Research Assessment Indicators and Tools

The Library of Kaunas University of Technology

biblioteka@ktu.lt

2024

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1922

Contents

- What is research assessment and why it matters?
- Clarivate Analytics Web of Science:
    - Journal Impact Factor (JIF);
    - Quartile in Category (Q);
    - Aggregate Impact Factor (AIF);
    - Eigenfactor Score & Article Influence Score (AIS);
- Elsevier Scopus:
    - CiteScore, Quartile in Category (Q), SJR, Source-Normalized Impact per Paper (SNIP);
- H-index;
- Altmetrics;
- Qualitative Research Assessment.

Scientometrics & Bibliometrics

Scientometrics - study of measuring and analyzing science by <u>quantitative</u> methods

- Journal-level metrics (IF, CiteScore, Quartile, …)

- Article-level metrics (no. of citations, views/downloads, …)

- Author-level metrics (h-index, no. of publications, no. of citations, collaboration, …)

- Altmetrics (alternative metrics)

Bibliometrics is the application of statistical methods to the study of bibliographic data, especially in scientific and library and information science contexts,

Both fields (scientometrics and bibliometrics) are closely related and largely overlap.

Source: VOSviewer - Visualizing scientific landscapes

- Assessing the **impact** of research results, when applying for a new job, promotion, salary supplement, or research funding;

- Evaluating other researchers for **collaborative** purposes;

- Choosing a journal for **publishing** research results;

- Selecting high quality scientific information for **studies** and graduation works;

- Assessing the **relevance** of literature sources for subscription;

- Bibliometric data are also analyzed in compiling **University rankings**.

Journal-level metrics

Article-level metrics

Author-level metrics

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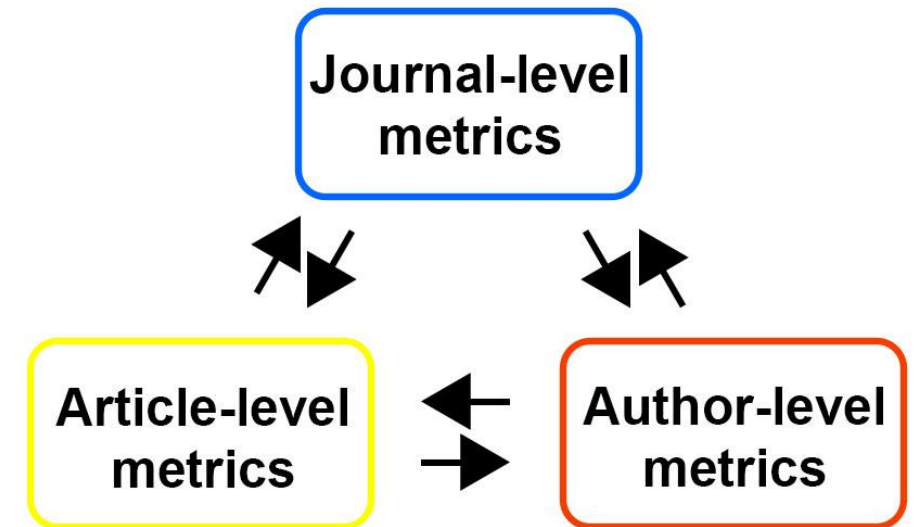
Publication is counted in the institutional research performance, if:

- It is important **where** your publication is published because journal metrics are used to determine researchers' performance

SOCIAL SCIENCES	NATURAL SCIENCES, TECHNOLOGY, AND MEDICAL AND HEALTH SCIENCES
Publication in a journal that has: ■ **JIF** in **SSCI** <u>and/or</u> **SCIE** (Web of Science), <u>and/or</u> ■ **SNIP** in Scopus	Publication in a journal that has: ■ **JIF** in **SSCI** <u>and/or</u> **SCIE** <u>and</u> ■ **JIF/AIF**>0.25

International-level scientific paper in the areas of natural sciences, technology, and medical and health sciences is a paper published in a scientific journal that is in the first, second or third quartile (**Q1-Q3**) of the relevant group of journals in the WoS **SCIE** database.

International-level scientific paper in the areas of humanities and social sciences is a paper published in a scientific journal that is in the first, second or third quartile (**Q1-Q3**) of the relevant group of journals in the WoS **SSCI** or Elsevier Scopus database

