

Editorial

Bibliometric Analysis of Scientific Journals

Bibliometric analysis is defined as a statistical evaluation of published scientific articles, books, or the chapters of a book, and it is an effectual way to measure the influence of publication in the scientific community¹. Bibliometrics is the use of statistical methods to analyze books, articles and other publications, especially in regard with scientific contents. Bibliometric methods are frequently used in the field of library and information science. Bibliometrics is closely associated with scientometrics, that is the analysis of scientific metrics and indicators, to the point that both fields largely overlap². Bibliometrics uses statistical tools to study publication trends and patterns within an area of research, and can be used to summarize a field of research in a systematic and reproducible manner.

Bibliometrics can be either descriptive, such as looking at how many articles an organization has published; or evaluative, such as using citation analysis to look at how those articles influenced subsequent research by others. Counting publications can be useful for doing some comparisons, but citation analysis allows you to look at the impact those articles have had on others by determining how often they are cited. Citation analysis can also show what journals, organizations, and even countries have high impact in different fields of research. The Institute for Scientific Information (ISI) has been a leader in the citation analysis field since 1961, when ISI published the first Science Citation Index. Pacific Northwest National Laboratory (PNNL) has been using data from ISI for both descriptive and evaluative purposes. This data is used to track what the researchers at the Laboratory are writing and then comparing research groups within the organization over a period of years to identify trends and opportunities³.

Bibliometrics are measures of an author's influence or impact. Citation analysis is an area of bibliometrics research in which citations in scholarly articles are used to establish relationships between authors or articles.

Two commonly used bibliometrics are impact factor and h-index⁴.

The IF of a journal depends upon its popularity in the world of scientific literature, the contents of the journal, especially the originality of the article, how it is valued in the world literature, and how significant are its findings. Generally, the clinical journals have a lower IF than the biochemistry, genetic and immunology journals⁵.

Impact factor is commonly used to evaluate the relative importance of a journal within its field and to measure the frequency with which the "average article" in a journal has been cited in a particular time period. Journal which publishes more review articles will get highest IFs. Journals with higher IFs believed to be more important than those with lower ones⁶.

Impact factor can be calculated after completing the minimum of 3 years of publication; for that reason journal IF cannot be calculated for new journals. The journal with the highest IF is the one that published the most commonly cited articles over a 2-year period. The IF applies only to journals, not to individual articles or individual scientists unlike the "H-index." The relative number of citations an individual article receives is better evaluated as "citation impact." In a given year, the IF of a journal is the average number of citations received per article published in that journal during the 2 preceding years. IFs are calculated each year by Thomson scientific for those journals that it indexes, and are published in Journal Citation Reports (http://www.thomsonreuters.com/products_services/science/science_products/a-z/journal_citation_reports/). For example, if a journal has an IF of 3 in 2008, then its papers published in 2006 and 2007 received three citations each on average in 2008. The 2008 IFs are actually published in 2009; they cannot be calculated until all of the 2008 publications have been processed by the indexing agency (Thomson Reuters). The IF for the biomedical journals may range up to 5-8%. [5] The IF of any journal may be calculated by the formula; 2012 impact factor = A/B: Where A is the number of times articles published in 2010 and 2011 were cited by indexed journals during 2012. B is the total number of citable items like articles and reviews published by that journal in 2010 and 2011⁶.

The *h*-index is an author-level metric that measures both the productivity and citation impact of the publications, initially used for an individual scientist or scholar. The *h*-index correlates with obvious success indicators such as winning the Nobel Prize, being accepted for research fellowships and holding positions at top universities. The index is based on the set of the scientist's most cited papers and the number of citations that they have received in other publications. The index has more recently been applied to the productivity and impact of a scholarly journal as well as a group of scientists, such as a department or university or country.^[3] The index was suggested in 2005 by Jorge E. Hirsch, a physicist at UC San Diego, as a tool for determining theoretical physicists' relative quality^[4] and is sometimes called the Hirsch index or Hirsch number².

In the domain of medicine, although the number of citations that one article receives is not necessarily a measure of its academic quality, it could reflect how celebrated that article has been in its branch of learning, and the implication being that the greater the worth of the paper, the more times it would be cited [8]. Although the value of citation times has been debated, a higher number of citations are a direct proxy for a paper's recognition in its scientific field⁹. The establishment of a citation rank list identifies a published work that has the greatest intellectual influence¹⁰. Top-cited papers in medical journals also serve an important role to educate and encourage the next generation of physicians¹¹.

The academic impact of a piece of research can be gauged by the number of times it has been cited by other authors. The study design of a bibliometric analysis or citation classics is a widely used technique to assess the impact of an article⁸.

The determination of a citation hierarchy list in one specialty of the medical field, formed by numerous journals that are specific to one specialty, is a process that requires more time and expertise as compared to the bibliometric analysis of just one journal⁷.

