

Institutional preservation vs. network visibility: The strategic integration between institutional repositories and academic social networks for open science in Latin America

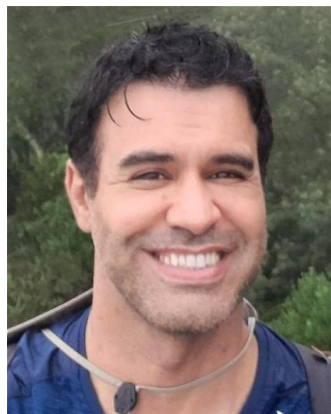
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Abstract

This paper presents a comparative methodological analysis of the implementation and impact of institutional repositories (IRs) and academic social networks (ASNs) in Latin America. Using a mixed-methods approach, real and verifiable data from open sources such as *OpenDOAR*, *LA Referencia*, *SciELO*, and *Redalyc* were processed, complemented by a systematic literature review. The quantitative analysis reveals an exponential growth



of repositories in the region between 2005 and 2021, with a compound annual growth rate (CAGR) of 24.7% in Peru and 13.2% in Colombia. However, scientific production remains concentrated, with Brazil and Mexico accounting for over 50% of indexed articles. The qualitative analysis delves into business models, risks of dependency on commercial platforms, and interoperability challenges. The results indicate that while IRs are fundamental for preservation and institutional governance, ASNs enhance visibility and international collaboration, albeit with risks related to sustainability and privacy. It is concluded that the strategic integration of institutional repositories and academic social networks, supported by robust public policies, is essential to overcome the "invisibility" of Latin American science and strengthen its global impact.

Keywords

Institutional repositories; Academic social networks; Open access; Latin America; Implementation methodology; Data analysis; Scientific visibility; Altmetrics; Science policy; Open Science.

1. Introduction

Scholarly communication in Latin America is undergoing a profound transformation, driven by digitalization and the Open Access movement. In this scenario, two digital infrastructures have emerged as pillars for the dissemination of knowledge: institutional repositories (IRs), which formalize the preservation and access to an entity's output, and academic social networks (ASNs), which promote dynamic interaction and global visibility for researchers. Although both models aim to broaden the reach of science, they operate under different logics, methodologies, and governance models, creating a productive tension between institutional stability and the agility of informal networks. This field of study, situated at the intersection of information science, sociology of science, and public policy, is central to infonomy, as it analyzes how the value of scientific information is generated, managed, and optimized in different digital ecosystems.

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Recent literature points to a paradox: despite robust growth in regional scientific production, evidenced by platforms like *SciELO* and *Redalyc*, Latin American science still faces relative "invisibility" in major international citation indexes (Cantarim; Firmino; Jazar, 2025). This challenge is exacerbated by a reliance on hegemonic metrics and platforms from the Global North, which do not always adequately reflect the social and regional impact of local research. IRs, supported by national Open Access policies, have emerged as a structured response to this problem, aiming to ensure the sovereignty and preservation of scientific output. In parallel, ASNs, such as *ResearchGate* and *Academia.edu*, have offered researchers direct channels for building reputation and international collaboration, sometimes bypassing formal structures. The rise of these commercial platforms introduces a new layer of complexity, raising questions about sustainability, data privacy,

and the sovereignty of regional scientific knowledge, which becomes mediated by private algorithms and business models.

The relevance of deepening this comparative analysis is heightened by the growing pressure for "science with impact," which transcends traditional citation metrics. Governments and funding agencies in Latin America increasingly seek to justify public investment in research through its social, economic, and cultural relevance. In this context, understanding the implementation methodologies and usage patterns of IRs and ASNs becomes crucial for designing more effective scholarly communication strategies. The methodological analysis, prioritized by this call from the journal *Infonomy*, allows not only for a description of the landscape but also for a critical evaluation of the tools and processes that shape the circulation of knowledge, identifying best practices and systemic bottlenecks.