GUIDELINES OF KTU FOR THE ORGANISATION OF THE PERFORMANCE AND COMPETENCY EVALUATION

Bibliographic Databases: Web of Science (WoS) & Scopus

Impact metrics

JIF Percentile, Q ≠ CiteScore Percentile, Q

► **Not suitable** to compare between different subjects

Normalized metrics

CNCI JCI ≠ SNIP

► **Suitable** to compare between different subjects
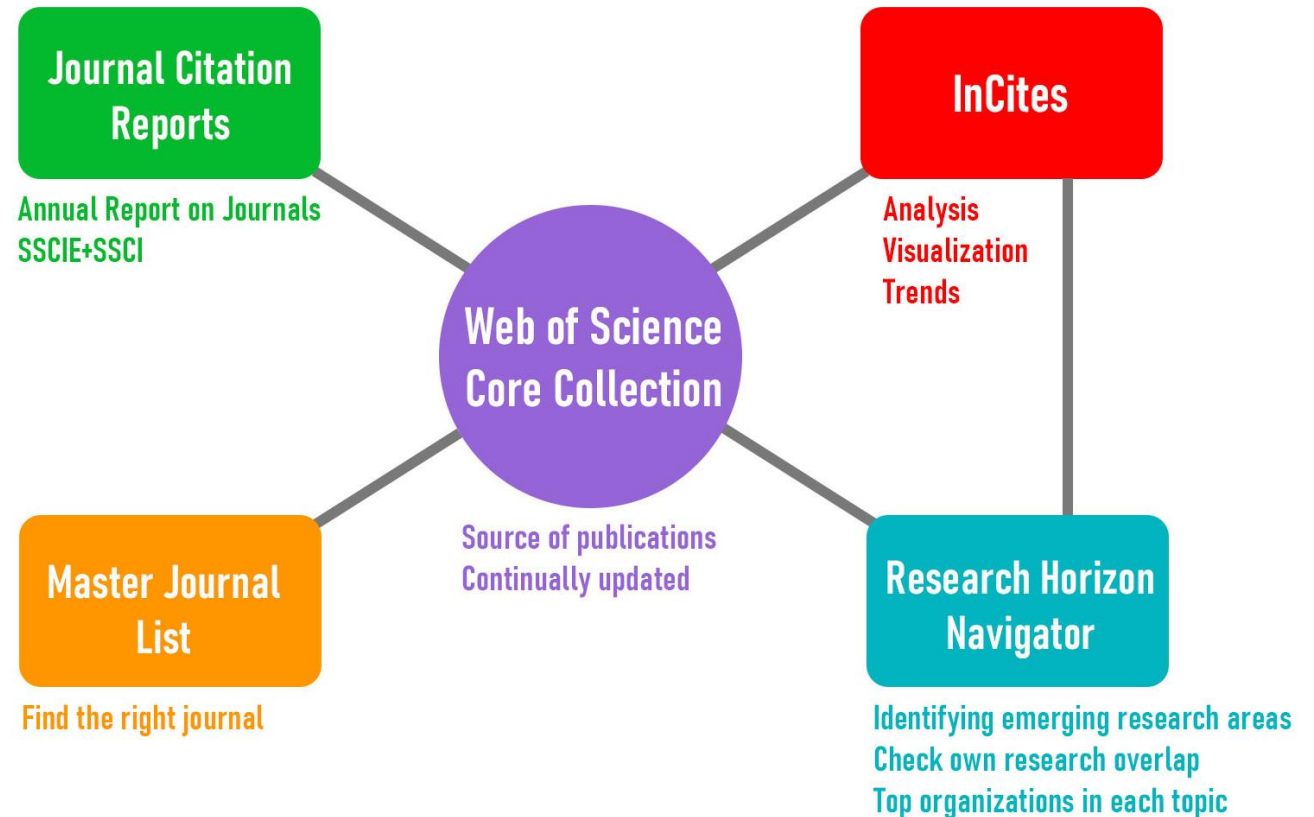
Prestige metrics

Eigenfactor AIS ≠ SJR

► **Suitable** to compare between different subjects

Web of Science (WoS) Database Tools

Useful to now which one to use for each case:

- **Web of Science Core Collection** – find publications, authors
- **Journal Citation Reports** – check journals (JIF, Quartile)
- **Master Journal List** – find the right journal
- **InCites** – check metrics, trends, compare institutions, researchers
- **Research Horizon Navigator** – check emerging research topics

Journal Citation Reports

Annual Report on Journals
SSCIE+SSCI

InCites

Analysis
Visualization
Trends

Web of Science Core Collection

Source of publications
Continually updated

Master Journal List

Find the right journal

Research Horizon Navigator

Identifying emerging research areas
Check own research overlap
Top organizations in each topic

WoS Core Collection Editions (Indexes)

Clarivate™ Web of Science

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WoS has several indexes for scholarly journals, books, conferences etc.

- **Science Citation Index Expanded (SCIE)** - multidisciplinary index to the journal literature of the sciences (natural science, technology, medical science);

- **Social Sciences Citation Index (SSCI)** - multidisciplinary index to the journal literature of the social sciences;

- **Arts & Humanities Citation Index (A&HCI)** - multidisciplinary index to the journal literature of the arts and humanities. Journals in the ESCI obtained an impact factor (IF) in 2023;

- **Emerging Sources Citation Index (ESCI)** – includes peer-reviewed publications of regional importance and in emerging scientific fields. Journals in the ESCI obtained an impact factor (IF) in 2023;

JIF

Other: Conference Proceedings (CPCI-S; CPCI-SSH), Book Citation Index (BKCI-S; BKCI-SSH).

WoS Edition (Index) in Research Assessment at KTU

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WoS Core Collection Editions (Indexes): where to find them?

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- **Journal Citation Reports** contain essential journal metrics

- Filter by editions / indexes, also by year, category, publisher, open access etc.

- Useful tool to find journals to publish

WoS DB Core Collection Index Dynamics

- New journals enter **ESCI** (Emerging Sources Citation Index)

- If/when they meet additional criteria, moved to **SCIE**, **SSCI**, **AHCI**

- Usually ESCI journals with JIF in **Q1** and **Q2** are considered to be moved to SCIE, SSCI, AHCI

- SCIE, SSCI, AHCI journals that decrease in impact, might be moved to ESCI

- **Emerging Sources Citation Index (ESCI) is not used in formal evaluation**
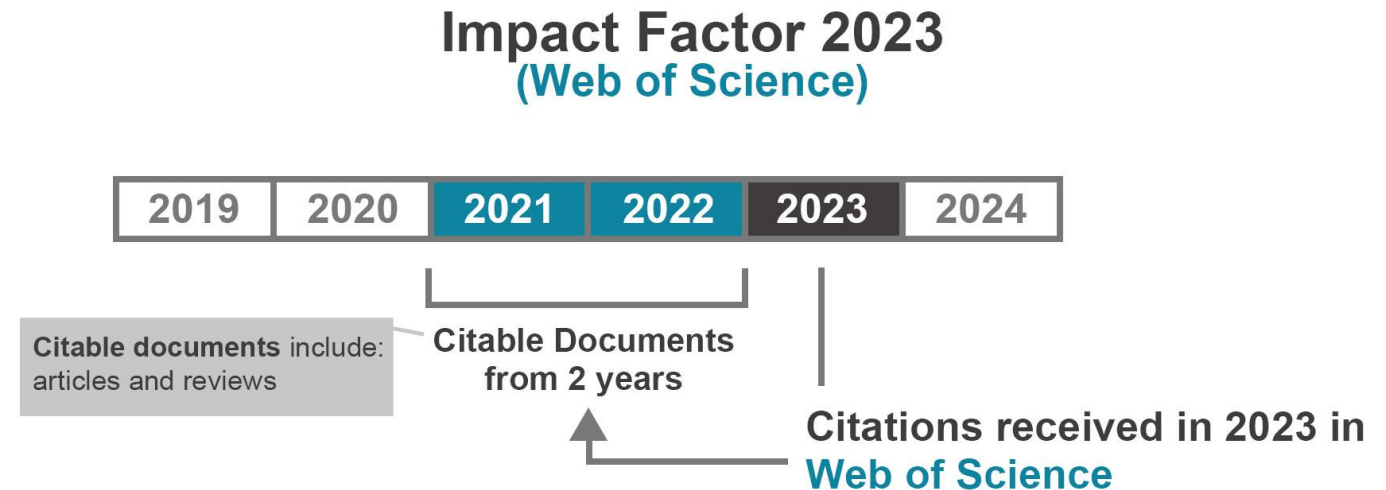

