

Chinese Journal of Chemistry's Hirsch Index:

A Case Study of 1995-2005

Metin Orbay
Amasya University
Turkey
morbay@omu.edu.tr

Orhan Karamustafaoğlu
Amasya University
Turkey
orseka@yahoo.com

ABSTRACT: Chinese Journal of Chemistry's (CHIN J CHEM) Hirsch index (h-index) over the period of 1995-2005 is studied, and its improvement has been confirmed with and without self-citations. Hirsch index of CHIN J CHEM shows that Chinese Journal of Chemistry has demonstrated a highly positive trend towards improvement during the selected years.

I. Introduction

Until now, a few citation-based indicators have been used to measure research performance (e.g., the number of citations to each of the q most cited papers, the total number of citations, the citations per paper, and the number of highly cited published papers). There are valid reservations about using the above-mentioned indicators to measure performance because some papers are cited for reasons that are unrelated to the quality or utility of a study (Kelly & Jennions, 2006; Miller, 2007).

Taking into account the advantages and disadvantages of the above-mentioned citation-based indicators, Jorge E. Hirsch has lately suggested a new indicator called *h-index*, serving as one single index for the assessment of the research performance of an individual scientist. According to the definition by Hirsch (2005), "A scientist has index h if his/her N papers have at least h citations each, and the other $(N-h)$ papers have fewer than h citations each? Hirsch's argument has generated considerable interest and almost immediately provoked reactions in the scientific community (Ball, 2005; Braun, Glanzel & Schubert, 2005; Glanzel & Persson, 2005; Glanzel, 2006a; Egghe & Rousseau, 2006; Egghe 2006; Cronin & Meho, 2006; Orbay, Karamustafaoğlu & Öner, 2007). In general, the *h-index* has been well received by the research group. On the other hand, the *h-index* has also a number of disadvantages as pointed out by some authors (Kelly & Jennions, 2006; Van Raan, 2006). Glanzel (2006b) has summarized some *pros* and *cons* of *h-index* in his recent paper.

Soon after, the *h-index* definition has been adapted into journals and article citations, as an *h-type* index equal to h if you have published h papers, each of which has at

least h citations (Braun, Glanzel & Schubert, 2006). Braun and co-workers stressed that the h -type index for journals would advantageously supplement journal impact factor (IF), the total number of citations divided by the number of articles in a given time period (Garfield, 1976), in at least two aspects:

- i. It is strong in the sense that it is insensitive to an accidental excess of uncited articles, and to one or several highly cited articles,
- ii. It combines the effect of “quantity” and “quality?” in a rather specific way (Braun, Glanzel & Schubert, 2005).

Naturally, the journal h -index would not be calculated for a “lifetime contributions?” as defined by Hirsch for the scientific output of a researcher, but for a definite period, in the simplest case for a given year. Using this procedure, R. Rousseau studied the evolution of *The Journal of American Society of Information Sciences (JASIS)* Hirsch index and introduced relative h -index (Rousseau, 2007).

In this paper, the improvement of Hirsch index of *Chinese Journal of Chemistry (CHIN J CHEM)* over the period of 1995-2005 is studied and determined with and without self-citations. Here, the self-citation means that an article published in a journal is cited by other articles published in the same journal.

II. Methodology

As is well known, the *Web of Science* database offers a very simple way to determine the annual h -index of a journal. Retrieving all source items of a given journal from a given period and shorting them by the number of “times cited” it is easy to find the h -index of the journal for the given year.

In this paper, a case study is conducted for h -index of *CHIN J CHEM* over the period of 1995-2005. And a fixed moment in time is defined when citations are collected from *Web of Science*.

III. Findings

The h -index of *CHIN J CHEM* over the period of 1995-2005 is determined with and without self-citations, as shown in Figure 1.

