Analysis of Bibliometrics information for select the best field of study

Nader Ale Ebrahim
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www.researcherid.com/rid/C-2414-2009
http://scholar.google.com/citations
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http://scholar.google.com/citations

Available online at: http://dx.doi.org/10.6084/m9.figshare.1621261

Abstract:

Bibliometrics can be defined as the statistical analysis of publications. Bibliometrics has focused on the quantitative analysis of citations and citation counts which is complex. It is so complex and specialized that personal knowledge and experience are insufficient tools for understanding trends for making decisions. We need tools for analysis of Bibliometrics information for select the best field of study with promising enough attention.

This presentation will provide tools to discover the new trends in our field of study in order to select an area for research and publication which promising the highest research impact.

Keywords: H-index, Improve citations, Research tools, Bibliometrics
From submission to sharing: the life cycle of an article

• Phase 1: Conception and birth
• Phase 2: Submission
• Phase 3: Reviewers
• Phase 4: Production and publication
• Phase 5: Dissemination and archiving
  – The article is published, but its life cycle isn’t yet complete. In this phase, dissemination can start; sharing the Share Links article helps increase readership and make it more visible.

Source: https://www.elsevier.com/reviewers-update/home/featured-article/from-submission-to-sharing-the-life-cycle-of-an-article
Introduction of bibliometrics

• Bibliometrics can be defined as the quantitative analysis of science and technology performance and the cognitive and organizational structure of science and technology.

• Basic for these analyses is the scientific communication between scientists through (mainly) journal publications.

• Key concepts in bibliometrics are *output* and *impact*, as measured through publications and citations.

• Important starting point in bibliometrics: scientists express, through citations in their scientific publications, a certain degree of influence of others on their own work.

• By large scale quantification, citations indicate influence or *(inter)national visibility* of scientific activity, but should not be interpreted as synonym for ‘*quality*’.


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Informetrics, scientometrics, bibliometrics, webometrics, cybermetrics and altmetrics

Bibliographies – largely references

Whole Internet, cyberspace

Science of Science

Web presence, visibility and impact – links, pages, documents

Alternative metrics – views, downloads, web citations, etc

<table>
<thead>
<tr>
<th>Term</th>
<th>Short Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bibliometrics</td>
<td>Bibliometrics is a set of methods to quantitatively analyse academic literature and scholarly communications.</td>
</tr>
<tr>
<td>Informetrics</td>
<td>Informetrics is the study of quantitative aspects of information. This includes the production, dissemination, and use of all forms of information, regardless of its form or origin.</td>
</tr>
<tr>
<td>Scientometrics</td>
<td>Scientometrics is the study of quantitative features and characteristics of science, scientific research and scholarly communications.</td>
</tr>
<tr>
<td>Webometrics</td>
<td>Webometrics is the study of quantitative features, characteristics, structure and usage patterns of the world wide web, its hyperlinks and internet resources.</td>
</tr>
<tr>
<td>Cybermetrics</td>
<td>Cybermetrics is an alternative term for Webometrics.</td>
</tr>
<tr>
<td>Librametrics</td>
<td>Librametrics is a set of methods to quantitatively analyse availability of documents in libraries, their usage and impact of library services to its user community.</td>
</tr>
<tr>
<td>Patentometrics</td>
<td>Patentometrics is a set of methods to quantitatively analyse patent databases, patent citations and their usage patterns.</td>
</tr>
<tr>
<td>Altmetrics</td>
<td>Altmetrics is new metrics proposed as an alternative to the widely used journal impact factor and personal citation indices like the h-index. The term altmetrics was proposed in 2010, as a generalization of article level metrics, and has its roots in the twitter #altmetrics hashtag.</td>
</tr>
<tr>
<td>Article Level Metrics (ALM)</td>
<td>Article level metrics is an alternative term for Altmetrics.</td>
</tr>
</tbody>
</table>

Reasons for bibliometric studies

• Understanding of *patterns*
  – discovery of regularities, behavior
  – “order out of documentary chaos” [Bradford, 1948]

• Analysis of *structures & dynamics*
  – discovery of connections, relations, networks
  – search for regularities - possible predictions

• Discovery of *impacts, effects*
  • relation between entities & amounts of their various uses
  – providing support for making of decisions, policies

Source: https://comminfo.rutgers.edu/~tefko/Courses/e530/Lectures/Lecture09%20Bibliometric%20searching.ppt

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Use of evaluative bibliometrics

- Academic, research & government institutions for:
  - promotion and tenure, hiring, salary raising
  - decisions for support of departments, disciplines
  - grants decision; research policy making
  - visualization of scholarly networks, identifying key contributions & contributors
  - monitoring scholarly developments
  - determining journal citation impact

- Resource allocation:
  - identifying authors most worthy of support;
  - research areas most worthy of funding
  - journals most worthy of support or purchase; etc.

