



## Improving the digital visibility of scholarly publishing in Algeria through CrossRef

LAKHNECHE Fatima\*<sup>1</sup> , ZEBAIR Mokhtaria<sup>2</sup>

<sup>1</sup>Laboratory of Research in Information Systems and Archives in Algeria. Faculty of Humanities and Islamic Sciences University of Oran 1 Ahmed Ben Bella (Algeria) lakhneche.fatima@edu.univ-oran1.dz

<sup>2</sup>Laboratory of Research in Information Systems and Archives in Algeria. Faculty of Humanities and Islamic Sciences University of Oran 1 Ahmed Ben Bella (Algeria). zebair.mokhtaria@univ-oran.dz

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### Abstract:

This study aims to identify scholarly publishing in Algeria using the CrossRef database to increase its visibility. This will be achieved by tracking the extent to which journals from the Algerian platform for scientific journals (ASJP) are indexed in CrossRef and obtaining Digital Object Identifiers (DOIs). Additionally, the membership and participation of Algerian institutions of higher education and scientific research that issue these journals in CrossRef will be studied. The study yielded several results. Notably, CrossRef is the largest registration agency for digital object identifiers (DOIs), and universities and university centers are the most registered Algerian institutions in the CrossRef database, accounting for 77.3% and 11.4% respectively. Additionally, 79 out of 849 ASJP journals were registered in CrossRef and received a total of 23,338 DOIs. The growth rate of digital content increased by 24.65% after 2023. The study suggests that CrossRef can be used as an alternative to explore scholarly publications, increase citations, and improve research visibility.

**Keywords:** scholarly publications, visibility, CrossRef, Digital Object Identifier, Algerian journals platform ASJP, Algerian higher education and scientific research institutions

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\* Corresponding author



## 1. INTRODUCTION

The trend towards increasing the digital visibility of research has become a necessity in scholarly publishing. Therefore, universities and scientific research institutions have focused on scholarly publishing as a prominent indicator and a pillar to improve their classification within international rankings. The outcomes of scientific research rely on citations. To ensure that the scholarly publishing community is aware of the researcher's existence and can locate them in the digital environment, they must demonstrate their presence. The products of their research should be globally visible, either in full text or included in bibliographic databases that provide an accurate description of their data. By the Open Access movement and its benefits for researchers in scholarly publishing, including access to information and metadata, technical and ethical rules must be followed to ensure accurate classification and access to published scientific journals. (DEMİR, 2023)

Therefore, individuals involved in scholarly publishing, including researchers, research institutions, and publishers, register with international bibliographic databases such as Scopus, Web of Science, Google Scholar, Microsoft, and CrossRef to identify and locate their digital content. By subscribing to these databases and obtaining digital identifiers for scientific publications (such as DOIs), researchers can be represented by ORCIDs, and research institutions can be represented by RORs (DEMİR, 2023)

Scholarly publishing has experienced significant growth in recent decades due to the impact of digital outputs, as reported by major databases such as Scopus and the Web of Science (Krauskopf & Salgado, 2023).

The vast amount of information available in the digital environment has made it difficult to locate and track scientific material. Therefore, the use of Digital Object Identifiers (DOIs) has become necessary to provide reliable and unique access to scientific research outputs (T. Aditya Sai Srinivas, David Donald, Thippanna, & Thulasi Thanma, 2023).

In addition to the restrictions imposed by global databases such as Scopus and Web of Science, which can hinder scholarly publishing and citations, particularly in developing countries (Maricato, Regina da Silva, & Ramos, 2023) many universities and research institutions in these countries have turned to using the CrossRef bibliographic database. This is due to the facilities it provides in exchange for DOI grants.

The significance of DOIs for entities is echoed by their primary registration agency, CrossRef, which is a DOI registration agency and operates under the Open Citation Initiatives established by the Foundation DOI International in 1998. (Zayed, 2021).



### **Literature review**

After searching various databases provided by the National Online Documentation System (SNDL), including Knowledge, Scopus, Research Gate, World Cat, and Google Scholar, we found previous studies related to the subject of the study and digital visibility for scholarly publishing in general and those that dealt with the CrossRef database in particular. We focused on reviewing previous studies that centered on CrossRef. We have compiled a list of this previous literature below:

