digital platforms managed by ABC that include: PRICILA, the national aggregator of open access institutional repositories; the construction of a national repository of research data; the portal of national scientific academic journals; CONECTO (VIVO), the curriculum information management system; the negotiation of national licences to commercial scientific academic journals and their centralised access; the national licences for the acquisition of persistent identifiers and publication resources and access to research results related to COVID-19³²⁸.

At the **institutional level**, there are three universities that have developed their own open access policy: Universidad Santa María la Antigua (USMA), Universidad Tecnológica de Panamá (UTP) and Universidad Especializada de las Américas (UDELAS).

Panamá is an active member of **CTCAP** and its political and technical institutions work actively in the coordinated development and implementation of actions in favour of open access.

11.3. Open access digital platforms

Despite not having a national open access policy, Panama has the necessary digital platform infrastructure for the implementation of these policies, the ABC platform. Its main strength is open access repositories.

Repositories

In Panama there are 8 open access institutional repositories of STI entities (universities and research institutions).

The **Portal of Institutional Repositories of Science, Technology and Innovation of Open Literature (PRICILA)**³²⁹ is the national aggregator of open access repositories. It is a tool to promote the dissemination of Panama's scientific and technological production managed by SENACyT through the ABC portal. At the date of this report, it brings together 8 institutional repositories and has more than 3,400 documents in open access³³⁰. PRICILA is the national node of LA Referencia. It guarantees the interoperability of the repositories it harvests through the validation of metadata, applying the standards set by OpenAIRE and applied by LA Referencia.

Furthermore, in 2022 Panama has launched the national research data repository³³¹. At the same time, the country is investing in training librarians, research staff and similar human resources in the skills needed to handle research data management.

³²⁸ See <https://abc.senacyt.gob.pa/ciencia-abierta/>

³²⁹ See <http://pricila.senacyt.gob.pa/vufind/>

³³⁰ LA Reference data. Consulted August 2022.

³³¹ See <https://abc.senacyt.gob.pa/ciencia-abierta/>

Academic Journals

Academic journals in Panama are few and weak. As of the date of this report, SENACyT is in the process of developing a national scientific journal portal. This project, involving collaboration with R&D&I entities, aims to improve the professionalisation of Panamanian national academic journals, strengthen them and improve their internationalisation and indexing³³².

The weakness of Panamanian academic journals is reflected in their indexing data. Latindex catalogue 2.0 contains 29 Panamanian academic journals; there is no Panamanian SciELO node; Redalyc has 2 Panamanian titles, and 5 academic journals are indexed in DOAJ.

Table 11. Number of Panamanian academic journals in Latindex (catalogue 2.0), SciELO, Redalyc and DOAJ

	Latindex (catalogue 2.0)	SciELO	Redalyc	DOAJ
No. of academic journals	29	0	2	5

Source: Compiled by authors, based on data from Latindex, Redalyc and DOAJ. Access date: December 2022.

Access to databases of indexed journals, commercial academic journals, books in digital format and other specialised scientific content is provided through national licenses negotiated and provided by the ABC Platform to the entire scientific and academic community³³³.

Curriculum management systems

In Panama there is a system for storing and searching science and technology profiles, the **CONECTO (VIVO)** system³³⁴. Managed by SENACyT through the ABC platform, CONECTO (VIVO) facilitates collaboration between scientists, students, teachers and society in general and provides access to the scientific trajectory and results of research personnel. The research discovery tool is also designed to facilitate and enhance collaboration between scientists from all disciplines. Information on profiles is shown individually, by organisation and by type of research. It also includes a mapping of capacities at international level. CONECTO (VIVO) is actively promoting the use of persistent identifiers such as ORCIDs³³⁵ among the Panamanian research community.

However, CONECTO (VIVO) is not enabled as a curricular information management tool for use in bidding to public calls for research in Panama. By way of illustration, the public call for the promotion of R&D (FID) 2022³³⁶ and the public call for new researchers and innovators 2022³³⁷ mention in their requirements the submission of a curriculum vitae of research staff and do not ask for the use of CONECTO (VIVO) as standardised CV information tools.

³³² See <https://abc.senacyt.gob.pa/ciencia-abierta/>

³³³ See <https://abc.senacyt.gob.pa/>

³³⁴ See <http://conecto.senacyt.gob.pa/conecto/>

³³⁵ See <https://info.orcid.org/>

³³⁶ See <https://www.senacyt.gob.pa/convocatoria-publica-de-fomento-a-id-fid-2022/>

³³⁷ See <https://www.senacyt.gob.pa/convocatoria-publica-de-nuevos-investigadores-e-innovadores-2022/>

12. Peru



0.17%
R&D
expenditure/GDP*

0.44%
Research staff/EAP
in (0/00)*

157
Institutional
repositories

121
Open access
journals



National OA
policy



OA legal
framework



Institutional OA
policies



National repository
aggregator



National journal
aggregator



Curriculum
management
system

Source: See the [Law regulating the National Digital Repository of Science, Technology and Innovation for Open Access](#).
Data: Compiled by author based on [RICyT](#), [LA Referencia](#), [OpenDOAR](#) and [DOAJ](#).
Note: Data referring to 2020. No. of researchers per thousand of labour force (0/00).

The governance of the national STI system in Peru is regulated by the **Framework Law on Science, Technology and Technological Innovation**, No. 28.303, published in **2004**. The National Science, Technology and Innovation System (SINACTI) was regulated in Law No. 31.250, published in 2021.

Peru had the **first national open access policy** in the LAC region. It is established in **Law No. 30.035**, of **2013**, regulating the National Digital Repository of Science, Technology and Innovation for Open Access.

The National Council for Science, Technology and Innovation (CONCYTEC) is the governing body of the National System of Science, Technology and Innovation (SINACTI) which manages, promotes, coordinates, supervises and evaluates State actions throughout the country in the field of science, technology and technological innovation in general and in open access in particular.



The National Digital Repository of Open Access Science, Technology and Innovation ([ALICIA](#)), is managed by CONCYTEC with the purpose of forming an interoperable national network of digital repositories, offering open access to intellectual assets in STI resulting from public funding.



The [CTel's](#) Virtual Library is an information service provided by CONCYTEC, with the aim of providing the scientific and academic community with access to the full texts of the information resources subscribed by CONCYTEC.



[CTI Vitae](#) contains self-referenced information on the curricula vitae of people declaring themselves to be professionally related to STI work in Peru.



The [Research Information Management System](#) consolidates and manages Peru's scientific and academic information.

12.1. Institutional framework

Governance

The governance of the national STI system in Peru is regulated by the **Framework Law on Science, Technology and Technological Innovation**³³⁸ (Law No. 28.303), published in 2004. It establishes the powers, scope and resources of State action in the field of science, technology and technological innovation and the definition and functions of the different agents that comprise it: the National Science, Technology and Innovation System (SINACTI), the National Science, Technology and Innovation Council (Concytec), the National Fund for Scientific, Technological and Technological Innovation Development (FONDECYT), the National Network of Scientific Information and Telematic Interconnection and the National Consultative Council of Research and Development for Science, Technology and Technological Innovation. It also addresses the role of regional bodies, STI policy and plans and funding and incentives for the system.

The **National Science, Technology and Innovation System (SINACTI)**³³⁹ was further regulated in **Law No. 31.250**³⁴⁰, published in 2021. SINACTI is the functional system under the Executive Authority that includes the public and private bodies that manage the strategic definition, implementation and effective implementation of public policies on science, technology and innovation. SINACTI's priority-setting, policymaking and governance bodies are the Multisectoral Commission for Science, Technology and Innovation, the Consultative Commission for Science, Technology and Innovation and the National Science, Technology and Innovation Council (Concytec).

The **Multisectoral Commission for Science, Technology and Innovation**³⁴¹ is responsible for monitoring and supervising the fulfilment of the objectives of the national STI policy and for issuing technical reports that serve as the basis for decision-making in updating this policy. Its members are senior representatives of the ministries with competences in matters related to research activity³⁴², the President of the National Assembly of Regional Governments and Concytec, which acts as the Technical Administration body.

The **Consultative Commission on Science, Technology and Innovation** advises the Multisectoral Commission on STI and Concytec in identifying and proposing policy options, initiatives and interventions for the development of science, technology and innovation in the country. Its members are 9 professionals of recognised prestige in science, academia, the private sector, civil society and the public sector.

The organisation with senior authority in the governance of the Peruvian STI system is the **National Council of Science, Technology and Innovation (Concytec)**³⁴³. Concytec is a governing body and technical and regulatory authority of SINACTI and is attached to the Presidency of the Council of Ministers. It is responsible for directing, promoting,

³³⁸ See https://transparencia.concytec.gob.pe/images/stories/ley_28303_ciencia_tecnologia.pdf

³³⁹ See <https://conocimiento.concytec.gob.pe/termino/sistema-nacional-de-ciencia-tecnologia-e-innovacion-sinacti/>

³⁴⁰ See <https://busquedas.elperuano.pe/normaslegales/ley-del-sistema-nacional-de-ciencia-tecnologia-e-innovacion-ley-n-31250-1968664-1/>

³⁴¹ See <https://busquedas.elperuano.pe/download/url/decreto-supremo-que-crea-la-comision-multisectorial-de-cienc-decreto-supremo-n-025-2021-pcm-1928760-2>

³⁴² Ministries: Economy and Finance; Production; Agrarian Development and Irrigation; Transport and Communications; Education; Health; Foreign Affairs; Environment; Energy and Mines; Defence; Foreign Trade and Tourism; and Development and Social Inclusion.

³⁴³ See <https://www.gob.pe/concytec>

coordinating, supervising and evaluating State action in STI, guiding the actions of the private sector and promoting and encouraging its development through coordinated and complementary action among the members of SINACYT. Concytec has legal status under public law and its own scientific, administrative, economic and financial autonomy. Law No. 28.613³⁴⁴ determines and regulates its aims, organisation and functions. These are: (1) to direct, coordinate, supervise and evaluate SINACTI; (2) to formulate and update the National Science, Technology and Innovation Policy and submit it to the Presidency of the Council of Ministers for approval; (3) to coordinate its implementation at sectoral and territorial level; (4) to monitor and evaluate its implementation and its results and impacts; (5) to promote, coordinate, supervise and evaluate the actions of the State and private institutions in the field of STI; (6) to manage the National Science, Technology and Innovation Information Network; (7) to promote coordination and cooperation mechanisms among the members of SINACTI at national and international levels; (8) to issue a binding technical opinion on matters under its remit; (9) to propose the allocation of available resources and the incentives system in STI in accordance with the law; (10) to design, arrange, implement and update the national STI registries and repositories; (11) to evaluate the scientific performance of the research staff and of the entities engaged in research activity; (12) to supervise compliance with the legislation on STI, detect infringements and impose the corresponding sanctions within the scope of its remit.

The **National Science, Technology and Innovation Policy (POLCTI)** is the main strategic instrument that guides SINACTI and establishes public action on science, technology and innovation in the country. As of the date of this report, the *National Policy for the Development of Science, Technology and Technological Innovation 2016-2021*³⁴⁵, published by Concytec in coordination with the relevant sectors, is in force. This *Policy* addresses the rationale and importance of public action in this area, analyses the Peruvian situation and establishes the national STI policy, the principles on which it is based, the strategic objectives that should guide the actions of all those involved and the concrete actions to be implemented. Its strategic objectives are: (1) to promote the generation and transfer of scientific and technological knowledge, aligning research results with the needs of the country, which will be defined with the sectors involved; (2) to promote and develop new incentives that stimulate and increase STI activities by the entities of the SINACTI; (3) to promote the generation of duly qualified human capital for STI; (4) to improve the quality levels of research and technological development centres; (5) to generate quality information on the performance of the entities that make up the SINACTI; and (6) to strengthen the institutional framework for science, technology and technological innovation in the country.

At the time of publication of this work, the new policy is being worked on with the participation of universities, public research institutes, regional governments and other SINACTI members. It is expected to be approved soon.

³⁴⁴ See

[https://www2.congreso.gob.pe/sicr/cendocbib/con4_uibd.nsf/A6B512C341DC0BF405257A7600598873/\\$FILE/4LEY_28613_Ley_Consejo_Nacional_Ciencia_TECNOLOG%C3%8DA_INNOVACI%C3%93N_CONCYTEC.pdf](https://www2.congreso.gob.pe/sicr/cendocbib/con4_uibd.nsf/A6B512C341DC0BF405257A7600598873/$FILE/4LEY_28613_Ley_Consejo_Nacional_Ciencia_TECNOLOG%C3%8DA_INNOVACI%C3%93N_CONCYTEC.pdf)

³⁴⁵ See <https://cdn.www.gob.pe/uploads/document/file/1427444/politica-nacional-cti.pdf.pdf>

Research Funding

The **National Programme for Scientific Research and Advanced Studies (PROCIENCIA)**³⁴⁶ is the instrument, managed by Concytec, which collects, manages, administers and channels national and foreign resources to finance SINACYT's research activity. PROCIENCIA replaces the former National Fund for Scientific, Technological and Technological Innovation Development (FONDECYT) and finances the implementation of national and regional STI programmes for scientific research, innovation and technology transfer, scholarships, mobility programmes and scientific events. Its objectives are: (1) to consolidate a critical mass of STI actors and actions; (2) to position Peru's research community among the main world benchmarks; and (3) position itself as a strategic partner at international level. Its resources come from the public budgets of the national and regional governments, the public and private institutions of SINACYT, the Peru-IDB science and technology programme and funds from international cooperation.