Source: Web of Science Core Collection

JIF (Journal Impact Factor)	All citations to the journal in the current year to items published in the previous two years, divided by the total number of scholarly items (these comprise articles, reviews, and proceedings papers) published in the journal in the previous two years.
Quartiles	Quartile (1/4) rankings based on rank for the JIF in category (Q1 (highest) > Q2 > Q3 > Q4 (lowest))
AIF (Aggregate Impact Factor)	Calculated the same way as the Impact Factor for a journal, but it takes into account the number of citations to all journals in the category and the number of articles from all journals in the category.
Journal Citation Indicator (JCI)	A three-year average of a field-weighted metric called CNCI (Category Normalized Citation Impact), itself a ratio between number of citations to a journal and the number of expected citations to a journal.
Eigenfactor Score	Eigenfactor Score – is based on the number of times articles from the journal published in the past 5 years have been cited, but it also considers which journals have contributed these citations so that highly cited journals will influence the network more than lesser cited journals. Excludes self-citation.
Article Influence Score (AIS)	An average influence of journal's publication, accumulated within 5 years after its publishing

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JIF Calculation: all citations to the journal in the current year to items published in the previous two years, divided by the total number of scholarly items (these comprise articles, reviews, and proceedings papers) published in the journal in the previous two years:

$$JIF(2023) = \frac{No.\ of\ citations\ in\ 2023\ of\ documents\ published\ in\ 2021\ and\ 2022\ (\textbf{7892})}{No.\ of\ documents\ in\ 2021\ and\ 2022\ (\textbf{1234})} = \textbf{6.4}$$

- **JIF** is used as a proxy for the relative importance of a journal **within** its field;
- Journals with higher **impact factor** values are given the status of being more important, or carry more prestige in their respective fields, than those with lower values;
- **JIF is not used** to compare journals from different research areas;
- **JIF** is often abbreviated as **IF.**

Impact Factor 2023
(Web of Science)

2019	2020	2021	2022	2023	2024

Citable documents include: articles and reviews

Citable Documents from 2 years

Citations received in 2023 in Web of Science

JIF in Research Assessment at KTU

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International-level scientific paper in the areas of humanities and social sciences is a paper published in a scientific journal that is in the first, second or third quartile (**Q1-Q3**) of the relevant group of journals in the WoS SSCI or Elsevier Scopus database

GUIDELINES OF KTU FOR THE ORGANISATION OF THE PERFORMANCE AND COMPETENCY EVALUATION

JIF & JCI

Journal Impact Factor (JIF) – in any given year, the impact factor of a journal is the average number of citations received per paper published in that journal during the two preceding years. <u>Not used to compare journals from different research areas.</u>

Journal Citation Indicator (JCI) is a three-year average of a field-weighted metric called **CNCI** (Category Normalized Citation Impact), itself a ratio between number of citations to a journal and the number of expected citations to a journal. Normalized by research areas. <u>Can be used to compare journals from different research areas.</u>

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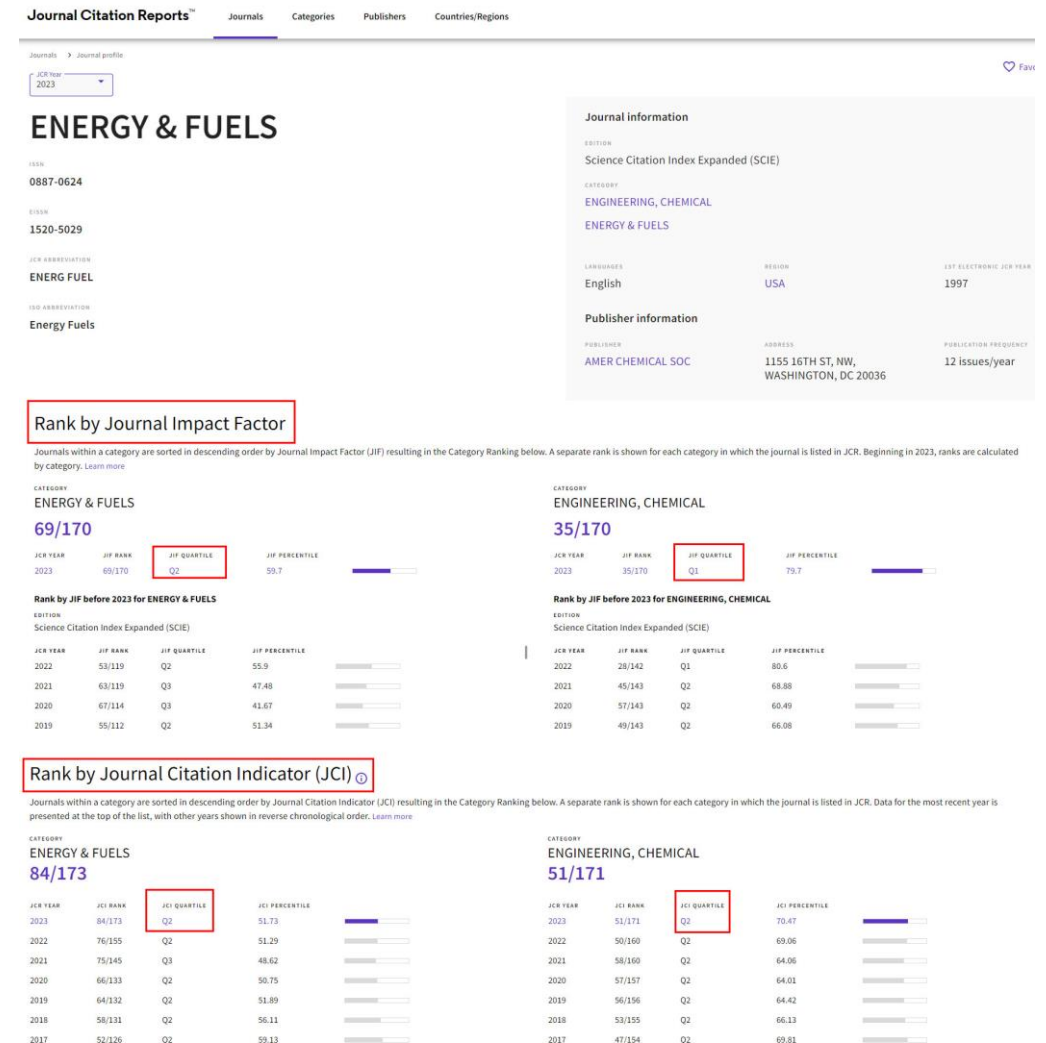
- **Quartile** in Category - quartile rankings based on rank for the **JIF**. Quartiles are defined as:

  Q1 0.0 < Z ≤ 0.25 Highest

  Q2 0.25 < Z ≤ 0.5

  Q3 0.5 < Z ≤ 0.75

  Q4 0.75 < Z (Lowest)

- $Z = (X/Y)$ – where X is the journal rank in category and Y is the number of journals in the category.

- **Q1-Q3** are more valued, i.e. it is encouraged to publish in such journals

Quartile of REVIEWS IN CHEMICAL ENGINEERING:

Rank by Journal Impact Factor

Journals within a category are sorted in descending order by Journal Impact by category. Learn more

CATEGORY
ENGINEERING, CHEMICAL

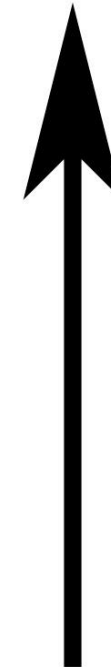**39/170**

JCR YEAR	JIF RANK	JIF QUARTILE	JIF PERCENTILE
2023	39/170	Q1	77.4

Rank by JIF before 2023 for ENGINEERING, CHEMICAL

EDITION
Science Citation Index Expanded (SCIE)

JCR YEAR	JIF RANK	JIF QUARTILE	JIF PERCENTILE	
2022	37/142	Q2	74.3	
2021	15/143	Q1	89.86	
2020	21/143	Q1	85.66	
2019	20/143	Q1	86.36	

Q1
Q2
Q3
Q4

Quartiles in Research Assessment at KTU

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Aggregate Impact Factor - AIF

- Aggregate Impact Factor takes into account the number of citations to all journals in the category and the number of articles from all journals in the category;

- An aggregate Impact Factor of 1.0 means that that, on average, the articles **in the subject category** published one or two years ago have been cited one time;

- **JIF/AIF** is used to compare journals between <u>different research categories</u>.

Journal in one category:

$$\frac{JIF}{AIF}$$

Journal in several categories (divided by average AIF):

$$\frac{JIF}{\overline{AIF}}$$

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GUIDELINES OF KTU FOR THE ORGANISATION OF THE PERFORMANCE AND COMPETENCY EVALUATION

Eigenfactor Score

- Citations are calculated from the indicated year;

- Interval for cited publications – 5 years

- Composed in a way that the sum of Eigenfactor for all JCR indexed journals would be 100: value of 1 indicates that the journal accumulated 1% of overall influence

- Journal self citations are not included

Article Influence Score (AIS)

- An average influence of journal's publication, accumulated within 5 years after its publishing;

- Calculated by multiplying Eigenfactor Score by 0.01 and dividing by the number of publications in the journal:

$$\frac{0.01 * EigenFactor\ Score}{X}$$

X = 5-year Journal Article Count divided by the 5-year Article Count from All Journals.

Eigenfactor and AIS are not used in the formal research evaluation at KTU

Scopus is usually used for social sciences

CiteScore	Based on the number of citations to documents (articles, reviews, conference papers, book chapters, and data papers) by a journal over <u>four years</u>, divided by the number of the same document types indexed in Scopus and published in those <u>same four years</u>.
CiteScore Quartile	Quartile (1/4) rankings based on rank for the <u>CiteScore</u> (Q1 (highest) > Q2 > Q3 > Q4 (lowest))
SNIP – Source-Normalized Impact per Paper	Measures the contextual citation impact by weighting citations based on the total number of citations in a subject field for a source. It helps you make a direct comparison of sources in <u>different subject fields</u>.
SJR – Scimago Journal Rank	Weighted by the prestige of a journal. Subject field, quality, and reputation of the journal have a direct effect on the value of a citation. A citation from a source with a relatively high SJR is worth more than a citation from a source with a lower SJR.

