

The pros and cons of key metrics

FWCI - Field Weighted Citation Impact

If you wish to analyse the impact of articles from different fields, you should use "normalised" or "field-weighted" citation metrics, to ensure that you are comparing like-with-like.

FWCI shows how the article's citation count compares to similar articles in the same field and timeframe. It measures the number of citations received by an article divided by the expected number of citations for similar articles. A FWCI of 1 means that the output performs as expected for the global average; an FWCI of 1.44 means 44% more cited than expected.

Pros

- It measures the citation impact of the output itself, not the journal in which it is published. Because the FWCI includes field normalization, theoretically, the score should be a better indicator of performance than a raw citation count.
- It considers the differences in research behaviour across disciplines as it attempts to compare like-with-like by comparing an output's citations with those of other outputs of the same age and type classed by Scopus as being in the main subject area. This side-steps the problems inherent in using one measure to compare articles in different disciplines - an FWCI of 1.44 is just as good in History as in Oncology.

Cons

- Citation-based metrics should not be interpreted as a direct measure of research quality.
- It could be seen as disadvantaging work that is purposefully multi- and cross-disciplinary.
- It is not recommended for a small publication set.
- Can be strongly influenced by outlier publications.
- Only the publications included in Scopus have FWCI.

How to use

- Available in SCOPUS.

<https://www.metrics-toolkit.org/field-normalized-citation-impact/>

Citation Percentiles and “Highly Cited” labels

The position of a paper or group of papers with respect to other papers in a given discipline, country, and/or time period, based on the number of citations they have received. Expressed as a percentile or awarded a “Highly Cited” honor based upon percentile rankings. The higher the percentile benchmark, the better. This is available in Scopus for citations. Particularly useful for authors as a way to contextualize citation counts for journal articles as an indicator of academic impact.

Pros

- Counts and ranks the number of citations for all outputs worldwide covered by the Scopus dataset.
- Percentile boundaries are calculated for each year, meaning an output is compared to the percentile boundaries for its publication year.
- Can be used to distinguish between entities where other metrics such as number of outputs or citations per output are similar.

Cons

- Data are more robust as the sample size increases; comparing a unit to one of a similar size is more meaningful than comparing one researcher to another.
- Covers only the publications included in Scopus.

How to use

- Available in Scopus.

Find out more: <https://www.metrics-toolkit.org/highly-cited-papers-and-highly-cited-labels/>

Altmetric scores

Captures online attention surrounding academic content e.g. Twitter, Facebook and Social Media activity; mentions in Policy documents and registered Patents; Media coverage etc.

Pros

- Can give an indication of the wider impact of outputs, tracking their use in policy documents, news items, and so on to give a fuller picture of research impact using many indicators, not just citations and provide a measure of impact outside academia.
- Can accumulate more quickly than traditional indicators such as citations and therefore provide an early indicator of the likely impact of a paper, before it has had time to be cited in the future.

- Can be used for different types of research outputs not just articles.

Cons

- Should not be used as a direct measure of research impact or quality of any kind.
- Attention doesn't necessarily indicate that the article is important or even of quality. Does not take into account the sentiments of mentions made about research objects, and thus does not help one understand the positive nor negative attention that a piece of research has received.
- Open to being artificially influenced. Altmetric Explorer will discard where someone has repeatedly tweeted about research for example but may not be sophisticated enough to detect where multiple accounts have tweeted a DOI just to increase an Altmetric score.
- May indicate popularity with the public, but not necessarily quality research.

How to use

Altmetrics: What, why, how?

<https://www.metrics-toolkit.org/altmetric-attention-score/>

h-index

An author has an *h*-index of *n* where they have published *n* or more articles that have each been cited *n* or more times by other items index by the particular product being used (Scopus, Web of Science, etc.)

Pros

- Is focused on the impact of an individual researcher, rather than on venue of publication.

Cons

- Not recommended as an indicator of research performance, use with care to make comparisons because of its bias against early career researchers and those who have had career breaks.
- It is not normalised by field. The *h*-index is meaningless without context within the author's discipline.
- There is too much temptation to pick and choose *h*-indices from different sources to select the highest one. *h*-indices can differ significantly between different sources due to their different datasets – there is no such thing as a definitive *h*-index.
- This metric is based on citations of articles so discriminates against disciplines with other types of research output such as computer programs, reports, works of art.

How to use

- Available in SCOPUS, Web of Science and Google Scholar.

Key author metrics: What, why, how?

<https://www.metrics-toolkit.org/h-index/>

Journal Impact Factor™

A journal's JIF for year X is the sum of all citations indexed in Web of Science from year X referring to articles published in the journal in years X-1 and X-2, divided by the total number of articles the journal published in years X-1 and X-2.

Used to compare journals within the SAME field.

Pros

- May be useful for identifying journals to which to submit work for larger readership.

Cons

- Not field-weighted.
- Not all journals have an impact factor.
- There is a strong English / US bias in the journals covered.
- Interdisciplinary journals are not well represented.
- Citation distributions within journals are extremely skewed - the *average* number of citations an article in a specific journal might get can be a very different number to the *typical* number of citations an article in a specific journal might get.
- The JIF is nothing more than the mean average number of citations to articles in a journal, and thus highly susceptible to outliers.
- Journal metrics do not well reflect new/emerging fields of research.

How to use

- Available in Web of Science.

Journal metrics: what, why, how?