The **National Programme for Technological Development and Innovation (PROINNOVATE)**³⁴⁷ co-finances business innovation projects, strengthening of ecosystem institutions, productive development and entrepreneurship and support for internationalisation. To this end, it has at its disposal budget allocations from the FINCYT 3 fund, the Research and Development Fund for Competitiveness (FIDECOM), the Framework Fund for Innovation, Science and Technology (FOMITEC) and the MSME Fund.

Research Performing

Law No. 31.250 establishes the entities conducting STI activity in Peru: (1) Universities; (2) companies; (3) public research institutes; (4) Centres of Productive Innovation and Technology Transfer; (5) regional consortia; (6) all institutions, natural or legal persons engaged in science, technology and innovation activities.

Universities are the entities that carry out and develop the most scientific research activities. In Peru there are 33 public universities, including the National University of San Marcos (UNMSM)³⁴⁸, the National University of Engineering (UNI)³⁴⁹ and the National University of San Agustín de Arequipa (UNSA)³⁵⁰, which are those that carry out the most R&D activity. In addition, there are 44 private universities, including the Cayetano Heredia University (UPCH)³⁵¹ and the Pontificia Catholic University of Peru (PUCP)^{352 353}.

The **public research institutes** are scientific research and technological development entities under the ministries within their sphere of competence and regulated by law. They are identified, authorised and coordinated by Concytec, which also evaluates their performance and is empowered to issue recommendations for their continuous improvement. These are: the National Institute for Agrarian Innovation (INIA)³⁵⁴, of the Ministry of Agrarian Development and Irrigation³⁵⁵; the National Commission for Aerospace

³⁴⁶ See <https://prociencia.gob.pe>

³⁴⁷ See <https://www.proinnovate.gob.pe/>

³⁴⁸ See <https://unmsm.edu.pe/>

³⁴⁹ See <https://www.uni.edu.pe/>

³⁵⁰ See <https://www.unsa.edu.pe/>

³⁵¹ See <https://www.cayetano.edu.pe/cayetano/es/>

³⁵² See <https://www.pucp.edu.pe/>

³⁵³ See <https://www.gob.pe/institucion/sunedu/informes-publicaciones/2824150-iii-informe-bienal-sobre-la-realidad-universitaria-en-el-peru>

³⁵⁴ See <https://www.gob.pe/inia>

³⁵⁵ See <https://www.gob.pe/midagri>

Research and Development (CONIDA)³⁵⁶ and the National Geographical Institute (IGN)³⁵⁷, both of the Ministry of Defence³⁵⁸; the Geophysical Institute of Peru (IGP)³⁵⁹, the Peruvian Amazon Research Institute (IIAP)³⁶⁰, the National Institute for Research on Glaciers and Mountain Ecosystems (INAIGEM)³⁶¹ and the National Service of Meteorology and Hydrology of Peru (SENAMHI)³⁶², of the Ministry of Environment³⁶³; the Peruvian Institute of Nuclear Energy (IPEN)³⁶⁴ and the Geological, Mining and Metallurgical Institute (INGEMMET)³⁶⁵, both of the Ministry of Energy and Mines³⁶⁶; the Peruvian Institute of the Sea (IMARPE)³⁶⁷ and the Technological Institute of Production (ITP)³⁶⁸, of the Ministry of Production³⁶⁹; the National Institute of Health (INS)³⁷⁰, of the Ministry of Health³⁷¹, the National Institute of Telecommunications Research and Training (INICTEL)³⁷².

The **Regional Consortia for Science, Technology and Innovation (CRCTI)** are partnerships formed by SINACTI institutions from one or more regions for joint action such as: (1) development of science, technology and innovation (STI) programmes; (2) equipping laboratories; (3) provision of scientific and technological services; (4) training of high-level researchers; (5) creation and implementation of science and technology parks; (6) scientific communication and scientific dissemination activities; (7) other activities linked to the creation and consolidation of capacities for the generation of scientific knowledge, development of technologies and their incorporation into productive and service activities through innovation.

The **business sector**, both public and private, also conducts research and development activities, although to a lesser extent than other entities. Private institutions include the Industrial Development Centre of the National Society of Industries³⁷³, the municipal business promotion units, the Centre for Services and Technology Transfer of the Pontificia Catholic University of Peru³⁷⁴ and the UNITEC centre of the National University of Engineering³⁷⁵.

³⁵⁶ See <https://www.gob.pe/conida>

³⁵⁷ See <https://www.gob.pe/ign>

³⁵⁸ See <https://www.gob.pe/mindef>

³⁵⁹ See <https://www.gob.pe/igp>

³⁶⁰ See <https://www.gob.pe/iiap>

³⁶¹ See <https://www.gob.pe/inaigem>

³⁶² See <https://www.gob.pe/senamhi>

³⁶³ See <https://www.gob.pe/minam>

³⁶⁴ See <https://www.gob.pe/ipen>

³⁶⁵ See <https://www.gob.pe/ingemmet>

³⁶⁶ Ver en <https://www.gob.pe/minem>

³⁶⁷ Ver en <https://www.gob.pe/imarpe>

³⁶⁸ Ver en <https://www.gob.pe/itp>

³⁶⁹ Ver en <https://www.gob.pe/produce>

³⁷⁰ Ver en <https://web.ins.gob.pe/>

³⁷¹ Ver en <https://web.ins.gob.pe/es>

³⁷² Ver en <https://www.inictel-uni.edu.pe/>

³⁷³ See <https://www.cdi.org.pe/>

³⁷⁴ See <https://www.pucp.edu.pe/cite-materiales/transferencia-tecnologica/>

³⁷⁵ See <https://www.gob.pe/institucion/concytec/informes-publicaciones/1326952-plan-nacional-estrategico-de-ciencia-tecnologia-e-innovacion-para-la-competitividad-y-el-desarrollo-humano-2006-2021>

Research Assessment

The body that evaluates the scientific performance of research personnel in Peru is Concytec, through the **Regulations for the Qualification and Classification and Registration of Researchers of the National System of Science, Technology and Technological Innovation (RENACYT)**³⁷⁶. RENACYT's functions are: (1) to promote the work of scientific, technological and social researchers being conducted within the framework of minimum standards of dedication and quality; (2) to contribute to improved quality and impact on the development of the institutions of the country's scientific, technological and innovation system; (3) to promote the national and international recognition of those conducting research in the country and of Peruvians who research abroad; (4) to encourage the growth of scientific, technological and innovation work from early stages of training; (5) to generate a database providing information on researchers in the country; (6) to manage the registration of SINACYT researchers. RENACYT evaluates and hosts information on Peruvian and foreign research personnel engaged in STI activities in Peru, Peruvians who conduct STI activities abroad and foreigners who do not reside in Peru but have a commitment with a Peruvian entity to conduct STI activities in the country.

RENACYT classifies research personnel into eight different levels based on the score obtained for the following qualifications: academic degree or level of studies, bibliometric indicators of scientific output, patents, teaching and supervision of theses and dissertations. This evaluation work is carried out through a call for qualification, classification and registration in RENACYT, which is permanently open to all research staff at any time of the year.

12.2. Open access policy and legal framework

Peru has a national open access policy underpinned by **Law No. 30.035**³⁷⁷, published in March 2013. This was the first national legislation on open access and institutional repositories published in a LAC region.

This policy focuses on institutional repositories as the essential element for long-term preservation and open access to publicly funded scientific content. All intellectual output within the national territory; or those whose scientific output is supported, totally or partially, with funds or grants from the State, must enter their research results in the National Digital Repository of Science, Technology and Innovation of Open Access, managed by Concytec, or in their institutional repository.

The Law establishes the National Repository as the platform for the long-term storage, maintenance and archiving of the intellectual assets resulting from STI production in the public, private and state-funded sectors. This includes books, publications, journal articles, technical-scientific papers, software, processed data and monitoring statistics, academic theses and the like. This information should be freely and openly accessible, not for profit and without any registration, subscription or payment requirements and must be available to read, download, reproduce, distribute, print, search or link to full text. It is Concytec's responsibility to implement, integrate, standardise, store, preserve and manage the smooth running of the National Repository and to establish and adopt strategies and policies to

³⁷⁶ See <https://resoluciones.concytec.gob.pe/subidos/sintesis/RP-090-2021-CONCYTEC-P.pdf>

³⁷⁷ See <https://alicia.concytec.gob.pe/normativas/>

guarantee open access to STI output, promote its use and adoption and provide technical assistance to the actors that make up SINACYT.

Up to 68³⁷⁸ Peruvian universities and research centres have their own **institutional open access policy**. This is one of the requirements for institutions to be harvested by ALICIA.

12.3. Open access digital platforms

Repositories

The National Repository is called **ALICIA (Open Access to Scientific Information)**³⁷⁹. It is Peru's national aggregator that centralises all digital information resulting from STI output generated with public funds or financed by the State. As of the date of this report, ALICIA currently offers access to more than 580,000 texts from 180 institutional repositories, mostly from Peruvian universities.

The regulations of ALICIA's functions were published in 2015 (Supreme Decree No. 006-2015-PCM)³⁸⁰. It contains a comprehensive glossary of technical terms related to open access and establishes the mandatory application of storage, archiving and open access to state-funded intellectual assets in STI. It also creates the National Network of Open Access Digital Repositories of Science, Technology and Innovation (RENARE)³⁸¹, a network of institutional repositories of public sector bodies whose purpose is to foster collaborative

³⁷⁸ These are National Meteorology and Hydrology Service of Peru - SENAMHI, Ministry of Education - MINEDU, National Forestry and Wildlife Service - SERFOR, Geophysical Institute of Peru - IGP, National Institute of Agrarian Innovation - INIA, Institute of Peruvian Studies - IEP, National Institute for the Defense of Competition and Protection of Intellectual Property - INDECOPI, Peruvian Amazon Research Institute - IIAP, National Water Authority - ANA, Peruvian Sea Institute - IMARPE, Catholic University Santo Toribio Mogrovejo - USAT, University of Sciences and Humanities - UCH, University of Sciences and Arts of Latin America - UCAL, National University of the Peruvian Amazon - UNAPIQUITOS, Neumann Business School S.A.C., Postgraduate School Neumann Business School S.A.C., EP NEUMAN, - EP NEUMAN, Faculty of Pontifical and Civil Theology of Lima - FTPCL, University of Engineering and Technology - UTEC, University of Lima - ULIMA, University of San Martín de Porres - USMP, University of the Pacific - UP, ESAN University, Female University of the Sacred Heart - UNIFÉ, José Carlos Mariátegui University - UJCM, National Agrarian University of the Jungle - UNAS, National Agrarian University of La Molina - UNALM, National University of Cajamarca - UNC, National University of Education Enrique Guzmán y Valle - UNE, National University of Moquegua - UNAM, National University of Piura - UNP, National University of San Agustín - UNAS, National University of San Antonio Abad del Cusco - UNSAAC, National University of Ucayali - UNU, National University Federico Villarreal - UNFV, National University Mayor de San Marcos - UNMSM, National University Pedro Ruiz Gallo - UNPRG, National University Santiago Antúnez de Mayolo - UNASAM, Peruvian University Cayetano Heredia - UPCH, Peruvian University Los Andes - UPLA, Peruvian University Union - UPEU, Private University Antenor Orrego - UPAO, Private University of Tacna - UPT, University San Pedro - USP, University Señor de Sipán - USS, Technological University of Peru - UTP, National System of Evaluation, Accreditation and Certification of Educational Quality - SINEACE, Group of Analysis for Development - GRADE, Ministry of Culture - MINCUL, Peruvian University of Applied Sciences - UPC, Andean University of Cusco - UAC, Continental University - UCONTINENTAL, University Le Cordon Bleu - ULCB, National University José María Arguedas - UNAJMA, National University of Jaén - UNJ, National University of Barranca - UNAB, National University of Trujillo - UNITRU, Catholic University San Pablo - UCSP, National University of Juliaca - UNAJ, Technological University of the Andes - UTEA, Postgraduate School Gerens S. A.C. - GERENS, Environmental Evaluation and Control Agency - OEFA, National University of Callao - UNAC, Private University of Huancayo Franklin Roosevelt - UR, National Superior School of Dramatic Art - ENSAD, National University San Luis Gonzaga of Ica - UNICA, University of Piura - UDEP, National University of Tumbes - UNT, National University Jorge Basadre Grohmann - UNJBG, and Scientific University of the South – UCSUR.

³⁷⁹ See <https://alicia.concytec.gob.pe/>

³⁸⁰ See <https://alicia.concytec.gob.pe/normativas/>

³⁸¹ See <https://alicia.concytec.gob.pe/renare/>

work among its members to promote open access, use and preservation of information and knowledge in science, technology and innovation.

Concytec supports Peruvian STI entities in the creation and maintenance of their open access institutional repositories, establishes the minimum quality and interoperability requirements that they must fulfil and comply with the law.

Under a collaboration agreement established between Concytec and the National Superintendence of University Higher Education (SUNEDU), the National Register of Research Work (RENATI) collects theses and academic work leading to an academic degree or professional title from ALICIA. RENATI contains institutional repositories holding the degree works of Peruvian universities, documentation and publications of universities that have ceased their activity, works of institutions that are implementing their institutional repository and publications of degrees of Peruvian research personnel obtained abroad.

Moreover, **Concytec's institutional repository**³⁸² is created to host and allow free access to Concytec's institutional scientific output, improve visibility and guarantee the preservation of its scientific information. This repository is also available to researchers who have nowhere to store their research results if their institution does not have its own repository.

