



The Role of ORCID in Advancing Authorship, Research Visibility, and Institutional Integration in the Digital Knowledge Ecosystem

R.K. Bhatt^a and Snehasish Paul^b

^aSenior Professor, Department of Library and Information Science, University of Delhi, Delhi, Pin-110007, India.

Email: drbhatrk63@gmail.com

^bPh. D. Research Scholar, Department of Library and Information Science, University of Delhi, Delhi, Pin-110007, India.

Email: snehasishpaulas98@gmail.com

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The Open Researcher and Contributor ID (ORCID) is crucial in the digital research landscape, as it provides a consistent and interoperable method for identifying researchers. This study examined the influence of ORCID on authorship recognition, research visibility, and integration within institutions, utilising data from 2014 to 2024. A mixed-methods approach was employed, incorporating global registration statistics, the distribution of work types, and case studies on integration. The findings indicate a steady increase in ORCID usage, with notable surges in 2017 and 2020 owing to institutional mandates and the transition to digital research processes. Journal articles were the predominant output, but the inclusion of datasets, software, and creative works highlights ORCID's interdisciplinary nature. Countries such as India, Brazil and Nigeria have experienced higher adoption rates following outreach initiatives. Institutional platforms such as IRINS and D Space ease administrative tasks and enhance metadata quality through ORCID integration. Verified affiliations and contributor roles improve transparency in academic records, although adoption remains inconsistent in Southeast Asia, Central Africa, and smaller institutions. These results underscore the importance of ORCID in bolstering research infrastructure and emphasise the need for broader outreach and policy-level integration to bridge adoption gaps and enhance global influence.

Keywords: ORCID; Researcher Identification; Institutional Integration; Scholarly Communication; Metadata Trust, Digital Research Infrastructure; Persistent digital identifiers (PDIs)

Introduction

In the rapidly evolving domain of digital scholarship, ensuring the visibility, attribution, and integrity of research outputs is imperative.¹ As research becomes increasingly digitally globalised, concurrent growth in interdisciplinary and global collaborations has presented challenges in clearly tagging authors and attributing their contributions across multiple Information systems.² These challenges, including name disambiguation, institutional mobility, and variations in authorship metadata, have long hindered the discoverability, credibility and integrity of scholarly outputs. Persistent digital identifiers (PDIs) have emerged as game-changing tools in the knowledge ecosystems. Among these, the Open Researcher and Contributor ID (ORCID) system stands out as one of the most globally utilised PDIs.³ Launched in 2012, ORCID provides researchers with unique, enduring 16-digit alphanumeric identifiers, ensuring consistent credit for academic and creative works, irrespective of name

changes, language barriers, or shifts in institutional affiliations. Beyond mere identification, the ORCID facilitates the integration of research profiles with publishers, repositories, funding bodies, and institutional systems, thereby enhancing the flow of verified metadata across the scholarly infrastructure.⁴ As more research institutions, funding agencies and journals mandate ORCID IDs, their function has shifted from being a digital identifier to a crucial element of the digital research framework.

ORCID enhances the visibility and citation of work while minimising administrative tasks through automated data exchange via APIs, enabling researchers to maintain comprehensive academic records.⁵ (Fig. 1).

This study examined the role of ORCID in enhancing authorship integrity, increasing research visibility, and facilitating institutional integration within the global digital knowledge framework. By utilising historical data analysis, visual modelling, and an assessment of ORCID's infrastructural capabilities, this study aims to demonstrate ORCID's role in

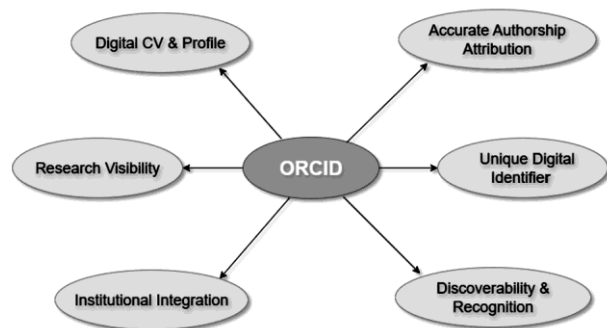


Fig. 1 — ORCID: Powering Research Identity & Visibility¹³
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fostering a transparent, interoperable, and reliable scholarly communication environment.

