Citation Impact: what is it and how to measure it?

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Session Summary

1. Citation impact

- Definitions and Limitations
- Citation indicators: how are citations measured?

2. Tools that capture citations

- Web of Science, Scopus and Google Scholar
- How citations are used in League Tables

3. Actions

- Tips to make sure your publications are captured in citation databases
- Tips to enhance citations

DISCLAIMER: the indicators and databases presented in this session are not exhaustive

Key points

1. Citations are not a measure of quality and must be used in the right context
2. Citation metrics vary across databases
3. Research quality and open research practices are the best ways to enhance citations

1. What is citation impact?

Citation Impact is a measure of the frequency with which an academic paper is cited in other publications.

- Credit to someone's work
- Indicator of intellectual contribution to one's field
- Used to assess research performance
- It informs funding decisions

Limitations

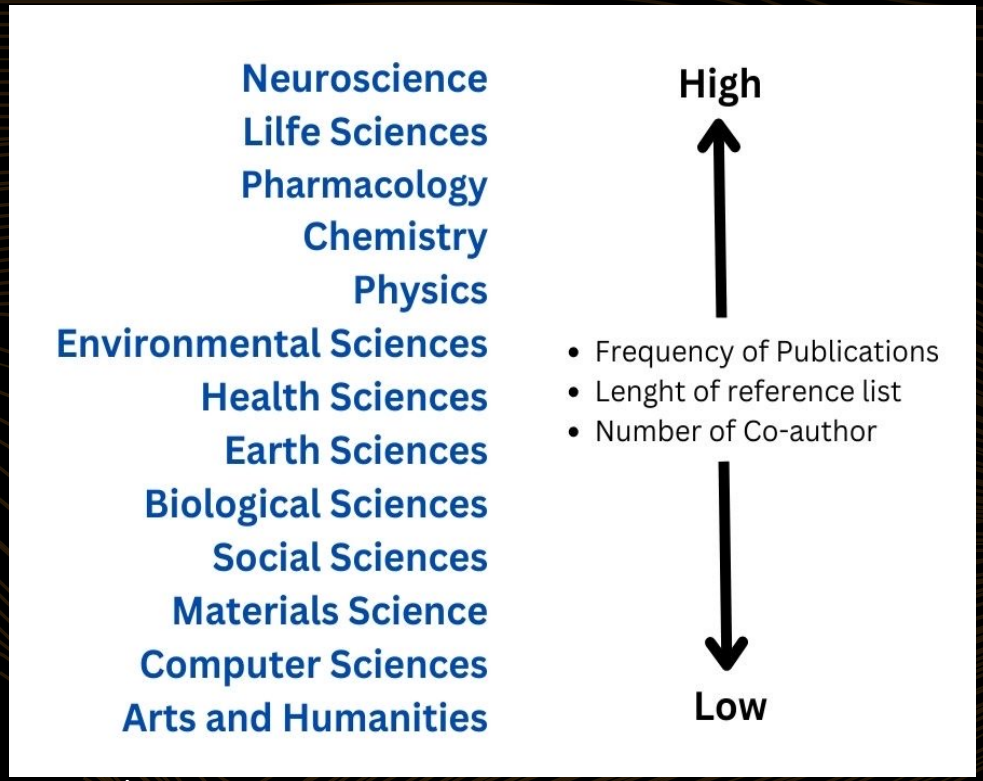
Not all citations are good → Lack of context!!