Concytec's institutional repository allows access to information through communities and collections, such as research projects, research results (articles, books, advanced studies, etc.), authors, organisations and funding sources.

Academic Journals

In Peru there is no national policy to support national scientific academic journals, although ALICIA includes academic journals in institutional repositories in its validation and collection services. SciELO Peru³⁸³ is managed by CONCYTEC.

Peruvian academic journals have a significant presence in Latindex, with 192 academic journals in catalogue 2.0, in SciELO Peru, with 42 indexed titles and in Redalyc, with a total of 38 academic journals. Likewise, Peru has a total of 121 academic journals indexed in the International Directory of Open Access Journals (DOAJ).

Table 12. Number of Peruvian academic journals in Latindex (catalogue 2.0), SciELO, Redalyc and DOAJ

	Latindex (catalogue 2.0)	SciELO Peru	Redalyc	DOAJ
No. of academic journals	192	42	38	121

Source: Compiled by the authors based on data from Latindex, SciELO, Redalyc and DOAJ. Date of consultation: December 2022.

³⁸² See <https://repositorio.concytec.gob.pe/>

³⁸³ See <http://www.scielo.org.pe/>

Curriculum management systems

CTI Vitae³⁸⁴ is a tool managed by Concytec that registers the self-referenced curricular information of people who declare themselves to be professionally linked to the STI field in Peru (as of the date of this publication, 279,419 people are registered).

CTI Vitae connects with various sources of information, allowing information such as academic degrees to be imported from the National Superintendence of University Higher Education (SUNEDU), data imports from the National Registry of Identification and Civil Status (RENIEC)³⁸⁵, scientific publications registered in ALICIA, publications in WoS and Scopus, as well as the ORCID identifier of research staff. In addition, the tool allows participation in Concytec calls for proposals through PROCENCIA, access to the Virtual Library and researcher classification through the National Registry of Science, Technology and Technological Innovation (Renacyt). Finally, CTI Vitae has the option of exporting the full or summarised curriculum information in different formats and to connect the data with other information sources such as ALICIA and RENACYT.

The **National Register of Science, Technology and Technological Innovation (RENACYT)**³⁸⁶ contains the list of Peruvian research personnel³⁸⁷. As of the date of this report, CTI Vitae has a total of 7,659 research personnel profiles with links to their CTI Vitae sheets³⁸⁸.

PeruCRIS³⁸⁹ is the national *Current Research Information System*, which consolidates and manages the scientific and academic information of Peru. PeruCRIS is managed by Concytec and validates the information sent by SINACTI entities. It contains five directories: human talent, institutions, scientific output, projects and infrastructures. At the date of this report, it displays validated information from 11,008 researchers, 196 institutions and 687 projects. This information can be displayed or downloaded via csv, txt, json or via an API.

³⁸⁴ See <https://ctivitae.concytec.gob.pe/>

³⁸⁵ See <https://www.gob.pe/reniec>

³⁸⁶ See <https://ctivitae.concytec.gob.pe/renacyt-ui/#/registro/investigadores>

³⁸⁷ See <https://servicio-renacyt.concytec.gob.pe>

³⁸⁸ See <https://ctivitae.concytec.gob.pe/renacyt-ui/#/registro/investigadores>

³⁸⁹ See <https://perucris.pe>

13. Uruguay



0.45%
R&D
expenditure/GDP*

1.78%
Research
staff/EAP in (0/00)*

7
Institutional
repositories

33
Open access
journals
acceso abierto



National OA
policy



OA legal
framework



Institutional OA
policies



National repository
aggregator



National journal
aggregator



Curriculum
management
system

Source [aNI portal](#) and [timbó portal](#).

Data: Compiled by author based on [RiCyT](#), [LA Referencia](#), [OpenDOAR](#) and [DOAJ](#).

Note: Data referring to 2020. No. of researchers per thousand of labour force (0/00).

Governance of the national STI system in Uruguay is regulated by **Law No. 18.084**, enacted in **2006**.

Uruguay **does not have a national open access policy** though the National Agency for Research and Innovation (ANII) and the **Udelar** have **open access mandates**, both referred to publicly funded publications.

Public digital infrastructures are in place to implement open access policies: institutional repositories, OA diamond journals and a national platform for curriculum data management.

SILO

REPOSITARIOS
ABIERTOS DE CIENCIA Y
TECNOLOGÍA

[SILO](#) is Uruguay's national open access repository system for science and technology. Created by ANII in 2019, it brings together the results of research and development activities collected by the open access repositories of member institutions and provides data to regional and global aggregators, thanks to the adoption of common policies, standards and protocols.



The Uruguayan Association of Academic Journals ([AURA](#)) was set up officially in 2015 with the presence of Latindex and SciELO, and with the support of ANII. 93% of AURA journals are published in open access by academic institutions, professional associations or public bodies.

CVUY

[CVUY](#) is the national platform of curricular data of research personnel that contributes to the maintenance and permanent updating of standardised and validated information on Uruguay's human capital in the scientific field. The curricular information of CVUY users is used by national institutions for academic purposes.

13.1. Institutional framework

Governance

Governance of the national STI system in Uruguay is regulated by **Law No. 18.084**³⁹⁰, enacted in 2006.

The **Ministry of Education and Culture (MEC)**³⁹¹ is responsible for promoting and coordinating the science, technology and innovation policy and for putting knowledge at the service of national and local development. This work is carried out through the **Directorate for Innovation, Science and Technology (DICYT)**³⁹², the body responsible for the design, coordination and evaluation of innovation, science and technology policies at national level.

The **National Council for Innovation, Science and Technology (CONICYT)**³⁹³ is the advisory and consultative body to the Executive and Legislative powers in matters of science, technology and innovation. It is made up of representatives of the government, academia and the productive sector. Its functions are: (1) to propose strategic lines, plans and instruments on science, technology and innovation policies to the Ministry of Education and Culture; (2) to promote and stimulate the development of research in all areas of knowledge; (3) to promote actions to strengthen the National System of Science, Technology and Innovation; (4) to propose the regulation of the different funds in which the MEC participates and of the Selection Committees and to supervise their operation; (5) to approve and revise, when necessary, the resolutions of the projects financed by the MEC; (6) to propose technical commissions and evaluators for the evaluation process of the projects.

STI policy is coordinated through the 2010 **National Strategic Plan for Science, Technology and Innovation (PENCTI) of 2010**.³⁹⁴ This Plan was drawn up by the Ministerial Cabinet for Innovation³⁹⁵, which consists of various ministries and currently comprises the Ministerial Cabinet for Productive Transformation and Competitiveness, with the collaboration of CONICYT. As of the date of this study, Uruguay is starting to discuss the basis for a new PENCTI³⁹⁶. In 2021, the Ministry of Education and Culture did this by launching four public³⁹⁷³⁹⁸ consultation calls to: (1) analyse the existing regulations in science, technology and innovation policies and activities in Uruguay, with the aim of identifying possible overlaps and gaps and to evaluate incentives and disincentives; (2) characterise the actors and their capacities in the science, technology and innovation system in Uruguay; (3) analyse the resources and instruments for the promotion of science, technology and innovation, public and private investment in R&D&I and the stimulus and support instruments applied in the last 10 years and evaluate the concrete impact of the support and stimulus programmes surveyed and the overall impact of investment in R&D&I;

³⁹⁰ See <https://www.impo.com.uy/bases/leyes/18084-2006>

³⁹¹ See <https://www.gub.uy/ministerio-educacion-cultura/>

³⁹² See <https://www.gub.uy/ministerio-educacion-cultura/direccion-innovacion-ciencia-tecnologia>

³⁹³ See <https://www.conicyt.gub.uy/>

³⁹⁴ See <https://www.anii.org.uy/institucional/documentos-de-interes/23/plan-estrategico-nacional-de-ciencia-tecnologia-e-innovacion-pencti/>

³⁹⁵ See <http://museohistorico.gub.uy/innovaportal/v/32994/2/mec/gabinete-ministerial-de-la-innovacion>

³⁹⁶ See <https://www.conicyt.gub.uy/pencti>

³⁹⁷ See <https://www.gub.uy/ministerio-educacion-cultura/comunicacion/convocatorias/reordenamiento-institucional-area-ciencia-tecnologia-innovacion>

³⁹⁸ See <https://www.gub.uy/ministerio-educacion-cultura/comunicacion/convocatorias/consultorias-c3yc4-ciencia-tecnologia-innovacion>

(4) analyse the operation of the science, technology and innovation system in Uruguay and express some general principles for a new institutional design.

Research Funding

At national level, the **National Agency for Research and Innovation (ANII)**³⁹⁹ is the government body that funds research in Uruguay through open calls for proposals. Created by law 18.084 in 2006, it makes funds available to the public for research projects, national and international postgraduate scholarships and incentive programmes for innovative culture and entrepreneurship, in both public and private sectors.

At institutional level, the **Sectoral Commission for Scientific Research (CSIC)**⁴⁰⁰ of the University of the Republic (UdelaR) is the main funding body in Uruguay. Its purpose is the comprehensive promotion of research in all areas of knowledge at the University of the Republic and, to this end, implements funding programmes to stimulate and strengthen research at institutional level. It only funds projects of the University of the Republic itself.

Research Performing

The agents for the execution of research activity in Uruguay are universities and non-university research institutes.

The university sector consists of 2 public universities, 5 private universities and 8 university institutes. The most noteworthy of these institutions is the **UdelaR**⁴⁰¹, a public university responsible for the production of approximately 80% of the country's knowledge (Aguirre-Ligüera, Maldini and Fontans, 2020) and where 89.5% of the country's students' study (data from the Statistical Yearbook of Education 2019).

There are also four non-university sectoral research institutes attached to the ministries within their areas of expertise: the National Institute for Agricultural Research (INIA)⁴⁰², under the Ministry of Agriculture and Fisheries, the Clemente Estable Biological Research Institute (IIBCE)⁴⁰³, under the Ministry of Education and Culture, the Technological Laboratory of Uruguay (LATU)⁴⁰⁴, under the Ministry of Energy and Minerals and the Uruguayan Antarctic Institute (IAU)⁴⁰⁵ which reports to the Ministry of Defence. Finally, the Institut Pasteur de Montevideo⁴⁰⁶, dedicated to scientific research in biological medicine, is a private non-profit foundation created through an agreement between the Institut Pasteur de Paris, the UdelaR and the Ministries of Health, Education and Culture and Economy and Finance. The Institute has been in operation since 2007 and is part of the International Network of Pasteur Institutes.

³⁹⁹ See <https://www.anii.org.uy>

⁴⁰⁰ See <https://www.csic.edu.uy>

⁴⁰¹ See <https://udelar.edu.uy/portal/>

⁴⁰² See <http://www.inia.uy/>

⁴⁰³ See <https://www.gub.uy/ministerio-educacion-cultura/politicas-y-gestion/instituto-clemente-estable>

⁴⁰⁴ See <https://www.latu.org.uy/>

⁴⁰⁵ See <http://www.iau.gub.uy>

⁴⁰⁶ See <https://pasteur.uy/>

Research Assessment

The **ANII** is the government body that coordinates the evaluation of research activity in Uruguay through the National System of Researchers (S.N.I.)⁴⁰⁷, created in 2007. The S.N.I. is responsible for the periodic evaluation and coordination of the system of financial incentives for research personnel. Its objectives are: (1) to strengthen, expand and consolidate the scientific community; (2) to identify, periodically evaluate and categorise all researchers who conduct research in the national territory or who are Uruguayans working abroad; (3) to establish a system of economic support that stimulates dedication to the production of knowledge in all areas through peer review.

13.2. Open access policy and legal framework

In Uruguay there is no national open access policy for scientific publications and research data declared as such, nor is there a specific legal framework to support such a policy. The 2010 National Strategic Plan for Science, Technology and Innovation did not include open access to scientific content among its guiding principles or objectives. However, at institutional level there are concrete initiatives and mandates of great relevance that directly promote the depositing in open access of publicly funded research results.

The Udelar launched the first initiative in favour of open access in Uruguay through the research project "Institutional repository model as an alternative for the social, scientific and technological development of the country". This initiative aimed to (1) determine the communication model used by Uruguayan researchers to communicate their research results; (2) determine the availability, ease of access and level of copyright clearance of academic papers published in academic journals by Uruguayan researchers; (3) analyse institutional policies for the communication and management of publicly funded research results; and (4) propose a repository model based on open access. Its two most notable results were identifying the absence of national and institutional policies for open access to scientific knowledge (Aguirre-Ligüera, Maldini and Fontans, 2020) and the development of a narrative that defended the need to develop a model of open access institutional repositories in the country⁴⁰⁸. In 2014, the Udelar created its open access institutional repository, COLIBRI⁴⁰⁹ and made it compulsory for all teaching and research staff and students writing theses and final projects to submit their research work in open access⁴¹⁰.

Meanwhile, in 2019, the **ANII** published its open access regulation⁴¹¹ which establishes that grant recipients must deposit scientific publications in open access, funded by the Agency through research, innovation or grant projects, in the repository of their institution or the institution responsible for the project and that the repository must be part of the national aggregator of open access repositories, SILO. It allows a maximum embargo of 12 months and links the final payment of the grant to the fulfilment of the self-archiving obligation. Despite not having the status of law and not being supported by political declarations, this mandate has had a huge impact as a mechanism to encourage open access among research staff.