Source: https://comminfo.rutgers.edu/~tefko/Courses/e530/Lectures/Lecture09%20Bibliometric%20searching.ppt
Applications of Scientometrics and Bibliometrics in Research Evaluation

• For Institution/ Collaborative Research Group

• For a scientist:
  – Mapping of collaborations, collaborating institutions, collaborating countries, co-authors, highly cited papers, top publishing journals, percentage of cited vs. uncited papers, percentage of self-citations, author-level indicators such as h-index, i10-index, etc.

• For a country

• For a journal

## Major Citation Databases

<table>
<thead>
<tr>
<th>Name of Citation Database</th>
<th>Launched</th>
<th>Scope</th>
<th>Owned by</th>
<th>Terms of Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science Citation Index (SCI)</td>
<td>1964</td>
<td>Global</td>
<td>Thomson Reuter</td>
<td>Subscription-based with Web of Science</td>
</tr>
<tr>
<td>Social Science Citation Index (SSCI)</td>
<td>1972</td>
<td>Global</td>
<td>Thomson Reuter</td>
<td>Subscription-based with Web of Science</td>
</tr>
<tr>
<td>Arts &amp; Humanities Citation Index (A&amp;HCI)</td>
<td>1978</td>
<td>Global</td>
<td>Thomson Reuter</td>
<td>Subscription-based with Web of Science</td>
</tr>
<tr>
<td>Scopus</td>
<td>2004</td>
<td>Global</td>
<td>Elsevier B.V.</td>
<td>Subscription-based</td>
</tr>
<tr>
<td>Google Scholar Citations</td>
<td>2004</td>
<td>Global</td>
<td>Google Inc.</td>
<td>Freely Available Online</td>
</tr>
<tr>
<td>Microsoft Academic Search</td>
<td>2003</td>
<td>Global</td>
<td>Microsoft Research</td>
<td>Freely Available Online</td>
</tr>
<tr>
<td>CiteSeerX (CiteSeerX.ist.psu.edu)</td>
<td>1997</td>
<td>Global; Subject specific</td>
<td>Pennsylvania State University, USA</td>
<td>Freely Available Online</td>
</tr>
</tbody>
</table>

The Institute for Scientific Information (ISI)

- The Institute for Scientific Information (ISI) was founded by Eugene Garfield in 1960. It was acquired by Thomson Scientific & Healthcare in 1992, became known as Thomson ISI and now is part of the Healthcare & Science business of the multi-billion dollar Thomson Reuters Corporation.

- ISI offered bibliographic database services. Its speciality: citation indexing and analysis, a field pioneered by Garfield. It maintains citation databases covering thousands of academic journals, including a continuation of its long time print-based indexing service the Science Citation Index (SCI), as well as the Social Sciences Citation Index (SSCI), and the Arts and Humanities Citation Index (AHCI). All of these are available via ISI's Web of Knowledge database service.
Thomson Reuters (formerly ISI) has been the authority on citation data for over 50 years.
Eugene Garfield, Ph.D.

Founder & Chairman Emeritus
Institute for Scientific Information (ISI)

For more Info
The Institute for Scientific Information (ISI)

- The ISI also publishes annual Journal Citation Reports which list an impact factor for each of the journals that it tracks. Within the scientific community, journal impact factors play a large but controversial role in determining the kudos attached to a scientist's published research record.
Scopus (Launched 2004)

- Scopus is the largest abstract and citation database of peer-reviewed literature: scientific journals, books and conference proceedings. Delivering a comprehensive overview of the world's research output in the fields of science, technology, medicine, social sciences, and arts and humanities, Scopus features smart tools to track, analyze and visualize research.

- As research becomes increasingly global, interdisciplinary and collaborative, you can make sure that critical research from around the world is not missed when you choose Scopus.