- Inaccurate attribution: giving wrong credit
- Incorrect citations (typos or wrong article mentioned)
- Citations do not reflect the impact or influence of a work beyond academic circles

Citation features

- Gender difference (?)
- Document type-sensitive
- Time-sensitive (2-3 years are needed to cumulate citations)
- Field-sensitive

Citations: Field difference



www.Elsevier.com

Table 4.1 Publication Cultures by Comparison: NSE (Natural Sciences, Engineering) and SSH (Social Sciences, Humanities)

	NSE	SSH
Citation behaviour	Constructive citation (rung ladder principle)	Citation as differentiation/rebuttal
Thematic orientation	International	Regional and national
Publication language	English	Often language of the country
Place of publication	International	Regional and national
Kind of publication	Journal papers dominate	Monographs and collected volumes dominate; also journal papers
Target group	International specialist audience	Specialist academia and audience
Individual vs. coauthorship	Coauthorship	Often individual authors

Rafael Ball (2018) *An Introduction to Bibliometrics. New Developments and Trends.* Elsevier. Doi: 10.1016/B978-0-08-102150-7.00004-9

1. How do we measure citations?

Not normalised indexes

- Citation count
- Mean citation count
- H- Index

Limitations:

Don’t provide context!!!

Don’t consider field/time/document type differences.

Normalised indexes

- Journal Normalised Citation Impact (JNCI)
- Category normalised citation impact (CNCI)
- Percentile in Subject Area

H-Index

h-index of value=*h* indicates that *h* number of publications that have been cited at least *h* times (Jorge Hirsch 2005)

LIMITATIONS:

- It does not take into account highly cited papers
- H index can only increase over the years
- H index favours senior academics

Never use H-index to directly compare researchers

H-Index: example

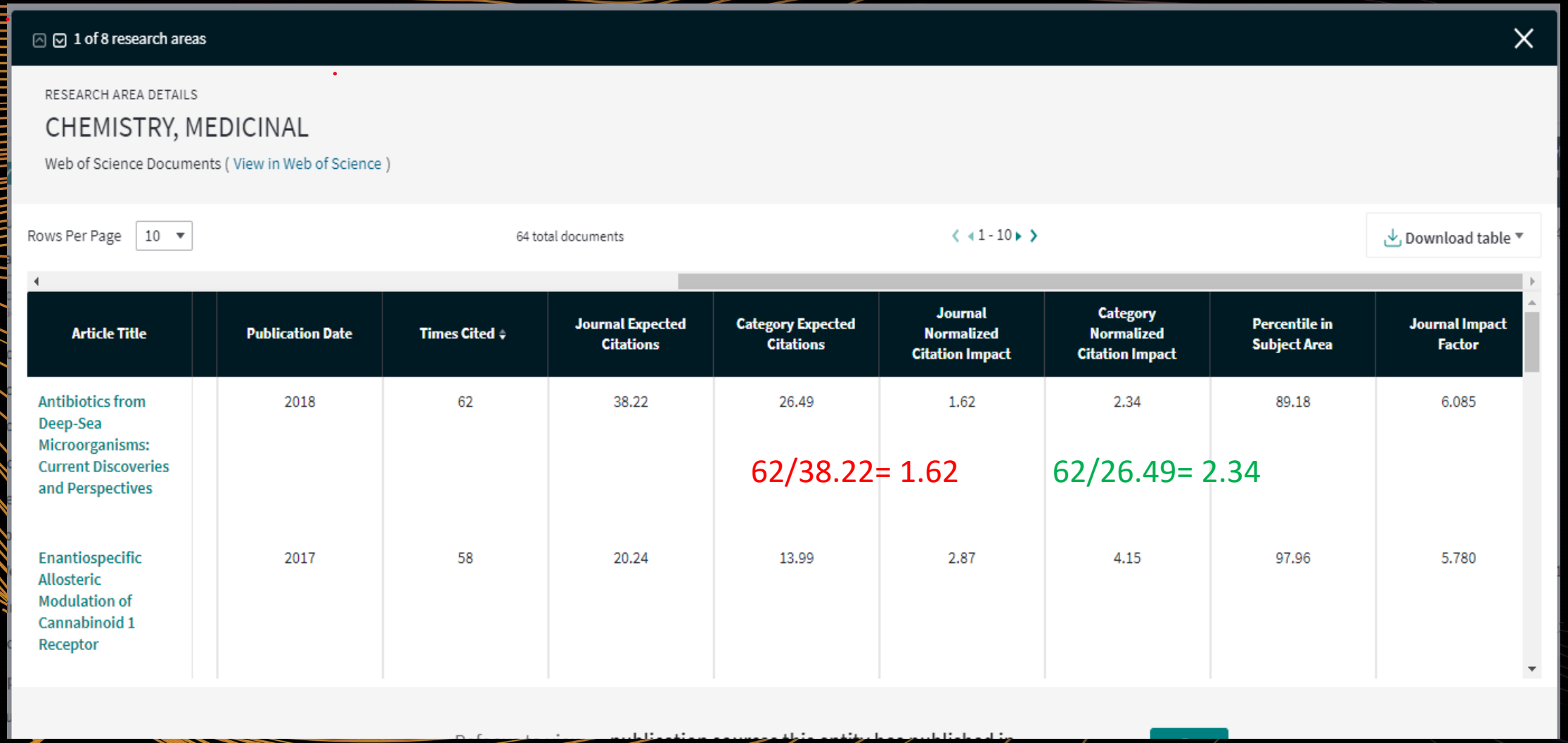
	Researcher A	Researcher B	Researcher C
H-Index	**4**	**2**	**3**
Paper 1	4	25	6
Paper 2	6	9	5
Paper 3	5	1	4
Paper 4	5	0	3
Paper 5	0	0	2
Paper 6	0	0	/
Paper 7	0	/	/
Paper 8	0	/	/