⁴⁰⁷ See <https://sni.org.uy/>

⁴⁰⁸ See https://repositoriosuruguay.wordpress.com/proyecto_id/

⁴⁰⁹ See <https://www.colibri.udelar.edu.uy/jspui/>

⁴¹⁰ See <https://www.colibri.udelar.edu.uy/jspui/Documentos/Ordenanza-aprobada.pdf>

⁴¹¹ See <https://www.anii.org.uy/institucional/documentos-de-interes/30/reglamento-de-acceso-abierto/>

Despite this progress, Uruguay has not yet addressed research data management. The open access mandates of the ANII and UdelaR do not take them into consideration and there are no digital platforms for their deposit, curation and long-term preservation. Meanwhile, administrative data has been targeted by a National Action Plan for Open Government, published in 2012, which facilitated Uruguay's accession to the International Open Data Charter and the creation of the National Catalogue of Open Data⁴¹² which provides access to more than 2,000 open data sets of public agencies, academia, civil society organisations and private companies and to applications developed using them⁴¹³ (Prieto, 2022).

As of the date of this report, Uruguay is in the process of developing its national open science guidelines.

13.3. Open access digital platforms

Repositories

Since the construction of **COLIBRI**, other universities and university institutes have developed their own institutional repositories.

Also, as part of building the national infrastructures necessary for the implementation of open access mandates, ANII created SILO⁴¹⁴, the **National System of Open Access Repositories of Science and Technology of Uruguay** that promotes access and visibility of scientific and technological production at the national level. SILO is the national aggregator of institutional repositories that contributes to the correct adoption of common interoperability policies, protocols and standards. SILO also enables the coordination of actions and the adoption of plans, programmes and projects related to open access to national scientific production (Fernández, 2019). As of the date of this report, it aggregates a total of 8 open access institutional repositories and is working on adding another 6⁴¹⁵. It hosts 8,612 documents in open access, more than 70% of which are from the UdelaR. More than 50% of these are bachelor's and master's theses, 22% are academic articles and the rest are other type of documents such as technical reports, books, etc. SILO has been the national node of LA Referencia since 2018.

Academic Journals

In Uruguay OA diamond academic journals published by universities, research institutes and other non-profit organisations are predominant.

In 2015 the Uruguayan Association of Academic Journals (AURA)⁴¹⁶ was formed. Latindex and SciELO Uruguay play a key role in AURA. The objectives of this association are to foster, strengthen, support, encourage and promote the coordinated and cooperative publication of national academic journals in all knowledge areas, in accordance with ethical principles and standards of editorial and scientific quality and to strengthen the dynamic community of publishers and managers of academic publications through the

⁴¹² See <https://catalogodatos.gub.uy/>

⁴¹³ See <https://catalogodatos.gub.uy/about>

⁴¹⁴ See <https://snrd-ti.anii.org.uy/>

⁴¹⁵ See <https://snrd-ti.anii.org.uy/vufind/Content/repos>

⁴¹⁶ See <https://aura.edu.uy/>

professionalisation and recognition of the editorial task. To this end, AURA fosters dialogue between authors and the public, maintains collaborative links with national and foreign academic journals, agencies and organisations, manages the national licensing for the award of long-lasting identifiers and offers specialised training in long-lasting identifiers and good publishing practices. As of the date of this report, AURA has 65 associated journals. Only 3 of these academic journals are published by commercial publishers under the subscription access model and the rest are published in open access by academic institutions, professional associations, or public bodies. In 2019, AURA signed its members up to AmeliCA (López Jordi et.al. 2022).

Uruguayan academic journals have a significant presence in Latindex, with 43 journals in catalogue 2.0, Uruguay, with 25 indexed titles, Redalyc, with a total of 11 academic journals and DOAJ with SciELO a total of 32 Uruguayan academic journals.

Table 13. Number of Uruguayan academic journals in Latindex (catalogue 2.0), SciELO, Redalyc and DOAJ

	Latindex (catalogue 2.0)	SciELO Peru	Redalyc	DOAJ
No. of academic journals	45	27	12	33

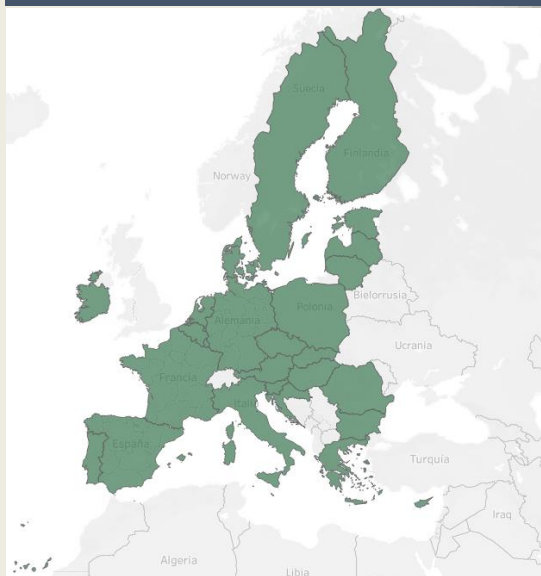
Source: Compiled by the authors based on data from Latindex, SciELO, Redalyc and DOAJ. Access date: December 2022.

Curriculum management systems

As part of the construction of the National System of Researchers, the ANII provides the CVUy service⁴¹⁷, the national platform of curricular data of research personnel that contributes to the maintenance and permanent updating of standardised and validated information on Uruguay's human capital in the scientific field. As of the date of this report, it has data on more than 10,000 Uruguayan professionals and academics, whose curricular information is used by national institutions for academic and research purposes.

⁴¹⁷ See <https://cvuy.anii.org.uy/>

14. European Union



2.32%
R&D
expenditure/GDP*

9.18%
Research staff/EAP
in (0/00)*

1,364
Institutional
repositories

5,218
Open access
journals



Regional OA
policy



OA legal
framework



Institutional OA
policies



Regional repository
aggregator



Regional journal
aggregator



Curriculum
management
system

Data: Compiled by the authors on the basis of [Eurostat](#), [OECD](#), [OpenDOAR](#) y [DOAJ](#).
Note: Data referring to 2020 (EU27). No. of researchers per thousand of labour force (0/00).

The EU is an economic and political union of 27 Member States with specific competences in science and technology. The institutions responsible for STI policy are the **European Commission** and the **Council of the European Union**.

The EU's **first open access policy** was launched in **2010**. Since then, there has been a **succession of mandates** with an **increasing scope of action** and ever **higher standards**.

The European Commission has been at the forefront of open access policies in the EU based primarily on the inclusion of increasingly demanding self-archiving obligations in institutional or thematic repositories for the beneficiaries of the Framework Programmes. To facilitate the fulfilment of these mandates, it has put in place a number of platforms and services: OpenAIRE, EOSC and ORE. Europass is similar to curriculum management systems in other countries, although it is not part of the digital fabric of the open access policy.



OpenAIRE is the European aggregator of open access scientific content. It provides support services to the research community, project managers, repository managers and public decision-makers. OpenAIRE promotes open scholarly communication and improved accessibility, reusability, reproducibility, and monitoring of research results.



EOSC is an ecosystem for the production, analysis, curation, long-term preservation, and reuse of research data. Its final aim is to provide European researchers, innovators, companies, and citizens with a federated and open multidisciplinary environment where they can publish, find, and reuse data, tools and services for research, innovation and education purposes.

Open Research Europe

ORE is a free, open access publishing platform for the publication of all types of research results funded by H2020 and HE. It is a voluntary tool that facilitates compliance with open access mandates and provides an immediate publication venue under open science conditions. It is contracted by the EC to the publisher F1000.

14.1. Institutional framework

The EU has a strong leadership role in identifying public problems and designing science STI policies, both its own, through the successive Framework Programmes for funding scientific research and technological development activity and those of its Member States. Thanks to its supranational character with specific competences in science and technology and responsible for the proper administration of a huge budget for this purpose, it has emerged as the leading body in the definition of open access policies, attached to those of open science since 2017.

Governance⁴¹⁸

The European Union (EU) is a supranational entity that brings together 27 European countries in a strong economic and political union. These countries are Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain and Sweden. The EU was founded after World War II as a purely economic union. From then until today, it has developed into an organisation covering many different policy areas⁴¹⁹, including public action for scientific research, technological development and innovation. The institutional framework of the European Union consists of seven institutions: (1) the European Parliament; (2) the European Council; (3) the Council of the European Union; (4) the European Commission; (5) the Court of Justice of the European Union; (6) the European Central Bank; and (7) the Court of Auditors. Of these institutions, the role of the Council of the European Union and the European Commission are noteworthy as essential bodies in the design and implementation of STI policies at EU level.

The **Council of the European Union**⁴²⁰, usually known as the **Council**⁴²¹, is the institution of the European Union in which the Member States are represented at ministerial level to adopt laws and coordinate policies. The Council of the European Union takes decisions on European legislation jointly with the European Parliament. Ministers meet in different configurations depending on the topic to be discussed. When the Council brings together ministers from all Member States responsible for the portfolios of trade, economy, industry, research and innovation or space, it is called the **Competitiveness Council**⁴²². The Council of the EU negotiates and adopts not only legal acts but also documents, such as conclusions, resolutions and declarations, which have no legal effect. The Council uses these formats to express a political position on an issue related to EU policy areas. These documents only establish political commitments or positions and are not legally binding. In research, innovation and space, the Council regularly uses *conclusions* to outline the **concrete actions to be undertaken** by both the Community institutions and the by the Member States and to set out the objectives to be achieved.

⁴¹⁸ See <https://eur-lex.europa.eu/>

⁴¹⁹ Customs; agriculture; humanitarian aid and civil protection; trade; competition; culture; human rights and democracy; development and cooperation; education, training and youth; employment and social affairs; enterprise and industry; energy; taxation; research and innovation; justice and fundamental rights; environment; single market; foreign and security policy; regional policy; health; food safety; and transport.

⁴²⁰ See <https://www.consilium.europa.eu/es/council-eu/>

⁴²¹ It should not be confused with the European Council, a Community institution that brings together the Heads of State and Government of the Member States to promote the general political action of the European Union, nor with the Council of Europe, an international organisation of a regional nature that is distinct from and outside the European Union.

⁴²² See <https://www.consilium.europa.eu/es/council-eu/configurations/compet/>

The **European Commission**⁴²³ is a politically independent body of the EU, which represents its common interests and is its main executive body. It is the sole body responsible for drafting proposals for new European legislation and for implementing the decisions of the European Parliament and the Council. **Its role is to** look after the general interests of the Union by proposing and checking that legislation is complied with and implementing EU policies and the EU budget.

Research Funding

The **European Commission** is the institution responsible for funding STI activities in the EU. To this end, it has the multiannual financial instrument known as the Framework Programme for Research and Development, aimed at financing actions and areas considered strategic for the EU and/or where isolated actions by the Member States are insufficient or less effective than in transnational collaboration. Since its inception to date there have been a total of 9 Framework Programmes whose geographical scope and budget have been steadily growing (see table 14).

Table 14. European Union research funding programmes

Programme	Abbreviation	Period	Budget (In K million €)
First Framework Programme	FP1	1984–1987	3.3
Second Framework Programme	FP2	1987–1991	5.4
Third Framework Programme	FP3	1990–1994	6.6
Fourth Framework Programme	FP4	1994–1998	13.2
Fifth Framework Programme	FP5	1998–2002	14.9
Sixth Framework Programme	FP6	2002–2006	19.3
Seventh Framework Programme	FP7	2007–2013	55.8
Horizon 2020	H2020	2014–2020	80
Horizon Europe	HE	2021–2027	95.5

Source: Compiled by the authors based on data from the European Commission.

Horizon Europe⁴²⁴, the Framework Programme for the period 2021-2027, is a funding instrument for STI activities, mostly implemented through competitive calls. It has a structure based on three pillars, a cross-cutting axis and two complementary programmes (European Defence Fund⁴²⁵ and EURATOM⁴²⁶). Pillar I, called Excellent Science, funds frontier research projects designed and led by researchers through the European Research Council (ERC)⁴²⁷. It also encourages the mobility of researchers and their integration in companies through the Marie Skłodowska-Curie actions and promotes the development of research infrastructures. Pillar II, called Global Challenges and European Industrial

⁴²³ See https://ec.europa.eu/info/index_en

⁴²⁴ See https://www.horizonteeuropa.es/sites/default/files/noticias/Gu%C3%ADa%20del%20participante%20-%20Horizonte%20Europa%20web_0.pdf

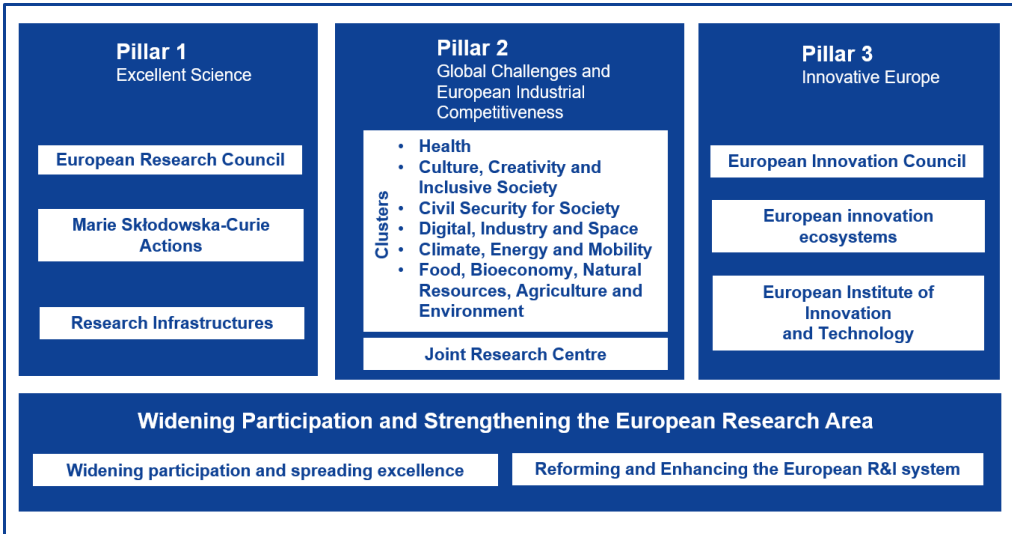
⁴²⁵ See https://ec.europa.eu/info/funding-tenders/find-funding/eu-funding-programmes/european-defence-fund_es

⁴²⁶ See https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/euratom-research-and-training-programme_en

⁴²⁷ See <https://erc.europa.eu/>

Competitiveness, funds research and generation of new knowledge and technology for societal challenges, strengthens industrial technological capacities with the aim of increasing the competitiveness of European industry (especially SMEs) and establishes missions with ambitious objectives oriented towards major global challenges with a high impact on citizens (health, climate change, renewable energies, mobility, security, digital, materials, etc.). Pillar III, called Innovative Europe, aims to make Europe a pioneer in creating innovative markets and growing innovative SMEs through the European Innovation Council (EIC)⁴²⁸, an institution that supports leading innovators, entrepreneurs, SMEs and scientists with ambitions to grow internationally and the European Institute of Innovation and Technology (EIT)⁴²⁹, an institution that fosters the integration of research, higher education and entrepreneurship through *Knowledge and Innovation Communities* (KICs). These three pillars are underpinned by a horizontal axis, called Widening Participation and Strengthening the European Research Area (ERA), dedicated to assisting Member States in their efforts to develop their national research and innovation potential, especially those with lower STI performance in STI, to improve their participation in Horizon Europe.