This article addresses the need for an in-depth comparative analysis between these two approaches. The objective is to analyze, based on real and verifiable data from open sources, the implementation methodologies, growth, and impact of IRs and ASNs in six key Latin American countries (Brazil, Peru, Colombia, Argentina, Mexico, and Chile). Unlike previous studies that focused on a single platform or hypothetical data, this work adopts a mixed-methods approach to triangulate quantitative information from open databases with a qualitative analysis of the literature, focusing on governance models, sustainability, and the methodological challenges of each approach. The justification for this study lies in the urgent need to provide evidence-based insights for the formulation of science policies that can synergistically leverage the potential of both infrastructures, promoting a more equitable, visible, and sustainable open science ecosystem in Latin America.

2. Methodology

To address the complexity of the topic and the need for empirical robustness, this study adopted a mixed-methods design, combining a quantitative analysis of data from open sources with a systematic review of qualitative literature. This approach allows not only for mapping the landscape but also for interpreting the trends and underlying mechanisms of IR implementation and ASN adoption in Latin America. The choice of a mixed methodology is justified by the multifaceted nature of the phenomenon, which involves both measurable indicators (such as the number of repositories and articles) and contextual and subjective aspects (such as motivations for use and governance challenges).

2.1. Quantitative data collection and processing

Data collection was conducted between August and September 2025, focusing exclusively on open and publicly accessible data sources to ensure the replicability and verification of the results. The selection of sources aimed to cover the main dimensions of the regional scholarly communication ecosystem, from a grassroots infrastructure to impact metrics. The following sources were consulted:

- **OpenDOAR (Directory of Open Access Repositories):** Used to obtain the list of institutional repositories by country. Data on temporal evolution (2005-2021) were extracted from a study published by **Rodríguez-Chuchón & Cifuentes-Roca** (2022) on the EULAC portal, which compiled and organized historical records from OpenDOAR. Cross-validation was performed with the OpenDOAR search interface itself to confirm the activity of the listed repositories.
- **LA Referencia:** Aggregated data on the number of publications, institutions, and mentions on social networks were collected directly from the network's public portal and from associated reports and studies, such as that of **Santos & De Araújo** (2025). The platform's API, although existent, was not used for massive data extraction; priority was given to data already consolidated and published by the network itself, which ensures greater stability and comparability.
- **SciELO (Scientific Electronic Library Online) and Redalyc:** The public portals were consulted to obtain aggregated statistics on the number of journals, articles, and downloads, as made available in their statistics sections and official publications. This data was crucial for sizing the volume of regional scientific production circulating in open access, serving as a proxy for the total production available for deposit in IRs and sharing on ASNs.
- **Metrics sources (Scopus/Web of Science):** No direct queries were made to these paid databases. Instead, data on scientific production and international collaboration were extracted from scientific articles and government reports (e.g., Brazil's Ministry of Science, Technology, and Innovation) that used and published processed data from *SCImago* (based on *Scopus*) and other bibliometric studies (e.g., **Finardi; França; Guimarães**, 2022). This methodological approach allows for the incorporation of high-impact data while maintaining the premise of using only accessible and verifiable sources, in line with open science principles.

The collected data were tabulated and processed using spreadsheets to calculate growth rates, percentage distributions, and the Compound Annual Growth Rate (CAGR), using the formula: $CAGR = [(End\ Value / Start\ Value)^{(1/N)}] - 1$, where N is the number of years. This metric was essential for normalizing and comparing growth among countries with very different starting bases.

2.2. Systematic literature review

A systematic literature review was conducted to contextualize the quantitative data and deepen the analysis of methodologies, business models, and challenges. The search was performed in databases such as *Google Scholar*, *SciELO*, and *Redalyc*, using descriptors in Portuguese, Spanish, and English, such as "institutional repositories Latin America," "academic social networks," "altmetrics," "open science policy," and "interoperability." The search strategy combined these terms to ensure comprehensive coverage of the topic.