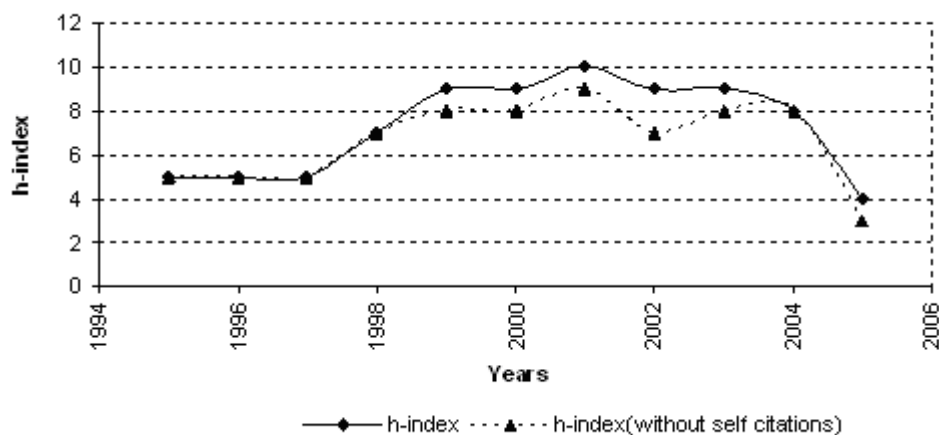
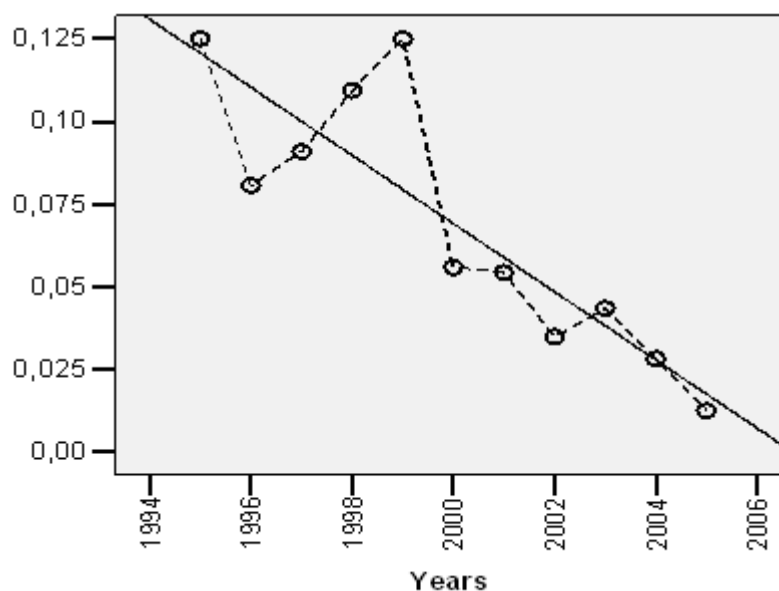


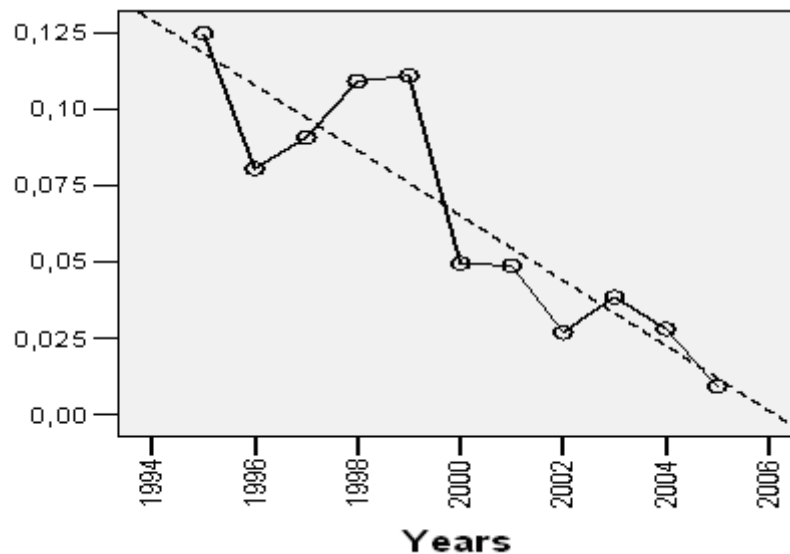
Figure 1. *h*-index of *CHIN J CHEM* over the period of 1995-2005.

