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Database and Research Metrics:

Indexing Databases:

Indexing is the process of creating indexes for record collections which allows researchers to more quickly find records for specific individuals; without them, researchers might have to look through hundreds or thousands of records to locate an individual record. It also represents a number referring to a list of terms, definitions, topics etc. arranged in alphabetical order in order to efficiently guide the readers to the desired information within the content. Indexing facilitates in the organization of literature in such a manner that makes the document of interest easily identifiable by the readers.

MathSciNet (AMS: American Mathematical Society)	Since 1940, Mathematical Reviews® (MR) has served researchers and scholars in the mathematical sciences by providing timely information on peer-reviewed articles and books. **MathSciNet®**, the electronic version of MR, presents a fully searchable database with many tools designed to help navigate the mathematical sciences literature, including: •reviews written by a community of experts •bibliographic listings dating back to the early 1800s •links to articles, journals, and publishers •linked reference lists •citation information on articles, books, and journals **MathSciNet** is an electronic publication offering access to a carefully maintained and easily searchable database of reviews, abstracts and bibliographic information for much of the mathematical sciences literature. Over 125,000 new items are added each year, most of them classified according to the Mathematics Subject Classification. Authors are uniquely identified (by their MR Author ID), enabling a search for publications by individual author rather than by name string. Continuing in the tradition of the paper publication, *Mathematical Reviews* (MR), which was first published in 1940, expert reviewers are selected by a staff of professional mathematicians to write reviews of the current published literature; over 90,000 reviews are added to the database each year. Extending the MR tradition, MathSciNet® contains over 3.6 million items and over 2.3 million direct links to original articles. Bibliographic data from retro digitized articles dates back to the early 1800s. Reference lists are collected and matched internally from approximately 650 journals, and citation data for journals, authors, articles and reviews is provided. This web of citations allows users to track the history and influence of research publications in the mathematical sciences.
SCI / SCIE: Science Citation Index Expanded	SCI, the Science Citation Index, considered to be one of the most reputable multidisciplinary citation indexes in the globe, offers researchers and others access to the latest impact factor values of over 13,000 science journals that

(Clarivate)	have been in existence since 2012. The more extensive version of SCI, the Science Citation Index Expanded (SCIE) is comprised of more than 9,500 major journals of 178 scientific disciplines from 1900 to the present day. The journals indexed by SCI and SCIE are described as the world's leading journals. Both indexes are available online through the Library Web of Science platform.
DOAJ : Directory of Open Access Journals (Open Global Trusted)	DOAJ (Directory of Open Access Journals) was launched in 2003 with 300 open access journals. Today, this independent index contains almost 17 500 peer-reviewed, open access journals covering all areas of science, technology, medicine, social sciences, arts and humanities. Open access journals from all countries and in all languages are accepted for indexing. DOAJ is financially supported by many libraries, publishers and other like-minded organizations. Supporting DOAJ demonstrates a firm commitment to open access and the infrastructure that supports it. DOAJ is a co-author to the Principles of Transparency and Best Practice in Scholarly Publishing that provide the basis of the DOAJ basic criteria for inclusion.
Google Scholar	Google Scholar is a popular scholarly indexing engine that crawls the web looking for scholarly publications: articles, books, reports, theses, conference proceedings, preprints, among others. Google scholar identifies scholarly content, determines each item's bibliographic metadata, and groups different online versions of an item together with this metadata in search results. There is no need to register your journal with Google Scholar. Google Scholar will eventually find and automatically crawl the site. Google Scholar relies on two key pieces of information in order to do its indexing: 1. A way to crawl all the Uniform Resource Locators (URLs) - or essentially links - for articles, either via a crawler-friendly browse (usually set up by default for Open Journal Systems (OJS) instances), or a sitemap. 2. Bibliographic information from articles in the form of machine-readable metadata tags ("metatags"). These metatags are derived from the information you add to the forms in OJS to describe your journal, issues, and submissions. Bibliographic metatags indicate to Google Scholar the specific metadata for

