

Chapter 3

Evolution of Literature on Scientometric Indicators

ABSTRACT

An unbiased and reasonable research evaluation should reflect the diversity and impact of research productivity. The evaluation of scientific research is essential to determine its achievement, reputation, growth, and progress of an individual or an institution. In this context, production and quality of scholarly content offer a strong foundation for its rational evaluation. The citations along with the number of scientific publications are predominantly used to evaluate research content. The use of scientometric indicators is of great use in the measurement and evaluation of the scientific research output, but at the same instant, it requires a great carefulness in use.

INTRODUCTION

Before the application of indexes and indicators, the peer review system was used for research evaluation. The application of the quantitative indicators or peer-review system to assess the scientific research is dependent upon the assessment objective and conditions (Vinkler, 2010). With the passage of time, the field of metric sciences have developed to evaluate and assess scholarly content. These have also come up with much anticipated indexes and indicators that have become essential to the evaluation. In this context, the scientometric indicators are of great significance as they offer scientists, institutions, funding agencies etc. with an empirical methods to appraise the

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performance of research output. Scientometrics as an evaluation method of research highlights its significance in forthcoming academics but it's due to the deficiency of robust and comprehensive proof on its precision and efficacy its application for evaluation of research is not well-developed.

Scientometrics has made us aware that science is quantifiable though there may be some faults and errors in the results (Leydesdorff, 2005). Leydesdorff and Milojević (2012) provide an overview of the field of scientometrics, in relation to the study of science, technology, and innovation from a quantitative perspective. The duo cover major historical milestones in the development of this specialism from the 1960s to 2012 and discuss its relationship with the sociology of scientific knowledge, the library and information sciences, and science policy issues such as indicator development. The disciplinary organization of scientometrics is analyzed both conceptually and empirically. A state-of-the-art review of five major research threads is also provided viz., (1) the measurement of impact; (2) the delineation of reference sets; (3) theories of citation; (4) mapping science; and (5) the policy and management contexts of indicator developments. Mingers and Leydesdorff (2015) provide a broad review of scientometrics. They observe that scientometrics is predominantly constituted of study of citations in academic literature but at the same time it also reflects other features like quantity.

Bornmann and Leydesdorff (2013) state that the scientometric indicators are anticipated to be a one-third portion of the evaluation system; peer-review sharing the other part end scores which together with a comprehensive peer-review may be used for grants distribution. Rinia et. al (2001) observe that some scientists to a great level agree that peer review is substantial part of research evaluation method. But at the same instant, most of them sense that a comprehensive and in-depth scientometric examination adds to the evaluation practice some important standards that cannot be in case by peer-review system. Further they determine that the quantifiable scientometric indicators reveal noteworthy research management and strategy relevant to various aspects of scientific performance. According to them these are the proficient tool to *monitor* and to *evaluate* the rank of a research institute in international framework. Likewise, Južnič et.al (2010) discuss how scientometric indicators effect the peer-review selection of research project applications. In their study an evaluation of three calls for research project proposals in Slovenia was made: In Year 2003 call, whereby engagement of interest in peer-review system was not avoided efficiently, Year 2005 call, a comprehensive international peer-review system with decreased conflict of interest effect but a limited number of reviewers was used, and in 2008 call where

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