Review of Literature

The increasing intricacy of academic communication underscores the essential requirement for effective systems that facilitate precise author identification, attribution, and management of research outputs. Research on persistent digital identifiers (PDIs), particularly ORCID, highlights their importance in addressing the challenges of research discoverability, data integrity, and administrative efficiency.

Previous research has emphasised ORCID's ability to distinguish names and simplify researcher identification. Nonetheless, studies within Ireland's Technological University and Institute of Technology sectors have shown varied opinions. Faculty participation was limited, with many joining primarily due to institutional pressure. Concerns included unclear objectives, the effort required to maintain profiles, fears of surveillance, and concerns about data privacy. Librarians viewed ORCID positively, recognising its advantages for author identification and system integration, although awareness gaps remained. These findings underscore the importance of institutional communication, researcher education, and role alignment in ensuring adoption.⁶ Research conducted in the Czech Republic indicates that by 2024, nearly 60% of researchers will have adopted ORCID, mainly due to institutional policies and its integration with the national Current Research Information System (CRIS). This system facilitates the consistent reporting of verified ORCID IDs, reducing redundancy. These results highlight the significance of infrastructure, standardisation, and policy backing in the adoption process at the national level.⁷ A case study conducted by Emory University's

School of Law sheds light on the difficulties faced in encouraging legal scholars to adopt ORCID, as they often adhere to more conventional publishing practices than other academic fields. Key strategies for boosting engagement included personalised outreach, messaging tailored to individual faculty members, and ongoing support. This study highlights the importance of customised, discipline-aware approaches to promote ORCID in non-scientific fields.⁸ In the United States, organisations such as Texas A&M, East Carolina University and the Modern Language Association have investigated the integration of ORCID into institutional repositories, thesis submission systems, and researcher profile platforms. Discussions of these cases emphasised the crucial role of librarians, the technical difficulties encountered in outreach (such as directory inconsistencies), and the benefits of ORCID's compatibility with systems like VIVO, REACH NC, and name authority files like VIAF and ISNI. These initiatives reinforce the importance of cross-departmental collaboration and infrastructure alignment in promoting the adoption of ORCID.⁹

ORCID was established to address the issue of author name ambiguity by creating a universal, discipline-neutral identifier system. Its implementation followed a phased adoption strategy, beginning with unpublished academic content and subsequently expanding to encompass published and unclaimed pieces. Initially, it offered value to publishers and funders by streamlining the submission and reporting processes. As ORCID has evolved, its integration with existing identifier systems and research information infrastructures has facilitated wider author involvement and institutional participation. The initiative's success relies on coordinated efforts among stakeholders, as adoption necessitates both technical integration and incentives designed for researchers, institutions and system developers.¹⁰ In the realm of Open Science, ORCID has become an essential personal identifier recognised across various disciplines and infrastructures. European academic libraries have played a crucial role in advocating for and implementing ORCID, serving as coordinators of awareness initiatives and service processes. The increasing adoption in nations such as Austria, where usage rose by 31% within a year, illustrates ORCID's potential for integration into research evaluation and institutional reporting. The study highlights that successful implementation relies

on user-focused services and collaboration among libraries, researchers and system developers¹¹ (Fig. 2).

Objectives of the study

The present study was undertaken with the following objectives:

1. To analyse the global growth of ORCID registrations (2014–2024)
2. To evaluate the diversity of research outputs supported by ORCID
3. To assess the impact of outreach activities on regional adoption
4. To examine institutional integration models (e.g., IRINS, DSpace)
5. To explore ORCID’s role in metadata verification and research trust
6. To identify adoption gaps by region and discipline

Methodology

This investigation relied on data gathered from ORCID-related datasets and reports spanning the period from 2014 to 2024. Three main Excel spreadsheets were employed: one monitored the global increase in ORCID registrations, another categorised the types of research outputs associated with ORCID profiles, and the third recorded event participation data from outreach initiatives. The data were organised and refined using Microsoft Excel and subsequently analysed using Python, specifically with pandas and