Figure 7. Outline of the Horizon Europe programme



Source: European Commission.

The types of actions funded through Horizon Europe are: (1) Research and Innovation Actions (RIA); (2) Innovation Actions (IA); (3) Coordination and Support Actions (CSA); (4) Innovation and Market Deployment actions (IMDA); (5) Training and Mobility Actions (TMA); (6) Pre-Commercial Procurement Actions (PCP); (7) Public Procurement of Innovative Solutions Actions - PPI; (8) Program Co-Financing Actions (CoFund); (9) Prizes; (10) Framework Partnership Agreements (FPAs); and (11) Specific Grant Agreements (SGAs).

⁴²⁸ See https://eic.ec.europa.eu/index_en

⁴²⁹ See <https://eit.europa.eu/>

Research Performing

The implementing entities of the STI activity in the EU are all those eligible to apply to Horizon Europe. I.e., universities, research centres, technology or technology transfer centres, enterprises, public administrations, natural persons, European Economic Interest Groupings (EEIGs), international organisations of European interest and Community bodies established in an EU or Associated Member State⁴³⁰ or in third countries whose profile meets the eligibility and eligibility conditions set out in the calls.

Europe has approximately 5,000 higher education institutions, 17.5 million higher education students, 1.35 million higher education teachers and 1.17 million researchers⁴³¹. It also has more than 5,000 research centres⁴³². To be eligible as beneficiaries of the Horizon Europe programme, the implementing entities of STI activity must form consortia of at least three legal entities, independent of one another, each established in a different EU Member State or Horizon Europe Associated country, with at least one entity belonging to the EU. The only exceptions to this rule are single-beneficiary actions (ERC, EIC, Marie Skłodowska-Curie, prizes and some CSAs) and Pre-commercial or Innovative Public Procurement actions, for which at least two public purchasers are required, each established in a different Member or Associated State and with at least one of them belonging to the EU.

Research Assessment

Scientific merit at curriculum level in the EU is evaluated by executive agencies, that implement the Horizon Europe programme⁴³³.

The **Research Executive Agency (REA)**⁴³⁴ is the largest European executive agency. It evaluates most of the proposals submitted for Horizon Europe funding: under Pillar I, the Marie Skłodowska-Curie actions and the research infrastructure programme; under Pillar II, the actions of the Culture, Creativity and Inclusive Society cluster, the Civil Security for Society cluster, the Promotion of Agricultural Products cluster, the Food, Bioeconomy, Natural Resources, Agriculture and Environment cluster; and all actions under the Widening Participation and Strengthening the European Research Area programme and the Coal and Steel Research Fund. Within these programmes, the only single-beneficiary programme involving curricular scientific performance measurement is the Marie Skłodowska-Curie programme, designed to fund research and innovation projects that boost the careers of top researchers through mobility and innovative doctoral and postdoctoral training.

The **European Research Council Executive Agency (ERCEA)**⁴³⁵ evaluates the research proposals competing in the ERC's single-beneficiary grants: *Starting grants*, *Consolidator grants* and *Advanced grants*, as well as in *Synergy grants*, which allow for up to four different beneficiaries.

⁴³⁰ These are: Albania, Bosnia and Herzegovina, Faroe Islands, Former Yugoslav Republic of Macedonia, Liechtenstein, Moldova, Armenia, Georgia, Montenegro, Serbia, Turkey, Ukraine and Tunisia.

⁴³¹ See https://ec.europa.eu/commission/presscorner/detail/es/IP_22_365

⁴³² See <https://research.webometrics.info>

⁴³³ CINEA – European Climate, Infrastructure & Environment Executive Agency; EISMEA – European Innovation Council and SMEs Executive Agency; ERCEA – European Research Council Executive Agency; HaDEA – European Health and Digital Executive Agency; REA – Research Executive Agency

⁴³⁴ See <https://rea.ec.europa.eu/>

⁴³⁵ See <https://erc.europa.eu/>

14.2. Open access policy and legal framework

The **Council of the European Union** has consistently declared its strong support for open access and open science policies through its conclusions, which have been drawn up in coordination with the Commission's actions. In 2016, the **Council Conclusions of 27 May on the Transition to an Open Science System**⁴³⁶ recognised that open science offers the potential to enhance the quality, impact and benefits of science and to accelerate the progress of knowledge by helping to make it more reliable, efficient and accurate, more understandable to society and better suited to addressing societal challenges. In this document, the Council establishes the semantic perimeter of the concept of open science, calls for the results of publicly funded research to be made as openly available as possible and advocates the optimal re-use of research data. It also argues that the assessment of scientific quality should be extended to also measure the influence of science on society as a whole, rather than emphasising a set of indicators based on the impact of academic journals and the number of citations of publications and it encourages the Commission, Member States and stakeholders to continue to develop and implement initiatives to improve the quality of their assessment and review systems. This message is reinforced in the **Council conclusions on Accelerating the Circulation of Knowledge in the EU**⁴³⁷ of 29 May 2018 and in the **Council Conclusions on Governance of the European Research Area**⁴³⁸ adopted on 30 November 2018, which stress the importance of developing open access and open science policies through the Framework Programmes and the need to implement an open science policy aimed at improving the recognition and reward mechanisms for research staff. In the **Council Conclusions on the New European Research Area**⁴³⁹ of December 2020, the conclusions include a specific section on open science, highlighting that widespread open access to research publications and data plays a crucial role in boosting the impact, quality, efficiency, transparency and integrity of R&I, encouraging the Commission, Member States and stakeholders to support and implement open science practices in their research reward and evaluation systems and recognising that bibliodiversity, multilingualism and recognition of all scientific output is an important element of an open science policy in the ERA. Subsequently, in the **Council Conclusions on Deepening the European Research Area**⁴⁴⁰ of 28 May 2021, the focus is directed at the need to change the systems for assessing scientific merit towards a new model that goes beyond publication and citation measurement and takes account of research excellence, teaching and skills, impact, services to society, open science practices, team science, mobility, management and leadership skills, entrepreneurship and collaboration with industry, among others. All these developments have crystallised in the **Conclusions of the Council on Research Assessment and Implementation of Open Science**⁴⁴¹, adopted on 10 June 2022, which make an open and detailed case for the need to change the system of recognition of research merit and how to do so and include a novel approach to open access and open science by arguing the need for a European approach to capacity building for the publication and communication of research results and for developing multilingualism in European scholarly publishing. The Council Conclusions welcomed the European initiative which has launched a dialogue with stakeholders at European level in order to collect views on research assessment systems and which aims to facilitate the establishment of a broad coalition of stakeholders willing to develop and implement changes. The *Agreement on Reforming Research Assessment* was made public in July

⁴³⁶ See <https://data.consilium.europa.eu/doc/document/ST-9526-2016-INIT/es/pdf>

⁴³⁷ See <https://data.consilium.europa.eu/doc/document/ST-9507-2018-INIT/es/pdf>

⁴³⁸ See <https://data.consilium.europa.eu/doc/document/ST-14989-2018-INIT/es/pdf>

⁴³⁹ See <https://data.consilium.europa.eu/doc/document/ST-13567-2020-INIT/en/pdf>

⁴⁴⁰ See <https://www.consilium.europa.eu/media/49980/st09138-en21.pdf>

⁴⁴¹ See <https://www.consilium.europa.eu/media/56958/st10126-en22.pdf>

2022 and is open for signature to organisations from across the world at the Coalition for the Advancement of the Research Assessment (COARA)⁴⁴² platform.

In terms of actual implementation, in 2010, the **European Commission** launched the first pilot initiative to promote open access through its research funding programmes. Beneficiaries of the 7th **Framework Programme** grants in seven specific areas⁴⁴³ contained the so-called *special clause* 39. This clause obliged researchers participating in these projects to make every effort to publish the results of their research in an open access repository. The obligation affected approximately 20% of the budget financed by the EC in FP7. This pilot crystallised in **Horizon 2020**⁴⁴⁴ as a mandate for all beneficiaries of the new framework programme across all actions and all areas. The H2020 grant agreement⁴⁴⁵ included the obligation to deposit, as soon as possible and at the latest on publication, a machine-readable electronic copy of the published version or the final peer-reviewed manuscript accepted for publication, in a repository for scientific publications. Beneficiaries were also required to ensure open access, via the repository, to the deposited publication on publication (if an electronic version was available for free via the publisher) or within six months of publication (twelve months for the humanities and social sciences) in any other case. In addition, H2020 beneficiaries should also aim at depositing the data underlying the publications at the same time in order to ensure the reproducibility of the results. For the rest of the research data generated in the projects, from 2017 onwards, all H2020 beneficiaries had to produce a data management plan and make it "as open as possible and as closed as necessary" unless they opted out of the Open Research Data Pilot.

As a complement to its actions as a funding agency, on 25 April 2018 the European Commission adopted the ***Recommendation on access to and preservation of scientific information***⁴⁴⁶. In this document, the EC urges Member States to establish and implement clear policies for: (1) the dissemination of and open access to scientific publications from publicly funded research; (2) the management of data resulting from publicly funded research; (3) strengthening the preservation and re-use of scientific information (publications, datasets and other research results); (4) the development of the infrastructures supporting the system enabling access to, preservation and re-use of scientific information and to promote their federation within the European Open Science Cloud (EOSC); (5) improvements in the capacities and competencies of researchers and staff of academic institutions in scientific information; (6) adjustment to the recruitment and performance evaluation system for researchers, the evaluation system for the award of research grants and the evaluation system for research organisations; (7) participation in multilateral dialogues on the transition to open science at national, European and international level on the issues outlined in the document; (8) designation of a national contact, whose tasks will be to coordinate the measures contained in the Recommendation and to act as the EC's interlocutor on matters relating to access to and preservation of scientific information; (9) reporting to the EC eighteen months after the publication of the document and every two years thereafter, on the measures taken to comply with the Recommendation.

⁴⁴² See www.coara.eu

⁴⁴³ Energy, Environment (including Climate Change), Health, Information and Communication Technologies (Cognitive Systems, Interaction, Robotics), Research Infrastructures (e-Infrastructures), Science in Society, Socio-Economic Sciences and Humanities.

⁴⁴⁴ See https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-2020_en

⁴⁴⁵ See https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/amga/h2020-amga_en.pdf

⁴⁴⁶ See <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32018H0790>

The European Commission redoubled its commitment with the open access policy in the development of **Horizon Europe (HE)**⁴⁴⁷. In this new Framework Programme, the concept of open science is introduced and given a high profile through three channels. Firstly, HE contains programmes with specific calls to fund STI actions with open science as an object of study. This is the case for the calls dedicated to the construction of the EOSC under the Research Infrastructures programme (Pillar I) and for some calls under the horizontal axis Widening Participation and Strengthening the European Research Area. Secondly, HE makes open science practices the new paradigm under which researchers who apply for one of its calls for proposals must work. Proposals to be submitted are required to include a description about open science practices within the excellence section that would be subject for evaluation. Finally, open science provisions to peer-reviewed scientific publications emanating from the projects at the project execution stage under HE grant agreement conditions are more demanding than under H2020 grant agreement conditions. Immediate open access is now required, and embargo periods are no longer accepted. To this end, beneficiaries are required to maintain sufficient intellectual property rights to comply with the open access mandate. Articles must be deposited in a trusted repository and open access provided to them under CC-BY or an equivalent licence and open access to monographs provided via repositories under CC BY-NC, CC BY-ND or equivalent licences. Metadata must be published under a CC 0 licence. All work shall contain **information on other research results, tools and instruments** necessary to validate the results obtained. Research data must be managed according to FAIR principles (findable, accessible, interoperable and reusable) and, to this end, a data management plan will need to be associated with it.