- (Harzing, 2019) In his letter provides an evaluation of CrossRef and Dimensions coverage in comparison to Google Scholar, Microsoft Academic, Scopus and the Web of Science. The evaluation is based on a detailed investigation of the full publication and citation record of a single academic, as well as six top journals in Business & Economics. This small-scale study suggests that CrossRef and Dimensions have similar or better coverage for publications and citations compared to Scopus and the Web of Science. However, their coverage is substantially lower than that of Google Scholar and Microsoft Academic. If confirmed by larger-scale studies, CrossRef and Dimensions could serve as good alternatives to Scopus and the Web of Science for literature reviews and citation analysis. Google Scholar and Microsoft Academic remain the most comprehensive free sources for publication and citation data.
- Another paper introduces COCI, the Open Citations Index of CrossRef open DOI-to-DOI citations (<http://opencitations.net/index/coci>). COCI is the first open citation index created by OpenCitations. It contains over 445 million DOI-to-DOI citation links derived from the data available in CrossRef. The resource description framework is used to describe these citations through the extended version of the OpenCitations Data Model (OCDM). (Heibi & Peroni, 2019)
- Then (Hendricks, Tkaczyk, Lin, & Feeney, 2020) explain the scholarly metadata collected and provided by CrossRef, and its significance in the scholarly research ecosystem. CrossRef is a valuable source for scientometric research, including measuring science growth and impact and understanding new trends in scholarly communications. the study discusses CrossRef's role in the research ecosystem and trends in metadata curation over the years, including the evolution of its citation data provision. It summarizes the research used in CrossRef's metadata and describes plans to improve metadata quality and retrieval in the future.
- (Zayed, 2021) Confirms in her study that CrossRef Foundation is a non-profit organization, and it is required to subscribe to benefit from its services. Its mission is to serve the scientific community and improve the process of scientific communication., it has (8) specialized services, such as a Content Registration service, that provided by the Foundation, through which DOI sets content, and participation in this institution is very important to the publisher.
- (Visser & Nees Jan, 2021) This study compares five multidisciplinary bibliographic data sources: Scopus, Web of Science, Dimensions, CrossRef, and Microsoft Academic. The



comparison covers scientific documents from 2008 to 2017. Scopus is compared with each of the other data sources individually. It begins by analyzing the differences in document coverage between the data sources. This includes differences over time, per document type, and per discipline. It also examines differences in the completeness and accuracy of citation links. The analysis allows us to discuss the strengths and weaknesses of each data source. It is important to combine a comprehensive coverage of the scientific literature with a flexible set of filters to make selections.

- (Borrego, Ardanuy, & Arguimbau, 2023) An analysis of ERIH PLUS journal coverage reveals that CrossRef indexes more sources than Scopus, including additional journals from Eastern and Southern Europe and the Global South. Only two-thirds of the journals deposit abstracts and ORCIDs, and around a third deposit affiliations. The metadata completion level for individual articles varies depending on the language of the document. Only half of the journals deposit references, resulting in Scopus retrieving more citations than CrossRef, except for publications in German and French. While CrossRef shows potential as a bibliographic discovery tool in the arts and humanities, it requires improvement in terms of metadata completion.
- An African study evaluates the coverage of African journals in Web of Science, Scopus, and CrossRef. A list of active journals published in each of the 55 African countries was compiled from Ulrich's periodicals directory and African Journals Online (AJOL) website. The journal master lists for Web of Science, Scopus, and CrossRef were searched for the African journals. A total of 2,229 unique active African journals were identified from Ulrich and AJOL. The volume of African journals in the Web of Science and Scopus databases is 7.4% (N = 166) and 7.8% (N = 174), respectively, compared to the 45.6% (N = 1,017) covered in CrossRef. South African journals account for the highest coverage in the two most authoritative databases, representing 73.5% and 62.1% of all African journals in Web of Science and Scopus, respectively. In contrast, Nigeria publishes 44.5% of all African journals. The distribution of African journals is biased towards Medical, Life and Health Sciences, Humanities, and the Arts in the three databases. It is important to note that this information is based on objective data and does not include any subjective evaluations. The underrepresentation of African journals in CrossRef is concerning. CrossRef is a free indexing infrastructure that could be used to create an African-centric research indexing database. (Toluwase & Onaolapo, 2023).
- An Arabic study seeks to monitor the Arab presence in CrossRef and analyze the indicators of this presence in addition to standing on the reality of the interaction of Arab members in CrossRef with the basic service of CrossRef, on which the rest of the services depend, which is the content registration service and the extent to which the basic metadata is met in it, and in order to achieve this, it was adopted from the descriptive analytical approach and the bibliometric approach to describe and analyze the nature of the Arab presence in CrossRef and come up with quantitative and qualitative indicators and provide results and recommendations



that are useful in supporting and enriching this presence, the study reached a number of Among the most important results: the number of Arab countries represented in Crossreef reached 01 out of 22 countries. (Abdelmoniem Ibrahim, 2022).

