Scholarly Metrics

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Learning Objectives

Be able to interpret some standard citation metrics with caution and know where to find them

Explore three major sources of citation data including Web of Science (JCR), Scopus and Google Scholar

Identify best practices on broadening your scholarly impact
h-index

- J. E. Hirsch, 2005
- # of papers \((h)\) published that have each been cited at least \(h\) times.
- Can be applied to any level of aggregation such as author, institution and journal, etc.

An author has 8 papers that have been cited 34, 29, 20, 15, 7, 6, 5 and 4 times. What is the author’s h-index?

<table>
<thead>
<tr>
<th>Paper #</th>
<th># of Citations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>34</td>
</tr>
<tr>
<td>2</td>
<td>29</td>
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<tr>
<td>3</td>
<td>20</td>
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<tr>
<td>4</td>
<td>15</td>
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<td>5</td>
<td>7</td>
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<td>6</td>
<td>6</td>
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<tr>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>4</td>
</tr>
</tbody>
</table>

= h-index

Example from https://subjectguides.uwaterloo.ca/calculate-academic-footprint/YourHIndex
**h-index Issues**

- Is not influenced by citation counts of papers that have been cited at least \( h \) times
- Distinctive. Its value can only increase, never decrease, over time.
- Advantage senior researchers but disadvantage early-career researchers

<table>
<thead>
<tr>
<th>Paper #</th>
<th>John’s # of Citations</th>
<th>Sara’s # of Citations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>34</td>
<td>62</td>
</tr>
<tr>
<td>2</td>
<td>28</td>
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<td>5</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>17</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>16</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>13</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
<td>1</td>
</tr>
</tbody>
</table>
Finding Your h-index in Web of Science
Finding Your h-index in Scopus
Finding h-index in Google Scholar

• i10-index: # of papers with at least 10 citations. Simple and straightforward to calculate. Only used in Google Scholar

• Why an individual’s h-index is different in Web of Science (9), Scopus (11) and Google Scholar (13)?
h5-index: # of papers (h) published in the report year and the preceding four years that have been cited at least h times.

h5-median: median # of citations in the report year and the proceeding four years to those papers that have each been cited at least h time.

Journal Impact Factor

- Average number of times the papers published in a journal over a two-year period (the two years prior to the report year) were cited during the report year.
- e.g., IEEE Access

![Journal Impact Factor Calculation Diagram](image)
Finding Journal Impact Factor in Web of Science

InCites Journal Citation Reports

2018 Journal Impact Factor & percentile rank in category for: IEEE Access

4.098
2018 Journal Impact Factor

Graph showing the Journal Impact Factor from 2014 to 2018 for IEEE Access, indicating an increase over the years.
CiteScore

- Like *Impact Factor*, but based on three years’ data
- Average # of times the papers published in a journal over a three-year period (the three years prior to the report year) were cited during the report year.
- e.g., IEEE Access

Image from https://journalmetrics.scopus.com/index.php/Faqs
Finding CiteScore in Scopus

![Finding CiteScore in Scopus](image)

1. Enter the title in the search bar: **IEEE ACCESS**
2. The CiteScore for **IEEE Access** is **4.06** for the year 2018.
Putting Citations in Context

Fields/Disciplines: Citation rates vary by discipline.

Time: Citations grow over time at different rates.

Document Types: Articles, Reviews, Conference Papers etc.
Source Normalized Impact Per Paper (SNIP)

- Developed by Henk Moed in 2009 and revised in 2012
- Impact Per Paper (IPP): calculated as the # of citations given in the present year to publications in the past three years divided by the total # of publications in the past three years. (Similar to CiteScore)
- Normalized in order to correct for differences in citation practices between subject fields

\[
SNIP = \frac{\text{Impact Per Paper (IPP)}}{\text{Relative Database Citation Potential (RDCP)}}
\]

Definition from https://www.journalindicators.com/methodology
SNIP (Cont’d)

\[ RDCP (Relative \ Database \ Citation \ Potential) = \frac{Database \ Citation \ Potential \ (DCP)}{Median \ DCP} \]

• Database Citation Potential (DCP): average # of citations to the publications in the subject field of the journal, counting three proceeding years.

