

## Chapter 5

# H-Index and Its Variants: A Critical Analysis

### ABSTRACT

*Researchers suggest that the use of h-index for the purpose of the evaluation of research performance, its dependencies like the academic career, and the subject field of his/her publications should always be considered and taken into account for fruitful results. Also, h-index should be complemented with its variants to reduce its shortcomings. In the future, researchers should focus on testing the validity and applicability of the existing h-index variants rather than developing the new ones. Further, it is not possible to reflect the scientist's or researcher's academic contribution merely in terms of numerical values. The quantities to signify research quality should be considered with a grain of salt.*

### INTRODUCTION

The manifestation and expression of research work of a researcher, research group, organization or an institution is an important consideration in the evaluation of its research performance. Traditional scientometric indicators like Total Paper Productivity, total citation count have a major drawback that they do not reflect the quality of research and can be affected by various factors for example, a single publication with a good number of citations (Kelly & Jennions, 2006; Panaretos & Malesios, 2009). In comparison h-index is a novel indicator which takes care of both the qualitative and quantitative

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aspect of the scientific output. In a short period of time, it has gained wide appreciation among scientific and research community. Given this context, a deep delve analysis of the h-index which is considered to be the core indicator to rate and rank scientific research and research community world over has been done in the present chapter.

## **HIRSCH-INDEX (H-INDEX)**

The fame of h-index is growing because of the impression that it is a simple and easy metric to assess both the quantity and quality of a researcher's scientific output. The Hirsch-index or h-index is a renowned scientometric indicator introduced by Hirsch in 2005. It aims to capture scientists' impact in a research area. The h-index was primarily proposed as a better substitute to other bibliometric indicators (Bornmann, Mutz, Hug, & Daniel, 2011; Egghe, 2006; Egghe & Rousseau, 2006; Hirsch, 2005; Moed, 2005; Van Raan, 2006). Being a simple indicator to perceive the impact and worth of scientist's research work it has attracted a lot of consideration. A huge interest has been shown by the scientific community for this indicator (Ball, 2005; Bador & Lafouge, 2010; Bar-Ilan, 2008a; Bar-Ilan, 2008b; Bar-Ilan & Levene, 2015; Baruch, Szűcs, & Gunz, 2015; Benevenuto, Laender & Alves, 2015; Bertoli-Barsotti, & Lando, 2015; Bornmann & Daniel, 2005; Bornmann, et al., 2011; Cronin & Meho, 2006; Dong, Johnson & Chawla, 2015; Dorogovtsev & Mendes, 2015; Glänzel & Persson, 2005; Jenkins, 2015; Jin, 2007; Hodge, Lacasse, & Bean, 2016; Kelly and Jennions, 2006; Liu & Rousseau, 2009; Lopez, Susarla, Swanson, Calotta & Lifchez, 2015; Lü, Zhou, Zhang & Stanley, 2016; Marshall, et.al., 2016; Olensky, Tsai & Chen, 2016; Monastersky, 2005; Nazaroff, 2005; Rousseau, 2006a; Rousseau, 2006b; Saad, 2010; Schubert, 2015; Schreiber, 2015; Van Raan, 2006; Van Bevern, et al., 2016; Van Bevern, Komusiewicz, Molter, Niedermeier, Sorge & Walsh, 2015; Van Eck & Waltman 2008; Watson, McDonagh & Thompson, 2016; Xu, Liu, & Mingers, 2015; Washburn, 2015; Westreich, 2015; Würtz & Schmidt, 2016; Zhang, 2009; Zhang, Manor & Li, 2015). The scientometricians and bibliometricians are so-much engrossed in the h-index that the history of the subject can now be virtually divided into pre-Hirsch and a post-Hirsch period. Further than its value in academics, it is now used as a necessary index for the evaluation and assessment of researchers, research faculties and institutions and also for the comparison and performance evaluation journals and nations (Prathap, 2010). The popularity and status

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