As noted above there are no studies that look at around CrossRef database in the Algerian context right now. Therefore, our research aims to bridge this gap and address this issue. To cover this matter, we will focuses on two main areas: firstly, defining the CrossRef agency and its services for the scientific research community. Secondly, investigating the extent to which research institutions affiliated with the Algerian Ministry of Higher Education and Scientific Research register with the agency. Additionally, the study examines the readiness of the Algerian platform for scientific journals ASJP, which are classified under categories (b) and (c) and not classified at the platform level, to obtain digital identifiers of DOIs and register them with CrossRef. This prompts us to question the scientific research community's perspective on scholarly publishing in Algeria, specifically from the standpoint of the bibliographic database CrossRef. The following questions arise:

- What is the CrossRef agency and what is its role in scholarly publishing?
- How many Algerian scientific research institutions are registered with the CrossRef Agency and how are they categorized?
- What is the coverage of ASJP scientific journals in the CrossRef bibliographic database and how is it distributed by category?
- Which Algerian higher education and research institutions with DOIs have scientific journals included in CrossRef?
- How is the digital content recorded in the CrossRef bibliographic database distributed over time?
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#### **Objectives and Methods:**

The aim of this study is to monitor the digital visibility of research institutions in Algeria that are involved in scholarly publishing through their membership in digital identifier registration institutions. The CrossRef agency was used as an example to track the scholarly publishing movement in Algeria. The study aims to introduce the CrossRef agency. This study examines the distribution of Algerian scientific research institutions and journals registered with the CrossRef agency over time and by type To the best of the researcher's knowledge, this is the first local study in Algeria to investigate the presence of Algerian scientific publications and research institutions in the CrossRef agency.

The study's objectives necessitated the use of a descriptive analytical approach. This approach is suitable for exploring and describing the CrossRef agency, its website, and the services it provides. Additionally, it allows for a description of the reality of Algerian higher education and



scientific research institutions' membership and the extent to which they benefit from CrossRef's services. Data for the study was collected from the websites of:

**The Algerian Scientific Journals Platform** lists scientific journals classified as B and C, as well as unclassified scientific journals, with a total estimated at 849 and their digital content. (ASJP, 2021)

#### **The Algerian Ministry of Higher Education and Scientific Research**

Website (MESRS) provides a list of various scientific research institutions involved in scholarly publishing, including universities, university centers, research centers, higher and National Schools, and Thematic Agencies. The total number of institutions is 219. (MESRS)

**The CrossRef agency website was carefully searched to find bibliographic information.** (Crossref)

Higher education institutions were searched individually and scientific journals were searched using the ISSN (International Standard Serial Number) option. If the journal name did not appear, it was confirmed through the name of the scientific journal.

**The website and official (AJPSpublications) Facebook page of AJPS Publications** (AJPSPublications), the exclusive organization sponsor representing CrossRef in North Africa and the Middle East, were used to communicate with CrossRef (African Journal of Political Sciences).

We used the remote interview via social media to communicate with CrossRef ambassadors. (mostafa, 2023) (Bartell, 2023)

The search process was conducted in Arabic, French, and English.

#### **Study Concepts:**

##### **The concept of Scholarly publishing:**

Scholarly publishing refers to the author's intellectual message conveyed to the audience through recognized scientific journals. These journals provide intellectual protection and privacy to the author's work, ensuring the desired scientific benefit. (Sahnouni, 2019)

It is worth noting that the researcher has published scholarly articles and research in their field of specialization in prestigious peer-reviewed journals. These journals have a global impact factor and are included in global rankings, making them widely available. Such journals are issued by academic institutions such as universities, publishing houses, or researchers themselves (Rashwan, 2003).

Scholarly publishing is a crucial aspect of university evaluation and international rankings. The global intellectual production and citation frequency of universities, as well as their reference



quotations, are key factors in determining their ranking. Therefore, it is important to maintain high-quality publications (Al-Dahshan, 2020).

In recent decades, scholarly publishing has been impacted by the digital environment and technological advancements, leading to the emergence of a new model called electronic scholarly publishing (Melhem, 2015):

*"The process of producing books, journals and various publications using modern applications and new technologies."*

#### **Concepts in Digital Visibility:**

The term 'visibility' is derived from the Latin word 'visibilitas'.

The concept of visibility in the digital realm refers to the degree to which an object can be seen in a given space. It is important to note that visibility has a hierarchical dimension, with varying degrees of visibility and invisibility. (Tardy, 2007)

In the scientific field, visibility refers to the presence of a researcher on the web, including recognition, positioning, and citations received for conducting research in the scientific community. (Andrea, Migue, Frank, Ramiro, & Andrés, 2022)

Bibliometrically, it refers to the frequency with which certain articles are cited in others. The scientific impact of research is determined by its usefulness and international influence (Dahman, Kouici, & Dahman, 2013)

We conclude that the digital visibility of research refers to the technological tools derived from the digital environment that enhance the visibility of research from and through it.