Scopus DB Main Indicators

- **CiteScore**
- **SJR**
- **SNIP**
- CiteScore **Quartile**:
    - **Q1 0.0 < Z ≤ 0.25 Highest**
    - Q2 0.25 < Z ≤ 0.5
    - Q3 0.5 < Z ≤ 0.75
    - Q4 0.75 < Z (Lowest)
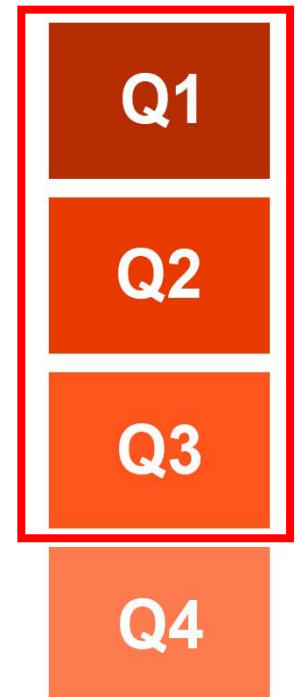- **Q1-Q3** are more valued, i.e. it is encouraged to publish in such journals

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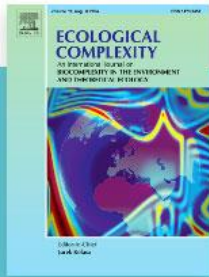
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GUIDELINES OF KTU FOR THE ORGANISATION OF THE PERFORMANCE AND COMPETENCY EVALUATION

Scopus <u>CiteScore</u> & Web of Science <u>JIF</u>

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- Scopus and WoS use different methodology calculating their CiteScore and JIF respectively.
- CiteScore is calculated: citations from 4 years divided by number of documents in those same 4 years.
- JIF is calculated: Citations received in a referenced year divided by a number of documents in previous 2 years. That is why these two impact indicators differ significantly.
- Citations take time to accumulate, so the longer the period the more citations tend to accumulate. That is why usually CiteScore is higher than JIF for the same journal.
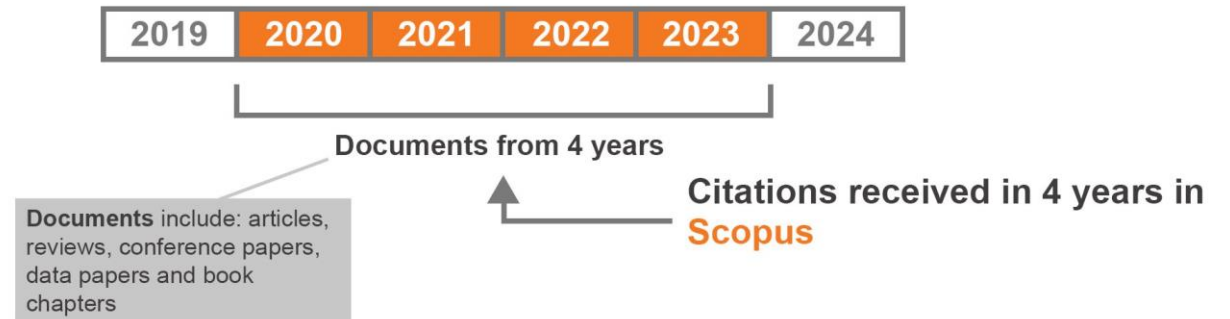
CiteScore 2023
(Scopus)

| 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |

Documents from 4 years

Documents include: articles, reviews, conference papers, data papers and book chapters

Citations received in 4 years in Scopus

Impact Factor 2023
(Web of Science)

| 2019 | 2020 | 2021 | 2022 | 2023 | 2024 |

Citable documents include: articles and reviews

Citable Documents from 2 years

Citations received in 2023 in Web of Science

ECOLOGICAL COMPLEXITY
An international Journal of BIOCOMPLEXITY IN THE ENVIRONMENT AND THEORETICAL ECOLOGY

Ecological Complexity
Supports open access

| 7.1 CiteScore | 3.1 Impact Factor |

- **Web of Science (WoS)** is used more for publications in natural sciences, engineering & technology, medical & health sciences, agricultural & veterinary sciences
- **Scopus** is used more for social sciences
- Great **overlap** between WoS and Scopus

Strengths:

- **WoS:** More options for citation analysis for institutions; more robust author searching – all authors from all publications are indexed, searchable, and unified based on ORCID and Researcher ID profiles; Deeper citation indexing across all content (back to 1900; for Lithuania – since 1990)
- **Scopus:** more publications in total; compares up to 10 sources by impact metrics: number of citations, number of articles published in a year, % of articles not cited, & % of articles that are review articles, all graphed by year. View secondary documents, which are documents not indexed in Scopus (retrieved from the references or citations of the documents that are covered by Scopus)
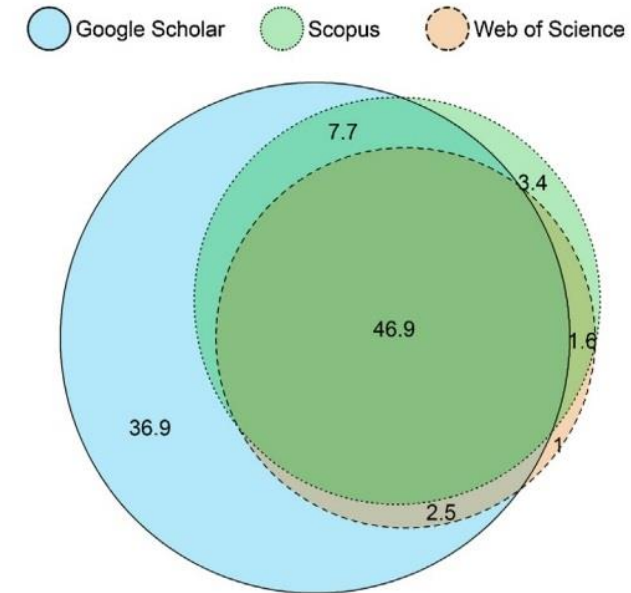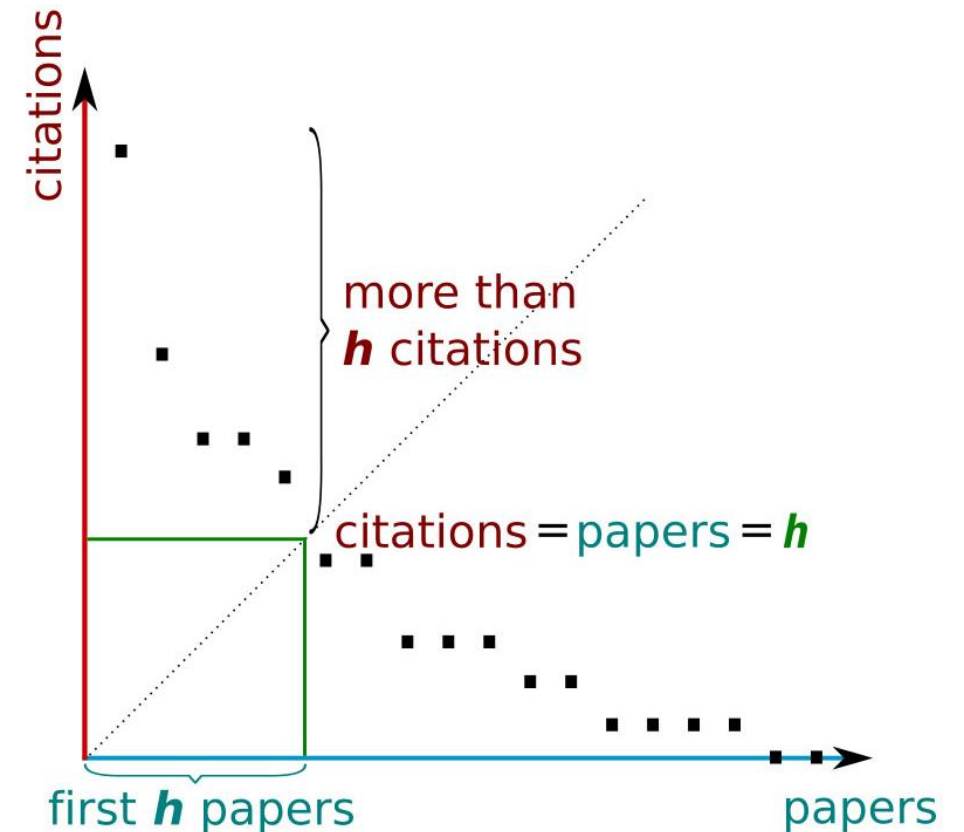