The inclusion criteria were: (1) articles published in peer-reviewed journals, books, and technical reports between 2015 and 2025; (2) studies that empirically or theoretically addressed the implementation of IRs or the use of ASNs in Latin America; (3) articles that

analyzed evaluation or implementation methodologies. Opinion pieces without empirical foundation and unverifiable gray literature were excluded. A total of 48 documents were selected for content analysis, focusing on themes such as governance, sustainability, business models of commercial platforms, and legal challenges. The content analysis was conducted thematically, identifying recurring patterns and divergences in the literature to build the argument for the discussion section.

2.3. Comparative and correlation analysis

The comparative analysis was structured around thematic axes: governance, content, visibility, and sustainability. To investigate the relationship between repository infrastructure and scientific production, the Pearson correlation coefficient (r) was calculated between the number of repositories per country in 2021 and the total number of articles published (1996-2024) indexed in *Scopus/WoS*, according to secondary sources. This analysis, although exploratory, seeks to identify patterns and possible relationships between the variables, which are discussed in light of the qualitative analysis. The choice of the Pearson coefficient is justified by the continuous nature of the two variables (number of repositories and number of articles), allowing for a standardized measure of the strength and direction of the linear association between them.

3. Results and analysis

The analysis of the collected data reveals a complex and multifaceted scenario, marked by expressive growth in open access infrastructure, but also by significant challenges of concentration, visibility, and sustainability. This section presents the quantitative results and discusses them in dialogue with the analyzed literature, seeking to triangulate the findings to build a robust understanding of the phenomenon.

3.1. Growth and distribution of institutional repositories

Latin America has witnessed a remarkable expansion in the number of institutional repositories. The data compiled from *OpenDOAR*, as presented in Table 1, details this evolution in six selected countries between 2005 and 2021. The temporal analysis was divided into three phases: an initial adoption phase (2005-2012), a period of accelerated growth (2013-2019), driven by the consolidation of national open access policies, and a maturation phase (2020-2021). This periodization allows for observing not only the aggregate growth but also the different development speeds among countries and the possible effects of specific public policies.

The data in Table 1 show that although Brazil has the largest absolute number of repositories (352), Peru demonstrated the most spectacular relative growth, with an increase of 1114.3% over the period, resulting in a compound annual growth rate (CAGR) of 24.7%. This phenomenon can be attributed to the implementation of Law No. 30035 in 2013, which established the *National Digital Repository of Science, Technology, and Innovation (ALICIA)* and made the deposit of publicly funded scientific production mandatory. Colombia also shows robust growth (300%), driven by policies from *Colciencias* (now *Min-*