Normalised citation indexes: CNCI and JNCI

Normalised citation score = $\frac{Article\ citations}{Expected\ citations}$

- Expected citations = average number of citations to articles of:
  - the same field, year and document type
  - same year, journal and document type

Normalised indexes in Incites: CNCI and JNCI



1 of 8 research areas

RESEARCH AREA DETAILS

CHEMISTRY, MEDICINAL

Web of Science Documents (View in Web of Science)

Rows Per Page 10 | 64 total documents | 1 - 10 | Download table

Article Title	Publication Date	Times Cited	Journal Expected Citations	Category Expected Citations	Journal Normalized Citation Impact	Category Normalized Citation Impact	Percentile in Subject Area	Journal Impact Factor
Antibiotics from Deep-Sea Microorganisms: Current Discoveries and Perspectives	2018	62	38.22	26.49	1.62	2.34	89.18	6.085
Enantiospecific Allosteric Modulation of Cannabinoid 1 Receptor	2017	58	20.24	13.99	2.87	4.15	97.96	5.780

62/38.22= 1.62

62/26.49= 2.34

Normalised citation indexes: CNCI

CNCI (Incite) similar to FWCI (SciVal): often used to benchmark institutions.

For a group of papers, the CNCI value is the average of the values for each of the papers

$$CNCI_i = \frac{\sum_i CNCI_{each\ paper}}{p_i}$$

p= number of papers
i= entity being evaluated

http://help.prod-incites.com/inCites2Live/indicatorsGroup/aboutHandbook/usingCitationIndicatorsWisely/normalizedCitationImpact.html

Normalised citation indexes: CNCI and JNCI

LIMITATION

- Extremes, highly and poorly cited papers, are very influential on the final score
  → not indicated to evaluate small sets of publications

Normalised citation indexes: Percentile

How does it work?

1. Define a reference set (papers published in the same year, same field, same document type)
2. Rank the publications according to the citation counts
3. Divide publications in percentiles

Paper rank	Citation count
1	250
2	199
3	180
4	111
5	110
6	90
7	83
8	80
9	79
10	60
….	59
1000	2

TOP 1%

Normalised citation indexes: Percentile

PROS

- Provide context
- Not influenced by extremes

CONS

What to do with:

- papers with equal citations?
  - Use the average rank→ e.g. both are given 3.5
  - Or use the same rank→ there are two 3 and there will be no 4
- article with multiple subject categories?
  - the article is ranked in all categories
  - WoS provide the score of the highest percentile

Misuses of citation metrics

NEWS FEATURE | 19 August 2019

Hundreds of extreme self-citing scientists revealed in new database

Some highly cited academics seem to be heavy self-promoters – but researchers warn against policing self-citation.