Source: http://www.elsevier.com/online-tools/scopus

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A Comparison between Two Main Academic Literature Collections: Web of Science and Scopus Databases

Author Level Indicators

- H Index
- i10 index
- Articles with Citation Data
- Average Citation per Article
- Total Citations Count
- Cited vs. Uncited Papers Ratio
- Eigenfactor® score
- Impact Points
- RG Score

CHECK YOUR SCORE

• H-Index?
• i10-Index?
• g-Index?
• Citations Count?
• Articles with citation?
• Average citations per article?
• Impact Points?
• RG Score?
Citations as a proxy of scientific impact

Visibility
Relevance
Quality
Reputation
Random factors
Scientific impact
Citations

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H and g-index
H-index Example

Source: [http://www.slideshare.net/librarian68/overview-of-citation-metrics](http://www.slideshare.net/librarian68/overview-of-citation-metrics)

Scholar A | Scholar B
---|---
10 | 27
10 | 12
9 | 5
8 | 4
7 | 4
6 | 2
6 | 2

56 citations | 56 citations
6 h-index | 4 h-index
A new phenomenon
Numbers of published papers on the h-index

Source: Rowlands, I. (2013). The h-index. Friend or Foe?
2nd Bibliometrics in Libraries Meeting: The Open University.
A scientist has index $h$ if $h$ of his/her $N_p$ papers have at least $h$ citations each, and the other $(N_p-h)$ papers have no more than $h$ citations each.

As an example, a researcher with an H-index of 15 has (of their total number of publications) 15 papers which have been cited at least 15 times each.

<table>
<thead>
<tr>
<th>Researcher</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper rank</td>
<td>Citations</td>
<td>Paper rank</td>
</tr>
<tr>
<td>1</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
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<tr>
<td>3</td>
<td>6</td>
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<td>5</td>
</tr>
<tr>
<td>6</td>
<td>0</td>
<td>6</td>
</tr>
</tbody>
</table>

Neither researcher can have an H-index of more than 6.

“Hirsch, who has a $h$-index of 49, says that a "successful scientist" will have an index of 20 after 20 years; an "outstanding scientist" will have an index of 40 after 20 years; and a "truly unique individual" will have an index of 60 after 20 years.”

Table 2: Publication and citation list of scientist S1

<table>
<thead>
<tr>
<th>Rank (squared) - Publications</th>
<th>Citations</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (1) A</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>2 (4) B</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>3 (9) C</td>
<td>9</td>
<td>39</td>
</tr>
<tr>
<td>4 (16) D</td>
<td>8</td>
<td>47</td>
</tr>
<tr>
<td>5 (25) E</td>
<td>6</td>
<td>53</td>
</tr>
<tr>
<td>6 (36) F</td>
<td>6</td>
<td>59</td>
</tr>
<tr>
<td>7 (49) G</td>
<td>6</td>
<td>65</td>
</tr>
<tr>
<td>8 (64) H</td>
<td>5</td>
<td>70</td>
</tr>
<tr>
<td>9 (81) I</td>
<td>5</td>
<td>75</td>
</tr>
</tbody>
</table>

Normalized citation metrics put citation information in context

Citation rates vary among fields. What is good or average in mathematics is very different from what is good or average in biochemistry.

How “good” is this? What is the context?

Additional metrics are needed to understand research performance.

Source: Ann Kushmerick (May 3, 2013), Bibliometric Analysis Tools for Research Portfolio Analysis and Management, Manager, Research Evaluation and Bibliometric Data

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All three publication lists have a Hirsch Index of 5

<table>
<thead>
<tr>
<th>Author 1</th>
<th>Author 2</th>
<th>Author 3</th>
</tr>
</thead>
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<td>30 P1</td>
<td>100 P1</td>
</tr>
<tr>
<td>10 P2</td>
<td>10 P2</td>
<td>70 P2</td>
</tr>
<tr>
<td>8 P3</td>
<td>8 P3</td>
<td>8 P3</td>
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<td>6 P4</td>
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<td>6 P4</td>
</tr>
<tr>
<td>5 P5</td>
<td>5 P5</td>
<td>5 P5</td>
</tr>
<tr>
<td>1 P6</td>
<td>4 P6</td>
<td>1 P6</td>
</tr>
<tr>
<td>0 P7</td>
<td>4 P7</td>
<td>0 P7</td>
</tr>
</tbody>
</table>

Source: Henk F. Moed, (2011) "New developments in electronic publishing and bibliometrics", CWTS, Leiden University, Netherlands & Elsevier, Amsterdam, Netherlands
Different bibliometric distributions have the same H-Index