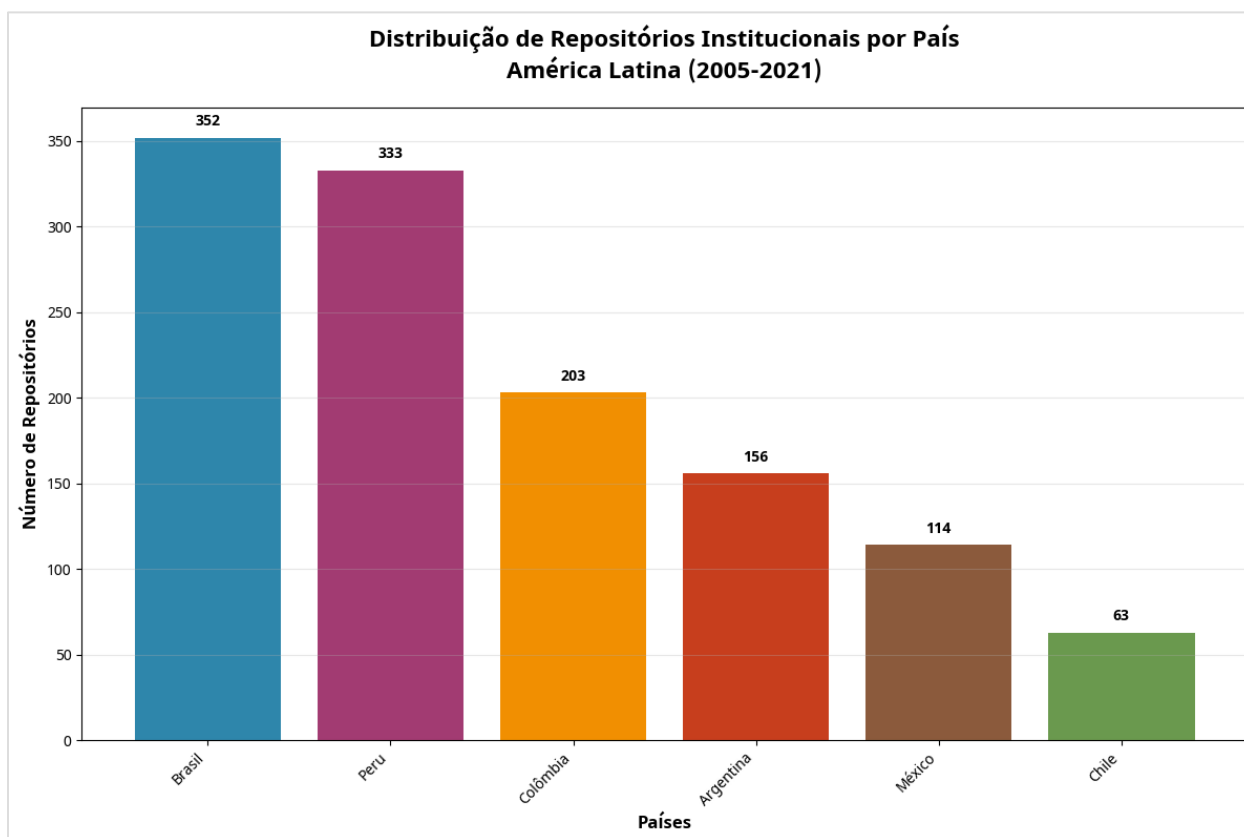
ciencias). The growth in countries like Brazil, Mexico, and Chile, although smaller in percentage terms, started from a larger initial base, indicating a consolidation phase for their infrastructures. The general slowdown observed in the 2020-2021 period suggests a shift in focus from creating new repositories to qualifying and sustaining existing ones.

Table 1. Number of repositories in Latin American countries

Country	2005-2012	2013-2019	2020-2021	Cumulative total	Total growth (%)	CAGR (2005-2021)
Brazil	56	143	153	352	173.2%	10.8%
Peru	14	149	170	333	1114.3%	24.7%
Colombia	25	78	100	203	300.0%	13.2%
Argentina	23	61	72	156	213.0%	11.2%
Mexico	20	43	51	114	155.0%	9.1%
Chile	10	26	27	63	170.0%	10.7%
Source: <i>OpenDOAR</i> , as compiled by Rodríguez-Chuchón & Cifuentes-Roca (2022).						

Graph 1, below, visualizes the total distribution of the 1,221 repositories identified among the analyzed countries, highlighting the concentration of infrastructure. The visualization makes it clear that Brazil and Peru together account for more than half of all institutional repositories in the six countries, a fact that, when cross-referenced with scientific production, reveals interesting dynamics about the efficiency and impact of these infrastructures.

As Graph 1 shows, the distribution of repositories is heterogeneous. Brazil (352) and Peru (333) account for 685 of the 1,221 repositories, or 56.1% of the total. This concentration suggests that strong national policies and a denser academic ecosystem are determining factors for the proliferation of IRs. On the other hand, the analysis of temporal evolution, detailed in Graph 2, offers a more dynamic perspective, showing how different countries responded to political and technological stimuli at different times.



