*DESIDOC Journal of Library & Information Technology*, Vol. 29, No. 3, May 2009, pp. 55-58


# Is Impact Factor True Evaluation for Ranking Quality Measure?

Khaisar Muneebulla Khan[1] and Pradeep Hegde[2]

[1]*Department of Library and Information Science, Mangalore University*
*Mangalagangothri, Mangalore- 574 199*
*E-mail: khaisarmk@yahoo.com*

[2]*ICFAI Business School, Bangalore-560 062*
*E-mail: pradeepvenoor@yahoo.com*

**ABSTRACT**

The paper gives the background, meaning and the criteria of the impact factor explaining their terminologies and calculations with examples. It discusses its advantages and the associated problems, and states on the possible misuse and manipulation of the impact factor. The paper concludes with a caution not to finally rely on the impact factor as the only valid measure to rank journal quality and productivity.

**Keywords:** Impact factor, citation analysis, librametrics, bibliometrics, informetrics, immediacy index, citation index, quality measures

## 1. INTRODUCTION

Evaluating scientific quality is a difficult proposition which has no standard solutions. Ideally, published scientific results should be scrutinised by true experts in the field and given scores for quality and quantity according to established rules. However, in reality what is called peer review is usually performed by committees with general competence rather than with the specialist's expertise that is needed to assess primary research data. Committees, therefore, tend to use secondary criteria like crude publication counts, journals prestige, the reputation of authors and institutions, and estimated importance and relevance of the research field[1], thereby making peer review a rational process or otherwise. On this background, it is hardly surprising that alternative methods for evaluating research are being sought, such as citation rates and journal impact factors (IF), which seem to be quantitative and objective indicators directly related to publish science.

The citation data are obtained from a database produced by the Institute for Scientific Information (ISI) in Philadelphia, which continuously records scientific citations as represented by the reference lists of articles from a large number of the world's scientific journals. The references are rearranged in the database to show how many times each publication has been cited within a certain period, and by whom, and the results are published as the *Science Citation Index* (*SCI*). On the basis of the *SCI* and authors' publication lists, the annual citation rate of papers by a scientific author or research group can thus be calculated. Similarly, the citation rate of a scientific journal–known as the journal impact factor–can be calculated as the mean citation rate of all the articles contained in the journal[2]. Journal impact factors, which are published annually in *SCI* Journal Citation Reports, are widely regarded as a quality ranking for journals and used extensively by leading journals in their advertising.

## 2. MEANING OF TERMS INVOLVED IN THE CONCEPT

The IF was devised by Eugene Garfield, the founder of the Institute for Scientific Information, now part of Thomson, a large worldwide US-based publisher. IF are calculated each year by Thomson Scientific for those journals which it indexes, and the factors are published in Journal Citation Reports. Some related values, also calculated and published by the same organisation, are

- **Immediacy index**: the average citation number of an article in that year.
- **The journal cited half-life:** the median age of the articles that were cited in Journal Citation Reports each year. For example, if a journal's half-life in 2005

Received on 5 January 2009

is 5, that means the citations from 2001-2005 are 50 per cent of all the citations from that journal in 2005.

- **The aggregate IF for a subject category:** it is calculated taking into account the number of citations to all journals in the subject category and the number of articles from all the journals in the subject category.

These measures apply only to journals and not to individual articles or individual scientists (unlike, say, the H-index). The relative number of citations an individual article receives is better viewed as citation impact. It is, however, possible to measure the IF of the journals in which a particular person has published articles. This use is widespread, but controversial. Eugene Garfield warns about the "misuse in evaluating individuals" because there is "a wide variation from article to article within a single journal"[3].

## 3. CALCULATION OF IMPACT FACTOR

The IF for journals are generally calculated based on a three-year period, and can be viewed as an approximation of the average number of times papers published are cited in the two calendar years following publication. For example, the 2008 IF for a journal would be calculated as follows:

A = the number of times articles published in 2006-07 were cited in indexed journals during 2008.