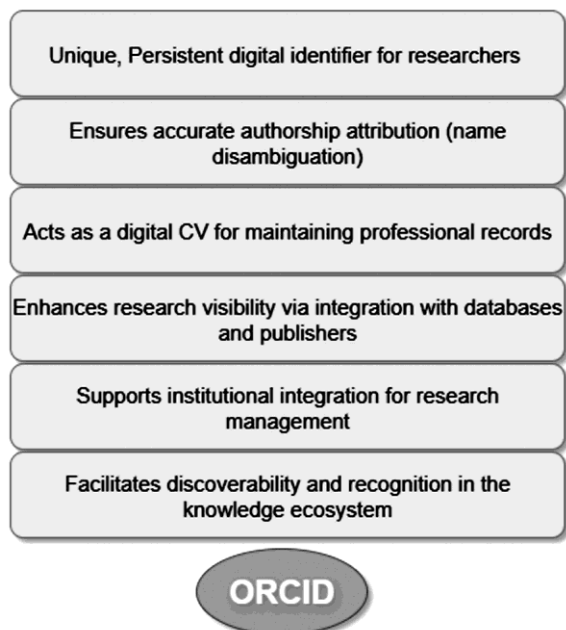


Fig. 2 — ORCID in Enhancing Academic & Literary Authorship¹³
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matplotlib. Descriptive statistics and graphical analyses were employed to identify visual trends, output distributions, and outreach effects. The registration data offered a longitudinal perspective on ORCID adoption, allowing the identification of significant turning points and their connections to global events or policy changes. The dataset on research work types was used to assess the range of academic outputs supported by ORCID, emphasising its compatibility with various scholarly formats, including journal articles, datasets, software and creative works. Event data were examined to understand the link between outreach activities and regional adoption, with a focus on countries such as India and Nigeria, where strategic engagement appeared to correlate with increased adoption. Institutional integration was evaluated through case studies and ORCID’s annual report, concentrating on how systems such as DSpace and IRINS have incorporated ORCID to streamline workflows and enhance data interoperability. Trust in scholarly communication was evaluated using metadata related to verified affiliations and persistent identifiers, utilising visualisations from recent reports on trust markers.

A thorough gap analysis has identified challenges and underrepresented regions, institutions, and disciplines, highlighting areas where ORCID adoption could be enhanced. This integrative approach, which merges quantitative and qualitative methods, offers a solid foundation for assessing ORCID’s evolving role within the global research ecosystem.

The conceptual framework depicted in Figure 3 was employed to specify ORCID’s role across several critical domains: researcher identity, supported work types, system benefits, enhanced visibility, institutional integration

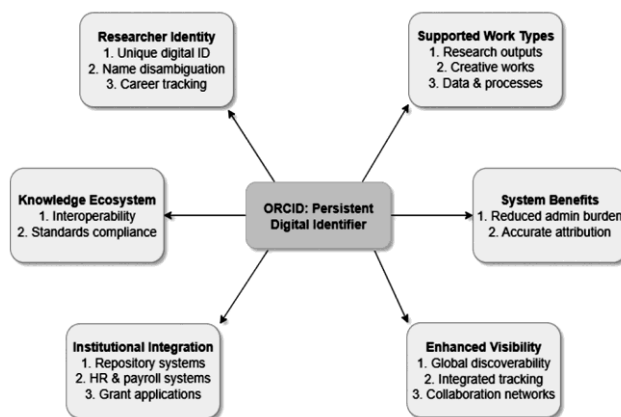


Fig. 3 — ORCID as a Persistent Digital Identifier in the Knowledge Ecosystem¹² (Source(s): Created by authors)

integration, and knowledge ecosystem alignment. This framework facilitated the categorisation of findings and supported the analysis of ORCID's impact by examining case data and institutional reports.¹²

Results

The findings of this study are based on a comprehensive analysis of ORCID datasets spanning the period from 2014 to 2024. This analysis encompasses registration patterns, types of research outputs, outreach initiatives, and efforts to integrate institutions. This study stresses ORCID's expanding global presence, with adoption patterns influenced by the intensity of outreach, system integration, and regional participation. Visual aids and summary tables depict the spread and influence of ORCID adoption across various fields.¹³

Table 1 data indicates that the number of annual ORCID registrations has increased over the past decade. Notable growth periods align with significant outreach efforts and a global shift to digital scholarly infrastructure.¹⁴

Table 1 — Growth of ORCID Registrations Worldwide (2014–2024)¹⁴

Year	Number of Registrations
2014	500,000
2015	900,000
2016	1,500,000
2017	2,300,000
2018	3,200,000
2019	4,400,000
2020	6,100,000
2021	7,800,000
2022	9,200,000
2023	10,500,000
2024	11,800,000