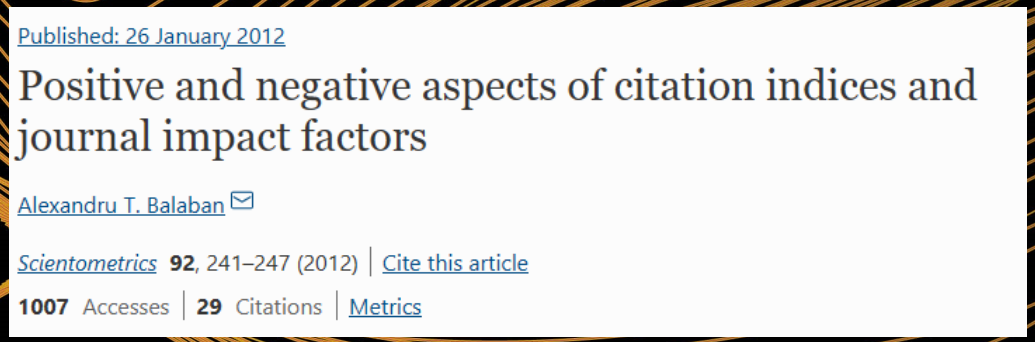
Published: 31 January 2022

Do negative citations reduce the impact of cited papers?

Linhong Xu, Kun Ding & Yuan Lin

Scientometrics **127**, 1161–1186 (2022) | Cite this article

652 Accesses | **1** Citations | **19** Altmetric | Metrics



Published: 26 January 2012

Positive and negative aspects of citation indices and journal impact factors

Alexandru T. Balaban

Scientometrics **92**, 241–247 (2012) | Cite this article

1007 Accesses | **29** Citations | Metrics

- Often confused as a measure of quality
- Goal displacement
- Self-citations
- Cite what you know; citation of works by friends, colleagues, groups, and networks.

The case of the Journal Impact Factor

- It is one of the most misused metrics
- It is a journal metric, not an article metric!! → it must not be used to evaluate the quality of an article.

$$\text{JIF (2022)} = \frac{Total\ citations\ received\ in\ \boldsymbol{all}\ published\ items\ (2022)}{Citations\ received\ in\ \boldsymbol{citable}\ items\ (2020-2021)}$$

Citable items= Original Research (research papers, proceeding papers, reviews)
Not citable items= Editorial materials (commentary, perspectives, letters…)

The case of the Journal Impact Factor

Manipulation of JIF:

- Journals publish more editorial materials
- Editorial malpractice→ suggesting citations during peer-review
- Citation cartels → mutual agreements between journals to cite each other


Citation Cartels: The Mafia of Scientific Publishing

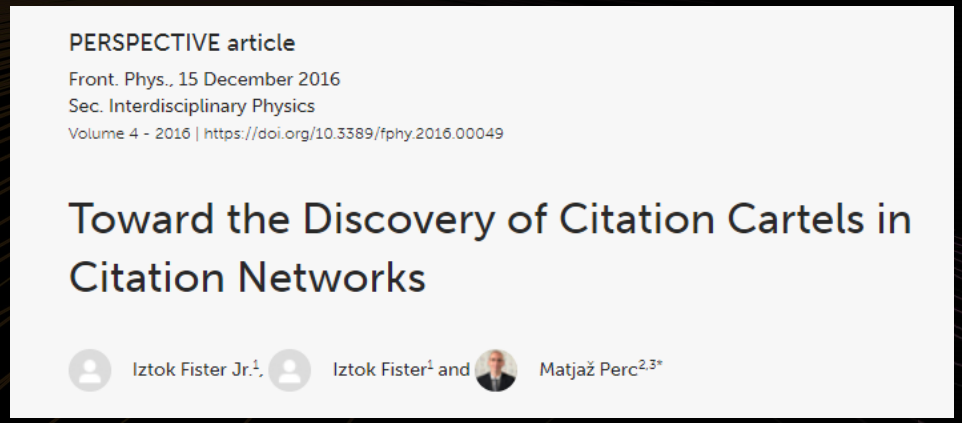
By Enago Academy

Dec 26, 2022 4 mins read Listen

(average: 4 out of 5.)