B = the number of "citable items" (usually articles, reviews, proceedings or notes; not editorials and letters-to-the-Editor) published in 2006-07.

The 2008 impact factor = A/B. However, the 2008 IF will actually be published in 2009, because it could not be calculated until all of the 2008 publications had been received. Also, a convenient way of thinking about it is that a journal that is cited once, on average, for each article published has an IF of 1 in the equation above.

## 4. ADVANTAGES OF IMPACT FACTOR

Impact actor has many advantages and benefits for researchers as well as information professionals, knowledge managers and the librarians. These are;

(i) It is sometimes useful to be able to compare different journals and research groups.

(ii) ISI's wide international coverage. Web of Knowledge indexes 9000 science and social science journals from 60 countries.

(iii) Results are widely (though not freely) available to use and understand. They are an objective measure, and have a wider acceptance than any of the alternatives.

(iv) In practice, the alternative measure of quality is "prestige." This is rating by reputation, which is very slow to change, and cannot be quantified or objectively used. It merely demonstrates popularity.

## 5. PROBLEMS ASSOCIATED WITH THE USE OF JOURNAL IMPACT FACTORS

There are a few inherent problems in journal IF. ISI excludes certain article types (such as news items, correspondence, and errata) from the denominator. New journals, which are indexed from their first published issue, will receive an IF after the completion of two years' indexing; in this case, the citations to the year prior to Volume 1, and the number of articles published in the year prior to Volume 1 are known zero values. Journals that are indexed starting with a volume other than the first volume will not have an IF published until three complete data-years are known; annuals and other irregular publications will sometimes publish no items in a particular year, affecting the count. The IF is for a specific time period; it is possible to calculate the IF for any desired period, for which the web site gives instructions. Journal Citation Reports includes a table of the relative rank of journals by IF in each specific science discipline, such as organic chemistry or psychiatry. Besides, there are many other common problems or difficulties that are associated with IF. These are:

(i) Journal IF are not statistically representative of individual journal articles and they correlate poorly with actual citations of individual articles.

(ii) Authors use many criteria other than impact when submitting to journals besides; Citations to "non-citable" items are erroneously included in the database.

(iii) Self citations are not corrected and review articles are heavily cited which inflate the impact factor of journals.

(iv) Long articles collect many citations and give high journal IF where as short publication lag allows many short-term journal self citations and gives a high journal IF.

(v) Citations in the national language of the journal are preferred by the journal's authors and selective journal self citation, i.e., articles tend to preferentially cite other articles in the same journal.

(vi) Coverage of the database is not complete and books are not included in the database as a source for citations.

(vii) Majority of database has an English language bias which is also dominated by American publications.

(viii) IF is a function of the number of references per article in the research field and that the journal set in database may vary from year to year.

(ix) Research fields with literature that rapidly becomes obsolete are favoured and depends on dynamics (expansion or contraction) of the research field.

(x) Many studies have also indicated that the small research fields tend to lack journals with high impact.

(xi) Relations between fields (for example, clinical *vs* basic research) strongly determine the journal IF.

## 6. MISUSE OF IMPACT FACTOR

It has been very rightly observed by Seglan that 'the IF is often misused to predict the importance of an individual publication based on where it was published'[4]. Further, Hansson is of the opinion that 'this does not work well since a small number of publications are cited much more than the majority, for example, about 90 per cent of Nature's 2004 IF were based on only a fourth of its publications'[5]. The IF, however, averages over all articles and thus underestimates the citations of the top cited while exaggerating the number of citations of the average publications. Academic reviewers involved in programmatic evaluations, particularly those for doctoral degree granting institutions, often turn to ISI's proprietary IF listing of journals in determining scholarly output. This builds in a bias which automatically undervalues some types of research and distorts the total contribution each faculty member makes. The absolute value of an IF is meaningless. A journal with an IF of 2 would not be very impressive in disciplines and fields like Microbiology, where as it would in Oceanography. Such values are many a times advertised by scientific publishers.