#### **Digital Object Identifier DOI:**

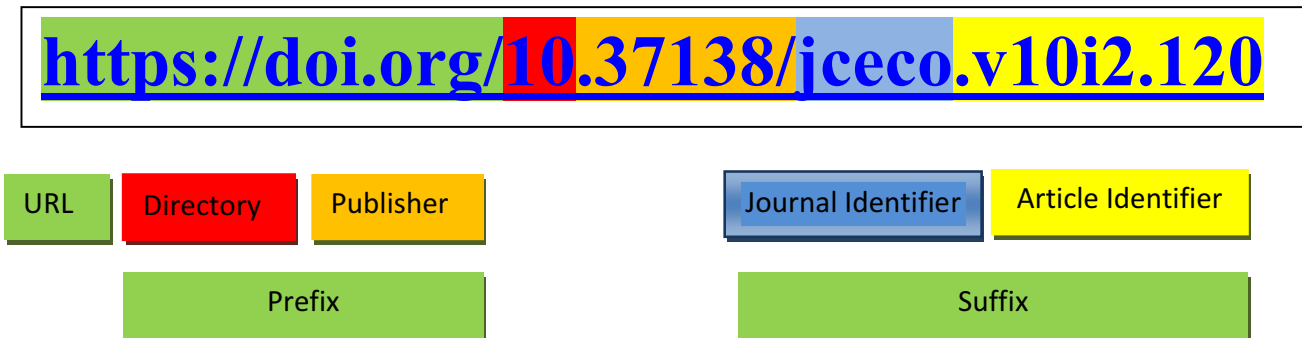
Digital Object Identifier DOI is a permanent identifier used to identify digital content objects uniquely; Digital Object Identifier DOI was officially launched at the Frankfurt Book fair in 1997. (Wang, 2007)

Digital Object Identifier DOI consist alphanumeric characters, it is split into two parts separated by forward slash.

- **The prefix** with indicates the organization responsible for managing the DOI.
- **The suffix** is chosen by the registrant for that item. (Mondal & Mondal, 2023, p. 77)



Fig.2. shows the structure of DOI.



Source: (Mondal & Mondal, 2023, p. 78)

### **International DOI Foundation:** (DOI Foundation)

The International DOI Foundation was established by the American Publishers Association, the International Publishers Association, and the International Association of Scientific, Technical and Medical Publishers as a non-profit organization to coordinate registration agencies for various Digital Object Identifiers (DOIs) and promote the proper use of the DOI system.

### **Digital Object Identifiers Registration Organizations :**

Registration Agencies (RAs) are authorized to assign Digital Object Identifiers (DOIs) to objects. Their mission is to provide services to the scholarly publishing community and organizations that need to identify, locate, and track their materials. RAs provide DOI prefixes and register them with an infrastructure for describing bibliographic data for scientific content, all under the management of the DOI Foundation. The main agency we will discuss is CrossRef.

However, before delving into the details of CrossRef, we will briefly mention some other agencies that provide Digital Object Identifiers (DOIs).

#### **-Agencies with global coverage**

1. **CrossRef** is considered one of the most important Digital Object Identifier (DOI) registration agencies, being the first and largest registered agency for DOIs. It provides access to electronically available information sources for articles, books, and conference proceedings. CrossRef is a scientific record that the global community can use to benefit society. (Doi foundation)
2. **Data Cite** is a global non-profit organization that provides Digital Object Identifiers (DOIs) for research data and other outputs. By assigning DOIs, DataCite makes research outputs





discoverable and citable, and provides associated metadata to the community. DataCite is also developing additional services to facilitate the connection and sharing of research outputs within the broader research ecosystem, and to assess the use of outputs within that ecosystem. Any organization within the research community can join DataCite to start DOI registration (Datacite)

3. **The Entertainment Identifier Registry (EIDR):** is a public registry that provides a unique identifier for audio and visual content across the global entertainment industry. It was established to meet the need for a unified identification system that can uniquely identify and track different forms of entertainment content. (The Universal Media Identifier)
4. **Human & Digital (HAND):** is a talent identifier designed for the requirements of working in Hollywood and sports. HAND provides the industry with an interoperable talent identifier for historical, current, and future uses by identifying legal entity humans, licensed virtual humans, and fictional characters. (Human & Digital)
5. **The multilingual European DOI Registration Agency (mEDRA):** is available for DOI registration. The DOI International Foundation officially designated it on July 1, 2003. It provides DOI registration services to publishers, academic institutions, research centers, and intermediaries in Italy, the EU market, and internationally. It is a continuous quotation system for internet documents. The system tracks the relationship between citing and cited articles (mEDRA)

**-Agencies with regional coverage:**

1. **The Publications Office of the European Union (OP)** The Publications Office of the European Union (OP) is the official publisher of EU institutions, bodies, offices, and agencies. It is responsible for assigning DOI names to the content produced by these customers, including official EU publications, online journal articles, datasets, and grants. (DOI Foundation)
2. **Chinese DOI** is a DOI registration service jointly operated by ISTIC and Wanfang Data. It was the first DOI RA in China and Asia. Chinese DOI provides DOI registration, solutions, and other value-added services to Chinese publishers, research institutions, service providers, and researchers for research content such as academic journals, scientific statements, theses, books, conference proceedings, and advance publications... etc. (DOI Foundation)
3. **China National Knowledge Infrastructure (CNKI):** The China National Knowledge Network (CNKI) is an electronic publishing project that began in 1996. Initially focused on



electronic journals, the project has since expanded to include newspapers, theses, proceedings, yearbooks, reference works, and more. CNKI is a symbol of China's electronic publishing industry, which has significantly advanced Chinese library systems and supported researchers in their work. CNKI academic databases currently serve over 5,500 institutions, including universities, public libraries, corporate libraries, and hospitals both in and outside of China. (China National Knowledge Infrastructure (CNKI))

