Bibliometrics: an overview

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Parts of this guide are based on resources from MyRi: http://www.ndlr.ie/myri/
Part 1: Introduction

This guide is designed to give you an introduction to bibliometrics; focusing on why you may want to use certain metrics, what tools you can use to gather the data and what the limitations are. If you would like more detailed guidance on using the different tools please refer to the tool specific workbooks on the bibliometrics webpages: http://library.leeds.ac.uk/researcher-impact#bibliometrics_measuring_impact.

What is bibliometrics?

Bibliometrics is the statistical analysis of bibliographic data, commonly focusing on citation analysis of research outputs and publications, i.e. how many times research outputs and publications are being cited. Bibliometric analysis is becoming an increasingly important way to measure and assess research impact of individuals, groups of individuals or institutions.

Due to limitations associated with bibliometrics (as highlighted in the issues and limitations section), bibliometric measures should always be used in conjunction with other data such as funding received, number of patents, awards granted and qualitative measures such as peer review.

Why use bibliometrics?

Bibliometrics could help with a number of activities, including:

- Demonstrating the importance and impact of your own research and/or that of your research group. This can be useful for:
  - applying for tenure, promotion or grants
  - including bibliometric data on your CV
  - demonstrating the value of your research to your institution
  - demonstrating return on investment to funding bodies, industry and the general public

- Identifying areas of research strength and weaknesses. This can be useful for:
  - informing future research priorities for an institution

- Identifying top performing journals in a subject area. This can be useful for:
  - deciding where to publish
  - learning more about a subject area
  - identifying emerging areas of research

- Identifying top researchers in a subject area. This can be useful for:
  - locating potential collaborators or competitors
  - learning more about a subject area
  - informing the recruitment process

There are a number of limitations associated with bibliometrics; therefore it is important to use bibliometric measures in conjunction with other measures. The following section lists some of the main limitations.
Issues and limitations of bibliometrics

The use of bibliometrics continues to remain controversial due to the following issues and limitations:

- Citations patterns can differ greatly between disciplines, for example, in certain disciplines research outputs may be cited more frequently than in other disciplines. Therefore it is important to compare researchers, or groups of researchers against those from the same or similar discipline.
- Some disciplines such as the arts, humanities and social sciences rely less on publishing in journals yet bibliometrics commonly focuses on journal article citations.
- A paper may be cited in a negative rather than a positive way yet the citation would still be counted.
- The tools used to gather bibliometric data do not cover all research areas and do not index all publications. Results will vary depending on the tool you use.
- Manipulation of the system by researchers inappropriately self-citing, citing colleagues, splitting outputs into many articles etc can distort the data. A number of bibliometric tools now allow you to exclude self-citations.
- Experienced researchers will have an advantage over early career researchers when using certain metrics as they will have produced more outputs. Therefore it is important to compare researchers who are at the same stage of their career.

It is important to remember that bibliometric measures don’t necessarily measure the quality of research output and instead focuses on the impact of research, i.e. how often the work is being cited. Just because a research output is highly cited doesn’t necessarily mean that the work is of good quality. This is why it is important to use bibliometrics in conjunction with other data such as funding received, number of patents, awards granted and qualitative measures such as peer review.

Key points to remember when conducting bibliometric analyses:

1. Always compare like with like, for example:
   - Groups and individuals in the same or similar discipline
   - Groups and individuals in the same stage of their academic career
   - Journals in the same discipline or category
   - Similar size institutions

2. Don’t rely on a single bibliometric tool; results can vary depending on the tool used because the content covered by each tool varies, as does the depth of coverage and discipline coverage.

3. Be aware that some disciplines rely less on publishing in journals than others and will therefore fare less favourably.

4. Put the data in context using a combination of metrics and other qualitative information where appropriate.
### Part 2: Main metrics

The following table gives more information about some of the main metrics used to measure the impact of research outputs and publications.