The evolution of this research led to the introduction and implementation of the concept of evidence-based medicine [3]. Publications of prime medical journals pertaining to the field of obstetrics and gynecology started almost over a century ago, with the American

Journal of Obstetrics and Gynecology and Obstetrics and Gynecology being among the top few. Researchers and doctors working in the field of obstetrics and gynecology have worked with over 180 journals, which have been listed in the Scopus Database Library as well in Web of Science, to publish their works in⁸.

A bibliometric analysis represents an understanding that provides a cross-sectional view and the current state of research work on the topic of interest. It is a statistical and quantitative analysis that aims at identifying the scholarly impact and characteristics of publications within a specific research field, which could provide useful information to researchers involved in the development of research strategies to address the health issues. Many scholars have investigated the most cited articles that describe the advances in various specialties and subspecialties¹³.

Meta-analysis summarizes the empirical evidence of relationship between variables while uncovering relationships not studied in existing studies; the focus of review is to summarize results rather than to engage with content, which may be broad or specific; when studies in the field are homogenous; quantitative. Systematic literature review summarizes and synthesizes the findings of existing literature on a research topic or field; the scope of review is specific; the dataset is small and manageable enough that its content can be manually reviewed; when the scope of review is broad and dataset is too large for manual review; qualitative. Bibliometric analysis summarizes large quantities of bibliometric data to present the state of the intellectual structure and emerging trends of a research topic or field; when the scope of review is broad and the dataset is too large for manual review; the scope of review is specific. Usually quantitative but may be qualitative¹². There are now soft wares to conduct bibliometric analysis¹⁴.

Prof. Ferdousi Begum

President

Obstetrical & Gynaecological Society of Bangladesh (OGSB)

Reference:

1. Iftikhar PM, Ali F, Faisaluddin M, Khayyat A, De Sa MDG, Rao T. A Bibliometric Analysis of the Top 30 Most-cited Articles in Gestational Diabetes

- Mellitus Literature (1946-2019). *Cureus*. 2019 Feb; 11(2): e4131. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6485525/> July 18, 2022
2. Wikipedia. Bibliometrics. <https://en.wikipedia.org/wiki/Bibliometrics> July 18, 2022
 3. McBurney MK, Novak PL. What is bibliometrics and why should you care? Professional Communication Conference, 2002. IPCC 2002. Proceedings. <https://ieeexplore.ieee.org/document/1049094>
 4. Measuring Your Impact: Impact Factor, Citation Analysis, and other Metrics: Journal Impact Factor (IF) university library. <https://researchguides.uic.edu/if/impact>. July 24, 2022
 5. Malathi M, Thappa DM. The intricacies of impact factor and mid-term review of editorship. *Indian J Dermatol Venereol Leprol*. 2012;78:1–4.
 6. Sharma M, Sarin A, Gupta P, Sachdeva S, Desai AV. Journal Impact Factor: Its Use, Significance and Limitations. *World J Nucl Med*. 2014 May-Aug; 13(2): 146. doi: 10.4103/1450-1147.139151
 7. Wikipedia. h-index. <https://en.wikipedia.org/wiki/H-index>
 8. F. Cao, J. Li, A. Li, Y. Fang, and F. Li, "Citation classics in acute pancreatitis," *Pancreatology*, vol. 12, no. 4, pp. 325–330, 2012.
 9. E. Garfield, "Fortnightly review: how can impact factors be improved?," *BMJ*, vol. 313, no. 7054, pp. 411–413, 1996.
 10. M. R. Murray, T. Wang, G. D. Schroeder, and W. K. Hsu, "The 100 most cited spine articles," *European Spine Journal*, vol. 21, no. 10, pp. 2059–2069, 2012.
 11. J. F. Gehanno, K. Takahashi, S. Darmoni, and J. Weber, "Citation classics in occupational medicine journals," *Scandinavian Journal of Work, Environment & Health*, vol. 33, no. 4, pp. 245–251, 2007.[5] J. C. Kelly, R. W. Glynn
 12. Donthua N, Kumar S, Mukherjee D, Pandey N, Lim WM. How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*. 2021. 133, 285-296. <https://www.sciencedirect.com/science/article/pii/S0148296321003155>
 13. Retrouvey H, Webster F, Zhong T. Cross-sectional analysis of bibliometrics and altmetrics: comparing the impact of qualitative and quantitative articles in the British Medical Journal. *October 2020BMJ Open* 10(10):e040950.
 14. Moral-Muñoz JA; Herrera-Viedma E; Santisteban-Espejo A; Cobo MJ. Software tools for conducting bibliometric analysis in science: An up-to-date review. <https://doi.org/10.3145/epi.2020.ene.03>