	an article (e.g. title, author, publication date, etc.).
zbMATH (EMS: European Mathematical Society)	zbMATH Open (formerly known as Zentralblatt MATH) is the world's most comprehensive and longest-running abstracting and reviewing service in pure and applied mathematics. It is edited by theEuropean Mathematical Society (EMS), the Heidelberg Academy of Sciences and Humanities and FIZ Karlsruhe. The editorial work is done by the Berlin office of FIZ Karlsruhe, which as a member of the Leibniz Association is a non-profit company and a recognized organization serving the public interest. Since January 2021, zbMATH Open has been available as an open access database. Currently, zbMATH Open contains around 4.2 million bibliographic entries with reviews or abstracts drawn from more than 3,000 journals and book series, and some 190,000 books. Its coverage, which starts in the 18th century, is complete from 1868 to the present day, due to the integration of the "Jahrbuch über die Fortschritte der Mathematik" database. zbMATH Open provides easy access to bibliographic data, reviews and abstracts from all areas of pure mathematics as well as applications, in particular to natural sciences, computer science, economics and engineering. It also covers history and philosophy of mathematics and university education. All entries are classified according to the Mathematics Subject Classification Scheme (MSC 2020) The **Mathematics Subject Classification (MSC)** is a classification scheme maintained by Mathematical Reviews and zbMATH Open. It is used by these reviewing services and many others to categorize items in the mathematical sciences literature. The MSC is updated every 10 years, the current version being MSC2020. See the classification search or download MSC2020 (PDF).
ERIC (Education Resources Information Center) (IES: Institute of Education Sciences, US)	ERIC is an internet-based digital library of education research and information sponsored by the Institute of Education Sciences (IES) of the U.S. Department of Education. ERIC provides access to bibliographic records of journal and non-journal literature from 1966 to the present. ERIC's mission is to provide a comprehensive, easy-to-use, searchable Internet-based bibliographic and full-text database of education research and information for educators, researchers, and the general public.
Social Sciences Citation Index (SSCI) (Clarivate)	Social Sciences Citation Index™ contains over 3,400 journals across 58 social sciences disciplines, as well as selected items from 3,500 of the world's leading scientific and technical journals. More than 9.37 million records and 122 million cited references date back from 1900 to present.

AHCI: Arts & Humanities Citation Index (Clarivate)	Arts & Humanities Citation Index contains over 1,800 journals across 28 arts & humanities disciplines. More than 4.9 million records and 33.4 million cited references date back from 1975 to present. Compared to the clinical, natural and social sciences, the arts & humanities may differ significantly regarding the type of content that is considered to be of scholarly importance, norms for reviewing content, and citation behavior. The Web of Science™ editors give these differences due consideration when reviewing journals in these subjects for Arts & Humanities Citation Index.
ESCI: Emerging Sources Citation Index (Clarivate)	Since launching the Emerging Sources Citation Index™ in 2015 we have added over 7,800 titles, with back files dating back to 2005. Journals included in the Emerging Sources Citation Index cover all disciplines and range from international and broad scope publications to those that provide deeper regional or specialty area coverage. More than 3 million records and 74.4 million cited references date back from 2005 to present. Part of the Web of Science Core Collection™, Emerging Sources Citation Index contains quality publications, selected by our expert in-house editors for editorial rigor and best practice at a journal level.
Book Citation Index (BKCI) (Clarivate)	The Book Citation Index™ includes over 128,000 editorially selected books, with 10,000 new books added each year. Containing more than 53.2 million cited references, coverage dates back from 2005 to present. The Book Citation Index is multidisciplinary, covering disciplines across the sciences, social sciences, and arts & humanities.
Conference Proceedings Citation Index (CPCI) (Clarivate)	Conference proceedings represent the leading edge of research – revealing emerging trends and new ideas before they appear in journals. The Conference Proceedings Citation Index lets you use cited reference searching to see the full impact of conferences and other professional meetings. The Conference Proceedings Citation Index contains over 227,000 conference proceedings, with 70 million cited references dating back from 1990 to present. The Conference Proceedings Citation Index is part of the Web of Science Core Collection™.
MEDLINE	MEDLINE is the U.S. National Library of Medicine (NLM) premier bibliographic database, covering biomedicine and life sciences topics vital to biomedical practitioners, educators, and researchers, such as bioengineering, public health, clinical care, and plant and animal science, nursing, dentistry, veterinary medicine, marine biology, and preclinical sciences. You'll find references from journals, newspapers, magazines, and newsletters.