The comparison of IF between different fields can be considered as invalid. Yet such comparisons have been widely used for the evaluation of not merely journals, but of scientists and of university departments. It is not possible to say, for example, that a department whose publications have an average IF below 2 is low level. This would not make meaning for disciplines like Mechanical Engineering, where only two review journals attain such a value. Even in the sciences, it is not fully relevant to fields like engineering, where the principal scientific output is conference proceedings, technical reports, and patents. Outside the sciences, IF are relevant for fields that have a similar publication pattern to the sciences such as economics, where research publications are almost always journal articles, that cite other journal articles. IF is not relevant to literature, where the most important publications are books citing other books. Therefore, it is justified that ISI does not publish a JCR for the humanities.

Since only the ISI database journals are used for determining IF, it undercounts the number of citations from journals in less-developed countries, and less-universal languages. Even though in practice they are applied this way, IF cannot correctly be the only thing to be considered by libraries in selecting journals. The local usefulness of the journal is important for studies and research than to consider the institution's faculty member is editor of the journal or on its editorial review board.

## 7. MANIPULATION OF IMPACT FACTORS

Manipulation in IF is possible on the basis of the editorial policy of the journal. It is observed by Foster, that 'A journal can adopt editorial policies that increase its IF[6]. These editorial policies may not necessarily involved in improving the quality of published scientific work. Journals sometimes may publish a larger percentage of review articles. While many research articles remain uncited after three years, nearly all review articles receive at least one citation within three years of publication; therefore review articles can raise the IF of the journal. The Thomson Scientific website gives directions for removing these journals from the calculation. For researchers or students having even a slight familiarity with the field, the review journals will be obviously the best choice.

## 8. CONCLUSION

Impact factor may be a reasonable indicator of quality for journals but there are some other potential proxies or considerations to rate the journals like readership rates, subscription rates, etc. IF performs comparably with subscription and readership rates for foreign journals. However, when a foreign journal is included, subscription and readership rates lose much of their correlation with journal quality, whereas impact factor retains its correlation. This suggests that impact factor may be less prone to biases than other available indicators and may thus be a more strong measure of journal quality.

Impact factor is commonly used as a tool for managing scientific library collections. Information professionals/knowledge managers and librarians faced with finite budgets must make rational choices when selecting journals for their departments and institutions. IF helps guide those choices by determining which journals are most frequently cited?

Many citation studies in medical and related fields have addressed IF's validity as a quality measure for clinical journals. Foster reported poor correlation between impact factor and journal prestige as ranked by scientists from the National Institutes of Health (NIH). Further, there are many studies conducted on librametrics, bibliometrics, informetrics as citation analysis and citation studies to determine the impact factor and

ranking of authorship, journal citation, productivities by library and information professionals. However, we can conclude that Journal impact factor has its own limitations and we believe that further evaluation of whether and how impact factor measures journal quality is needed before it is widely adopted as a quantitative marker of journal quality.

## REFERENCES


1. Hansen, H.F. & Jørgensen, B.H. Styring af forskning: Kan forskningsindikatorer anvendes? Samfundslitteratur, Denmark, 1995.

2. Garfield, E. Citation analysis as a tool in journal evaluation. *Science*, 1972, 471-9.

3. *Garfield, Eugen. Der Impact Faktor und seine richtige Anwendung. Der Unfallchirurg.* 1998, **101**(6)*, 413-14.*

4. Seglen, P.O. Why the impact factor of journals should not be used for evaluating research. *BMJ*, 1997, **314**(7079), 498–502.

5. Hansson, S. Impact factor as a misleading tool in evaluation of medical journals. *Lancet*, 1995, **346**(8979), 906.

6. Foster, W.R. Impact factor as the best operational measure of medical journals. *Lancet*, 1995, **346**(8985), 1301.