**Targeted advertising**

**Results**

<table>
<thead>
<tr>
<th>Papers: 46</th>
<th>Cites/paper: 6.57</th>
<th>h-index: 8</th>
<th>AWCR: 24.07</th>
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</thead>
<tbody>
<tr>
<td>Citations: 302</td>
<td>Cites/author: 170.70</td>
<td>g-index: 17</td>
<td>AW-index: 4.91</td>
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<tr>
<td>Years: 17</td>
<td>Papers/author: 20.72</td>
<td>hc-index: 6</td>
<td>AWCRpA: 13.35</td>
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<tr>
<td>Cites/year: 17.76</td>
<td>Authors/paper: 3.26</td>
<td>hi-index: 4.00</td>
<td>e-index: 13.96</td>
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<tr>
<td></td>
<td>hi_norm: 7</td>
<td>hm-index: 5.67</td>
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</table>

<table>
<thead>
<tr>
<th>Cites</th>
<th>Per year</th>
<th>Rank</th>
<th>Authors</th>
<th>Title</th>
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<td>... J Bal</td>
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<tr>
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<td>4</td>
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<td>The effects of technology-based learning on E-business through</td>
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<tr>
<td>2</td>
<td>0.14</td>
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<td>... B Jay</td>
<td>Process analysis techniques and tools for bu</td>
</tr>
<tr>
<td>1</td>
<td>0.08</td>
<td>18</td>
<td>J BAL...</td>
<td>Effective virtual teamworking</td>
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<td>1</td>
<td>0.10</td>
<td>19</td>
<td>J Bal...</td>
<td>Supporting SMEs through e-business</td>
</tr>
<tr>
<td>1</td>
<td>0.14</td>
<td>17</td>
<td>AH Anderson, J Mullin, R</td>
<td>Exploring why virtual teamworking is effective</td>
</tr>
<tr>
<td>0</td>
<td>0.00</td>
<td>30</td>
<td>Mcewan, J Bal...</td>
<td>A business model for collaborative commerce</td>
</tr>
</tbody>
</table>
Predicting scientific success

H-index prediction


H-index calculator uses BitmapExporter by Mario Klingemann

**H-index**

5

**# articles**

12

**Years since first article**

8

**# distinct journals**

5

**# articles in 'top' journals**

1

**Future h-index**

- 6
- 8
- 9
- 11
- 12
- 12
- 14
- 15
- 15
- 16

**Years ahead**

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10


**# distinct journals**: number of different journals where you have published in.

**Note**: The equations and the calculator model people that are in Neurotree, have an h-index 5 or more, and are between 5 to 12 years after publishing first article.
Bibliometrics

SciVal

Bibliometrics

Source: Scopus data up to 16 Nov 2015

Overall research performance

Scholarly Output: 870
Views Count: 22,401
Field-Weighted Citation Impact: 1.72
Citation Count: 4,501

Keyphrase analysis

Top 50 keyphrases by relevance, based on 870 publications

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SCOPUS - Analyze author output

Combined data for multiple authors
Ebrahimi, Nader; Ale Ebrahimi, Nader

Documents (18)  h-index (5)  Citations (118)  Co-authors (33)

Analyze documents published between 2009 to 2015

<table>
<thead>
<tr>
<th>Year</th>
<th>Citations</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>2015</td>
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<td>2010</td>
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<td>2009</td>
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</tbody>
</table>

Citations by year

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Results: 1,218
(from Web of Science Core Collection)

You searched for: TOPIC: ("virtual team") ...More

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1. Leading Effective Global Virtual Teams: The Consequences of Methods of Communication
   By: Morgan, Lisa; Paucar-Caceres, Alberto; Wright, Gillian
   SYSTEMIC PRACTICE AND ACTION RESEARCH Volume: 27 Issue: 6 Pages: 607-624 Published: DEC 2014
   Full Text from Publisher | View Abstract

2. Understanding the attitudes, knowledge sharing behaviors and task performance of core developers: A longitudinal study
   By: Licorish, Sherlock A.; MacDonell, Stephen G.
   INFORMATION AND SOFTWARE TECHNOLOGY Volume: 50 Issue: 12 Special Issue: SI Pages: 1578-1596 Published: DEC 2014
   Full Text from Publisher | View Abstract