Visualizing Citation Cartels

By PHIL DAVIS | SEP 26, 2016 | 15 COMMENTS


PERSPECTIVE article

Front. Phys., 15 December 2016

Sec. Interdisciplinary Physics

Volume 4 - 2016 | https://doi.org/10.3389/fphy.2016.00049

Toward the Discovery of Citation Cartels in Citation Networks

Iztok Fister Jr.[1], Iztok Fister[1] and Matjaž Perc[2,3]*

DORA (2012)

General recommendation:

Do not use journal-based metrics such as Journal Impact Factors, as a surrogate measure of the quality of individual research articles, to assess an individual scientist's contribution or in hiring, promotion and funding decision

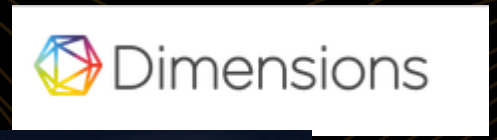
https://sfdora.org/read/

Key points

1. Citations are not a measure of quality and must be used in the right context
2. Citation metrics vary across databases
3. Research quality and open research practices are the best ways to enhance citations

2. Tools and systems that capture citations

- Citation services provide citation numbers but only for the publications in their own database
- Citation counts will vary across providers



Tools and systems that capture citations

The coverage of databases is different:

	WoS (core collection)	Scopus	Google Scholar
Journals	21 858 Journals	26 228 Journals	
Coverage	➢ 85 million records ➢ 134000 books ➢ 300000 conferences	➢ 87million records ➢ 335000 books ➢ 100000 conferences	
Time coverage	Since 1900	Since 1970	

Web of Science Coverage Details - Resources for Librarians - LibGuides at Clarivate Analytics

Content - How Scopus Works - Scopus - | Elsevier solutions

Tools and systems that capture citations

Web of Science and Scopus rely on a set of source selection criteria to decide which journals, conference proceedings, and books the database should index

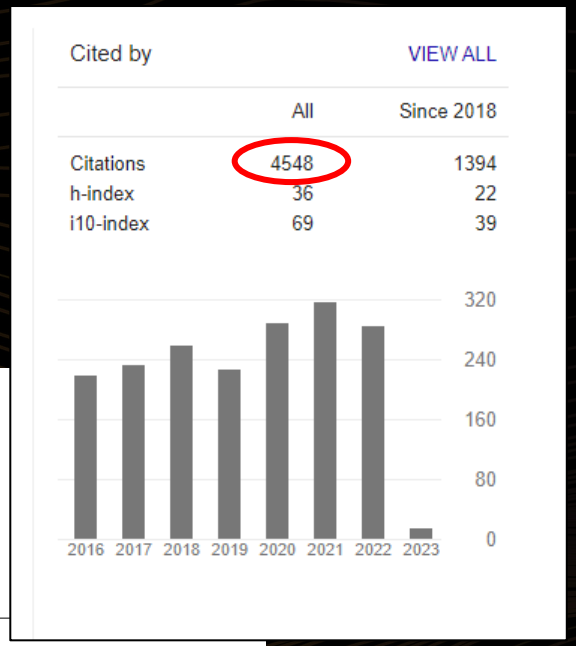
- Sensitive to bias in the selection criteria
- Limited coverage of texts written in languages other than English
- Limited coverage in Social Sciences and Humanities