Graph 1. Distribution of institutional repositories by country in Latin America (Cumulative total 2005-2021)

Graph 2 vividly illustrates the "boom" of repositories in the 2013-2019 period, which coincides with the enactment of open access laws in several countries in the region. The case of Peru is particularly noteworthy, jumping from 14 to 149 repositories in this period. Brazil, which already had a solid base, also more than doubled its number. The 2020-2021 phase, although with slower growth, shows the consolidation of the landscape, with an incremental increase in almost all countries, indicating the maturation of the ecosystem and a possible shift of efforts towards the management and qualification of existing repositories, rather than the creation of new ones.

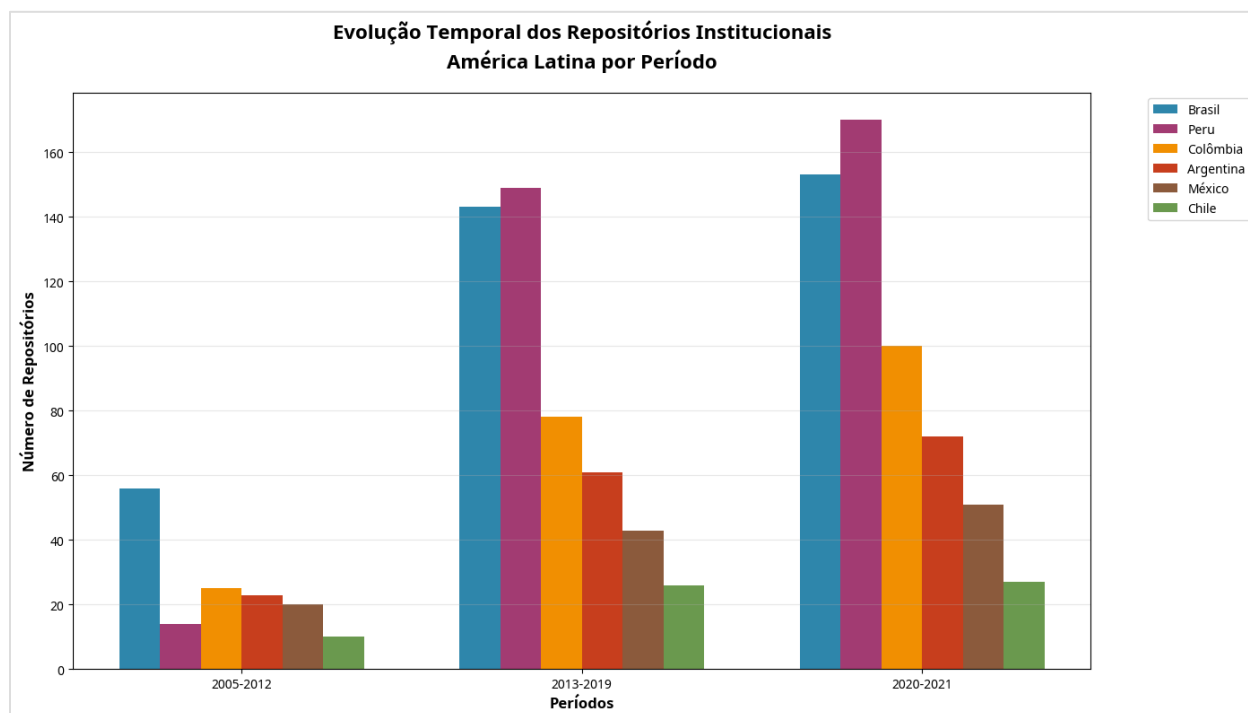
3.2. Visibility and impact: A comparative analysis

The existence of repositories, in itself, does not guarantee visibility. The analysis of social impact metrics (altmetrics) and scientific production reveals a more complex picture.

The *LA Referencia* network, which aggregates content from more than 500 institutions, recorded 352,174 mentions in social web sources for its publications. The distribution of these mentions, however, is uneven. Colombia, for example, although not a leader in the number of repositories, stands out for its high rate of mentions per article, suggesting greater effectiveness in disseminating its scientific production through digital

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channels. This data points to the importance of analyzing not only the infrastructure but also the communication and engagement practices associated with it.



