

What are research metrics?

Research metrics are quantitative indicators or measures that provide some evidence of the impact of research output. A research output can be a journal article, a book, a book chapter or the overall research productivity. Bibliometrics is the traditional citation-based metrics. They are based on citation counts, counting how many times a publication has been cited in another publication. Altmetrics are web-based metrics. They are used for measuring the attention or interest of a scholarly work on various types of online platforms that include social media, research blogs, Wikipedia, news outlets, online forums, and any other online resources.

Metrics for Journals

Journal Impact Factor

It is the most established metric for journals and the very first metric designed for journal evaluation. It was designed by Professor Eugene Garfield in 1955 as a measure to help librarians select the purchase of important journals. When a journal has an impact factor of 5 it means that in the last three years, this journal averaged 5 citations per published article. For example, if a journal has published 100 articles during the last two years and received 500 citations then the impact factor will be calculated using the following formula:

Example

Year	Citations	Publications (not including Editorials, Retractions, Discussions, Corrections and Notes)
2019	1278	437
2018	1190	391

$$IF_y = \frac{Citations_{y-1} + Citations_{y-2}}{Publications_{y-1} + Publications_{y-2}}$$

$$IF_{2020} = \frac{Citations_{2019} + Citations_{2018}}{Publications_{2019} + Publications_{2018}}$$

$$IF_{2020} = \frac{1278 + 1190}{437 + 391} = \frac{2468}{828} = 2.98$$

Journal Citation Reports (JCR)

It 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. The impact factor of various journals can be seen on the website:

<https://impactfactorforjournal.com/jcr-impact-factor-2022/>

Sl. No.	Journal Name	Impact Factor
1	CA-A CANCER JOURNAL FOR CLINICIANS	286.13
2	LANCET	202.731
3	NEW ENGLAND JOURNAL OF MEDICINE	176.079
4	NATURE REVIEWS MOLECULAR CELL BIOLOGY	113.915
5	NATURE REVIEWS DRUG DISCOVERY	112.288
6	NATURE REVIEWS IMMUNOLOGY	108.555
7	Lancet Respiratory Medicine	102.642

Source Normalized Impact per Paper (SNIP)

It 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.

The source normalized 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.

Impact Per Publication (IPP)

Impact Per Paper (IPP) is the number of current-year citations to papers from the previous 3 years, divided by the total number of papers in those 3 previous years.

Impact Per Paper (IPP)

- The number of citations given in the present year to papers in the past three years divided by the total number of publications in the past three years

$$\text{IPP 2020} = \frac{\text{Citations in 2020}}{\text{Publications in 2019+ 2018+ 2017}}$$

$$\text{IPP 2020} = \frac{300}{100} = 3$$

The SCImago Journal & Country Rank

It is a publicly available portal that includes the journals and country scientific indicators developed from the information contained in the Scopus® database (Elsevier B.V.). These indicators can be used to assess and analyze scientific domains. Journals can be compared or analysed separately. Country rankings may also be compared or analysed separately. Journals can be grouped by subject area (27 major thematic areas), subject category (309 specific subject categories) or country. Citation data is drawn from over 34,100 titles from more than 5,000 international publishers and country performance metrics from 239 countries worldwide. The SJCR allows you also to embed significant journal metrics into your web as a clickable image

widget

The screenshot shows the homepage of the Scimago Journal & Country Rank website. The browser address bar displays "https://www.scimagojr.com/index.php". The website header includes the text "also developed by scimago:" and the "SCIMAGO INSTITUTIONS RANKINGS" logo. A navigation menu contains links for "Journal Rankings", "Country Rankings", "Viz Tools", "Help", and "About Us". The main content area features a large orange background with the "SJR" logo and the text "Scimago Journal & Country Rank". Below this is a search bar with the placeholder text "Enter Journal Title, ISSN or Publisher Name" and a magnifying glass icon. The Windows taskbar at the bottom shows the search bar, task view, and various application icons, with the system tray displaying the date and time as "16-02-2023 20:38".

The screenshot shows a video presentation slide titled "JOURNAL IMPACT METRICS". On the left, there is a green circular logo with the letters "SJR". The main title of the slide is "SCImago Journal Rank (SJR)". The slide defines the metric with the following formula:

$$\text{SJR} = \frac{\text{Average no. of citations received per document in a year}}{\text{No. of documents published in last three years}}$$

Below the formula, the slide provides an example calculation:

- 300 citations per document in a year
- No. of documents published in last three years is 30
- 300/30=10

The slide is part of a video, as indicated by the video player interface at the top right, which shows a person's face and a clock icon.

CiteScore

The CiteScore is based on the number of citations to documents (articles, reviews, conference papers, book chapters, and data papers) by a journal over four years, divided by the number of the same document types indexed in Scopus and published in those same four years.