Google Scholar follows an inclusive and automated approach

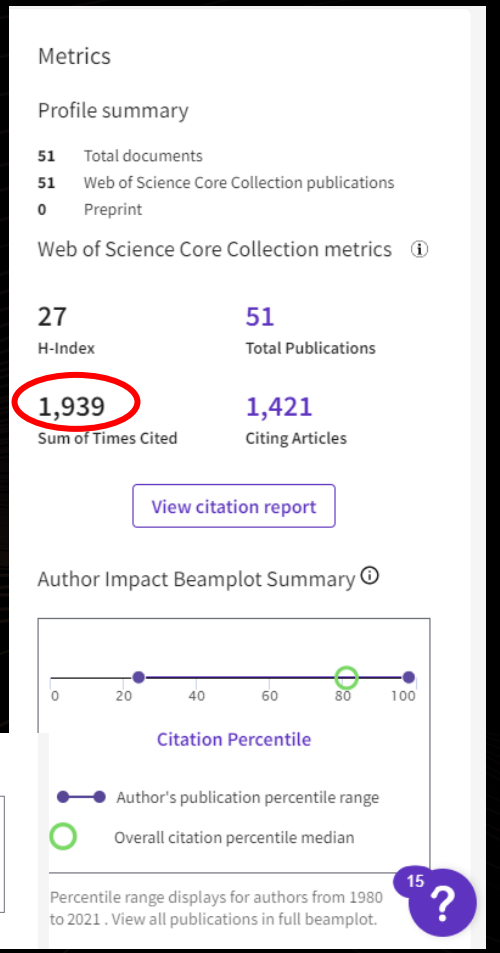
- It is not fully transparent about how articles and citations are included.
- It offers less reliable data and fewer bibliometric tools.
- It presents errors such as duplicate entries, incomplete bibliographic information and inclusion of non-scholarly materials

Individual citations across multiple platforms

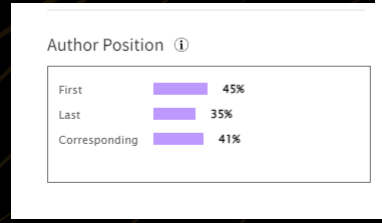
Google Scholar



WoS



Scopus



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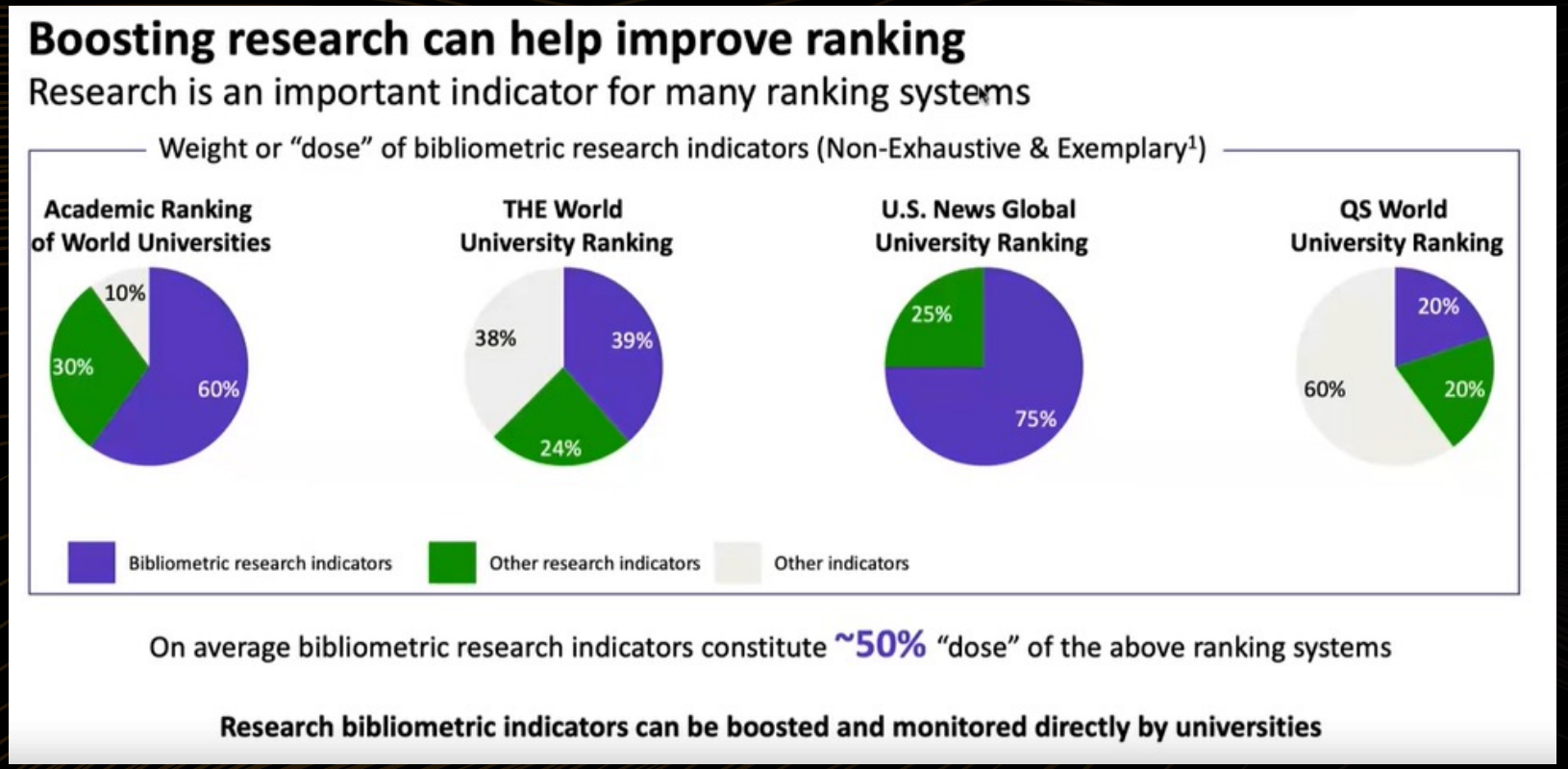
Citations and the League Tables