DCI: Data Citation Index	The Data Citation Index™ provides a single point of access to quality research data from global repositories across disciplines. Descriptive records are created for data objects and linked to literature articles in the Web of Science. As data citation practices increase, the Data Citation Index aims to provide a clearer picture of the full impact of research output, as well as to act as a significant tool for data attribution and discovery. Due in large part to government mandates to make research data freely accessible, there are increasing numbers of data repositories being created worldwide and filled with data by researchers. As part of your literature search, data will provide a more comprehensive picture of the research being undertaken in your topic or field. By itself, the benefits of data are obvious: data can be used by other researchers with different objectives, results can be reproduced more easily and accurately, researchers receive the credit they're due, and data producers have a new channel by which to promote their work. The links between Data Sets and published research in the Web of Science allows researchers to discover relevant research data, while those collecting and depositing data can measure the impact of their work.
BIOSIS Citation Index	BIOSIS Citation Index™ combines the carefully indexed life science coverage found in BIOSIS™ Previews *(*Biological Abstracts™, Reports, Reviews, and Meetings*)* with the power of cited reference searching in Web of Science™. Precision searching is delivered through custom terms, and specialized, article-level indexing, with tags to vital data such as Enzyme Commission numbers, and cross-references throughout to gene, disease, and organism names. Deep and broad coverage across all subject areas, including traditional areas of biology like botany, zoology, and microbiology; alongside related and interdisciplinary fields such as agriculture, biochemistry, bioengineering, biomedical, biophysics, biotechnology, ecology, medicine, and pharmacology. Premier life sciences coverage, superior indexing, and powerful search, combine to deliver confident life sciences research.
ARCI: Arabic Citation Index	The Arabic Citation Index (ARCI), a new database on the Web of Science platform, makes Arabic journals more accessible to researchers worldwide by connecting Arabic scholarly content to the global citation network of

	high quality, peer-reviewed scholarly literature with more than 1.8 billion cited research references. Funded by the Egyptian government and built Clarivate, ARCI is searchable in both Arabic and English, and hosted on the Web of Science platform. Indexing Arabic publications provides local scientific communities with the ability to contribute to national, regional, and international research efforts – facilitating collaboration and extending the Arabic academic footprint.
CSCD: Chinese Science Citation Database	Clarivate Analytics partnered with the Chinese Academy of Sciences to host the Chinese Science Citation Database™ on the Web of Science™. Over 1,200 journals and 5.2 million records back to 1989 provides bibliographic information and citations to articles in the core science and engineering journals published in the People's Republic of China. The Chinese Science Citation Database was the first non-English product available within Web of Science. Web of Science now supports Unicode — expanding search capabilities beyond English to character languages and empowering Chinese Science Citation Database and other Web of Science Core Collection™ users with new customization options. When connected to the multidisciplinary citations on the Web of Science platform, the Chinese Science Citation Database becomes so much more. Nearly every discovery is influenced by earlier research, both in its subject area and in related fields, and a publication can have significant influence and impact on other research after is has been published. No other platform has a full citation network to accurately and confidently connect you to the highest quality multidisciplinary research.
SciELO Citation Index (Scientific Electronic Library Online	a program of the Sao Paulo Research Foundation for the cooperative publishing of open access journals, which includes regional journals from Latin America and the Caribbean as well as titles from Spain, Portugal and South Africa.

Citation Databases: Citation databases are databases that have been developed for evaluating publications. The citation databases enable you to count citations and check, for example, which articles or journals are the most cited ones.

Note: None of the citation databases cover all publications. The coverage of different disciplines also varies greatly.

Note: Citation analysis and bibliometric indicators are based on citations and the amount of them. Citing in itself, however, is not a quality criterion and there can be many reasons for the citing (negative citations, ethnocentricity, self-citation).

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Citation databases can be used for cited reference searches, enabling you to find, check and track citation data year-by-year, navigating forward and backward through the literature related to a topic.

You can use a citation database to:

- Distinguish between authors with the same name, or an author's name that has been presented in different ways
- Analyze search results to show the number of documents broken down by various criteria, including year, author, source, affiliation, or subject categories
- Search within results by adding additional terms to the initial search
- Identify highly cited works related to a particular topic
- Find related works that share references or authors
- Create search alerts to keep up to date with developments in your discipline
- Set up citation alerts to notify you when a document or author is cited elsewhere
- Set up alerts to notify you about new documents by an author
- Generate a profile that presents an analysis and citation summary of works published by an institution or author(s), including h-index
- Compare the performance of journals in a particular subject area

Scopus (Elsevier)	Scopus is the largest abstract and citation database of peer-reviewed literature: scientific journals, books and conference proceedings. Delivering a comprehensive overview of the world's research output in the fields of science, technology, medicine, social sciences, and arts and humanities, Scopus features smart tools to track, analyze and visualize research. As research becomes increasingly global, interdisciplinary and collaborative, you can make sure that critical research from around the world is not missed when you choose Scopus.
Web of Science (Clarivate)	Web of Science, previously known as Web of Knowledge, is a database of bibliographic citations of multidisciplinary areas that covers the various journals of medical, scientific, and social sciences including humanities. It was inaugurated in 2004 by Thomson Reuters (Thomson Scientific), which is a part of Thomson Cooperation, to incorporate the citation indices and provides a scope for analysis of indexing and citations. It usually requires a commercial subscription and also helps in viewing the references. It is also utilized for searching of a subject and cited references; for instance, it retrieves the articles that are cited by a reference article and also helps in the viewing of the references that are already cited in a relevant article. It shows 10e15 results per page, which contains details like name of authors and source. The articles can be searched by using entries like author name, country, title, and source. The benefit of utilizing this database is that it will retrieve a number of articles from various disciplines and therefore saves time.

