Journal of Informetrics 4 (2010) 141–147

Contents lists available at ScienceDirect

Journal of Informetrics

journal homepage: www.elsevier.com/locate/joi

Rankings of information and library science journals by JIF and by *h*-type indices

Judit Bar-Ilan*

Department of Information Science, Bar-Ilan University, 52900 Ramat-Gan, Israel

ARTICLE INFO

Article history:
Received 27 August 2009
Received in revised form 27 October 2009
Accepted 10 November 2009

Keywords:
h-Index
Journal impact factor
Ranking
h-Type indices

ABSTRACT

In this paper we compute journal rankings in the Information and Library Science JCR category according to the JIF and according to several *h*-type indices. Even though the correlations between all the ranked lists are very high, there are considerable individual differences between the rankings as can be seen by visual inspection, showing that the correlation measure is not sensitive enough. Thus we also compute other measures, Spearman's footrule and the *M*-measure that are more sensitive to the differences between the rankings in the sense that the range of values is larger than the range of correlation values when comparing the JIF ranking to the rankings induced by the *h*-type indices.

1. Introduction

A lot has been written about journal impact factors (JIF), its uses and misuses and how the JIF should not be used for evaluations (for example, see Garfield, 1955, 2006; Seglen, 1997). Still the JIF and journal rankings within a JCR subject category are widely used for evaluations.

In 2005, the physicist Jorge Hirsch (2005) introduced a new measure, the *h*-index, which combines publication and citation counts. This new measure raised huge interest among informetricians. Some tried to apply it, others criticized it and suggested improvement and some suggested ways to model the *h*-index. One of the first applications, suggested by Braun, Glänzel, and Schubert (2005, 2006) was to apply the *h*-index to journals. Glänzel and Schubert (2007) tested a theoretical model of dependence of the journal-type *h*-index on the JIF and the number of publications.

The JIF computed in the JCR, is the 2-year impact factor, i.e. the number of citations of articles published in years *y*-1 and *y*-2 in the journal, that appeared in articles published in year *y* are divided by the number of "citable documents" published in the journal in years *y*-1 and *y*-2. See discussion of what is meant by "citable documents" in the next paragraph. This paper uses data for 2007, i.e., citations that the journal received in 2007 to articles that were published in 2005 and 2006 divided by the number of "citable documents" the journal published in 2005 and 2006. The publication years are 2005 and 2006 and the citation window is 2007. ISI (Thomson Reuters) also publishes the 5-year impact factor, i.e. for 2007 it counts the citations in 2007 to items published in the journal in the years 2002–2006 and divides it by the number of "citable documents" the journal published in the given year.

What are "citable documents"? There is no clear definition of this term, but it is supposed to mean that one only counts items published in a journal that have potential to be cited. The definition of the number of "citable documents" is crucial, because it is the denominator of the JIF calculation, it is a normalizing factor that allows JIF's of journals in the same

* Tel.: +972 3 5318351; fax: +972 3 7384027.
E-mail address: barilaj@mail.biu.ac.il.

1751-1577/$ – see front matter © 2009 Elsevier Ltd. All rights reserved.
doi:10.1016/j.joi.2009.11.006

subject category to be compared. It was noticed by Moed and van Leeuwen (1995) that ISI counts only a subset of the items published by journals as "citable", most probably excluding letters and editorials, while all citations irrespective of the target of the citation ("citable" or "non-citable") are counted. They demonstrated that this inflates the JIF of some journals with large number of letters that receive citations. Recently, Rossner, van Epps, and Hill (2007) complained about ISI's impact factor calculations. In a reply to these complaints Pendelbury (2008) explained: "Although all primary research articles and reviews (whether published in front-matter or anywhere else in the journal) are included, a citable item also includes substantive pieces published in the journal that are, bibliographically and bibliometrically, part of the scholarly contribution of the journal to the literature. Research at Thomson has shown that, across all journals, more than 98% of the citations in the numerator of the Impact Factor are to items considered "citable" and counted in the denominator". Thus there is no uniform definition of a "citable document". Following the evidence found by Moed and van Leeuwen (1995) often only articles, reviews and notes are counted, but as Moed and van Leeuwen note editorials and letters are also citable. Thus in this study the document types considered citable were: article, reviews, proceeding papers, letters and editorials.