Google Scholar   Scopus   Web of Science

7.7

3.4

46.9

1.6

36.9

2.5

Fig. 3. Percentage of unique and overlapping citations in google scholar, Scopus, and Web of Science. n = 2,448,055 citations from all subject areas.

Source: Martín-Martín, Alberto & Orduna-Malea, Enrique & Thelwall, Mike & Delgado López-Cózar, Emilio. (2018). Google Scholar, Web of Science, and Scopus: A systematic comparison of citations in 252 subject categories. Journal of Informetrics. 12. 1160-1177. 10.1016/j.joi.2018.09.002.

h-index

h-index reflects the productivity of <u>authors</u> based on their publication and citation records

The h-index is based on a list of publications ranked in descending order by the <u>times cited</u>: **the value of h is equal to the number of papers (N) in the list that have N or more citations.** *Example: Scientist X has 3 publications with 9, 2 and 1 citations, i.e. 2 publications with 2 or more citations →* **h-index is 2**

+ Measures both quality and quantity of scientific output;

+ Used at all levels (from author to institution);

- Does not account for the number of authors of a paper;

- Not normalized by research fields;

- Favors established researchers/journals

more than **h** citations

citations = papers = **h**

first **h** papers

papers

h-index is on WoS, Scopus, Google Scholar, but all of these have different collections of documents that they use, so the h-index is also different.

# Bibliometric Reports for Individual Researchers

Publications from 2019-2023:

Name	******
Web of Science ResearcherID	******
ORCID	******
Documents in Q1 Journals	37
Documents in Q2 Journals	8
Documents in Q3 Journals	2
Documents in Q4 Journals	0
All Open Access Documents	26
Industry Collaborations	2
Times Cited	3073
Category Normalized Citation Impact	3.70
Citation Impact	65.38
Journal Normalized Citation Impact	1.29
H-Index	19
Documents in Top 1%	7
Documents in Top 10%	15
Domestic Collaborations	4
International Collaborations	43

Scientific output summary

Data visualizations (Quartile distribution)

Publications by Journal Quartile 2019-2023

Q3: 2

Q2: 8

Q1: 37

Source: WoS InCites Data
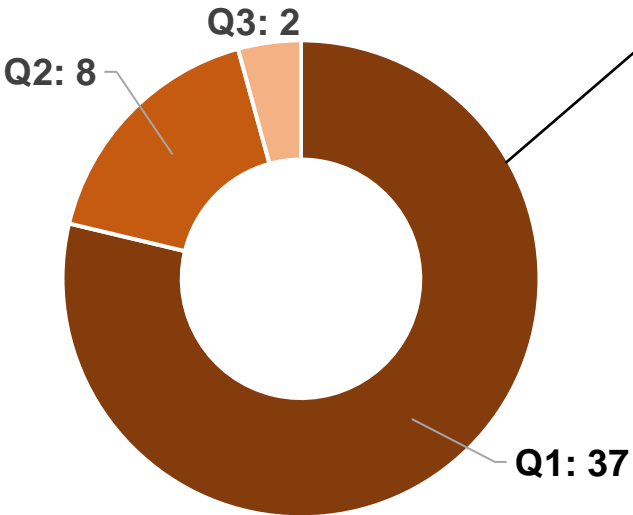
Bibliometric Reports for Institutions/Departments