In Figure 1, due to the fact that *h*-index with and without self-citation is the same from 1995 to 1998, the two lines of *h*-index with and without self-citations basically overlap. So, it is believed that there is no significant contribution of self-citations in this period.

On the other hand, in addition to a volume that gathers citations over a period of time, the published article numbers in that volume also influences the *h*-index. So, the *h*-index must be divided by the published article numbers, leading to a normalized (or relative) *h*-index (Rousseau, 2007). In this case, the results are shown in Figure 2a and 2b respectively.



a) Normalized *h*-index with self-citation



b) Normalized h -index without self-citation

Figure 2. Normalized h index of *CHIN J CHEM* over the period of 1995-2005.

As can be clearly seen from Figure 2, a normalized h -index leads to a linear increase when going backward in time. The Pearson correlation coefficients of the regression lines of this journal are 0.866 for normalized h -index (continuous line in Figure 2a.) with self-citations and 0.892 for normalized h -index without self-citations (dotted line in Figure 2b.), which are very high, and statistically significant (1% level). It is not surprising that these two correlation coefficients are very close to each other because of the fact that the self-citations over this period are limited by approximately 24%. Incidentally, this value is high in other twenty randomly selected journals published in the same field. In addition to this, the most cited five published articles in *CHIN J CHEM* over the period of 1995-2005 are listed in Table 1, from Citation report (URL: <http://isiknowledge.com>). As can be seen from Table 1, the three of the five most cited articles are published in 2000 and afterward.

Table 1. The five most cited articles published in *CHIN J CHEM*.

	2003	2004	2005	2006	2007	Total	Average Citations per Year
1. Xu JX, Wu HT, Jin S Cycloaddition of benzoheteroazepine II - Reactions and conformations of cycloadducts on 1,5-benzothiazepines and 1,5-benzodiazepines with nitrile imine and nitrile oxides CHINESE JOURNAL OF CHEMISTRY 17 (1): 84-91 JAN 1999	4	3	4	5	0	43	4.78
2. Yin HD, Wang CH, Wang Y, et al. Synthesis and characterization of tribenzyltin heteroaromatic carboxylates and crystal structure of tribenzyltin 4-pyridinecarboxylate CHINESE JOURNAL OF CHEMISTRY 19 (11): 1146-1152 NOV 2001	12	8	9	4	0	33	5.50
3. Du XD, Dai LX, Hou XL, et al. Highly efficient catalysts derived from planar chiral ferrocenes for asymmetric transfer hydrogenation of ketones CHINESE JOURNAL OF CHEMISTRY 16 (1): 90-93 JAN 1998	6	3	1	1	0	23	2.30
4. Zhang YH, Li JF, Wang K, et al. Lipases-catalyzed alcoholysis for the preparation of chiral 1-or 2-hydroxyalkanephosphonates CHINESE JOURNAL OF CHEMISTRY 21 (1): 4-6 JAN 2003	2	0	10	9	0	21	4.20
5. Wang S, Hu ML, Yuan JX, et al. Synthesis and crystal structure of polymer cobalt(II) complex, 1,2,4,5-benzenetetracarboxylate heptaimidazole tetraaqua cobalt(II) tetrahydrate CHINESE JOURNAL OF CHEMISTRY 18 (4): 546-550 JUL-AUG 2000	4	8	1	3	0	21	2.62

From these interesting results, it is concluded that many published papers in this journal have very high impact with respect to quantity (number of publications) and quality (citation rate) recently. Furthermore, open access is believed to have contributed to the improvement of *CHIN J CHEM*'s *h*-index as well.

IV. Conclusion

To sum up, the evolution of *IF* (SCI Database Reproduct Journal List, 2007) and *h*-index of *CHIN J CHEM* shows a highly positive trend during the selected years. In other words, *CHIN J CHEM* is improving itself both in quantity and quality, since *h*-index reflects peer review. And peer review, in turn, reflects research quality of a journal, as pointed out by Miller (2007).