Figure 4 shows a significant increase in ORCID registrations from 2014 to 2024 in the line graph. Starting with 500,000 registrations in 2014, the platform grew to 11.8 million users by 2024, indicating a 23-fold increase. The trajectory reveals a steady upward pattern, with notable increases between 2016 and 2017 and 2020 and 2021. These periods may be linked to institutional requirements, global outreach efforts or increased digital research adoption during the COVID-19 pandemic. The graph illustrates the accelerating global adoption of ORCID and its increasing significance in scholarly communication.¹⁵

Case Studies

Institutional case studies offer valuable insights into regional, infrastructural, and strategic variations in ORCID adoption. In India, the INFLIBNET Centre has led a national integration initiative through platforms such as IRINS and Shodhganga, supported by the ORCID Global Participation Fund. Institutions like IIT Kharagpur, IIT Bombay, and the University of Delhi have some of the highest numbers of researchers registered with ORCID. By integrating ORCID into systems like IRINS, researcher profiles are automatically populated, and D Space-CRIS is being tested to connect thesis and publication metadata with ORCID IDs.^{14,15} These efforts not only minimised administrative loads but also facilitated enhanced data quality and the efficiency of institutional reporting. Outreach is also important apart from system integration in facilitating the adoption of the system. Regional events' data show that states such as India, Brazil, and Nigeria have experienced significant spikes in ORCID registrations



Fig. 4 — ORCID Registration Growth from 2014 to 2024¹⁵

following focused workshops and webinars. These outcomes reflect the success of localised community-based outreach in scaling up ORCID's impact. Additionally, linking ORCID with institutional systems strengthens research integrity. The increasing use of verified affiliations and contributor roles, as highlighted in ORCID's 2024 Annual Report, demonstrates the platform's role in fostering transparency and trust in scholarly communications. Institutions that endorse authenticated ORCID IDs benefit from more reliable metadata and easier compliance with funders' requirements.¹³

Table 2 summarises the key case studies referenced in this study, highlighting the systems used, focus areas, and sources supporting ORCID adoption across different institutions and regional contexts.¹⁴

Figure 5 depicts the research outputs supported by ORCID, including journal articles, books, conference proceedings, datasets, software, artistic creations, and inventions. The ORCID's ability to include diverse scholarly and creative outputs demonstrates its interdisciplinary significance. By associating these works with a unique identifier, ORCID ensures that researchers receive recognition, regardless of the field or format in which they work. This flexibility is essential today, where contributions extend beyond publications to data, tools, and other creative endeavours^{15,16} (Table 3).

The study's conclusions are reinforced by a combination of illustrative figures and well-organised tables, highlighting ORCID's increasing influence in the global research arena. Figure 1 lays the groundwork by illustrating ORCID's interconnected roles in identity management, system integration, and scholarly communication. Figure 4 illustrates a steady increase in ORCID registrations from 2014 to 2024,

accompanied by notable surges associated with global events and institutional mandates. Figure 5 also showcases the vast array of research outputs supported by ORCID, such as journal articles, datasets, creative works, and inventions, reflecting its interdisciplinary flexibility. Table 5 further demonstrates the correlation between regional outreach efforts and adoption growth, underscoring the importance of awareness-raising campaigns. Table 1 outlines the types of scholarly works that ORCID can support, while Table 2 presents case studies from India, the Czech Republic, and Nigeria, providing real-world examples of successful integration. Finally, Table 4 categorises the broader advantages of ORCID for institutions and researchers, including visibility, trust,

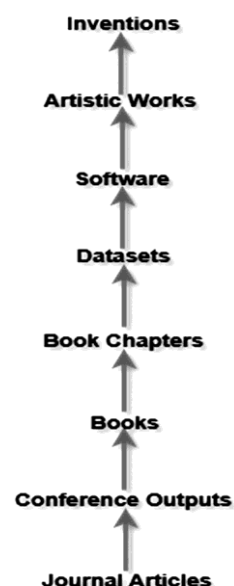


Fig. 5 — Diversity of Research Output Types Supported by ORCID^{15,16} (Source(s): Created by authors)

Table 2 — Overview of ORCID Integration Case Studies¹⁴

Case Study	Region/System	Focus Area	Source
India National Integration	IRINS, Shodhganga	Infrastructure, institutional policy	PT2.pdf, Annual Report ¹⁵
Outreach Impact	India, Brazil, Nigeria	Community engagement, adoption growth	PT2_orcid_events.xlsx ¹³
Technical System Integration	DSpace, IRINS	Automated metadata, profile updating	PT2.pdf ¹³
Trust and Metadata Quality	Global	Verified data, contributor roles	ORCID Annual Report 2024 ¹⁵