Production
- Number of documents
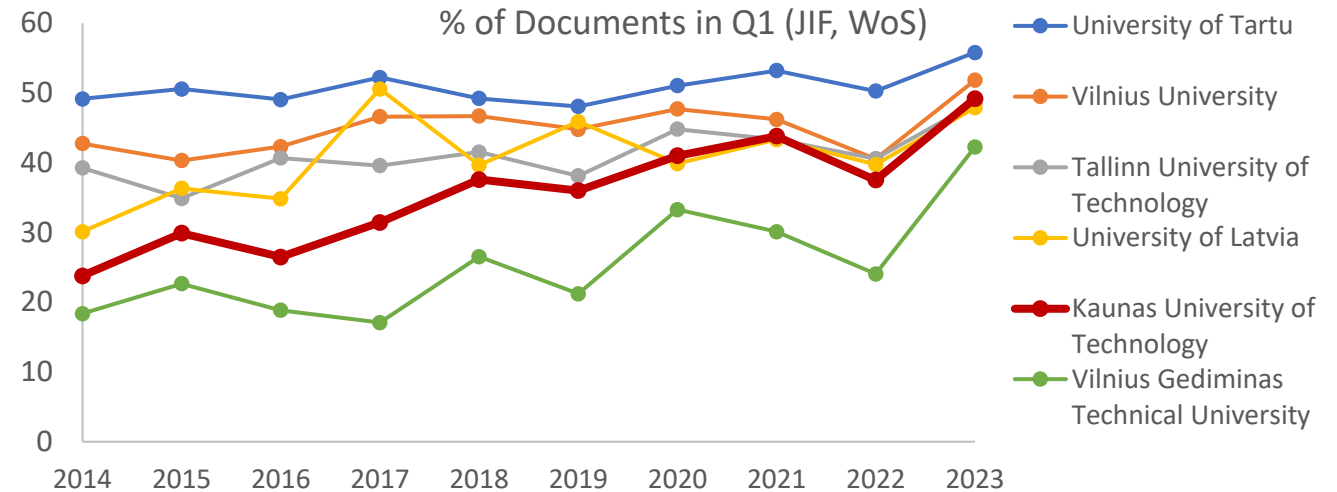- Number of citable documents

Collaboration
- Number of documents with international collaboration
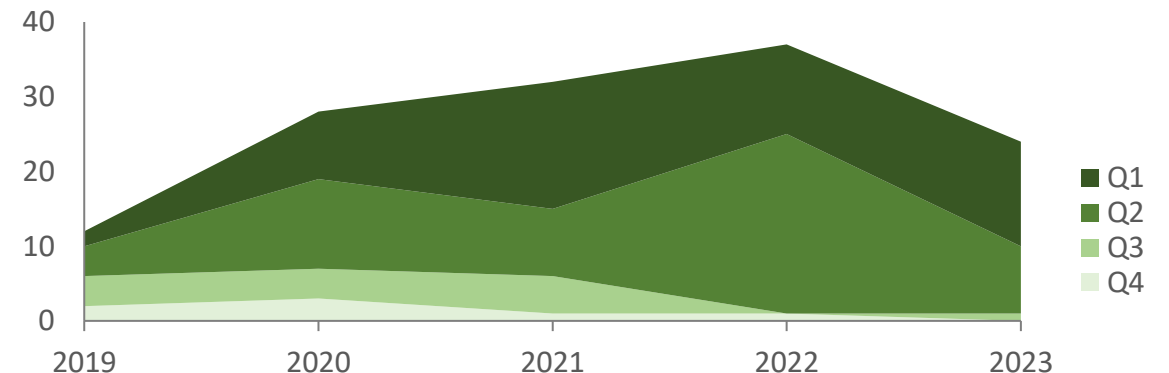- Number of documents with industry collaboration

Impact
- % of papers in Q1 journals
- Category Normalized Citation Impact

Excellence
- % Highly Cited Papers
- Papers in Top Journals

% of Documents in Q1 (JIF, WoS)

Legend: University of Tartu, Vilnius University, Tallinn University of Technology, University of Latvia, Kaunas University of Technology, Vilnius Gediminas Technical University

Department publications by JIF Quartiles (WoS)

Legend: Q1, Q2, Q3, Q4

Altmetrics – non-traditional bibliometrics

Altmetrics are a simple and effective way of understanding who is engaging with research online and what they're saying.

- Altmetrics track the attention research receives on social media, blogs, news outlets, and other online platforms.
- Can complement traditional citation metrics by showcasing research impact beyond scientific community.
- Tools to Track Altmetrics:
    - **Altmetric**
    - **OurResearch**
    - **PlumX**

Altmetrics are not used in formal research assessment (as of 2024)
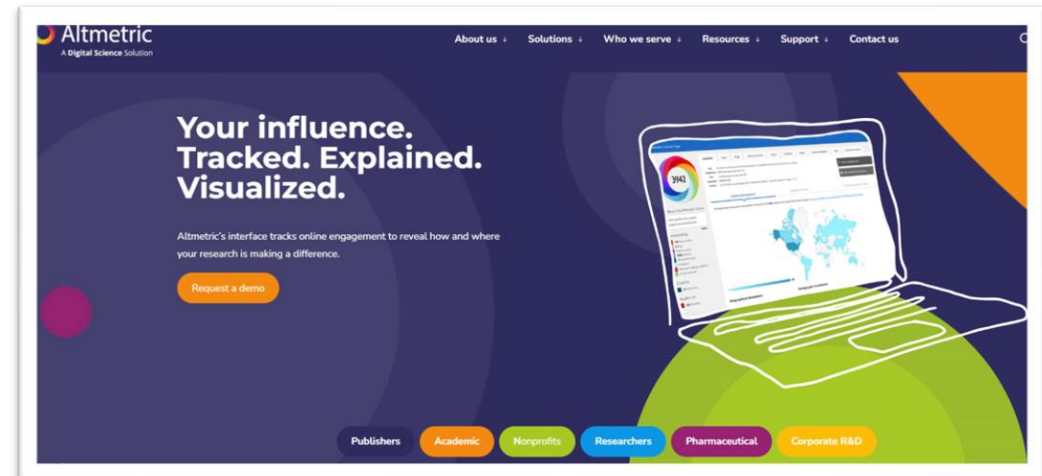

PlumX Metrics

Research metrics (also known as altmetrics), immediately measure awareness and interest and give us new ways to uncover and tell the stories of research.