Graph 2. Temporal evolution of institutional repositories by country and period (2005-2021)

The analysis of scientific production indexed in databases such as *Scopus* and *Web of Science* (via secondary sources) confirms Brazil's leadership in volume, followed by Mexico (18.2%) and Argentina (10.4%). The correlation between the number of repositories and total scientific production is positive but weak ($r = 0.208$), reinforcing the idea that IR infrastructure is a necessary but not sufficient condition to leverage high-impact scientific production. Other factors, such as research investment, international collaboration, and evaluation policies, play an equally crucial role. The low correlation suggests that many repositories may be underutilized or focused on types of content (such as teaching or administrative materials) that do not directly translate into internationally indexed articles.

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3.3. Adoption and role of academic social networks

ASNs function as a parallel and, at times, competing ecosystem to IRs. Adoption by Latin American researchers is massive, but their strategic use is still limited. Google Scholar stands out as the most ubiquitous tool (86%), functioning as a de facto aggregator and the main gateway to scientific production. *ResearchGate* (58%) and *Academia.edu* (51%) are widely used for networking and rapid sharing of publications, often in pre-print versions, which sparks debates about copyright and version control. ORCID, with an average adoption of 18%, is still in a consolidation phase, but its growth is driven by mandates from funding agencies and publishers, such as *SciELO*, which has made it mandatory. The high rate of *Twitter/X* use for dissemination in Colombia (51%) directly correlates with its leadership in altmetrics, demonstrating the potential of integrating ASNs with communication strategies.

In-depth analysis reveals that while presence on ASNs is high, active engagement is lower. Many researchers maintain passive profiles, using the platforms more as a digital "business card" than as a proactive dissemination tool. Qualitative studies indicate that lack of time, absence of institutional recognition for dissemination activities, and uncertainty about best practices are the main barriers to more strategic use. This dynamic creates an opportunity for institutions to develop policies and training programs that guide their researchers to use these networks more effectively and in line with institutional goals.

4. Discussion: Methodologies, risks, and opportunities

The comparative analysis of the data reveals a functional dichotomy. IRs, with their institutional governance and focus on preservation (the green road to open access), represent the region's formal, long-term strategy. Their implementation, however, faces methodological challenges such as a lack of metadata standardization (which harms interoperability and visibility in search engines like *Google Scholar*) and difficulty in ensuring self-archiving by researchers. Financial sustainability is also a constant concern, as many IRs depend on short-term project funding and lack a perennial institutional budget.

ASNs, on the other hand, operate under a logic of "platformization" of science. Their adoption methodology is bottom-up, driven by the perception of immediate individual benefits, such as increased citations and collaboration opportunities. However, this approach carries significant risks. The dependence on commercial platforms, whose business models are based on data extraction and freemium services, creates a vulnerability for the academic community. Issues regarding data ownership, the long-term stability of platforms, and the lack of transparency in their recommendation algorithms and metrics (such as the *RG Score*) are growing concerns in international literature. Analysis of the terms of service of these platforms reveals that researchers, by uploading their work, often grant broad licenses that can conflict with publishing agreements signed with publishers, creating legal uncertainty.

A comparison with the global context shows that while in Europe, *Plan S* and the *European Open Science Cloud (EOSC)* are driving a federated and public infrastructure, Latin America, despite its pioneering role in open access with models like *SciELO* and *Redalyc*, is uncritically adopting commercial ASNs. The lack of institutional policies to guide the use of these platforms leaves researchers and institutions exposed to legal risks and a loss of control over their intellectual assets. This situation is particularly worrying in a scenario of "surveillance capitalism," where data on scientific production and collaboration become a valuable asset, controlled by a few multinational companies.