<https://www.metrics-toolkit.org/journal-impact-factor/>

Citescore

Citescore is a way of measuring the citation impact of journals and is based on the average citations received per document.

A journal's Citescore for year X is the sum of all citations indexed in Scopus from year X referring to articles published in the journal in years X-1, X-2 and X-3, divided by the total number of articles the journal published in years X-1, X-2 and X-3.

Pros

- May be useful for identifying journals to which to submit work for larger readership.

Cons

- Not field-weighted.
- Citation distributions within journals are extremely skewed – the average number of citations an article in a specific journal might get can be a very different number to the typical number of citations an article in a specific journal might get.
- As with Journal Impact Factor, the Citescore is nothing more than the mean average number of citations to articles in a journal, and thus highly susceptible to outliers.
- Journal metrics do not well reflect new/emerging fields of research.

How to use

- Available in SCOPUS.

[How to use Citescore in Scopus](#)

[CiteScore metrics factsheet](#)

Source Normalized Impact per Paper (SNIP)

A journal's SNIP is 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. SNIP citations are normalised in order to correct for differences in citation practices between scientific fields.

Pros

- Field-weighted.
- SNIP corrects for differences in citation practices between scientific fields, thereby allowing for more accurate between-field comparisons of citation impact.
- SNIP comes with a 'stability interval' which reflects the reliability of the indicated - the wider the stability interval, the less reliable the indicator.

Cons

- Although consideration is taken to correct for differences in fields, the SNIP is still a journal-based metric and thus the metric applies to the place that an output is published rather than the merits of the output itself.
- Journal metrics do not well reflect new/emerging fields of research.

How to use

- Available in SCOPUS.

SCImago Journal Rank (SJR)

Citations are weighted—worth more or less—depending on the source they come from. The subject field, quality and reputation of the journal have a direct effect on the value of a citation. Can be applied to journals, book series and conference proceedings.

A journal's SJR is the average number of weighted citations received in a year divided by the total number of publications in the past three years.

Pros

- Field-weighted.

Cons

- Citations are weighted based on the source that they come from. The subject field, quality and reputation of the journal directly affect the value of a citation.
- The SJR is a journal-based metric and thus the metric applies to the place that an output is published rather than the merits of the output itself.
- Journal metrics do not well reflect new/emerging fields of research.

How to use

- Available in SCOPUS.

Raw citation count

A simple measure of attention for a particular article, journal or researcher.

Pros

- A simple-to-read measure of attention when comparing outputs of the same type and age within the same field.

Cons

- Citation practice varies across fields; the same number of citations could be considered low in one field e.g. immunology but high in another e.g. maths.
- Certain output types such as Review Articles will frequently be more highly cited than other types. As an example of how citation counts can be artificially inflated, the paper "[Effective Strategies for Increasing Citation Frequency](#)" lists 33 different ways to increase citations.
- The focus of citation counts is journals. In fields where publication is mostly in books or monographs (like history), any kind of journal-based metric is effectively useless. It also

excludes all other types of research output. The REF mentions many research outputs such as computer programs, reports, works of art, dramas, pieces of music, toolkits, training materials etc. If they accept these as research outputs, so should the research community, and these are not covered at all by metrics and will never contribute to a person's h-index.

How to use

<https://www.metrics-toolkit.org/journal-impact-factor/>

Altmetrics

Altmetrics are used to track online and social media interest in your research. These complement but do not replace traditional bibliometrics. They include measures such as Mentions, Captures and Social Media. Key altmetrics are the Altmetrics Donut, PlumX Metrics.

Pros

- Help researchers understand the overall volume of attention that research has received online.
- Speed – most altmetrics appear more quickly than citations.
- Should be used as partial evidence of impact alongside more traditional citation metrics.
- Mendeley readers – high mentions.
- Twitter counters – has high coverage, most articles have at least one tweet. Gives early evidence of attention / publicity.
- Can be used for other research outputs which are not covered by citation counts. E.g.
 - Books - google books citations
 - Academic videos - views
 - Data – citations, views, downloads
 - Grey literature – online citations.

Cons

- Altmetrics do not take into account the sentiments of mentions made about research objects, and thus do not help you understand the positive nor negative attention that a piece of research has received.
- Altmetrics coverage and scores vary across disciplines and it is hard to know what is a good score for altmetrics e.g. a view count.
- There are huge national biases for some Altmetric measures e.g. Tweets are not available for Chinese articles. Depends on uptake of services that mine data in different countries.
- Twitter can be manipulated very easily. Biases are against topics and researchers in countries not using Twitter much e.g. China.
- Policy mentions – coverage is very low, there are biases in international coverage and policy type coverage differences.

- Very sensitive to publication year and field.
- Some measures have clear impact interpretations e.g. educational impact, but most have unclear impact interpretations. All have biases.
- Other – Facebook wall posts: moderately common, publicity / attention evidence. Wikipedia citations are rare. Patent citations are rare, look at commercial impact. Clinical guideline citations, are rare, show health impact. News mentions are rare and hard to systematically gather. Blog citations are rare, evidence public interest.

How to use

- The Altmetric donut is used in Summon and by many large publishers.
- PlumX metrics are found in SCOPUS.

<https://www.bradford.ac.uk/library/additional-help/research-support/bibliometrics-and-altmetrics/#d.en.165658>

<https://www.metrics-toolkit.org/altmetric-attention-score/>

The information above is adapted from the University of Liverpool, with thanks.
<https://libguides.liverpool.ac.uk/c.php?g=663417&p=4835096>