Table 3 — Overview of ORCID-Supported Research Output Types^{15,16}

Work Type	Description
Book / Book Chapter	Complete scholarly books or sections of books.
Conference Outputs	Papers, presentations, posters, and proceedings
Journal Articles	Peer-reviewed articles (most common type)
Preprints	Manuscripts not yet peer-reviewed
Dissertations / Theses	Academic requirements for degrees
Working Papers	Circulated drafts, often in economics/social sciences
Creative Works	Images, sound, video, design, artistic performance
Data & Software	Datasets, software, workflows, cartographic material

workflow efficiency, and the development of shared infrastructure. Together, these visuals and tables offer a comprehensive perspective on ORCID's strategic role in promoting transparent, integrated and inclusive research practices.¹⁷

Table 4 presents the primary advantages of ORCID integration, including enhanced researcher visibility, improved data management, trust through confirmed affiliations, and facilitated institutional and global collaboration.¹⁸

Table 5 examines the relationship between the levels of outreach activities and the growth trends in ORCID adoption across different global regions, emphasising the impact of engagement intensity on service uptake.¹⁹

Figure 6 is a bar chart illustrating the association between different levels of outreach activities (High, Moderate, Low) and ORCID adoption growth trends (Strong, Rising, Limited) in various global regions. The graph indicates that higher outreach intensity is associated with stronger growth, reflecting the importance of efforts to raise awareness.^{14,15}

Discussion

The ORCID has become an increasingly functionally vital component of the scholarly communication infrastructure, serving as both a persistent identifier and a driving force for enhanced

transparency and system integration. Between 2014 and 2024, the number of registrations increased consistently, with significant rises tied to institutional requirements and the widespread adoption of digital research processes, stimulated by the COVID-19 pandemic.^{14,15} ORCID's adaptability in acknowledging various research outputs, such as software, datasets, and creative works, enhances its importance across different fields. In addition, efforts at outreach in India and Brazil have shown that focused engagement methods indeed can significantly drive adoption, aligning with the value of localised, community-focused promotion.^{20,21}

Figure 7 illustrates the obstacles to ORCID adoption, including a lack of awareness, technical integration challenges, and concerns about data quality and privacy. The platform's effectiveness is

Table 5 — Regional ORCID Outreach Levels and Adoption Growth Trends.¹⁹

Region	Outreach Activity Level	Adoption Growth Trend
North America	High	Strong
Europe	High	Strong
South Asia	Moderate	Rising
Sub-Saharan Africa	Moderate	Emerging
Latin America	Moderate	Rising
Southeast Asia	Low	Limited
Middle East & North Africa	Low	Slow
Oceania	Moderate	Stable

Table 4 — Key Outcomes Enabled by ORCID Adoption¹⁸

Outcome Category	Description
Researcher Visibility	Improved discoverability, consistent attribution, and enhanced research impact
Data Management	Streamlined workflows, automated updates, and integration with institutional systems
Trust & Transparency	Verified affiliations, increased metadata accuracy, and contributor role validation
Collective Benefits	Broader awareness, shared technical resources, and alignment with global infrastructure goals.