4. **The Japan Link Center (JaLC):** is the only Japanese organization authorized by the DOI Foundation as a registration agency (RA) for DOI, is jointly managed by academic institutions in Japan. The DII is assigned to various types of digital content, including scientific papers, books, research data, and e-learning materials. It is managed along with the content site's URL. The system manages the bibliography and location information of electronic academic resources. (Japan Link Center(JaLC))
5. **The Korean DOI Center** is operated by the Korea Institute of Science and Technology Information (KISTI). It collects bibliographic information for Korean science and technology, including press articles, official government documents, Korean patent information, research and development reports, and traditional Korean knowledge. The Korean DOI Center aims to promote the use of information and data collected in Korea, as well as improve access to Korean research achievements. (DOI Foundation)

Among the aforementioned registration agencies, CrossRef is the primary registration agency for DOIs, having been the first to register them. It is also the most widely used agency, with a total of 112,692,116 journal DOIs, 25,244,623 book DOIs, and 8,224,998 conference DOIs registered as of 01/29/2024. In addition to registration services, CrossRef offers other services.



#### 4. FINDINGS AND DISCUSSION

##### 4.1 Description of CrossRef and the Algerian scientific journals platform (ASJP):

Fig.2. shows the home page of the CrossRef website



Source: <https://www.CrossRef.org/> (Crossref)

CrossRef is the most powerful digital ID registration agency that dates back to 1999 when publishers decided to find a neutral party to facilitate the exchange of links between article reference lists. (Hendricks, Tkaczyk, Lin, & Feeney, 2020).

It is a non-profit organization that provides static identifiers for articles and journals and publishes all associated metadata. The organization was launched in 2000. (Borrego, Ardanuy, & Arguimbau, 2023)

The mission of this service is to facilitate researcher access to information sources. Currently, it covers approximately 155 million digital content items. (crossref)

CrossRef aims to achieve its goals through a set of principles developed in 2015 (Hendricks, Tkaczyk, Lin, & Feeney, 2020): these principles prioritize the importance of both the individual and the group, recognizing the impact of each member's electoral vote on the institution's board. Additionally, they emphasize the significance of group genius over individual intelligence and acknowledge the crucial role of technology in achieving future goals.



### Algerian scientific journals platform (ASJP):

**ASJP** ASJP is an electronic platform for Algerian scientific journals developed and managed by the Center for Research in Scientific and Technical Information (CERIST) in Algeria (ASJP, 2024) It serves as an intermediary between the author and the publisher, guaranteeing the publication of the article in journals. The platform documents all stages of publication. The latest update from the Directorate General of Scientific Research and Technological Development lists 995 journals. Of these, 849 are listed on the ASJP platform, while the remaining journals are not yet available.

- The 'Nature' and 'Science' journals are exceptions and allow researchers who have published in these two journals to admit the institution to which they belong to be included in the sample for the Shanghai ranking.
- Category A+: Scientific journals (articles) indexed in the Thomson Reuters Web of Science (WOS) (with Impact Factor) that are in the Top 5 micro-domains.
  - Category A: Scientific journals (articles) indexed in the Thomson Reuters Web of Science (WOS) (with Impact Factor). This is the minimum category that allows for institutions to be visible.
  - Category B includes scientific journals from selective databases such as Elsevier's SCOPUS and Thomson Reuters' 'All databases' (Medline, INSPEC, Biosis...) etc), updated list of the Agency for the Evaluation of Research and Higher Education (AERES), updated list of the European Reference Index for the Humanities (ERIH), updated categorization of CNRS economics and management journals, non-paying and more than 5 years old, or 2) non-paying scientific journals with more than 10 years of existence and validated by an internal commission with a representative of the Ministry and a representative of the DGRSDT (which meets twice a year).
  - Category C includes scientific journals with an ISSN, peer review, and accessible abstracts on the internet with established publication regularity.
  - Category D includes non-peer-reviewed journals or preprints registered in libraries, both with accessible abstracts on the internet.
  - Category E includes popular journals or books. (DGRSDT)