• Example: If a journal published 10 papers in 2008-2010 and these papers were cited 120 times in 2011, DCP is 6 and median DCP is 3, what is the journal’s SNIP?

\[ RDCP = \frac{DCP}{Median \ DCP} = \frac{6}{3} = 2 \]

\[ SNIP = \frac{Impact \ Per \ Paper \ (IPP)}{Relative \ Database \ Citation \ Potential \ (RDCP)} = \frac{120/10}{2} = 6 \]
### Finding SNIP in Scopus

Click on the source title to compare journals.
# Comparing Journals in Scopus

## Source details

**Environmental Science & Technology**

- **Scopus coverage years:** 1958, from 1967 to Present
- **Publisher:** American Chemical Society
- **ISSN:** 0013-936X  **E-ISSN:** 1520-5851
- **Subject area:** Chemistry: General Chemistry, Environmental Science: Environmental Chemistry

<table>
<thead>
<tr>
<th>Metric</th>
<th>2018 Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CiteScore</td>
<td>7.38</td>
</tr>
<tr>
<td>SJR</td>
<td>2.514</td>
</tr>
<tr>
<td>SNIP</td>
<td>1.959</td>
</tr>
</tbody>
</table>

[View all documents](#)  
[Set document alert](#)  
[Save to source list](#)  
[Entitled Full Text](#)  
[Journal Homepage](#)
Comparing Journals in Scopus (Cont’d)

Select up to 10 sources to compare

Selected sources:  
- Annals of Applied Statistics
- Journal of Informetrics
- Environmental Science & Technology

Search by title, publisher, ISSN, and/or subject area

Source title: Annals of Applied Statistics

Enter title: annals of applied statistics

Limit to: All subject areas

Source normalized impact per paper by year

SNIP:  
- Environmental Science & Technology: 1.407, 1.815, 1.959
- Journal of Informetrics: 2.19

Calculations last updated: 10 Nov 2019
Finding SNIP in CWTS Journal Indicators

https://www.journalindicators.com/indicators
Category Normalized Citation Impact (CNCI)

- **CNCI** is the citation impact (citations per paper) normalized for subject area, year of publication and document type.

\[
CNCI = \frac{\text{Actual Citations}}{\text{Category Expected Citations}}
\]

- Example: A Plant Sciences paper published in 2014 has been cited 46 times. Is that good, bad or average performance? (hint: an expected citation rate for the paper is 2.32)

\[
CNCI = \frac{46}{2.32} = 19.82
\]

Definition from [http://clarivate.libguides.com/incites_ba/understanding-indicators](http://clarivate.libguides.com/incites_ba/understanding-indicators)
Category Normalized Citation Impact (CNCI)

- When a paper belongs to multiple subject categories, the CNCI value is calculated with harmonic mean of all Category Expected Citations this paper belongs to.

- When calculating a set of papers (the collected works of an individual, institution or country/region), the CNCI value is the average of all the papers in the set.

Source from [http://help.prod-incites.com/inCites2Live/indicatorsGroup/aboutHandbook/usingCitationIndicatorsWisely/normalizedCitationImpact.html](http://help.prod-incites.com/inCites2Live/indicatorsGroup/aboutHandbook/usingCitationIndicatorsWisely/normalizedCitationImpact.html)
Finding CNCI in InCites

- InCites Benchmarking & Analytics is a citation-based evaluation tool.
- Registration and sign in are required.
- If you are already registered for Web of Science, ResearcherID or EndNote, use the same username and password.
Finding Your CNCI
How U.S. News Calculated the Best Global Universities Rankings?

Best Global Universities Rankings

These institutions from the U.S. and more than 80 other countries have been ranked based on 13 indicators that measure their academic research performance and their global and regional reputations. Students can use these rankings to explore the higher education options that exist beyond their own countries' borders and to compare key aspects of schools' research missions. These are the world's top 1,500 universities.

