Chapter 4
Scientometric Indicators:
Features and Categorization

ABSTRACT

In research, indicators are partial since each indicator is susceptible to methodological and technical problems that require both decisions by the indicator developer as well as corrections and modifications at researcher's level. Considering the different limitations, the question arises whether one can use research indicators in an efficient way forever. Given the fact that we now know quite a lot about the strengths and weaknesses of such indicators, it does not contradict their use, but an inexperienced handling of such indicators should be avoided.

INTRODUCTION

The literature on Scientometric indicators is predominantly based on empirical and experimental pedagogy. Novel scientometric indicators are time and again justified mostly on empirical reasoning, by extenuating that outcomes produced by indicators are in agreement with what seems to be instinctively rational. The indicators have been differentiated and compared empirically by Bornmann, Mutz, Hug and Daniel (2011) using experimental analysis of degree of correlation between scientometric indicators. Empirical method in scientometrics is quiet prevalent, however, since last decade, a substantial amount of theoretical research on scientometrics has given significant impression in terms of the assessment and evaluation of scientific output

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(Albarrán, Ortuño, & Ruiz-Castillo, 2011; Leydesdorff, 2005; Marchant, 2009; Palacios-Huerta & Volij, 2004; Waltman & Van Eck, 2009; Woeginger, 2008). Although empirical foundation of indicators is considered to be pragmatic way of analyzing the indicators but at the same instant, a theoretical point of view of indicators cannot be ignored (Bouyssou & Marchant, 2011; Ravallion & Wagstaff, 2011; Waltman, Van Eck, Van Leeuwen, Visser, & Van Raan, 2005). Scientometric indicators, in theoretical oriented research, are assessed and compared on the basis of their features and characteristics. An indicator with desired characters offers support and provision to accept the indicator for research assessment and if it has characters which are considered to be undesirable, the indicator is rejected. The present research thus deliberates on the theoretical foundation of scientometric indicators for their evaluation and analysis, their categorization and also their features for the assessment of scholarly content.

CATEGORIZATION OF INDICATORS

Scientometric indicators have been classified by various researchers into different categories. These categories are based on a defined set of the characteristics of indicators. Though the foundation of scientometric indicators have a history dating back to the advent of *Science Citation Index* (SCI) database by Eugene Garfield in Philadelphia in 1963. Researchers from different fields have described how these indicators can be categorized depending upon the facets of their use, application, subject area etc. Various studies regarding the classification and categorization of scientometric indicators have been put forth at various levels. The most prominent amongst them are discussed in this chapter.

Okubo (1997) categorized Scientometric indicators in two classes.

- The first class is dedicated to the *quantitative indicators*, which reflect the quantitative aspect of science and technology activities. Quantitative indicators of Science and Technology comprises of the number of papers, the number of co-signers, the number of citations, the number of patents and the number of patent signer citations.
- The second deals with *relational indicators*, i.e. indicators that quantify relations and collaborations among the various performers in