

A fortnightly review on Impact factor of a Journal

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Being editor of a journal, I used to come across many questions daily by our authors and readers as well. Most frequently asked question by our authors is - **What is the Impact factor of your Journal?**

Most of the junior research fellows, upcoming scientists may not be aware of - what is the impact factor, how it is calculated and how can we use the impact factor. Most of the people will think that impact factor is important in assessing the quality of a journal. Here one should keep in mind that impact factor of a journal is no way related to the main quality parameters like peer review, detection of plagiarism, citations of the articles published in a journal etc.. Though there are many review articles published on impact factor, again I have summarized those points just to educate our readers.

The impact factor, often abbreviated IF, is a measure reflecting the average number of citations to recent articles published in science and social science journals. The impact factor was devised by Eugene Garfield, the founder of the Institute for Scientific Information (ISI), now part of Thomson Reuters.

History

- ❑ Librarians and information scientists have been evaluating journals for at least 75 years. Gross and Gross conducted a classic study of citation patterns in the '20s. [1] Others, including Estelle Brodman with her studies in the '40s of physiology journals and subsequent reviews of the process, followed this lead.
- ❑ The advent of the Thomson Reuters citation indexes made it possible to do computer-compiled statistical reports not only on the output of journals but also in terms of citation frequency. And in the '60s Thomson Reuters invented the journal "impact factor." After using journal statistical data in-house to compile the *Science Citation Index® (SCI®)* for many

years, Thomson Reuters began to publish *Journal Citation Reports® (JCR®)* [3] in 1975.

- ❑ IF is a measure of the frequency with which the "average article" in a journal has been cited in a particular year or period. The annual *JCR* impact factor is a ratio between citations and recent citable items published. Thus, the impact factor of a journal is calculated by dividing the number of current year citations to the source items published in that journal during the previous two years.

Calculation of impact factor

A=Total citations in 2010 to items published in Journal JMST

B=2010 citations to items published in journal JMST in 2008-09(Subset of A)

C=Number of substantive articles published in Journal JMST in 2008-09

Impact Factor=B\C

For Example, assume that in 2010, there were 3200 citations to items published in Journal JMST. Of these 550 were citations to items published in Journal JMST in 2008 and 2009. During those two years, journal JMST published 72 articles.

From the above formula

Impact Factor=B\C

2010 Journal JMST impact factor=550/72=7.64

Note that the impact factor 2011 will be actually published in 2012, because it could not be calculated until all of the 2011 publications had been received. Impact factor 2012 will be published in 2013

Using the impact factor wisely

- ❑ Thomson Reuters does not depend on the impact factor alone in assessing the usefulness of a journal, and neither should anyone else.

- ❑ The impact factor should not be used without careful attention to the many phenomena that influence citation rates, as for example the average number of references cited in the average article.
- ❑ The impact factor should be used with informed peer review. In the case of academic evaluation for tenure it is sometimes inappropriate to use the impact of the source journal to estimate the expected frequency of a recently published article. Again, the impact factor should be used with informed peer review. Citation frequencies for individual articles are quite varied.
- ❑ There are many artifacts that can influence a journal's impact and its ranking in journal lists, not the least of which is the inclusion of review articles or letters. This is illustrated in a study of the leading medical journals published in the *Annals of Internal Medicine*. [9]

Review articles

- ❑ Review articles generally are cited more frequently than typical research articles because they often serve as surrogates for earlier literature, especially in journals that discourage extensive bibliographies. In the *JCR* system any article containing more than 100 references is coded as a review. Articles in "review" sections of research or clinical journals are also coded as reviews, as are articles whose titles contain the word "review" or "overview."
- ❑ The Source Data Listing in the *JCR* not only provides data on the number of reviews in each journal but also provides the average number of references cited in that journal's articles. Naturally, review journals have some of the highest impact factors. Often, the first-ranked journal in the subject category listings will be a review journal. For example, under Biochemistry, the journal topping the list is *Annual Review of Biochemistry* with an impact factor of 35.5 in 1992. [9]

Calculation for five-year impact factor:

One year of citations to five years of articles.

A= citations in 1992 to articles published in 1987-91

B= articles published in 1987-91

C= A/B = five-year impact factor

An alternative five-year impact can be calculated based on adding citations in 1988-92 articles

published in the same five-year period. And yet another is possible by selecting one or two earlier years as factor "B" above.

Item-by-item impact

- ❑ While Thomson Reuters does manually code each published source item, it is not feasible to code individually the 12 million references we process each year.
- ❑ Therefore, journal citation counts in *JCR* do not distinguish between letters, reviews, or original research. So, if a journal publishes a large number of letters, there will usually be a temporary increase in references to those letters.
- ❑ Letters to the *Lancet* may indeed be cited more often than letters to *JAMA* or vice versa, but the overall citation count recorded would not take this artifact into account. Detailed computerized article-by-article analyses or audits can be conducted to identify such artifacts.

Cited-only journals in the JCR

- ❑ Some of the journals listed in the *JCR* are not citing journals, but are cited-only journals. This is significant when comparing journals by impact factor because the self-citations from a cited-only journal are not included in its impact factor calculation. Self-citations often represent about 13% of the citations that a journal receives. The cited-only journals with impact factors in the *JCR* Journal Rankings and Subject Category Listing may be ceased or suspended journals, superseded titles, or journals that are covered in the science editions of *Current Contents*®, but not a citation index.
- ❑ Users can identify cited-only journals by checking the *JCR* Citing Journal Listing. Furthermore, users can establish analogous impact factors, (excluding self-citations), for the journals they are evaluating using the data given in the Citing Journal listing.

Calculation for impact factor revised to exclude self-citations.
A= citations in 1992 to articles published in 1990-91
B=1992 self-citations to articles published in 1990-91
C=A - B= total citations minus self-citations to recent articles
D= number of articles published 1990-91
E= revised impact factor (C/D)
*Source: Thomson Reuters

Title change

A user's knowledge of the content and history of the journal studied is very important for appropriate interpretation of impact factors. Situations such as those mentioned above and others such as title change are very important, and often misunderstood, considerations.

A title change affects the impact factor for two years after the change is made. The old and new titles are not unified unless the titles are in the same position alphabetically. In the first year after the title change, the impact is not available for the new title unless the data for old and new can be unified. In the second year, the impact factor is split.

The new title may rank lower than expected and the old title may rank higher than expected because only one year of source data is included in its calculation (see below table). Title changes for the current year and the previous year are listed in the *JCR*® guide.

Unified 1992 impact factor calculation for title change.

A=1992 citations to articles published in 1990-91 (a1 + a2)

A1=those for new title

A2=those for superseded title

B=number of articles published in 1990-91 (B1 + B2)

B1=those for new title

B2=those for superseded title

C=unified impact factor (A/B)

C1=A1/B1 = *JCR*® factor for the new title

C2=A2/B2 = *JCR* factor for the superseded title

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Summary

Journal Impact Factor cannot be calculated for new journals. I mean the impact factor of a journal is calculated by dividing the number of current year citations to the source items published in that journal during the previous two years; hence impact factor can be calculated after completing the minimum of 3 years of publication. Journal Impact Factor will be a quotient factor only and will not be a quality factor. Journal Impact Factor will not be related to quality of content and quality of peer review, it is only a measure of the frequency with which the "average article" in a journal has been cited in a particular year or period. Journal, which publishes more review articles, will get highest impact factors.