PubMed	The NLM (National Library of Medicine, USA) first gave a database that is both interactive and searchable (Medline) in 1971, which in 1996, further added the database of "Old Medline" that covered publications from 1950 to 1965 (Falagas et al., 2008). In 1997, PubMed (the combined version of both Medline and Old Medline) was started by NLM, and it is considered a bibliographic database of freely accessible online literature searches and contains about 30 million or so abstracts of biomedical resources from MEDLINE, online books, and life science journals. In addition to abstracts, it also contains molecular biology data and clinical trial databases and so on.

Research Metrics:

IF: Impact factor of a journal	The **impact factor (IF)**is a measure of the frequency with which the average article in a journal has been cited in a particular year. It is used to measure the importance or rank of a journal by calculating the times its articles are cited. The calculation is based on a two-year period and involves dividing the number of times articles were cited by the number of articles that are citable. Calculation of 2010 IF of a journal: A= the number of times articles published in 2008 and 2009 were cited by indexed journals during 2010. B = the total number of "citable items" published in 2008 and 2009. A/B =2010 impact factor **Example:** The Journal "Nature" has impact factor 41.577 in year 2017 means that on average Nature's papers published in the year 2017 received roughly 41.577 citations per paper. $IF_{2017}= \frac{\text{Citations2017: Citations in 2017 for published papers in 2016 and 2015}}{\text{Publication2016+Publication2015}}$ $IF_{2017}= \frac{74090}{880+902} = 41.577$ **Be aware** that 2017 impact factors are actually published in 2018; they cannot be calculated until all of the 2017 publications have been processed by the indexing agency. The Impact Factor is reported in Journal Citation Reports (JCR) CiteScore, which is similar to the IF but is based on a 4-year period.

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JCR: Journal Citation Reports (Clarivate)	Journal Citation Reports™ (JCR) provides you with the transparent, publisher-neutral data and statistics you need to make confident decisions in today's evolving scholarly publishing landscape, whether you're submitting your first manuscript or managing a portfolio of thousands of publications. Quickly understand a journal's role within and influence upon the global research community by exploring a rich array of citation metrics, including the Journal Impact Factor™ (JIF), alongside descriptive data about a journal's open access content and contributing authors. Journal Citation Reports provides ranking for journals in the areas of science, technology, and social sciences. For every journal covered, the following information is collected or calculated: Citation and article counts, Impact factor, Immediacy index, Cited half-life, citing half-life, Source data listing, Citing journal listing, Cited journal listing, Subject categories, and Publisher information. - Limited to the citation data of Journals indexed in Web of Science - Process to determine journals included in the tool - Indexes over 12,000 journals in arts, humanities, sciences, and social sciences
SNIP: Source Normalized Impact per Paper	Source Normalized Impact per Paper (SNIP) measures contextual citation impact by weighting citations based on the total number of citations in a subject field. The impact of a single citation is given higher value in subject areas where citations are less likely, and vice versa. Unlike the well-known journal impact factor, SNIP corrects for differences in citation practices between scientific fields, thereby allowing for more accurate between-field comparisons of citation impact. CWTS Journal Indicators also provides stability intervals that indicate the reliability of the SNIP value of a journal. SNIP was created by Professor Henk F. Moed at Centre for Science and Technology Studies (CWTS), University of Leiden in 2009.
SJR (SCImago Journal Rank)	The SCImago Journal & Country Rank is a portal that includes the journals and country scientific indicators developed from the information contained in the Scopus® database (Elsevier B.V.)." Scopus contains more than 15,000 journals from over 4,000 international publishers as well as over 1000 open access journals. SCImago's "evaluation of scholarly journals is to assign weights to bibliographic citations based on the importance of the journals that issued them, so that citations issued by more important journals will be more valuable than those issued by less important ones.
IPP (Impact per Publication)	The impact per publication, calculated as the number of citations given in the present year to publications in the past three years divided by the total number of publications in the past three years. IPP is fairly similar to the well-known journal impact factor. Like the journal impact factor, IPP does not correct for differences in citation practices between scientific fields. IPP was previously known as RIP (raw impact per publication).