**-Table 1. Types of Higher Education and Research Institutions Registered in CrossRef.**

Type of Institution	Number of institutions in Algeria	Number of institutions registered in CrossRef	percentage %
-Universities	54	34	77.3%
-University Centers	9	5	11.4%
-National Schools	40	0	0
-Higher Schools of Teachers	12	0	0
-Research Centers Under the Guardianship of the Ministry of Higher Education and Scientific Research	19	4	9.1%
-Research Centers Not Affiliated with the Ministry of Higher Education and Scientific Research	11	0	0
-Thematic Agencies	3	1	2.3%
- Licensed Private Higher Training Institutions	17	0	0
-Institutions of Other Ministerial Departments	54	0	0
<b>-Total of Institutions</b>	<b>219</b>	<b>44</b>	<b>100%</b>

- **Source: Author’s construction based on source data from ASJP and CrossRef 2024.**

The table above shows that:

In Algerian higher education and scientific research institutions, universities hold the highest percentage at 77.3%, followed by university centers at 11.4%. It is important to note that these percentages are directly proportional to their total census and geographical distribution according to the division of the university network of the Ministry of Algerian Higher Education and Scientific Research.

The Ministry of Higher Education and Scientific Research has registered five research centers with the CrossRef agency. These centers include the Center for Research in Islamic Sciences and Civilization in the Algerian Central Region - Laghouat - and the Center for Scientific and Technical Research in Social and Cultural Anthropology in the Western Algerian Region - Oran -. Al-Bassira Center for Research, Consulting and Educational Services, Renewable Energy Development Center – Algeria, Center for Research in Applied Economics for Development, and El Hikma Center.

However, only one thematic agency, the Thematic Agency for Research in Health and Life Sciences of Oran, is registered.



The following institutions are registered: It is important to note that other institutions of higher education and scientific research from the higher schools of teachers and national schools have not been registered.

The significant difference in percentages is attributed to the universities' and university centers' interest in the scholarly publishing process and their researchers' competition to obtain digital identifiers for their content. This allows them to register their publications globally with donor institutions like CrossRef, improving their visibility and upgrading their international ranking.

- **Table 2. CrossRef coverage of the Algerian platform for scientific journals ASJP and its distribution by category**

Category	Number of journals on Asjp	Number of journals registered in CrossRef	percentage%	Number of journals not registered in CrossRef	percentage%
Classified scientific journals (B)	12	7	58.33%	5	41.67%
Classified scientific journals (C)	284	39	13.73%	245	86.27%
Unclassified scientific journals	545	29	5.32%	516	94.68%
<b>Total</b>	<b>849</b>	<b>75</b>	<b>8.83%</b>	<b>766</b>	<b>90.22%</b>

**Source: Author's construction based on source data from ASJP and CrossRef 2024**

- The table indicates that only 8.83% of the journals on the Algerian platform for scientific journals ASJP are registered with CrossRef.

- Scientific journals classified as (B) and registered with CrossRef ranked first, accounting for 58.33% of their total number on the Algerian platform for scientific journals ASJP, which is estimated at 12 journals. Our study found that 11 of these journals have their collections indexed in the ERIH plus database. Specialized journals within the humanities, social sciences, arts, and economics are the focus of this group, with the exception of one journal specialized in environmental sciences indexed in the Scopus database. This journal is not registered with CrossRef.

- The second group, classified journals class (C), has a rate of 13.73% the percentage of journals registered on ASJP is modest percentage compared to the total number. This is because these journals aim to improve their visibility and rank by adhering to certain criteria, such as registration with institutions that grant Digital Object Identifiers (DOIs). By browsing the ASJP platform and using the Indexed option, it was found that some journals obtained DOIs by registering with other databases, such as the Datacite database.

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- Then, 5.32% of the total number of unclassified scientific journals at the platform level did not meet the conditions approved by the Algerian committee in charge of the rehabilitation and development of scientific journals that were classified and declined, such as the journal Oum El Bouaghi Humanities. These journals seek registration with the CrossRef Agency to improve their production and visibility, both nationally and internationally.

- **Table 3. The most Algerian higher education and Research Institutions with DOI whose scientific journals included in CrossRef.**

N°	Name of Institution	Number of DOI	number of journals	percentage%	N°	Name of Institution	Number of DOI	number of journals	percentage%
1	Emir Abdelkader University of Islamic Sciences of Constantine	5147	5	%22.05	11	University of Oran 2	807	3	%3.46
2	University of Ouargla	2868	11	%12.29	12	University of Chlef	798	3	%3.42
3	University of Biskra	2435	9	%10.43	13	University of Tamenghasset	516	1	%2.21
4	Center for Scientific and Technical Research in Social and Cultural Anthropology-Oran	1894	1	%8.12	14	Al BASSIRA Center for Research, Consulting and Learning Services	338	5	%1.45
5	University of Laghouat	1772	5	%7.59	15	University of Tlemcen	293	3	%1.26
6	AL- HIKMA Scientific Research Center	1479	8	%6.34	16	University of Bejaia	280	1	%1.20
7	University of Relizane	960	2	%4.11	17	University of Constantine 2	275	1	%1.18
8	University center of Mila	958	4	%4.10	18	University of Boumerdes	183	1	%0.78
9	University of Constantine 1	919	1	%3.94	19	University center of Tipaza	175	1	%0.75
10	University of Oum El Bouaghi	844	4	%5.06	20	University of Oran 1	129	2	%0.55

- **Source: Author's construction based on source data from ASJP and CrossRef 2024.**



ASJP journals received a total of 23,338 DOIs from CrossRef, which were spread across 79 registered journals. However, 4 of these journals are not recognized by the Algerian Directorate of Research and Technological Development and are not registered on the ASJP platform.