The most recent of the European Commission's actions in favour of open access has been the publication of the document ***European Research Area and Policy Agenda 2022-2024***⁴⁴⁸. The concept of the European Research Area (ERA) was launched in 2000 and responds to the ambition of the EU institutions to create a single, borderless market for research, innovation and technology across the EU that helps countries to be more effective together, by aligning their R&D policies and programmes and embracing the free movement of researchers and knowledge. This document sets out the concrete actions to be implemented by the EC in the period 2022-2024 to advance the construction of the ERA. These actions target four priority areas: (1) deepening a fully functioning internal market for knowledge; (2) taking up together the challenges of the dual ecological and digital transition and increasing society's participation in the ERA; (3) widening access to excellence in research and innovation across the Union; (4) promoting concerted research and innovation investments and reforms. Within the first of these priority areas, the EC commits to specific actions related to open science: facilitating open knowledge sharing and re-use of all research results beyond academic publications; developing the European Open Science Cloud (EOSC); proposing a research-friendly EU legislative and regulatory framework for copyright and data; and moving towards reform of the research evaluation system, both individual and institutional merit assessment, to align it with open science principles and thus improve its quality, performance and impact.

⁴⁴⁷ See https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en

⁴⁴⁸ See https://ec.europa.eu/info/sites/default/files/research_and_innovation/strategy_on_research_and_innovation/documents/ec_rtd_era-policy-agenda-2021.pdf

14.3. Open access digital platforms

Repositories

The open access policy implemented by the European Commission through FP7, H2020 and HE relies on open access institutional or thematic repositories as essential elements of its implementation. To ensure the existence of a sufficiently extensive and technologically sound network of repositories, the EC launched **OpenAIRE**⁴⁴⁹ (*Open Access Infrastructure Research for Europe*), a technology and service infrastructure set up in 2009 to support, accelerate and measure the successful implementation of European open access policies for scientific publications and research data. OpenAIRE was born as a *Coordination and Support Action* (CSA) funded by FP7 for the period 2009-2012 and has continued without interruption, thanks to the fact that it has obtained funding throughout different competitive calls for funding scientific infrastructures launched by FP7 and Horizon 2020⁴⁵⁰. Originally, its main objective was to be the European aggregator of open access repositories hosting all the scientific output generated the projects funded by the Framework Programmes. It is currently a legal entity in the form of a non-profit civil association that promotes open scholarly communication and the improvement of accessibility, reusability, reproducibility and monitoring of research results, including data, from any scientific discipline and subject area. It does so by providing researchers, librarians, repository managers and public decision-makers with numerous technological tools and services for repository management, infrastructure interoperability and research data management needed to design, implement and comply with open access and open science mandates.

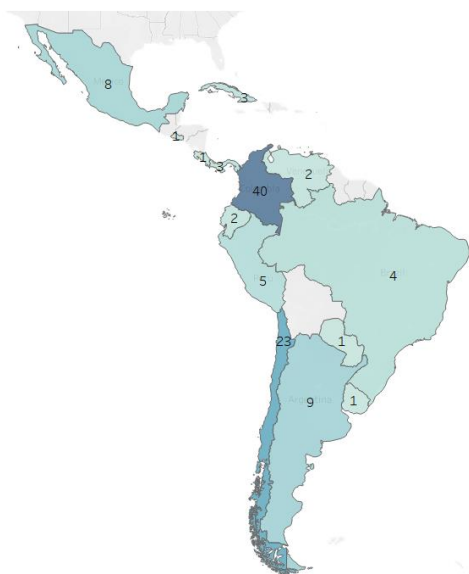
As of the date of this report, OpenAIRE aggregates information from 5,677 literature repositories, 3,945 data repositories, 98,522 open access journals and 131 aggregators, including LA Referencia.⁴⁵¹ OpenAIRE provides access to 142 million publications, 17 million research datasets and 300,000 software developments from 110,000 different information sources and 177,000 organisations. OpenAIRE holds scientific information from fourteen countries in Latin America (see figures 8-10): Argentina, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Mexico, Panama, Paraguay, Peru, Uruguay and Venezuela. The total number of Latin American repositories collected is 103.

⁴⁴⁹ See <https://www.openaire.eu/>

⁴⁵⁰ OpenAIRE has been built through the following projects: (1) *OpenAIRE – Open Access Infrastructure Research for Europe* (2009-2012). Funding programme: FP7-INFRASTRUCTURES-2009-1. Number of partners: 38 (2) *OpenAIREplus – 2nd Open Access Infrastructure Research for Europe* (2012-2014). Funding programme: FP7-INFRASTRUCTURES-2011-2. Number of partners: 40 (3) *OpenAIRE2020 – 3rd Open Access Infrastructure Research for Europe* (2015-2018). H2020-EINFRA-2014-2015/H2020-EINFRA-2014-1 funding programme. Number of partners: 50 (4) *OpenAIRE Advance – OpenAIRE Advancing Open Scholarship* (2018-2020). H2020-EINFRA-2016-2017/H2020-EINFRA-2017 funding programme. Number of partners: 48.

⁴⁵¹ See <https://explore.openaire.eu/>

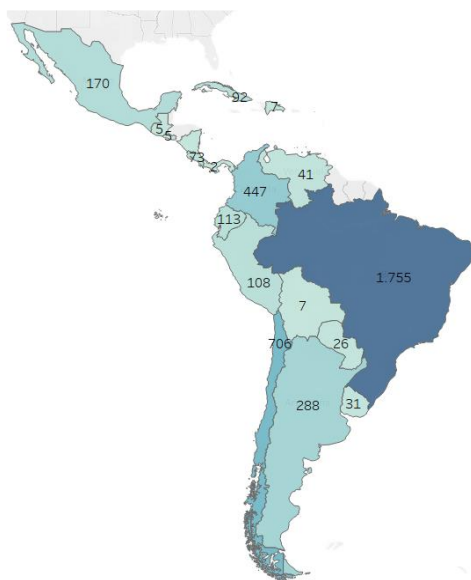
Figure 8. Number of repositories collected by OpenAIRE



Note: Repository or aggregator

Source: Compiled by the authors based on OpenAIRE data.

Figure 9. Number of Journal archives collected by OpenAIRE



Source: Compiled by the authors based on OpenAIRE data.

Among the services offered by OpenAIRE is **Zenodo**⁴⁵² Operated by CERN⁴⁵³, Zenodo is a multidisciplinary repository that hosts all kinds of documentary materials and results of research and academic activities conducted by any researcher, from any institution.

Regarding research data management, the **European Open Science Cloud (EOSC)**⁴⁵⁴ is a digital ecosystem for hosting and processing research data in support of EU science. Launched in 2016 and under construction as of the date of this report, it aims to provide European researchers, innovators, businesses and citizens with a pooled and open multidisciplinary environment where they can publish, find and reuse data, tools and services for research, innovation and education purposes. EOSC has been defined as a 'process' (Budroni et. al. 2019) which aims to change the unit of communication of research results from scientific articles to data. To date, progress has been made on the architecture for pooling new and pre-existing infrastructures, on standards to ensure compliance with FAIR principles, on designing the services to be provided to the 1.7 million European researchers, on access mechanisms, on interfaces, their rules of participation and their governance (Budroni et. al. (2019). Once established, value-added services will be developed, ranging from display and analysis to long-term preservation of information or monitoring the adoption of open science practices. . The EOSC is currently in its phase II of implementation (2021-2030). Its development is one of the 20 priority actions within the ERA policy agenda 2022-2024. It is expected that its full deployment will lead to increased research productivity, new knowledge and innovations, as well as greater reproducibility and confidence in science. The EC is building the EOSC through three main actions: (1)

⁴⁵² See <https://zenodo.org/communities/openaire/?page=1&size=20>

⁴⁵³ European Organization for Nuclear Research. See <https://home.cern/>

⁴⁵⁴ See <https://eosc-portal.eu/>

research projects funded by the H2020 research infrastructure programme calls⁴⁵⁵ and Horizon Europe, (2) the EOSC Partnership⁴⁵⁶, formed in July 2020 with more than 200 partner institutions; (3) co-programming actions between the EC and Member States.

Academic Journals

Academic journals have not been included as elements of the implementation of EC open access policies. Both H2020 and HE establish that the final destination of publicly funded scientific publications is institutional or thematic repositories, both for works published in open access journals and for those published in subscription access journals.

Open Research Europe (ORE)⁴⁵⁷ is a free, open access publishing platform funded by the European Commission for the publication of research arising from H2020 and HE projects in all thematic areas. The platform makes it easier for beneficiaries who use it voluntarily to comply with open access conditions and provides them with a publication venue where they can share all their results immediately. It was procured through a €5.8m public tender for 4 years, launched in 2018, which was won by the F1000 publishing company. ORE makes it possible to publish preprint versions of articles and all research results produced on projects, beyond publications (software code, research data, methodologies, protocols, reports, etc.). All work is published in open access under a CC-BY licence, publication and peer review processes are open and transparent and, where appropriate, authors are asked to include detailed descriptions of methods and provide full and easy access to the underlying data. ORE aims to be an alternative to commercial academic journals, not an alternative to repositories. Peer reviewed papers published in ORE are automatically sent to Zenodo.

Recently, both the Council and the Commission have turned their attention to the so-called **diamond publishing venues**. In Europe, open access journals that do not charge for processing articles are mostly published by the publication services of public research organisations and are often published in the languages of each member state. To try to protect them and improve their solvency and long-term sustainability, the EC has launched support initiatives through the Widening Participation and Strengthening the European Research Area programme, which includes the project **Developing Institutional Open Access Publishing Models to Advance Scholarly Communication (DIAMAS)**. This initiative, scheduled to run from September 2022 to September 2025, aims to provide the research community with an aligned, high quality and sustainable scholarly communication ecosystem capable of implementing open access as a standard publication practice across the ERA. This is expected to substantially increase the capacity of institutions to provide innovative, valid, reliable and accessible open access publishing services, while taking account of the specific needs of different scientific communities across disciplines, countries and languages.

EU Member States, aggregated, have a significant representation in DOAJ, with 5,218 titles. However, not all countries contribute journals to the other databases. In Latindex there are only journals from Spain, with 882 titles and from Portugal, with 45 (in total, 927). The same countries are the only ones contributing journals to SciELO: Spain contributing 44 journals, all of them in bio-health and Portugal contributing 61 (in total, 105). The geographical representation in Redalyc is broader: there is 1 journal from Germany, 1 from Denmark, 174 from Spain, 1 from Italy, 1 from Poland and 19 from Portugal (197 in total).

⁴⁵⁵ The EC has invested €252.4 million through the INFRAEOSC programme of Horizon 2020.

⁴⁵⁶ See <https://eosc.eu/>

⁴⁵⁷ See <https://open-research-europe.ec.europa.eu/>

Table 15. Number of European Union academic journals in Latindex (catalogue 2.0), SciELO, Redalyc and DOAJ

	Latindex (catalogue 2.0)	SciELO	Redalyc	DOAJ
No. of academic journals	927	105	197	5,218

Source: Compiled by the authors based on data from Latindex, SciELO, Redalyc and DOAJ. Access date: December 2022.

Curriculum management systems

The European Union does not have an integrated research information system for managing researchers' the curricular data.

Europass curriculum vitae⁴⁵⁸, created in 2004, is a common and standardised model of curriculum vitae that facilitates the search for employment in the countries of the European Union (Member States, countries of the European Economic Area and EU candidate countries). Still, this tool was not designed and is not used as an implementation element of open access or open science policies. Its aim is to establish a model curriculum to facilitate the mobility of workers – not researchers – throughout the European Union. As of the date of this study, Europass has more than four million registered users and by 2021 it had accumulated a total of 23 million visits to its portal.

⁴⁵⁸ See <https://europa.eu/europass/es>

15. COMMON CHALLENGES BETWEEN LATIN AMERICA AND THE CARIBBEAN AND THE EUROPEAN UNION

For the proper design of open access policies, the actors involved in the research funding, performing, communication and assessment of scientific activity must be perfectly coordinated. The challenges faced by LAC and EU countries are similar since the shift towards the open science paradigm subjects all STI systems to equal magnitude evolutionary pressures. These have been tackled differently in each region, given the differences in the configuration of each regional ecosystem.

The Latin American and Caribbean countries have an average R&D expenditure of 0.65%⁴⁵⁹ of their Gross Domestic Product. For their part, the 27 countries that make up the European Union spend an average of 2.32% of their GDP on R&D⁴⁶⁰. In terms of human resources, the 11 LAC countries have 2.2⁴⁶¹ researchers per 1,000 economically active population, while the 27 EU countries have 9.18⁴⁶² researchers per 1,000 EAP. These data show that each of the regions is, at aggregate level, in a different order of magnitude in addressing STI policies.

Homogenous STI governance systems

All LAC countries in this study, with the sole exception of Brazil, define their science, technology and innovation systems through a law with varying dates of enactment and scope. The most advanced **legal frameworks** establish the governance of national ecosystems, create and restructure the different institutions that form them, regulate their mission, list their functions, structure administrative hierarchical relationships between them and assign responsibilities. In the case of the EU, the legitimacy to act in the field of R&D&I is established in the founding treaties and there is no legal framework that explicitly clarifies the institutional framework that operates in this field.

Governance and strategic decision-making are led at the highest political level. In Argentina, Brazil, Chile, Colombia, Costa Rica, El Salvador and Uruguay and in the EU, this is at ministerial rank. The main problems faced by these countries are political instability, high turnover of decision-makers and implementing staff and the lack of state policies that prioritise STI activity. At a second level, all countries except Costa Rica, El Salvador and the EU have **advisory** bodies that sometimes also carry out planning and control tasks. In addition, some countries such as Argentina, Brazil, Chile, Colombia, Ecuador and Mexico also have entities whose mission is the regional and sectoral **coordination** of R&D&I and actions. This function is also carried out by the Council of the European Union.