3. A Calibrated Group Decision Process
   By: Rokou, Elena; Kyrtopoulos, Konstantinos
   GROUP DECISION AND NEGOTIATION Volume: 23 Issue: 6 Special Issue: SI Pages: 1369-1384 Published: NOV 2014
   Full Text from Publisher | View Abstract

4. Satisfaction with outcome and process from web-based meetings for idea generation and problem solving.
   By: Guo, Nan; Zhu, Xinmin; Wu, Wei
   GROUP DECISION AND NEGOTIATION Volume: 24 Issue: 3 Pages: 367-386 Published: SEP 2015
   Full Text from Publisher | View Abstract

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Citation Report: 1218
(from Web of Science Core Collection)

You searched for: TOPIC: "virtual team"... More

This report reflects citations to source items indexed within Web of Science Core Collection. Perform a Cited Reference Search to include citations to items not indexed within Web of Science Core Collection.

Published Items in Each Year

Citations in Each Year

Results found: 1218
Sum of the Times Cited [?] : 15217
Sum of Times Cited without self-citations [?] : 10399
Citing Articles [?] : 8040
Citing Articles without self-citations [?] : 7210
Average Citations per Item [?] : 12.49
h-index [?] : 58

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Users can view citation trends for any entity in the rankings list. For example, if the user clicks on the name CHINESE ACAD SCI:

<table>
<thead>
<tr>
<th>Rank</th>
<th>Institution</th>
<th>Web of Science Documents</th>
<th>Cites</th>
<th>Cites/Paper</th>
<th>Top Papers</th>
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<tr>
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<td>157,948</td>
<td>29.41</td>
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Source: MASSIMILIANO CARLONI (2014) *THE NEW JCR, Journal Citation Reports on INCITES*, Strategic Business Manager, Thomson Reuters
They will be taken to the Citation Trends Page for the Chinese Academy of Sciences, which shows a trend graph, normalized citation data, and raw citation data:

Source: MASSIMILIANO CARLONI (2014) *THE NEW JCR, Journal Citation Reports on INCITES*, Strategic Business Manager, Thomson Reuters
Practical Advice

• Find out what’s Hot
  – http://info.scopus.com/topcited/
  – http://top25.sciencedirect.com/

• Find the trends of the subject area
  – Search tips (including alerts)
  – Journals, authors, publications per year (Scopus)
Your paper is **worthless** if no one reads, uses, or cites it

A research study is meaningful **only if**…

- it is clearly described, so
- someone else can use it in his/her studies
- it arouses other scientists’ interest and
- allows others to reproduce the results.

By submitting a manuscript you are basically trying to sell your work to your community…

Source: **How To Get Your Article Published**: From title to references, From submission to revision Presented by: Anthony Newman, Elsevier, Amsterdam, Birmingham, Nov. 2010

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Positive correlation between downloads and citations partly due to the effect of citations upon downloads

Source: Henk F. Moed, (2011) "New developments in electronic publishing and bibliometrics", CWTS, Leiden University, Netherlands & Elsevier, Amsterdam, Netherlands
Age distribution of citations to Arxiv and non-ArXiv papers

Move curve by 6 months to the right

Citations lead to downloads

[Moed, J. Am Soc Inf Sci Techn, 2005]

Source: Henk F. Moed, (2011) "New developments in electronic publishing and bibliometrics", CWTS, Leiden University, Netherlands & Elsevier, Amsterdam, Netherlands
RELATIVE IMPACT AGAINST JOURNAL AVERAGE

Search publications by:
- Journal
- Document type
- Year

Source: Rachel Mangan, (2010), WEB OF KNOWLEDGE UPDATE TRAINING, MIMAS
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RELATIVE IMPACT AGAINST JOURNAL AVERAGE

Citation report shows an average of 7.81 citations per paper for that journal, year and document type.

Source: Rachel Mangan, (2010), WEB OF KNOWLEDGE UPDATE TRAINING, MIMAS
So our paper was cited 22/7.81 = 2.82 times the average. We call this journal actual versus expected cites (JXC).
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2 Centre of Research Services, Institute of Research Management and Monitoring (Iopm), University Of Malaya, Malaysia
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Correspondence Author Email: mrakshshandehroo@yahoo.com

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www.researcherid.com/rid/C-2414-2009
http://scholar.google.com/citations

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15. Jaslyn Tan, (2014), Maximizing the impact of your research paper, WILEY