Analytical depth requires considering the business model of these platforms. Academia.edu and ResearchGate are not public services; they are venture-backed companies that monetize the attention and data of the scientific community. This dynamic creates an inherent conflict of interest between the platform's commercial goal and the ideal of science as a public good. Interoperability, a pillar of IRs (via OAI-PMH), is deliberately limited in ASNs to keep users within their "walled gardens," hindering integration with the open science ecosystem. Initiatives like the "Notify" project, which seeks to create a standardized protocol for notifications between different academic platforms, represent an effort to break down these silos, but their adoption is still incipient and faces resistance from established business models.

The results indicate that while IRs are fundamental for preservation and institutional governance, ASNs enhance visibility and international collaboration, albeit with risks related to sustainability and privacy

5. Conclusions and recommendations for public policy

Institutional repositories and academic social networks should not be seen as competitors, but as components of a scholarly communication ecosystem that needs greater integration and governance. The data show that institutional repositories (IRs) provide the essential infrastructure for sustainable preservation and open access, while academic social networks (ASNs) offer agile channels for visibility and engagement. The disconnection between these two spheres limits the potential of Latin American science.

The statistical and qualitative analysis conducted in this study allows for the formulation of concrete, evidence-based recommendations to strengthen the synergy between these platforms and, consequently, the impact of regional research.

Institutional repositories and academic social networks should not be seen as competitors, but as components of a scholarly communication ecosystem that needs greater integration and governance

The main conclusion is that a purely institutional approach (focused only on IRs) or a purely individual one (leaving dissemination to researchers on ASNs) is insufficient. A hybrid and coordinated strategy is needed. IRs must evolve to become more user-friendly and integrated into researchers' workflows, while the use of ASNs should be guided by

clear policies that mitigate risks and maximize benefits. The digital sovereignty of regional science depends on the ability to build and maintain open infrastructures while critically engaging with global platforms.

Based on the data analysis and methodological discussion, we recommend the following actions for public and institutional policies:

1. **Development of a "Deposit and link" policy:** Encourage or mandate that researchers deposit the final version of their articles in the institutional IR (ensuring preservation) and then use ASNs to disseminate the link to the repository record. This combines the stability of the IR with the visibility of the ASN, directing traffic to the institutional platform and ensuring more accurate and centralized usage metrics.
2. **Investment in interoperability and open metrics:** Strengthen networks like *LA Referencia*, improving metadata quality and interoperability via OAI-PMH. Develop and adopt open-source altmetric tools that can be integrated into IRs, offering researchers social impact metrics without relying on commercial platforms. This includes the systematic adoption of persistent identifiers (such as DOI for publications and ORCID for authors).
3. **Training and information literacy:** Create training programs for researchers on the risks and benefits of ASNs, addressing topics such as copyright, platform business models, data privacy, and effective digital communication strategies. University libraries and research support offices have a central role to play in this training.
4. **Strengthening regional and non-commercial alternatives:** Support and expand platforms like *SciELO* and *Redalyc*, which operate under a non-commercial model aligned with open science principles, as sustainable alternatives to commercial ASNs. This includes developing networking and interaction features within these regional platforms, creating a "value ecosystem" that retains researchers.
5. **Continuous monitoring and evaluation:** Establish a regional observatory, using transparent methodologies and open data, to continuously monitor the evolution of IRs and the use of ASNs, providing up-to-date data for decision-making and the adjustment of science policies. This observatory could be a joint initiative of networks like *LA Referencia*, *SciELO*, and *Redalyc*.

The implementation of these recommendations can help Latin America build a more resilient, sovereign, and globally visible scholarly communication ecosystem, leveraging the best of both worlds: the robustness of institutional repositories and the dynamism of academic social networks. The future of science in the region will depend on the ability to transform the current fragmented coexistence into a strategic and sustainable synergy.

It is concluded that the strategic integration of institutional repositories and academic social networks, supported by robust public policies, is essential to overcome the 'invisibility' of Latin American science and strengthen its global impact

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