Journal of Information Technology Research
Volume 13 • Issue 1 • January-March 2020

H-Index and Its Variants:
Which Variant Fairly Assess Author's Achievements

Rosy Jan, University of Kashmir, Srinagar, India
Riyaz Ahmad, University of Kashmir, Srinagar, India

ABSTRACT

H-index is an accepted norm to rank scientists and makes them eligible for various professional benefits. However, taking into consideration the associated flaws of the h-index, a diversified set of parameters have been proposed by the scientific community to rank authors in a better way. Imaginary case studies and datasets are used to find out the practical and actual utility of the proposed indicators. To analyze the individual behaviour of each index, these indices are comprehensively evaluated on an extensive data set. This study emphasizes the scrutiny of the h-index, some of its variants, and extensions to rank authors. There appears to be a correlation between high citation rates for a published researcher and the award of prestigious accolades. Thus, the inclusion of a researcher in the list is based on high citation rates and the authority has claimed a direct connection between the citation rates and prestigious awards. In this context, the work initiated to find out the h-index and its variants for the selected researchers incorporated in the hall of citation laureates from the field of medicine. It is clear from the correlation analysis that there is a difference in the degree of correlation between the h-index and its variants. The A-index is weakly correlated, and M-Quotient is strongly correlated with h-index. Thus, most of the h-index variants are merely mathematically and arithmetically modified and does not add any new information as these are highly correlated and are based on the h-core. Thus, more useful and reasonable approaches could be developed for multidimensional and contextualized evaluations of scientific performance rather than cocooning them with mere numbers.

KEYWORDS

Citation Laureates, Clarivate analysis, Correlation analysis, Hall of citation laureates, H-index variants, H-index

INTRODUCTION

A lot of discussion and debate surrounds the h-index, since the time it was evolved; despite the fact that it is an established norm for the evaluation of research excellence and other related benefits. The indicator was proposed by a person from an entirely different field – a physicist, Jorge Hirsch, not ever published any paper on bibliometrics proposed an indicator, the h-index. This opened up a new research front in bibliometrics. "A scientist has index h if h of his/her Np papers have at least h citations each and the other papers have no more than h citations each" (Hirsch, 2005). The new index has been viewed favourably in the academic community and may be readily calculated using automated features found in Web of Knowledge or Scopus citation databases and additionally for Google Scholar (GS). H-index does not take into account any normalization of citation impact regarding the publication year and the subject area; it cannot be used to compare individuals who have published in different subject areas and publication years. Furthermore, the indicator cannot

DOI: 10.4018/JITR.2020010105

be used to compare people with different academic ages as the expected values for publications and citations are different depending on the age. These two and other limitations inhibit the use of the indicator in research evaluation almost entirely, as the scientists, as a rule, have neither published in similar subject areas and publication years, nor have a similar academic age (Bormann and Marx, 2011; Alonso, Cabrerizo, Viedma and Herrera, 2009; Glänzel, 2006; Huang and Chi, 2010; Ball, 2007; Rousseau, 2007). Better indicators have been proposed for comparisons across subject areas, publications years and ages (Bornmann and Marx, 2011). We can count more than 100 indicators potentially applicable at individual author level. The no. of variables seems high given the fact that it's the same variables that are manipulated through different algebraic and arithmetic formulas. H-index is taken as a base and produces these indices with some behavioural enhancements in order to overcome its limitations. With so many indicators and so much widespread use, it is important to examine these indicators and make a co-relational analysis with the alternatives to h-index. The sample population was taken from Clarivate analytics, Hall of Citation Laureates. The list pertains to likely Nobel Prize winners in Medicine, Chemistry, Physics, and Economics. There appears to be a correlation between high citation rates for a published researcher and the award of prestigious accolades. Finally, choosing one-tenth of one percent (0.1%) of the highest impact papers winnows the analysis to the topics and people most likely to be selected by Nobel selection committee.

Objectives

The work is set to fulfil the following objectives

- To determine the total number of publications (TNP) and a total number of citations (TNC) of each citation laureate with specific focus on calculating h-index and other selected variants.
- To ascertain the degree of correlation of the h-index with selected variants.
- To find out which variant fairly assess the author's achievements.

LITERATURE REVIEW

Hirsch (2005) "proposes the h index, defined as the number of papers with citation number >h, as a useful index to characterize the scientific output of a researcher." Further explaining h index Hirsch says it's an easily computable index, as it provides an estimate of importance, significance and broad impact of scientist's cumulative research contribution. Hirsch suggests that this index may prove very useful to compare, in an unbiased way, different individuals competing for the same resource when an important evaluation criterion is achieved. Bormann and Marx (2011), Alonso, Cabrerizo, Viedma and Herrera (2009), Glänzel (2006), Jin, Liang, Rousseau and Egghe (2007), Rousseau (2007) Kelly and Jennions (2006) and many others supported Hirsh's view. However, since its inception, the index was critically evaluated and disapproved as a suitable simple factor to measure the multidimensional achievements of researchers and likewise. H-index is not a suitable indicator for scientists with a short career and they are at an inherent disadvantage Lehmann, Jackson, and Lautrup (2008). The h-index has less predictive accuracy and precision, and cannot be used to compare scientist's work of different fields. Egghe (2006) states that the problem with h-index is that it puts small but highly-cited scientific outputs at a disadvantage. While the h-index de-emphasizes singular successful publications in favour of sustained productivity, it may do so too strongly. The issue related to the H-index calculation and that there is no logical connection between the number of citations and publication sequence. In addition, new authors have a problem with H-index as they have no or low index value due to time constraints. As the value of the H index will never decrease, then some of the researchers may depend on high values and therefore their real production or activity will decrease with time. Maabreh and Alsmadi (2012). In h index, once a paper is selected to belong to the top h papers, this paper is not used any more in the determination of h-index Egghe