ISI currently publishes two impact factors, the regular, 2-year impact factor and the 5-year impact factor. These impact factors are called "synchronous impact factors" (Ingwersen, Larsen, & Wormell, 2000). The impact factor is synchronous if only the citations received during a fixed period are counted. The citation window is usually of 1 year. For the case of synchronous impact factor the citation year is fixed and the publication years lie in the past, and thus this can be considered a retrospective measure (Glänzel, 2004).

Another type of impact factor is the "diachronous impact factor" where the citations received since the publication of the item and until a given point in time are counted. The publication window is usually of 1 year. The citations counted are the number of citations the publications in the publication window received during y years since their publication. Thus a 2007 diachronous impact factor with a citation window of 3 years, counts all the citations that items published in the journal in 2005 received in the years 2005, 2006 and 2007. The diachronous impact factor can be seen as a prospective measure, it considers the citations accumulated since publication (Glänzel, 2004).

The h-index of an author as defined by Hirsch is the number h such that the author has h publications with at least h citations each and the rest of publications received at most h citations. Hirsch did not limit the period in which the citations were received. This calculation puts young scientists at a disadvantage and it is also unfair to recently established journals if the h-index of journals is to be calculated. Thus Braun et al. (2005, 2006) calculated the diachronous h-index of journals; they looked at the 2001 items published in the journals and counted all the citations these items received until September 2005. The h-index of a journal is defined as the unique number h such that h items in the journal that were published in the given publication year(s) received at least h citations during the citation period and all other items received h citations or less. Glänzel and Schubert (2007) tested their model against a diachronous h-index with a 3-year citation window.

Harzing and van der Wal (2009) computed the h-index of some journals using Google Scholar. They too calculated a diachronous h-index. It is extremely difficult to calculate a synchronous h-index for journals using Google Scholar. To compute a 2-year synchronous h-index for journals for the year 2007, one needs to fix the publication years, 2005 and 2006 and to count all the citations these items received in 2007. From this point onwards the calculation is analogous to the calculation for the diachronous h-index.

Currently the Web of Science supports synchronous computations through its "Citation Report" interface. The procedure is explained in detail by Liang and Rousseau (2009): the citation report interface allows us to download the publications in a comma delimited format, where not only the total citation counts are given, but the citations per year are tabulated. This allows simple calculation of the synchronous h-index. The JIF can also be calculated easily using the downloaded data from the "Citation Report" interface. Liang and Rousseau calculated the h-index and related measures for journals in three JCR subject categories: environmental and resource economics, cybernetics, and information and library science. They showed that the h-index and its variants correlate highly with the JIF. In this paper we will also examine the rankings resulting from the JIF and from variants of the h-index, but we will compare the rankings using an additional measure, especially suited for comparing rank lists (Aguillo, Bar-Ilan, Levene, & Ortega, 2009; Bar-Ilan, Levene, & Lin, 2007). In addition we computed both synchronous and diachronous h-indexes. Bornmann, Werner, and Schier (2009) computed the synchronous h-index and some of its variants for 20 organic chemistry journals.

2. Definitions

The journal impact factor (JIF) and the h-index were already defined in the previous section. We will compute both the synchronous and the diachronous h-indices (3-year citation window) for 2007. The h-index does not have enough discriminatory power to rank all 56 journals in the Information and Library Science section of the JCR, because the journal with the highest h-index has h-index 11 or 12 (depending whether the synchronous or the diachronous case is considered). Thus we calculated the values for some variants of the h-index.

The g-index was introduced by Egghe (2006); it takes into account that top-cited articles in the h-core (the set of articles that received at least h citations) usually receive much more than h citations. The exact definition is: "A set of papers has a g-index g if g is the highest rank such that the top g papers have, together, at least g^2 citations." (Egghe, 2006, p. 132).