- League tables: University rankings based on certain metrics

Research Indicators	• **Citations**, publications in indexed journals, highly cited researchers, international co-authors, research reputation, % of most cited publications, Nobel prizes, Research Grants
Teaching Indicators	• Staff/Student ratio, university income, international student/staff, reputation, Doctorate to Batchelor student ratio, academic staff with Doctoral degree
Industry & Innovation	• Industry article citation impact, average citations by patents, number of patents filed, % articles with industry co-authors, % patents cited, Income from Industry, ratio of patent applications to grants

https://clarivate.com/webinars/driving-research-excellence-to-enhance-your-universitys-reputation/?utm_campaign=EM4_Uni_Rankings_LeadGen_Webinar_May25_SAR_Global_2022&utm_medium=email&utm_source=Eloqua

Bibliometric measures in League Tables



https://clarivate.com/webinars/driving-research-excellence-to-enhance-your-universitys-reputation/?utm_campaign=EM4_Uni_Rankings_LeadGen_Webinar_May25_SAR_Global_2022&utm_medium=email&utm_source=Eloqua

League Table	Citation Source
Times Higher Education: World University Ranking (&subject)	Scopus (Elsevier)
Times Higher Education: Impact Rankings	Scopus (Elsevier)
QS World University Rankings (&Subject)	Scopus (Elsevier)
QS Graduate Employment Rankings	Scopus (Elsevier)
CWTS Leiden Rankings	Web of Science (Clarivate)
Shanghai Academic Ranking	Web of Science (Clarivate)
US News & World Report	Web of Science (Clarivate)
Round University Ranking	Web of Science (Clarivate)
Centre for World University Rankings	Web of Science (Clarivate)

Increase journal coverage and citation capture

How to increase capture by Web of Science and Scopus:

1. Fix your Researcher Profiles and link them to your ORCID

    - WoS: Introduction to your Reseacher Profile (clarivate.com)
    - Scopus: Author profiles - Scopus | Elsevier solutions

2. Encourage your **publishers** to submit journals, books and conference proceedings to Web of Science

    - To submit journals for evaluation, use the Web of Science Publisher Portal.
    - To submit a book, email: clarivateeditorialbookrequests@clarivate.com
    - To submit conference proceedings, email: tr.pubrelations-proceedings@clarivate.com

3. How to increase citations

- Produce a piece of well-written, top-quality, original research
- Follow open research practices!