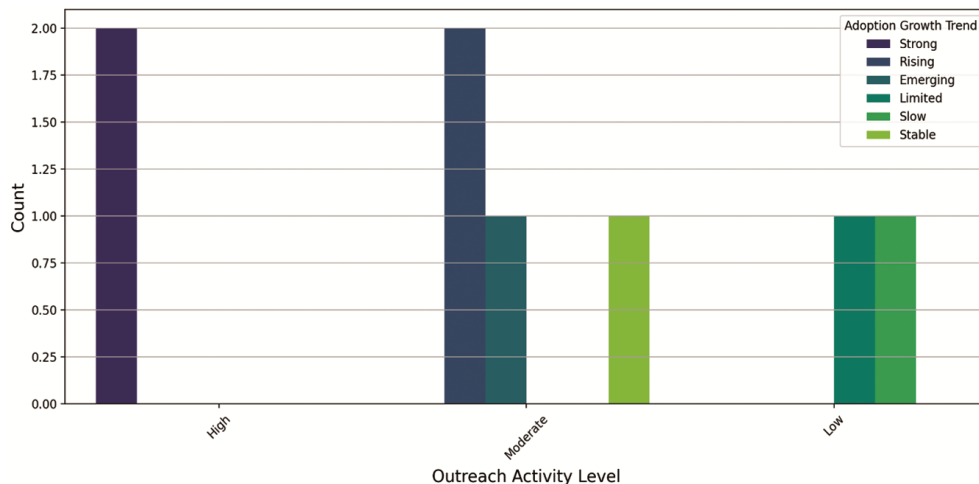


Fig. 6 — Outreach Activity Level by ORCID Adoption Growth Trend^{14,15}

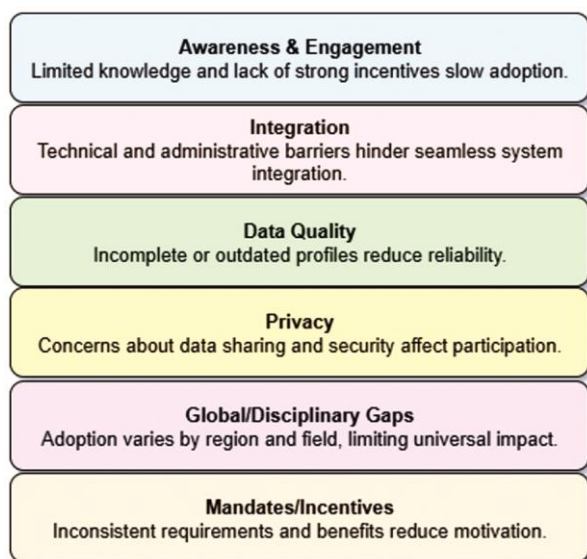


Fig. 7 — Challenges in Widespread ORCID Adoption^{22,23}
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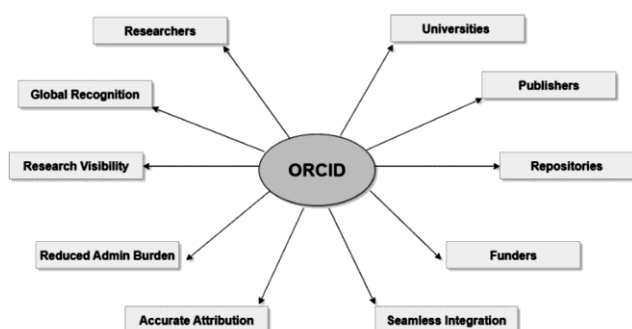


Fig. 8 — ORCID’s Role in Academic Knowledge Ecosystem²⁶
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hindered by inconsistent adoption across disciplines and regions, as well as irregular mandates. Addressing these issues requires coordinated strategies that combine policy, infrastructure, and education for successful global implementation.^{22,23}

Conclusion

Against the backdrop of growing digitisation and global interconnectedness, ORCID has emerged as a central tool in advancing transparency, managing researcher identity, and connecting diverse systems. Our work pinpoints the primary function of ORCID in terms of monitoring adoption and connecting researchers, institutions, and scholarly work in a trusted framework. Its significance can be witnessed in advancing research visibility, simplifying workflows and developing an open academic environment. Its

integration into institutional arrangements, support for numerous work types, and its operation in reducing administrative work substantiate that the work of ORCID extends beyond the recognition of authors.²⁴ It enables institutions to treat scholarly documents in a standard way, aids researchers in attributing their work, and creates a better scholarly environment for researchers. However, uneven global adoption suggests a need for increased infrastructure investment, policy coordination, and local mobilisation. Looking forward, ORCID’s most significant potential lies in enhancing equity in research visibility and participation, particularly in underrepresented regions. Strategic implementation, focusing on user engagement and interoperability, is essential for realising its full potential in the rapidly evolving digital knowledge domain.²⁵

Figure 8 flowchart illustrates ORCID’s pivotal role in scholarly communication, serving as a nexus that connects key stakeholders and functions with the research ecosystem.²⁶

Scope and Limitations

This study utilised secondary data sources and documented case studies. Although the analysis addresses significant global and regional patterns, it does not include primary survey data from researchers or organisations. The findings highlight structural and institutional trends rather than individual user behaviour. This study was limited by the availability of standardised data across countries, and its conclusions may not apply to institutions lacking ORCID-integrated systems.^{5,9,11,20}

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