These journals are distributed among 26 institutions in the Algerian higher education and scientific research sector. We have listed the top 20 institutions that have a DOI.

- Abdelkader University of Islamic Sciences of Constantine ranked first among Algerian higher education and scientific research institutions with a DOI score of 22.05%. All of its journals are indexed in CrossRef, with an average of 1029 DOI per journal.
- The University of Ouargla ranked second with 13.92% of its journals indexed in CrossRef, which corresponds to 58% of the total journals issued by the university.
- Biskra University has digitized 47% of its journal outputs, accounting for 11.39% of the total journals indexed by the CrossRef agency.
- The Center for Scientific and Technical Research in Social and Cultural Anthropology-Oran is ranked fourth, with 8.12%, despite only registering one journal with CrossRef.
- The Al-Hikma Center ranked sixth by registering all of its journals, with one classified as C and seven journals not classified at the ASJP platform level.
- The University of Oran 2 and the University of Chlef had an equal number of journals, which reflected their convergence in the number of DOI obtained by 3.46% and 3.42%, respectively. However, these percentages do not accurately reflect the extent to which each institution's output is indexed in CrossRef compared to the digital content of each institution's journals that are actually on the ASJP platform.





**Table 4. Shows the growth rate of digital content in Algerian higher education and scientific research institutions based on time distribution.**

N	Name of Institution	All time	content before 2023	percentage	current content 2023	percentage	growth rate
1	University of Ouargla	2857	2572	90.02%	285	9.98%	11.08%
2	University of Biskra	2426	2316	95.47%	110	4.53%	4.75%
3	AL- HIKMA Scientific Research Center	1064	1059	99.53%	5	0.47%	0.47%
4	Emir Abdelkader University of Islamic Sciences of Constantine	4955	3163	63.83%	1792	36.17%	56.66%
5	University of Laghouat	1798	1531	85.15%	267	14.85%	17.44%
6	Al BASSIRA Center for Research, Consulting and Learning Services	333	295	88.59%	38	11.41%	12.88%
7	university center of Mila	909	536	58.97%	373	41.03%	69.59%
8	University of Oum El Bouaghi	66	45	68.18%	21	31.82%	46.67%
9	University of Oran 2	759	543	71.54%	216	28.46%	39.78%
10	University of Chlef	687	687	100%	0	0.00%	0.00%
11	University of Tlemcen	266	115	43.23%	151	56.77%	131%
12	University of El Oued	51	12	23.53%	39	76.47%	325%
13	University of Relizane	540	388	71.85%	152	28.15%	39.18%
14	University of Oran 1	119	90	75.63%	29	24.37%	32.22%
15	University of Constantine 1	918	851	92.70%	67	7.30%	7.87%
16	University of Mostaganem	417	400	95.92%	17	4.08%	4.25%
17	University of Constantine 2	274	206	75.18%	68	24.82%	33.01%
18	University of Boumerdes	157	93	59.24%	64	40.76%	68.82%
19	university center of Tipaza	174	174	100%	0	0.00%	0.00%
20	University of Djelfa	107	77	71.96%	30	28.04%	38.96%
21	University of Bordj Bou Arreridj	13	1	7.69%	12	92.31%	1200%
<b>Total</b>		<b>18890</b>	<b>15154</b>	<b>80.22%</b>	<b>3736</b>	<b>19.78%</b>	<b>24.65%</b>

**Source: Author's construction based on source data from ASJP and CrossRef 2024.**



This section discusses the use of participation reports, one of the most important tools provided by CrossRef, which allows members to examine their metadata. (Hendricks, Tkaczyk, Lin, & Feeney, 2020). These reports provide information on digital content, including its size and distribution over two periods:

- **The current content** period, which corresponds to browsing the site, and **the Back file** period, which precedes it.

In our study, the period analyzed was prior to 2023, as indicated in the table above. The back file and current period were from January 01, 2023, until January 31, 2024.