LAC countries and the EU define action to promote STI through an official document known as the **Plan, Strategy o Policy**, as appropriate. These are multi-year planning instruments in which governments argue the basis for their policies, reflect the priorities of their public action and define strategies to achieve them.

In most cases, they also have a specific agency under the relevant ministries responsible for governance, whose role is to **implement and execute** STI policies. These are:

⁴⁵⁹ Source: Compiled by the author based on RICyT data.

⁴⁶⁰ Source: OECD.

⁴⁶¹ Source: Compiled by the author based on RICyT data.

⁴⁶² Source: OECD.

CONICET in Argentina; CNPq in Brazil; ANID in Chile; the Innovation and Research Promotion Agency in Costa Rica; SENECYT in Ecuador; CONACyT in El Salvador; CONACyT in Mexico; SENASCYT in Panama, CONCYTEC in Peru and ANII in Uruguay. In Colombia, it is the Minciencias itself and in the EU, it is the European Commission that carries out this work.

All of them also have specific research **funding** programmes, although in some cases there is a lack of continuity in public calls for proposals and uneven coverage in the different types of R&D&I support programmes. While the range of EC funding programmes is very broad and increasingly funded, not all LAC countries maintain minimum stability in their calls for proposals, nor do they call for actions related to all areas requiring support and promotion (training of research personnel, research projects, scientific infrastructures, networks or innovation actions, to cite a few examples). It is also noteworthy the importance of international cooperation funds for funding STI activities. In the case of Argentina, Chile, Costa Rica, Ecuador, El Salvador, Mexico, Panama, Uruguay and the EU, the main research funding agents are the entities responsible for the implementation and research performing of STI policies, i.e. CONICET, ANID, the Costa Rican Innovation and Research Promotion Agency, SENESCYT, CONACyT, CONACyT SENASCYT, ANII and the EC respectively. However, other research funding agencies exist in these and other LAC countries and in the EU and it is common for universities to play this role as well, especially in Central American countries.

In terms of **implementation**, the LAC countries have an important network of public and private universities, among which the public universities are renowned for their teaching quality and implementation of R&D activities. In addition, 9 of the 11 countries analysed - Argentina, Brazil, Chile, Costa Rica, Ecuador, El Salvador, Mexico, Peru and Uruguay - have a population of public sectoral research centres, in most cases under the Ministries responsible for their areas of specialisation (health, energy, geology, mining, agriculture, water, fisheries, etc.). On its part, the EU does not directly manage universities and research centres, as these belong to the member states in which they are located, although it has the capacity to influence them indirectly through its research funding programmes.

Regarding **research assessment** systems, most LAC countries have scientific performance evaluation systems in place for their teaching and research staff, either through direct evaluations of individual work or through institutional evaluations. In the case of Argentina, Ecuador, Mexico, Panama, Peru and Uruguay, the entities that carry out the evaluation work are the same as those responsible for the implementation and performing of STI policies. For its part, the EU does not directly assess curricular merits in an isolated manner, but always in the framework of the research proposals under evaluation.

Both the European and Latin American and the Caribbean regions have launched multilateral cooperation initiatives to modify their research assessment evaluation systems and align them with the open science principle. These are CoARA and CLACSO-FOLEC respectively, whose aims are the same.

Significant presence of open access to academic literature initiatives in LAC aligned with the European policy

All the LAC countries analysed, except Ecuador, have developed open access initiatives. The more advanced countries have national policies (Argentina, Chile, Colombia, Mexico and Peru), some of them with a legal base. Argentina, Mexico, Peru have specific laws with robust mandates expressed through Law No. 26.899 on Open Access Institutional Digital Repositories of 2013, the Decree Law of 2014 reforming the Law on Science and Technology and the Organic Law of the National Council of Science and Technology and Law No. 30.035 regulating the National Digital Repository of Science, Technology and Innovation of Open Access, published in 2013, respectively. Although they do not have the status of law, Chile and Colombia also have strong national open access policies within their open science strategies, both published in 2022 by ANID and Minciencias respectively. EU policy, implemented at the time of writing through the Horizon Europe programme, contains a robust mandate towards immediate self-archive of academic literature and FAIR research data that affects all recipients of European public research funding.

On the other hand, Brazil, Costa Rica, El Salvador, Panama and Uruguay have only institutional policies yet. Despite the lack of national initiatives, their universities and some research performing organizations have specific mandates affecting their students and researchers thus encouraging them to deposit their research outputs in their institutional repositories.

Ecuador have specific policy statements and public action narratives promoting open access and open science through which they maintain concrete actions that do not constitute a policy but do establish the basis for its design and further development.

All open access policies either recommend or require self-archiving of publicly funded scientific outputs in open access repositories. In this respect, their academic literature open access policies are fully in line with the European policy. However, their formal design, scope and level of demand are highly variable. The Chilean policy stands out as the only one that admits in national open access journals publication as a valid venue for compliance with the open access mandate, as an alternative to self-archive in repositories.

Regarding research data, only Argentina, Chile, Colombia and Peru include them in their initiatives' scope for the promotion of open access, although none of these countries have developed specific infrastructures for data archiving beyond national or institutional repositories. This situation contrasts with the major commitment made by the EU to build a comprehensive ecosystem for the production, curation, archive, and long-term preservation of research data through the EOSC.

There are regional initiatives whose objective is to collaborate in the deployment of actions in favour of open access that involve the governments of LAC countries, such as LA Referencia and CTCAP. However, no evidence has been found of bilateral cooperation relationships in this area among LAC countries.

A solid network of interoperable open access repositories

All LAC and EU countries analysed in this study have an extensive network of open access repositories that ensures sufficient coverage to facilitate the implementation of the mandates. In some countries there are funding agency repositories, in others there are national repositories, in others there are sectoral repositories, and all have institutional

repositories. In addition, the Zenodo repository is broadly used in the EU to host research publications, data and other digital objects from all over the world. Except for Chile, each LAC country has at least one content aggregator and all have a national node representing them in LA Reference. Its metadata validation service is based on the OpenAIRE standard. This makes LAC repositories and European repositories interoperable through LA Referencia.

Some LAC countries have national policies for financial support and technical services to repositories, while in others the support comes exclusively from the institutions to which they are attached. In terms of content, the quantity and nature of the documents deposited varies widely. Some are populated almost exclusively with doctoral theses and master's theses, while others are dominated by research articles. The quality of the hosted records is also very uneven, as in many cases the platforms do not have the capacity to assign persistent identifiers to the work that they store. The situation in the EU is similar. There is no systematic and direct financial support to European repositories from Horizon Europe and the content they host is not subject to any completeness check by the EC. The greater financial capacity of European universities and research centres means that the payment of licensing fees to providers for the allocation of persistent identifiers is covered and therefore repositories offer this service.

Very uneven support for academic journals

The non-commercial open access model based on diamond academic journals is the one that characterises LAC countries outside their borders. SciELO and Redalyc are pioneering initiatives that have had a major impact on the scholarly communication market in the region and in which Spain and Portugal are actively participating. However, the strength and impact of these actions have not led to diamond journals being included in open access policies (except for Chile), nor have they received the strong support from governments that might be expected. Only Brazil, Chile, Colombia and Mexico are of note for the support they provide to the diamond academic journals published by their publishing services. This takes the form of public calls for financial support, national quality assessment systems, public platforms for academic publishing based on open source software, training for publishers, centralised management of services such as ISSN, national licences to provide persistent identifiers and leadership as nodes of SciELO and Redalyc. Argentina, Costa Rica and Uruguay also give formal support to journals, albeit with fewer resources and fewer services. By contrast, El Salvador and Panama do not have a policy line of support for their academic journals, nor do they have SciELO and Redalyc nodes. Except for Chile, none of the LAC countries analysed have targeted incentives for research staff to publish in diamond academic journals and all have maintained licences for access to commercial scientific resources (journals, books, bibliographic reference databases). The result has been that, paradoxically, a strong non-commercial open access knowledge communication market has developed in the region without the necessary incentives to effectively re-engage authors, users and assessment agencies.

For its part, the past EU open access policies have not addressed academic communication market directly. None of its institutions negotiates access to scientific resources, nor does it provide financial support services or technological support of any kind to diamond academic journals, beyond the actions that its member states may carry out in their own national context. This situation has changed with the launching of ORE and of the DIAMAS initiative.

Almost total coverage of systems for curriculum information management.

All the LAC countries analysed, with the sole exception of Costa Rica, have national curriculum information management systems. These are CVAr in Argentina, CV Lattes in Brazil, the Researcher's Portal in Chile, CvLAC in Colombia, REDI in Ecuador, REDISAL in El Salvador, CVU in Mexico, CONECTO (VIVO) in Panama, CTI Vitae in Peru and CVUy in Uruguay. In some countries, these platforms are used to manage applications for public R&D grants and, in those countries where they are more advanced, they are interoperable with other scientific information systems.

In the case of the EU, it is of note that the Europass curriculum has not been designed and is not conceived as an element of implementation of open access policies, despite the potential of curriculum information management platforms to facilitate the implementation of open science policies.

Conclusion

The 11 LAC countries analysed in this study have nominally consistent and homogeneous governance systems. All of them have capacity to develop policies that change research funding schemes, delivery environments, communication markets and research evaluation pathways. This report shows a high penetration of open access policies, all based on scholarly literature deposit in open access repositories and hardly address the management of research data, a robust network of national and institutional repositories and almost complete coverage of curricular information management systems. It also shows the existence of highly relevant regional initiatives for the promotion of academic journals, that nevertheless receive very uneven levels of recognition and support from national open access policies.

Latin America and the Caribbean play a leading role in community based, non-commercial open access initiatives. Their lower percentage of investment in STI has facilitated the development of innovative solutions based on non-commercial models in which repositories, journals and curricular information management systems are based on open software platforms and offer alternative means of communication and access to research results to the mainstream channels.

For its part, the EU has a complex but well-oiled governance that emulates quite successfully the institutions involved in the decision-making and research funding schemes of national STI systems though its lack of direct control over the research institutions of its member states. The EU has devoted considerable efforts to developing a strong open science policy and has made this paradigm one of the fundamental principles of Horizon Europe, the European Union Framework Programme for Research and Innovation for the period 2021-2027. The EU's open access policy is based on a strong economic investment for the creation of large infrastructures research data ecosystem of all areas of knowledge, for the construction of a common governance system, and for ensuring its long-term sustainability through EOSC. In addition, it has strengthened the role of open access repositories through the obligations of its funding programs' beneficiaries and, so far, has shown less interest in the other open access digital infrastructures analysed in this report: scholarly journals and curriculum management systems.

The LAC and EU regions share a common framework of understanding about open science and have developed initiatives strongly aligned with each other, despite the differences in their respective contexts. Both faced the original challenge of providing open access to the society to scientific outputs through declarations, mandates and open access policies

based on digital infrastructures and, recently, both have understood that public action should broaden its scope towards open science and focus on new challenges such as the advancement of research assessment mechanism. This common endeavour provides with a fertile ground and an optimistic framework for collaboration.

The strong alignment of the policies of both regions, the growing attention and support that the EU is giving to community-driven and non-profit open access initiatives, and the opportunity to share policies and infrastructures for research data management bring a suitable space for mutual learning and bi-regional cooperation in open science. The goal is achieving a successful development of the EU-LAC Common Research Area.





Next chapter includes recommendations for policy action to advance in the engagement between the EU and Latin America and the Caribbean on addressing common challenges, move towards mutual learning, and achieve a complementarity of approaches and actions in open access actions between the two regions. These are considered particularly relevant and timely to activate the dialogue and articulate cooperation between the two regions in the field of open access. Actions pursue four main objectives:

- O1. Strengthen the governance and financing of STI systems in LAC.
- O2. Expand the coverage of open access policies in LAC.
- O3. Strengthen open science digital infrastructures in both regions.
- O4. Create research assessment systems aligned with open science principles in both regions.



16. RECOMMENDATIONS FOR POLICY ACTION

The ultimate goal of this work is to provide essential information to activate the open access dialogue between LAC and the EU and to promote an effective collaboration that manages, on the one hand, to overcome the main differences between the two regions and, on the other hand, to design a common agenda to address the new challenges posed by open science. To this end, this last chapter provides a series of recommendations for political action structured around the 4 priority objectives, broken down into 7 actions and articulated in 19 specific measures. For each of them, a time frame is suggested, and the target actors have been identified: the LAC countries at the national level, the LAC countries and the EU, or the LAC region as a whole and the EU.



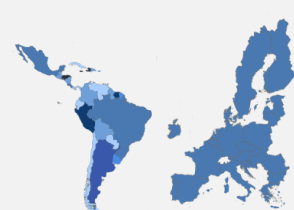

Table 16. Recommended goals, actions and measures

O1. Strengthen the governance and the financing of STI systems in LAC.		
Actions	Actors	Time frame
<p>A1. Spreading good practices in LAC countries.</p> <p>M1. Ongoing interregional initiatives should be strengthened and articulated for this action to be included in their agendas.</p> <p>M2. LAC countries will ensure continuous, realistic, concrete and committed strategic planning for STI, with coverage between legislature periods.</p>		<p>Short term</p> 
<p>A2. Guaranting the regularity, the economic sustainability and the scope of research funding programmes in LAC countries.</p> <p>M3. Existing funding programmes will be supported and strengthened.</p> <p>M4. Funding programmes will be extended to cover all areas requiring support and promotion: research staff training, research projects, scientific infrastructures, networks and innovation actions, to cite a few examples.</p>		<p>Short term</p> 

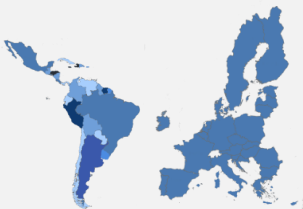



O2. Expand the coverage of open access policies in LAC.