1. **Use Preprint servers:** preprints archives are a popular way to get your results out early, allowing you to receive feedback from your peers and your work to be visible before the final publication.

How to increase citations

2. Make your manuscripts open access where possible

- Make your manuscript easily accessible. Upload your accepted manuscript or preprints to Pure so that it is recorded in the University repository.

  Check SHERPA RoMEO https://v2.sherpa.ac.uk/romeo/ or email openresearch@abdn.ac.uk to discover your open access options.

- Make use of University read and publish deals;

Corresponding affiliated authors can publish original and review articles as gold open access at no cost in selected journals.

Publisher agreements | Library | The University of Aberdeen (abdn.ac.uk)

How to increase citations

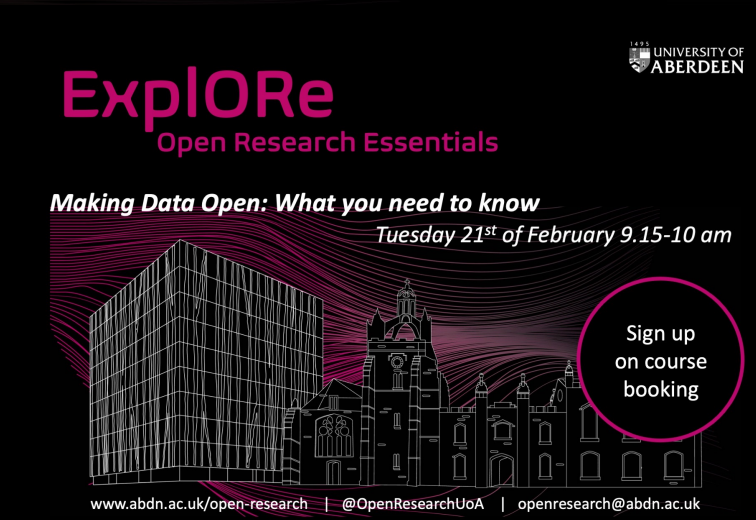
3. Make your data, software, and code open where possible

- Papers with supporting data freely available in a repository are associated with on average 25% increase in citations!

  Colavizza G, Hrynaszkiewicz I, Staden I, Whitaker K, McGillivray B (2020) The citation advantage of linking publications to research data. PLoS ONE 15(4): e0230416. https://doi.org/10.1371/journal.pone.0230416

- Figshare, Dryad, SlideShare etc. can all be used to share your research data and you can add a catalogue record to Pure to keep a record of everything in one place.

  How to make your data open | Library | The University of Aberdeen (abdn.ac.uk)



How to increase citations

- Collaborate with one or more co-authors; co-authors provide additional opportunities for promoting the research and citing the work. A high profile co-author can generate early interest in the work and international collaborations can generate wider audiences

- Use social media (e.g., Facebook, Twitter, Academia.edu, ResearchGate, Mendeley). Make sure that links to papers on social media are working. Check the settings on your University profile page to make sure that your Pure data is visible.

- Make use of conference opportunities, invited talks, and public engagement events to make your research more visible. Use blogs and websites to promote your work and talk to other researchers about your paper. Consider writing up your research as a non-academic piece in a magazine or newspaper for a wider, public audience.

Key points

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Questions?

ExplORe

Open Research Essentials

UNIVERSITY OF ABERDEEN

A training series with a focus on Open Research practices

24th of January – *Open Research: who are we and what do we do?*

31st of January – *Citation Impact: what is it and how to measure it?*

21st of February – *Making Data Open: What you need to know*

28th of February – *Guide to Open Access Research Publications*

14th of March – *Open Licences for Publications and Data*

Online from 9.15 to 10.00 am

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