For example, the 2021 CiteScore counts the citations received in 2018-2021 to articles, reviews, conference papers, book chapters, and data papers published in 2018-2021, and divides this by the number of these documents published in 2018-2021.

CiteScore calculation

$$CS_y = \frac{\text{Citations}_y + \text{Citations}_{y-1} + \text{Citations}_{y-2} + \text{Citations}_{y-3}}{\text{Publications}_y + \text{Publications}_{y-1} + \text{Publications}_{y-2} + \text{Publications}_{y-3}}$$

$$CS_{2021} = \frac{\text{Citations in 2021} + \text{Citations in 2020} + \text{Citations in 2019} + \text{Citations in 2018}}{\text{Publications in 2021} + \text{Publications in 2020} + \text{Publications in 2019} + \text{Publications in 2018}}$$

$$CS_{2020} = \frac{20 + 23 + 27 + 33}{5 + 10 + 7 + 6}$$

$$CS_{2020} = \frac{103}{28}$$

$$CS_{2020} = 3.67$$

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Metrics for Authors

Author-level metrics provide an assessment of the impact that an author makes on the scientific community or field of the study. The various metrics for authors are discussed below:

h-index

It is the metric that quantifies the impact of the researcher's output over the course of his or her career. It was suggested by Professor of physics Jorge E. Hirsch in 2005. H-index is calculated by using the number of articles an author has published to date and the number of citations each article receives. If an author has published 30 articles up to now, and if 10 of those papers have been cited each 10 times, her h-index is 10. If any of the other 20 papers with less than 10 citations receive 11 or more citations in the future, the h-index will increase accordingly.

The screenshot shows a Google Scholar profile for Dr. B.T. Sampath Kumar. The profile includes a profile picture, name, affiliation (Senior Professor, Library and Information Science, Tumkur University, Tumkur, INDIA), and a verified email address. It also features a 'Cited by' section with a table and a bar chart showing citation trends from 2019 to 2026. The table shows 3468 total citations, an h-index of 23, and an i10-index of 88. The bar chart shows a steady increase in citations over the years, peaking in 2024.

	All	Since 2021
Citations	3468	1357
h-index	23	14
i10-index	88	31

Year	Citations
2019	~180
2020	~220
2021	~200
2022	~210
2023	~200
2024	~280
2025	~200
2026	~50

TITLE	CITED BY	YEAR
Perception and usage of e-resources and the internet by Indian academics BT Sampath Kumar, GT Kumar The electronic library 28 (1), 137-156	184	2010
Smart ceramics RE Newinham, QC Xu, S Kumar, LE Cross Ferroelectrics 102 (1), 259-266	96	1990
Use of ICT in college libraries in Karnataka, India: a survey BTS Kumar, BS Biradar Program 44 (3), 271-282	92	2010

Citation Index : i10 Index & H Index

I 10index

Papers of Dr. Kalyan	Number of Citation
1	75
2	68
3	65
4	60
5	45
6	15
7	12
8	9
9	5
10	0

What ...
Where ...
How citation Index Calculated?

i10 Index is 7

H Index is 8

- The i-10 index is the number of publications with at least 10 citations
- Number of articles having at least 10 citations

i-10 index

The number of publications with at least 10 citations. This very simple measure is only used by Google Scholar and is another way to help gauge the productivity of a scholar.

G-index

For calculating g-index, articles are ranked in decreasing order of the number of citations. It indicates the largest number such that the top g articles received at least g^2 citations.

g-index for Professor X

The top g articles received (altogether) at least g squared citations.

Document no. (g)	Citation count	Square of g	Total no. of citations
Document 1	50 cites	1	50
Document 2	18 cites	4	50+18 = 68
Document 3	11 cites	9	68+11 = 79
Document 4	7 cites	16	79+7 = 86
Document 5	4 cites	25	86+4 = 90
Document 6	3 cites	36	90+3 = 93
Document 7	1 cites	49	93+1=94
Document 8	1 cites	64	94+1=95
Document 9	1 cites	81	95+1=96
Document 10	1 cites	100	96+1=97

References

1. <https://www.bodleian.ox.ac.uk/sites/default/files/bodreader/documents/media/iskills-researchmetrics2-videotranscript.pdf>
2. <https://www.enago.com/academy/what-are-different-research-metrics/>
3. <https://www.kressup.com/i10-index-calculate-i10-index.html>
4. <https://guides.library.cmu.edu/biblio/jrankings#:~:text=IPP%20-%20Impact%20Per%20Publication%3>
5. <https://lib.guides.umd.edu/bibliometrics/SNIP>
6. https://service.elsevier.com/app/answers/detail/a_id/14880/supporthub/scopus/~:/how-are-citescore-metrics-used-in-scopus%3F/#:~:text=What%20is%20the%20CiteScore%20methodology,in%20those%20same%20four%20years/

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