Actions	Actors	Time frame
<p>A3. Developing open access policies in those LAC countries that do not yet have them. These policies will:</p> <p>M5. Be coherent with those of the rest of the LAC region and with the EU.</p> <p>M6. Address FAIR management of research data.</p>		<p>Medium term</p> 

O3. Strengthen open science digital infrastructures in both regions.

Actions	Actors	Time frame
<p>A4. Funding non-commercial, open source repositories, diamond journals and curriculum management systems.</p> <p>M7. The EU and LAC will create public calls specifically aimed at developing, sustaining, improving coverage and strengthening interoperability of digital infrastructures.</p> <p>M8. The EU will include LAC countries in all funding calls for for this purpose.</p>		<p>Medium term</p> 
<p>A5. Jointly seeking political, technical and technological solutions for digital infrastructures. These solutions will:</p> <p>M9. Involve LAC countries in European infrastructures such as EOSC and ORE.</p> <p>M10. Promote the implementation of open source software based non-commercial digital platforms.</p> <p>M11. Support diamond open access journals.</p> <p>M12. Promote multilingualism in scientific communication.</p> <p>M13. Extend the use of non-commercial and decentralised metadata standards and persistent identifiers.</p>		<p>Medium term</p> 

O4. Create research assessment systems aligned with open science principles in both regions.

Actions	Actors	Time frame
<p>A6. Creating institutional research assessment systems aimed at the promotion of open science. These systems will:</p> <p>M14. Require open access mandates compliance to all scientific outputs to be assessed.</p> <p>M15. Include all research outputs such as data, software, protocols, methodologies, open educational resources, citizen science activities, scientific dissemination, etc. under assessment processes.</p> <p>M16. Avoid the use of journal impact bibliometric indicators for scientific quality measurement.</p> <p>M17. Assess the social impact of knowledge.</p>		<p>Medium term</p> 
<p>A7. Cooperating for a comprehensive and coordinated reform of research assessment systems.</p> <p>M18. Synergies will be sought between the existing FOLEC (LAC) and COARA (EU) initiatives.</p> <p>M19. The EU will include LAC countries in programmes and initiatives to be launched to reform research evaluation systems.</p>		<p>Medium term</p> 

ANNEXES

Table A.1. Policies and digital infrastructures in open access, and STI governance bodies in LAC countries

Country	It has						Institution responsible for the			
	National OA policy	OA legal framework	Institutional OA policies	National repository aggregator	National academic Journal aggregator	Curriculum management systems	Governance	Research Funding	Research Assessment	Policy or promotion of open access
Argentina	✓	✓	✓	✓	✗	✓	MINCyT	MINCyT, Agencia I + D+i, CONICET	MINCyT, Agencia I+D+i, CONICET	MINCyT
Brazil	✗	✗	✓	✓	✗	✓	MCTI	MCTI, Finep, CNPq, CAPES, FAPs	CAPES	IBICT
Chile	✓	✓	✓	✗	✓	✓	MinCiencia	ANID	CNA + ANID	ANID
Colombia	✓	✓	✓	✓	✓	✓	MINCIENCIAS	MINCIENCIAS GOB. TERRITORIALES	MINCIENCIAS	MINCIENCIAS
Costa Rica	✗	✗	✓	✓	✗	✗	MICITT	MICITT CONARE, Universides	MICITT	
Ecuador	✗	✗	✗	✓	✗	✓	SENESCYT	SENESCYT	SENESCYT + CACES	SENESCYT
El Salvador	✗	✗	✓	✓	✗	✓	CONACyT	CONACyT, Universides	CONACyT	CONACyT
Mexico	✓	✓	✓	✓	✓	✓	CONACyT	CONACyT	CONACyT	CONACyT
Panama	✗	✗	✓	✓	✗	✓	SENACyT	SENACyT	SENACyT	SENACyT
Peru	✓	✓	✓	✓	✓	✓	CONCYTEC	CONCYTEC	CONCYTEC	CONCYTEC
Uruguay	✗	✗	✓	✓	✗	✓	MEC	ANII	ANII	ANII + Udelar

Source: Compiled by the authors.

Table A.2. Latin American and Caribbean countries' participation in regional open access initiatives

Country	LA Referencia	Latindex	SciELO	Redalyc	CLACSO
Argentina					
Brazil					
Chile					
Colombia					
Costa Rica					
Ecuador					
El Salvador					
Mexico					
Panama					
Peru					
Uruguay					

Source: Compiled by the authors.

Figure A.1: Intensity of national open access actions and of the involvement in regional open access initiatives in Latin American and Caribbean countries



Note: high intensity countries: Argentina, Chile Colombia, Mexico and Peru. Moderate intensity: Brazil, Costa Rica, El Salvador, Panama and Uruguay. Low intensity: Ecuador.
Source: Compiled by the authors.

Table A.3. Main STI indicators in Latin American and Caribbean countries (2019)

Country	Researchers per thousand labour force *	Country's relative R&D effort as a percentage of GDP (in %)**
Argentina	5.14	0.52
Bolivia	0.32	-
Brazil	3.99	1.17
Chile	1.85	0.34
Colombia	0.85	0.20
Costa Rica	1.74	0.39
Cuba	1.69	0.52
Ecuador	1.58	0.44
El Salvador	0.33	0.16
Guatemala	0.07	0.05
Honduras	0.16	0.06
Jamaica	0.50	-
Mexico	1.16	0.30
Nicaragua	0.34	-
Panama	0.31	0.23
Paraguay	0.47	0.16
Peru	0.44	0.17
Puerto Rico	1.85	0.43
Trinidad and Tobago	2.23	0.06
Uruguay	1.78	0.45
Venezuela	0.44	0.69

Notes: * Reference year for El Salvador, Guatemala and Honduras, 2019; for Brazil and Costa Rica, 2018; for Jamaica and Panama, 2017; for Puerto Rico, 2015; for Ecuador and Bolivia, 2014; and for Nicaragua, 2012. Remaining countries, 2020.

** Reference year for Honduras, 2019; for Costa Rica, 2018; for Puerto Rico, 2015; for Venezuela, 2016; and for Ecuador and Bolivia, 2014. Remaining countries, 2020.

Source: Science and Technology Indicators Network -Iberoamerican and Inter-American- (RICYT).

Table A.4. Number of open access repositories in Latin American and Caribbean countries registered in OpenDOAR

Country	Total	Distribution of the total (%)	Institutional	Distribution of total institutional repositories (%)	Disciplinary	Aggregator	Governmental
Argentina	77	10.45	65	10.12	2	5	5
Bolivia	3	0.41	3	0.47	-	-	-
Brazil	156	21.17	131	20.4	11	4	10
Chile	27	3.66	21	3.27	3	3	-
Colombia	105	14.25	99	15.42	3	1	2
Costa Rica	10	1.36	8	1.25	1	1	-
Cuba	16	2.17	14	2.18	-	2	-
Dominican Republic	7	0.95	4	0.62	1	-	2
Ecuador	38	5.16	37	5.76	-	1	-
El Salvador	9	1.22	9	1.4	-	-	-
Guatemala	1	0.14	1	0.16	-	-	-
Honduras	5	0.68	4	0.62	-	-	1
Jamaica	6	0.81	5	0.78	1	-	-
Mexico	51	6.92	43	6.7	3	5	-
Nicaragua	11	1.49	10	1.56	-	1	-
Panama	8	1.09	6	0.93	-	-	1
Paraguay	2	0.27	2	0.31	-	-	-
Peru	177	24.02	157	24.45	3	1	16
Puerto Rico	1	0.14	1	0.16	-	-	-
Trinidad and Tobago	1	0.14	1	0.16	-	-	-
Uruguay	10	1.36	7	1.09	-	1	2
Venezuela	16	2.17	14	2.18	1	1	-
TOTAL	737	100	642	100	28	26	39

Source: Compiled by the authors based on OpenDOAR data. Access date: August 2022.

Table A.5. Number of journals in DOAJ, Latindex (catalogue 2.0), SciELO and Redalyc in Latin American and Caribbean countries

Country	DOAJ	Latindex (catalogue 2.0)	SciELO (current)	Redalyc
Argentina	361	409	96	100
Bolivia	8	9	34	11
Brazil	1,642	291	316	332
Chile	150	182	132	99
Colombia	428	69	203	261
Costa Rica	73	95	49	38
Cuba	126	63	75	44
Dominican Republic	7	15	-	1
Ecuador	87	247	29	27
El Salvador	4	5	-	-
Guatemala	-	12	-	-
Honduras	4	8	-	-
Mexico	202	325	155	257
Nicaragua	11	18	-	-
Panama	5	29	-	2
Paraguay	27	18	20	-
Peru	121	192	42	38
Puerto Rico	4	11	-	5
Uruguay	33	45	27	12
Venezuela	39	31	37	77
TOTAL	3,332	2,074	1,215	1,304

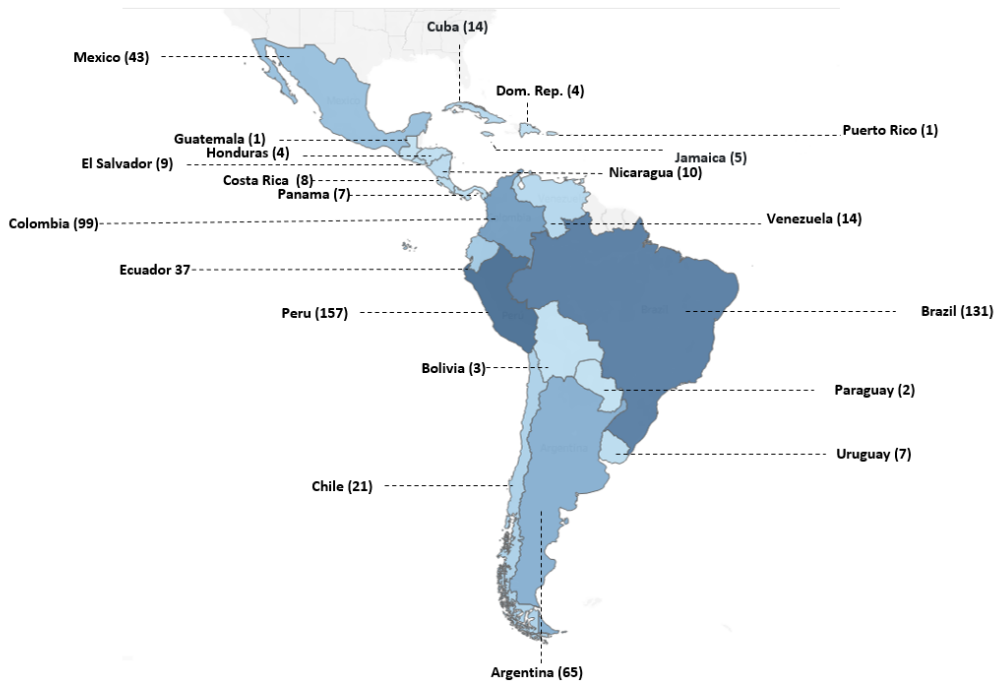
Source: Compiled by the authors based on data from DOAJ, Latindex, SciELO and Redalyc. Access date: December 2022.

Table A.6. Latin American and Caribbean countries presence in international open access initiatives

Country	Country with some repository/ Aggregator in OpenAIRE	Number of Repositories and Aggregators in OpenAIRE	Journal archive (OpenAIRE)	Country with a member in COAR	Number of members in COAR
Argentina	Yes	9	288	Yes	2
Bolivia	No	-	7	-	-
Brazil	Yes	4	1,755	Yes	1
Chile	Yes	23	706	Yes	2
Colombia	Yes	40	447	Yes	2
Costa Rica	Yes	1	73	Yes	1
Cuba	Yes	3	92	Yes	1
Ecuador	Yes	2	113	-	-
El Salvador	Yes	1	5	-	-
Guatemala	No	-	5	-	-
Haiti	No	-	-	-	-
Honduras	No	-	-	-	-
Jamaica	No	-	-	-	-
Mexico	Yes	8	170	Yes	1
Nicaragua	No	-	13	-	-
Panama	Yes	3	2	-	-
Paraguay	Yes	1	26	-	-
Peru	Yes	5	108	Yes	2
Puerto Rico	No	-	-	-	-
Dominican Republic	No	-	7	-	-
Trinidad and Tobago	No	-	-	-	-
Uruguay	Yes	1	31	Yes	1
Venezuela	Yes	2	41	-	-

Source: Compiled by the authors, based on OpenAIRE and COAR data. Access date: August 2022.

Figure A.2: No. of institutional repositories from LAC countries registered in OpenDOAR



Source: Compiled by the authors based on OpenDOAR data.

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Latin America and the Caribbean and the European Union are strategic regions for one another and natural partners to collaborate in the development of research and innovation policy priorities such as open science. This work describes the open access policies for scientific production that have been developed in LAC and in the EU, analyses the common challenges and convergence avenue for both regions to establish a policy dialogue, and proposes specific recommendations for a joint policy action on which to base intra-LAC and EU-LAC collaboration. These are structured into 4 priority objectives broken down into 7 actions and 19 concrete measures.

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