Criticism of Quantitative Research Assessment

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- Distorts good scientific practices
- Presents **mean** of data that are not normally distributed; *median* of these data suggested as more appropriate
- Impacts behavior of scholars, editors and other stakeholders (*publish or perish* culture)
- Some institutions (for example, Utrecht University) rejected Impact Factor as an indicator

Source: The Leiden Manifesto for research metrics

Qualitative Research Assessment
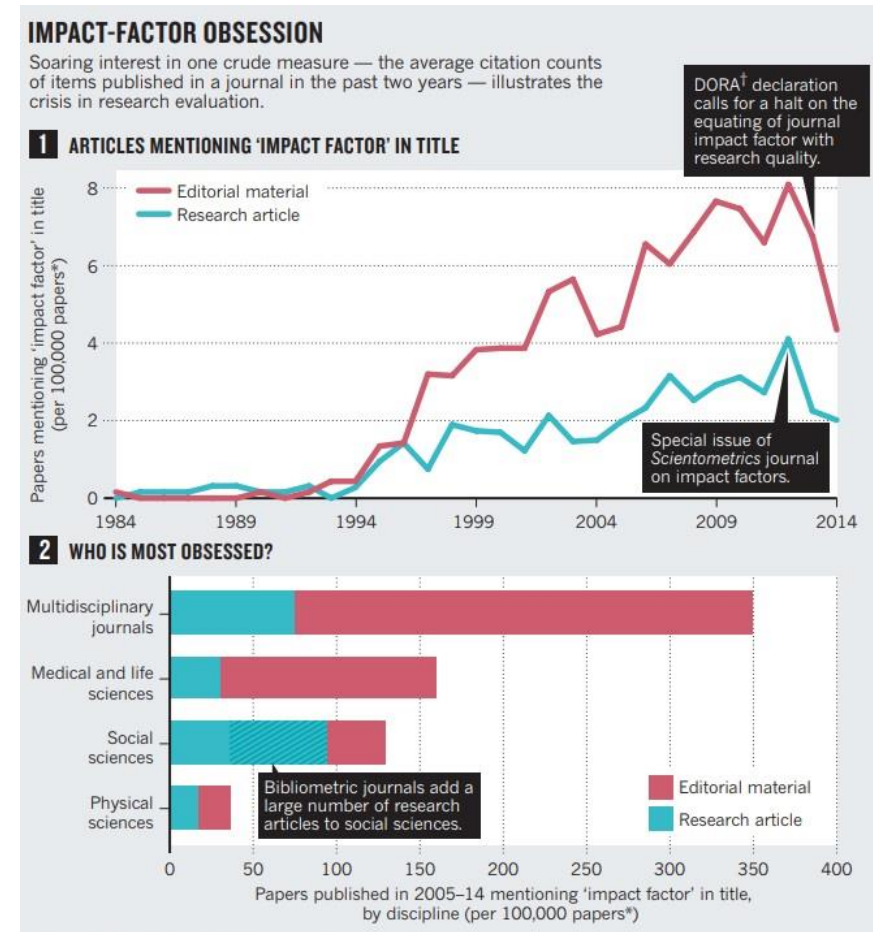
DORA (Declaration on Research Assessment) - seeks to advance practical and robust approaches to research assessment globally and across all scholarly disciplines;

The Leiden Manifesto - ten principles to guide research evaluation;

CoARA (Coalition for Advancing Research Assessment) - aims to shift focus on **qualitative** assessment, made by experts; **quantitative evaluation should support qualitative.**
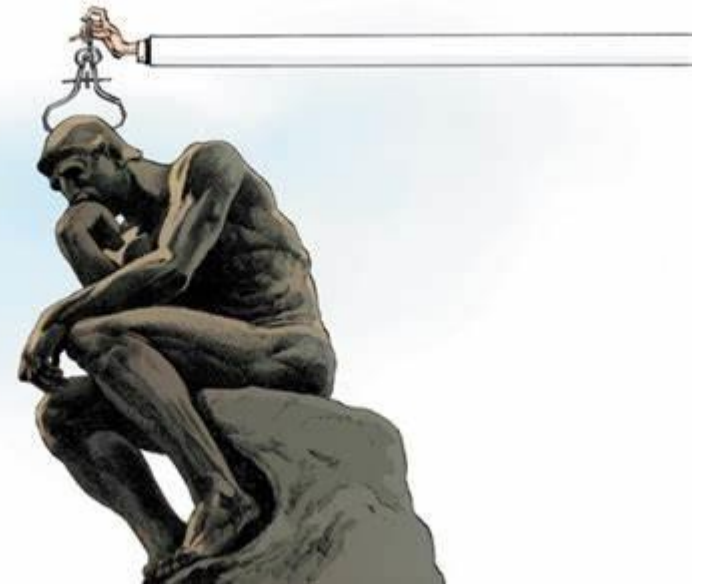
Illustration by David Parkins

CoARA – Coalition for Advancing Research Assessment

- Focus research assessment criteria on **quality**;

- Recognize the contributions that advance knowledge and the (potential) **impact** of research results;

- Recognize the **diversity** of research activities and practices, with a diversity of outputs, and reward early **sharing** and **open** collaboration;

- Use assessment criteria and processes that respect the **variety** of scientific disciplines, research types, research career stages, and that acknowledge **multi**-, **inter**-, and **trans**-disciplinary as well as inter-sectoral approaches;

- Acknowledge and endorse the **diversity** in research **roles** and careers, including roles outside academia;

- Ensure gender equality, equal opportunities and inclusiveness (**DEI**).

More on CoARA>>

Contacts   ktu

If you have any questions, please contact us

Giedrius Dabasinskas

Data Manager

Research Information Services Department

The Library of Kaunas University of Technology

Gedimino g. 50-123, Kaunas

Phone: +370 671 29 069; +370 (37) 300 652

E-mail: giedrius.dabasinskas@ktu.lt; biblioteka@ktu.lt

Research Assessment Indicators and Tools

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biblioteka@ktu.lt

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