CiteScore	Elsevier handles CiteScore metrics: a new standard that gives a more comprehensive, transparent and current view of a journal's impact that will help you guide your journal more effectively in the future. CiteScore metrics are part of the Scopus basket of journal metrics that includes SNIP (Source Normalized Impact per Paper), SJR (SCImago Journal Rank), citation- and document- counts and percentage cited. The integration of these metrics into Scopus provides insights into the citation impact of more than 22,220 titles. CiteScore metrics are a family of eight complementary indicators listed below. You can find out more about the individual indicators on the Scopus Journal Metrics website. • CiteScore • CiteScore Tracker • CiteScore Percentile • CiteScore Quartiles • CiteScore Rank • Citation Count • Document Count • Percentage Cited CiteScore is essentially the average citations per document that a title receives over a three-year period. It is simple to replicate. A CiteScore 2015 value is available for most active serial titles in Scopus — journals, book series, conference proceedings and trade journals — that started publishing in 2014 or earlier.
h-index (Author centric)	The h-index, or Hirsch index (by Jorge E Hirsch), measures the impact of a particular scientist rather than a journal. "**It is defined as the maximum value of h such that the given author/journal has published at least h papers that each of which has at least h citations by others**". For example, a scholar with an h-index of 5 had published 5 papers, each of which has been cited by others at least 5 times. **Example:** If an author has published 5 articles and has citations as 9, 7, 6, 2 and 1 for individuals, then his h-index is 3. Since, he has maximum 3 publications with 3 or more citations. However, the author does not have 4 publications with at least 4 citations. **NOTE:** An individual's h-index may be very different in different databases. This is because the databases index different journals and cover different years. For instance, Scopus only considers work from 1996 or later, while the Web of Science calculates a h-index using all years that an institution has subscribed to. (So a Web of Science h-index might look different when searched through different institutions.)

g-index (Author centric)	The *g-index*, created by Leo Egghe as a response to the h-index, is an author-level metric which places greater weight on highly-cited articles. You can view an author's *g-index* by downloading a free citation analysis software program called **Publish or Perish**. The g-index is calculated based on the distribution of citations received by a given researcher's publications, such that: given a set of articles ranked in decreasing order of the number of citations that they received, the **g-index is the unique largest number such that the top g articles received together at least g^2 citations**. A g-index of 20 means that a researcher has published at least 20 articles that **combined** has received at least 400 citations. However, unlike the h-index these citations could be generated by only a small number of articles. For instance an academic with 20 papers, 15 of which have no citations with the remaining five having respectively 350, 35, 10, 3 and 2 citations would have a g-index of 20, but a h-index of 3 (three papers with at least 3 citations each). **In simple understanding,** add all the number of citations and calculate its square-root, will give the value of g. As in above example 350+35+10+3+2 = 400 and g=$\sqrt{400}$=20. Roughly, *h* is the number of papers of a certain "quality" [citations] threshold, a threshold that rises as h rises; *g* allows citations from higher-cited papers to be used to bolster lower-cited papers in meeting this threshold. Therefore, in all cases g is at least h, and is in most cases higher. However, unlike the h-index, the g-index saturates whenever the average number of citations for all published papers exceeds the total number of published papers; the way it is defined, the g-index is not adapted to this situation.
i10-index	The *i10-index* was created by **Google Scholar** as an index to rank author impact. Simply, it is the number of publications the researcher has written that have at least 10 citations. If an author has i10-index as 15 that means he/she has 15 published articles with at least 10 citations.
altmetrics	Altmetrics, or alternative metrics, are new measures that take into account online reader behavior, network interactions with content and social media. Altmetrics are meant to complement, not completely replace, traditional

	impact measures and are measures of online attention and engagement. Examples of Altmetrics include: • mentions on Facebook, Twitter, or online news sites • exports to citation management systems like Mendeley or Zotero • downloads (of full text articles, software, etc.) • comments in blogs or other online forums Strengths of Altmetrics • Currency - Altmetrics can be gathered and calculated immediately, compared with traditional citations that accumulate slowly. • Diversity - Altmetrics capture data from a variety of sources, not just the traditional academic publishing setting, and thus may reflect the broader impact of research beyond the scholarly community. Additionally, altmetrics can be captured for research outputs beyond articles, like data sets, software, molecular structures, etc