- Our findings, based on CrossRef (2023) and ASJP (2023), indicate... Out of the 26 institutions that registered their journals with the CrossRef database, 21 affiliated with the Algerian higher education and scientific research sector deposited digital content to obtain the DOI of journal articles. The growth rate between the pre-2023 and post-2023 periods was 24.65%. It is worth noting that the current two-year period saw a significant increase in digital content compared to the previous period.
- During the current period, the University of Bordj Bou Arreridj, the University of El Oued, and the University of Tlemcen experienced a significant increase in content by 1200%, 325%, and 131%, respectively. This increase can be attributed to the positive results of seminars and training programs aimed at promoting digitization, visibility, and university classification. These programs were organized by the exclusive sponsor representing CrossRef in North Africa and the Middle East, AJSP publications. The University of Bordj Bou Arreridj's membership in the CrossRef agency was confirmed on December 1, 2022
- On Thursday, September 29, 2022, the University of Biskra became a member of the CrossRef agency.
- Eight universities, including the University Center of Mila, experienced significant growth in digital content productivity, ranging from 32.22% to 69.59%, due to their membership in the CrossRef agency..



## 5- CONCLUSION

The principle of 'publish or perish' has long been the prevailing rule in scholarly publishing. However, a new slogan, 'Be visible or vanish,' is gaining traction in the scholarly publishing arena. (Mewburn & Clews, 2023)

This study demonstrates the crucial role of Digital Object Identifiers (DOIs) in enhancing the visibility of scholarly publications through participation in DOI registration institutions, with CrossRef being the most significant one. It presents the first local analysis of the presence of Algerian scholarly publishing entities in the CrossRef database.

- CrossRef can be a useful alternative to certain international databases, such as Web of Science and Scopus, particularly for publishing in the humanities, social sciences, and arts, as well as for publishing in Arabic and other non-English languages that may not be well-represented in those databases.
- The study analyzed the membership and participation of Algerian higher education and scientific research institutions, as well as the journals of the Algerian Scientific Journals Platform, in obtaining DOIs through CrossRef. The findings indicate that:
- Among Algerian institutions of higher education and scientific research, universities are the most registered with the CrossRef institution, followed by university centers. This is due to the continuous authorship movement of faculty members and the nature of scientific research at universities. Faculty members in this category always seek to introduce their scientific production and obtain a large number of reference citations to increase the visibility and classification of their research.
- The study's results indicate that 79 scientific journals are present in the CrossRef database out of 849 journals (excluding 4 that are not counted by the Algerian Directorate of Research and Technological Development and not registered at the level of the ASJP platform). This lack of awareness and interest among journal editors and university officials regarding the importance of registering Digital Object Identifiers (DOIs) with institutions such as CrossRef, as well as the benefits of utilizing CrossRef services to enhance journal quality and visibility, is the cause of this issue.
- The study analyzed the top 20 institutions based on their number of obtained DOIs. This was not meant to undermine the status of other academic and research institutions, but rather due to the lack of stability in their rankings caused by irregular registration of digital content in CrossRef.



- The total number of DOIs (23,338) was compared to the 18,473 articles indexed in the CrossRef database. The disparity between the total number of DOIs obtained and the number of indexed articles is a result of the composition of the DOI assigned per institution, volume, and issue.
- The growth rate between the pre-2023 and post-2023 periods was approximately 24.65%. It is worth noting that the current two-year period saw a nearly 25% increase in digital content compared to the preceding period, despite its shorter length.

### **Recommendations:**

The study concluded a set of recommendations based on its results, including:

- the need to train researchers and editors-in-chief of journals to instill a culture of indexing national journals in major international databases such as CrossRef, Web of Science, and Scopus. The transformation of individual initiatives by Algerian institutions of higher education and scientific research into a national policy, accompanied by the Algerian committee in charge of the rehabilitation and development of scientific journals, has taken place.
- The training courses, carried out by the exclusive sponsor representing CrossRef in North Africa and the Middle East (AJPS), have proven to be effective. This study calls for intensifying seminars and training sessions, and encouraging university officials and editors-in-chief to accelerate the retrospective inclusion of digital content. This will help achieve international recognition and visibility for national journals. Allocating a team of specialists in library and information sciences to assist the editorial team of the scientific journal in indexing journals within CrossRef and obtaining a DOI.
- Returning scientific journals registered by African Journals Online AJOL, OPENEDITION, and KHOWLEDGE to their original owners, the Algerian institutions of higher education and scientific research that issued them. (Three C-rated journals were published by the University of Ouargla, along with one B-rated journal published by the University of Djelfa, one B-rated journal published by the University of Béjaïa, one B-rated journal published by the Center for Scientific and Technical Research in Social and Cultural Anthropology, and one B-rated journal published by the Center for Research in Applied Economics for Development.)
- The metadata for digital content should be recorded in both English and the language of the document. Additionally, conference proceedings and book chapters should also be included along with scientific articles.
- It is important to increase the number of CrossRef ambassadors in Algeria, as well as the North African and Arab regions, due to its significance as an alternative to international databases that impose restrictions on the registration of scientific journals.
- Providing detailed statistics on the affiliations of scientific journals at the website level of the CrossRef agency.



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