See the methodology »

Screenshots from https://www.usnews.com/education/best-global-universities

<table>
<thead>
<tr>
<th>RANKING INDICATOR</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global research reputation</td>
<td>12.5%</td>
</tr>
<tr>
<td>Regional research reputation</td>
<td>12.5%</td>
</tr>
<tr>
<td>Publications</td>
<td>10%</td>
</tr>
<tr>
<td>Books</td>
<td>2.5%</td>
</tr>
<tr>
<td>Conferences</td>
<td>2.5%</td>
</tr>
<tr>
<td>Normalized citation impact</td>
<td>10%</td>
</tr>
<tr>
<td>Total citations</td>
<td>7.5%</td>
</tr>
<tr>
<td>Number of publications that are among the 10% most cited</td>
<td>12.5%</td>
</tr>
<tr>
<td>Percentage of total publications that are among the 10% most cited</td>
<td>10%</td>
</tr>
<tr>
<td>International collaboration – relative to country</td>
<td>5%</td>
</tr>
<tr>
<td>International collaboration</td>
<td>5%</td>
</tr>
<tr>
<td>Number of highly cited papers that are among the top 1% most cited in their respective field</td>
<td>5%</td>
</tr>
<tr>
<td>Percentage of total publications that are among the top 1% most highly cited papers</td>
<td>5%</td>
</tr>
</tbody>
</table>
Known Issues with Using CNCI

• A single highly cited paper may inflate the CNCI values given a small set of papers.

• Very highly cited papers can have an unduly large influence on the CNCI value given a large sets of papers (e.g., collected works of an institution).

• If the baseline values for current year is very low, the CNCI values for current year can fluctuate more than expected.

• Other indicators
  • % Documents in Top 1%
  • % Documents in Top 10%
  • Average Percentile

Source from http://help.prod-incites.com/inCites2Live/indicatorsGroup/aboutHandbook/usingCitationIndicatorsWisely/normalizedCitationImpact.html
Putting It Together...

Normalization assumes that the various fields simply differ in their average citation impact or in the rate at which citations accrue, not in author’s reasons for citing or in the inherent meaning of a citation.

Normalization is intended to control for differences in citation rates among fields. But do these field-normalization citation metrics really eliminate disciplinary differences in impact?

Consider complementary citation impact indictors such as average percentile, % documents in top 1% and % documents in top 10% when comparing the relative influence of journals within their disciplines
Why an individual’s h-index is different in Web of Science, Scopus and Google Scholar?
Web of Science: more complete coverage of the natural and social sciences than the humanities. 13,100 journals in Core Collection (20,556 if include Emerging Sources Citation Index). Conference proceedings and book data are also available.

Scopus: 22,800 journals along with selected book series and conference proceedings. Natural and social sciences are represented well but is weaker in its coverage of arts and humanities.

Google Scholar: the broadest coverage. Data for approximately 87% of all the English-language scholarly documents available on the web: journal articles, preprints, conference papers, theses, research reports, and other items.
Broadening Your Scholarly Impact

Researcher Profiles

- Author disambiguation: ORCID, ResearcherID, Scopus Author ID
- University author profile page
- Author profiles: Web of Science, Scopus, Google Scholar
- Researcher Communities: Academia, ResearchGate
- Personal sites and social media: LinkedIn, blog

Altmetrics Tools

- Altmetrics
- PlumX
- ImpactStory
References


• Journal Impact Factor. Understanding Journal Citation Reports Metrics. [https://clarivate.libguides.com/jcr/basics](https://clarivate.libguides.com/jcr/basics)

• CiteScore. [https://journalmetrics.scopus.com/index.php/Faqs](https://journalmetrics.scopus.com/index.php/Faqs)

• How are CiteScore metrics used in Scopus? [https://service.elsevier.com/app/answers/detail/a_id/14880/suporthub/scopus/](https://service.elsevier.com/app/answers/detail/a_id/14880/suporthub/scopus/)

• How is SNIP (Source Normalized Impact per Paper) used in Scopus? [https://service.elsevier.com/app/answers/detail/a_id/14884/suporthub/scopus/related/1/](https://service.elsevier.com/app/answers/detail/a_id/14884/suporthub/scopus/related/1/)
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  http://clarivate.libguides.com/incites ba/understanding-indicators

• Eigenfactor (EF), EFn, Article Influence Score (AI).  
  http://www.eigenfactor.org/about.php


• Relative Citation Ratio (RCR).  https://nexus.od.nih.gov/all/2016/09/08/nih-rcr/

• iCite  https://icite.od.nih.gov