<table>
<thead>
<tr>
<th>Metric</th>
<th>What does it measure?</th>
<th>Questions this metric may help with</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scholarly output</td>
<td>The total number of outputs published. It measures productivity rather than impact.</td>
<td>How many journal articles has an individual researcher published? How many outputs has a research group published? How many outputs did the University of Leeds published in 2008, compared to the University of Manchester?</td>
</tr>
<tr>
<td>Citations counts</td>
<td>The number of citations received. It measures citations for individual outputs or a set of outputs.</td>
<td>In total, how many citations have my papers received over the last 5 years? How many citations has a specific journal article received? How many citations have our research group’s outputs received? How many citations have my outputs received compared to another researcher?</td>
</tr>
<tr>
<td>Field-weighted cited impact</td>
<td>The ratio of citations received, relative to the expected world average for the subject field, publication type and publication year.</td>
<td>Compared to the world average in my subject field, how are my outputs performing in terms of number of citations? Have my papers been cited more or less than would be expected for similar publications? How do the number of citations received by the University of Leeds’ publications compare with the World average?</td>
</tr>
<tr>
<td>Outputs in top percentiles</td>
<td>The number or percentage of outputs in the top most-cited publications in the world/UK/specific country</td>
<td>How many of my papers are in the top 1% of the most-cited publications in the world? How many of our research group’s publications are in the top 5% of the</td>
</tr>
</tbody>
</table>
| **H-index** | The productivity and impact of a researcher’s outputs. It is based on the number of publications as well as the number of citations they have received.  
An author has an H-index of $n$ if they have published $n$ papers, each of which has been cited at least $n$ times.  
Example: to have an H-index of 15, 15 of your papers must have been cited at least 15 times. |
| **Journal impact factor** | The importance of a particular journal. It is based on the average number of citations received per paper published in that journal in the preceding 2 years.  
Which journal should I consider publishing in?  
Which journals are considered important in my subject field? |
| **SCImago Journal Rank** | The importance of a particular journal. It is an alternative to the Journal Impact Factor. The SCImago Journal Rank places higher value/weight to citations from more prestigious journals.  
Which journal should I consider publishing in?  
Which journals are considered important in my subject field? |
| **Scopus SNIP** | The importance of a particular journal. The Scopus Snip normalises for citation rate subject differences. It is a ratio of a journal's citation count per paper and the citation potential in its subject field.  
Which journal should I consider publishing in?  
Which journals are considered important in my subject field? |
Part 3: Main bibliometric tools

The following table gives more information about some of the main tools used to gather bibliometric data.

<table>
<thead>
<tr>
<th>Tool</th>
<th>About</th>
<th>Access</th>
<th>Metrics available</th>
</tr>
</thead>
</table>
| SciVal     | SciVal is a subscription based research performance assessment tool which uses data from Scopus. It allows you to benchmark individual researchers, groups of researchers and institutions based on a variety of bibliometric measures. It holds information for 4600 research institutions and 220 countries. | Via a subscription. The University of Leeds has a subscription to SciVal. It can be accessed via the Library Catalogue by searching for SciVal. You will need to register for a free Elsevier account to log-in to the resource. You will be prompted to do this when you access it via the Library Catalogue. | • Scholarly Output  
• Citation Count  
• Citations per Publication  
• Cited Publications  
• Field-Weighted Citation Impact  
• Outputs in Top Percentiles  
• H-index  
• Journal Count  
• Journal Category Count  
• Number of Citing Countries  
• Collaboration  
• Collaboration Impact  
• Academic-Corporate Collaboration  
• Academic-Corporate Collaboration Impact  
• Publications in Top Journal Percentiles |
| Scopus     | Scopus is a subscription based citation database of peer reviewed literature from more than 21,000 journals, 40,000 books, 6.5 million conference papers and 24 million patents. The coverage of social sciences material is broader than Web of Science. At present, citation data is only available for papers published from 1996 onwards. | Via a subscription. The University of Leeds has a subscription to Scopus. It can be accessed via the Library Catalogue by searching for Scopus. | • Scholarly output  
• Citation counts  
• H-index  
• Number of co-authors  
• SCImago Journal Rank  
• Scopus SNIP |
| Web of Science | Web of Science is a subscription based citation database of more than 12,000 journals and over 160,000 conference proceedings. Coverage includes science, social science and arts and humanities dating back to 1900. | Via a subscription. The University of Leeds has a subscription to Web of Science. It can be accessed via the Library Catalogue by searching for | • Scholarly output  
• Citation counts  
• H-index  
• Journal impact factor |
Journal Citation Reports is a subscription based resource which allows you to evaluate and compare journals using citation data from over 11,000 journals. Coverage includes science, medicine and social sciences dating back to 1998.

Via a subscription. The University of Leeds has a subscription to Journal Citation Reports. It can be accessed via the Library Catalogue by searching for Journal Citation Reports.

- Journal impact factor
- Most frequently cited journals in a field
- Highest impact journals in a field
- Largest journals in a field

Further help

- All the tools mentioned above can be accessed via the Library Catalogue: [http://lib.leeds.ac.uk/](http://lib.leeds.ac.uk/)

- For further help, please see our bibliometric support pages: [http://library.leeds.ac.uk/researcher-impact#bibliometrics_measuring_impact](http://library.leeds.ac.uk/researcher-impact#bibliometrics_measuring_impact)

- If you cannot find your answer through the bibliometric support pages, you can contact the Scholarly Communications and Researcher Skills (SCoReS) Team on research@library.leeds.ac.uk

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