Reference

- Ball, Philip. (2005). Index aims for ranking of scientists. *Nature*, 436, 900.
- Cronin, Blaise, & Meho, Lokman I. (2006). Using the *h*-index to rank influential information scientists. *Journal of the American Society for Information Science and Technology*, 57(9), 1275-1278.
- Egghe, Leo, & Rousseau, Ronald. (2006). An informetric model for the Hirsch-index. *Scientometrics*, 69(1), 121-129.
- Egghe, Leo. (2006). How to improve the *h*-index: letter. *The Scientist*, 20(3), 121.

Garfield, Eugene. (1976). Is the ratio between number of citations and publications cited a true constant? *Current Contents*, 6, 5-7. Reprinted (1977) in *Essays of an Information Scientist*, 2, 419-421. Philadelphia: ISI Press. URL: <http://garfield.library.upenn.edu/essays/v2p419y1974-76.pdf>. (Accessed on 4 May 2007).

Glanzel, Wolfgang, & Persson, Olle. (2005). H-index for prize medalists. *International Society for Scientometrics and Informetrics*, 1, 15-18.

Glanzel, Wolfgang. (2006a). On the *h*-index- A mathematical approach to a new measure of publication activity and citation impact. *Scientometrics*, 67(2), 315-321.

Glanzel, Wolfgang. (2006b). On the opportunities and limitations of the *h*-index. *Science Focus*, 1, 10.

Hirsch, Jorge E. (2005). An index to quantify an individual's scientific research output. *Proceedings of the National Academy of Sciences of the United States of America*, 102(46), 16569-16572.

Kelly, Clint D., & Jennions, Michael D. (2006). The *h* index and career assessment by numbers. *TRENDS in Ecology and Evolution*, 21, 167-170.

Miller, Casey W. (2007). Superiority of the *h*-index over the impact factor for physics. *American Journal of Physics*. URL: <http://arxiv.org/abs/physics/0608183>. (Accessed on 13 January 2007).

Orbay, Metin; Karamustafaoğlu, Orhan; & Öner, Fedâ. (2007). What does Hirsch index evolution explain us? A case study: Turkish Journal of Chemistry. *BIBLIOS: Librarianship and Information Science Electronic Journal*, 8(27), 1-5.

Rousseau, Ronald (2007). A case study: evolution of JASIS?Hirsch index. *Science Focus*. URL: http://eprints.rcelis.org/archive/00005430/01/Evolution_of_h_JASIS_rev.pdf. (Accessed on 7 January 2007).

SCI Database Reproduct Journal List. URL: http://library.kaist.ac.kr/sci_journals.html. (Accessed on 4 May 2007).

Tibor, Braun; Wolfgang, Glanzel; & Andras, Schubert. (2005). A Hirsch-type index for journals. *The Scientist*, 19(22), 8.

Tibor, Braun; Wolfgang, Glanzel; & Andras, Schubert. (2006). A Hirsch-type index for journals. *Scientometrics*, 69(1), 169-173.

Van Raan, Anthony F.J. (2006). Comparison of the Hirsch-index with standard bibliometric indicators and with peer judgment for 147 chemistry research groups. *Scientometrics*, 67(3), 491-502.

Web of Science. URL: <http://isiknowledge.com>. (Accessed on 10 February 2007).

Authors:

Metin Orbay, Amasya University, Turkey. Email: morbay@omu.edu.tr

Orhan Karamustafaoğlu, Amasya University, Turkey. Email: orseka@yahoo.com

Submitted to CLIEJ on 7 May 2007.

Copyright © 2007 Metin Orbay & Orhan Karamustafaoğlu

Orbay, Metin, & Karamustafaoğlu, Orhan. (2007). *Chinese Journal of Chemistry's Hirsch index: A case study of 1995-2005*. *Chinese Librarianship: an International Electronic Journal*, 24. URL: <http://www.iclc.us/cliej/cl24OK.pdf>
