

Review

The "impact factor" revisited

Peng Dong, Marie Loh and Adrian Mondry*

Address: Medical Statistics and Epidemiology Group, Bioinformatics Institute, BMRC, A*STAR, Singapore

Email: Peng Dong - cindy_dongpeng@yahoo.com; Marie Loh - marie_lohcs@yahoo.com; Adrian Mondry* - mondry@hotmail.com

* Corresponding author

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Abstract

The number of scientific journals has become so large that individuals, institutions and institutional libraries cannot completely store their physical content. In order to prioritize the choice of quality information sources, librarians and scientists are in need of reliable decision aids. The "impact factor" (IF) is the most commonly used assessment aid for deciding which journals should receive a scholarly submission or attention from research readership. It is also an often misunderstood tool. This narrative review explains how the IF is calculated, how bias is introduced into the calculation, which questions the IF can or cannot answer, and how different professional groups can benefit from IF use.

Background

The number of periodical peer-reviewed scientific publications is conservatively estimated to exceed 16,000 worldwide; nearly 1.4 million articles are published every year [1,2]. Even though electronic formats theoretically allow access to most current publications, the sum of subscription fees charged by most periodicals exceeds the means of academic institutions, not to mention individuals. Accordingly, librarians must limit the quantity of periodical subscriptions. Researchers have a vast number of journals to choose from when considering where to find information, and where to publish their work. Potential employers of scientists who try to evaluate a candidate's bibliography are aware that not all publications are of equal quality. All three parties need objective, preferably quantitative, information to assist publication and subscription decisions, in effect which publications to count as important. A simple descriptive quantitative measurement of a journal's performance is the "impact factor" (IF), the average number of times articles from the journal published in the past two years have been cited in the current year.

Eugene Garfield, the founder of the Institute for Scientific Information (ISI), proposed a bibliographic system for scientific literature – "Citation Indexes for Science" in 1955 [3]. ISI's database was initially developed for cross reference literature searches and identification of individual scientists working on particular topics [4]. The citation index compiled information that was far more useful and convenient than the usual subject indexing and helped to span the gap between authors and researchers. It mainly consisted of a complete alphabetic listing of all periodicals covered and their representative codes. These codes described the bibliographic category (e.g. editorial, original research, review), while a different set of data was assigned to articles referring to an article in question.

The IF was originally conceived as a quantitative assessment of referenced publications in a given journal found in the scientific literature. By processing the data from the citation index, it became possible to calculate a ratio of cites to a journal. Garfield himself explained the meaning of impact, pointing out that a citation indicates an article has influenced someone and therefore, the more often an