Qualitative and Quantitative Methods in Libraries Journal Special Issue: Bibliometrics and Scientometrics

Teresa S. Welsh[*], Guest Editor's Introduction

[*] School of Library and Information Science, University of Southern Mississippi

Numerous papers and presentations related to bibliometrics have been presented at the International QQML conference each year. This special issue of *QQML Journal* contains selected papers representing a variety of bibliometric research methodologies.

Definition of Bibliometrics

Bibliometrics, literally "the measurement of books", is a term that was first used in the 1969 article by Pritchard, "Statistical Bibliography of Bibliometrics". In the article, Pritchard defined bibliometrics as "the application of mathematics and statistical methods to books and other media of communication" in order to "shed light on the processes of written communication and of the nature and course of development of a discipline" (348-349). That definition has been expanded in recent years to include analyses of such things as collections, databases, and websites. A more modern and inclusive definition of bibliometrics is the "use of mathematical and statistical methods to study and identify patterns in the usage of materials and services within a library or to analyse the historical development of a specific body of literature, especially its authorship, publication, and use" (Reitz, 2014).

Bibliometrics is a broad term that includes more specific types of research such as *scientometrics*, the study of "all quantitative aspects of the literature of science and technology (Hood, 2001); *webometrics*, "which is concerned with measuring aspects of the web: web sites, web pages, parts of web pages, words in web pages, hyperlinks, web search engine results

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(Thelwall, 2009); and *altmetrics*, which is "based on the Social Web for analysing and informing scholarship" (altmetrics.org).

Bibliometric research has been categorized in several ways. Borgman (1989) classified bibliometrics into three types: analysis of *producers* (authors or institutions), *artifacts* (books, journal articles, websites), and *concepts* (topics or subject areas). Stevens (1953) categorized bibliometrics into two types: *descriptive* (productivity by author, organization, geographical region, time period, or subject) and *evaluative* (usage data, citation behaviour). Nicholas and Ritchie (1978) used two related categories: *literature characteristics* (authorship, publication year, etc.) and *literature relationships* (behavioural studies such as citing or co-citing patterns) (Hertzel, 2003).

Wilson (2003) developed a timeline model of the development of bibliometric research: stage 1, classical bibliometrics (analysis of publication patterns and document characteristics); stage 2, citation analysis (impact analysis); and stage 3, full-text analysis (content analysis).

Bibliometric Laws

There are three bibliometric laws related to publication pattern, and since publication patterns do not always reflect the exact proportions of these laws, perhaps a better term would be bibliometric *models*.

Bradford's Law – "The bibliometric principle that a disproportionate share of the significant research results on a given subject are published in a relatively small number of the scholarly journals in the field…. first noted by Samuel C. Bradford in 1934…. He found that a few core journals provide 1/3 of the articles on a given subject" (Reitz, 2014).

Lotka's Law – "The bibliometric principle that the number of authors making n contributions to the scholarly literature of a given field is about C/n^a…. Lotka's empirical law of scientific productivity means that … about 61% of all published authors make just one contribution, about 15% have two publications, about 7% make three contributions, and less than 1% produce ten or more publications" (Lotka, 1926; Reitz, 2014).

Zipf's Law – "The principle that the frequency of the *rth* most common word or phrase in a relatively lengthy text (or in any natural language) is approximately $1/r$…. This means that the 10^{th} most frequent word will be used about twice as often as the 20^{th} most frequent word, and ten times more often that the 100^{th} most frequent word" (Zipf, 1949; Reitz, 2014).

Value of Bibliometrics

Bibliometric research can be useful for information scientists and librarians, particularly for collection development and for identifying publication trends. Pritchard and Wittig (1981) identified seven uses of bibliometrics:

1. Identification of an underlying problem such as gender differences in publications, promotion policies, or productivity.
2. Evaluation of organizations by research and publication or by impact.
3. Evaluation of countries by research productivity and/or impact.
4. Examination of general growth and development of a subject or discipline.
5. Evaluation of journals or groups of journals (publication pattern or impact)
6. Analysis of raw data for operations research (such as usage data).
7. Study of bibliometric patterns that are of general interest and add to the body of knowledge related to social science (3-5).

As library budgets become tighter, bibliometric research is particularly useful in the analysis of usage patterns and impact of library services and materials. The data generated from bibliometric research can be instrumental in helping a library better serve its patrons as well as in documenting a library's value to the community it serves.

References

University of North Carolina (2014). About altmetrics.org. Available at: http://altmetrics.org/about/

Borgman, C.L. (1989). Bibliometrics and Scholarly Communication. *Communication Research*, 16(5), 583.

Bradford, S.C. (1934). Sources of Information on Specific Subjects. *Engineering*, 137: 85-86.

Hertzel, D.H. (2003). Bibliometrics History. In M. Drake (ed.), *Encyclopedia of Library and Information Science*, Second Edition, Vol. 1: 288-328. New York: Marcel Dekker.

Hood, W.H. & Wilson, C.S. (2001). The Literature of Bibliometrics, Scientometrics, and Informetrics. *Scientometrics*, 52(2): 291-314.

Lotka, A.J. (1926). The Frequency Distribution of Scientific Productivity. *Journal of the Washington Academy of Science*, 16(12): 317-323.

Nicholas, D. & Ritchie, M. (1978). *Literature and Bibliometrics*. London: Clive Bingley, London.

Pritchard, A. (1969). Statistical Bibliography or Bibliometrics. *Journal of Documentation*, 25(4): 348-349.

Pritchard, A. & Wittig, G.R. (1981). *Bibliometrics: A Bibliography and Index*, Vol. 1. Watford, England: ALLM Books.

Reitz, J.M. (2014). *Online Dictionary for Library and Information Science*. Available at: http://www.abc-clio.com/ODLIS/odlis_about.aspx

Stevens, R.E. (1953). *Characteristics of Subject Literatures*. Chicago: American College and Research Library Monography Series 7.

Thelwall, M. (2009). *Introduction to Webometrics: Quantitative Web Research for the Social Sciences*. San Rafael, CA: Morgan & Claypool. Available at: http://webometrics.wlv.ac.uk/

Wilson, C.S. (2003). A Science of Public Knowledge: Theoretical Foundations of LIS. In R.J. Todd (ed.), *Proceedings of the American Society for Information Science and Technology*, 4(1): 439-440.

Zipf, G.K. (1949). *Human Behavior and the Principle of Least Effort*. Reading, MA: Addison-Wesley.