



Applied Evaluative Informetrics. Henk F. Moed. Springer International Publishing AG, Gewerbestrasse 11, 6330 Cham, Switzerland. 2017. xxi + 312 pages. Price: € 44.99. ISBN 978-3-319-60521-0.

This book is a comprehensive introduction to the multi-dimensional field of evaluation of research performance, written by an expert with 30 years of experience in teaching, research and organizing conferences in the field. This field has grown considerably since Francis Narin wrote his pioneering report 'Evaluative bibliometrics: the use of publication and citation analysis in the evaluation of scientific activity' in 1976 when the company he founded, Computer Horizons Inc., was engaged in gathering and analysing publication and citation data from the Science Citation Index (SCI) for inclusion in the US National Science Foundation's biennial publication *Science Indicators*. This book is a continuation of Narin's report and the author's own earlier book *Citation Analysis in Research Evaluation* (2005). It deals with the application of informetrics in research assessment with special attention to its evaluative dimension. The book is intended for a broad audience – all those subjected to research assessment, Master's and doctoral students, research managers, science policy makers and funders, and practitioners and students of informetrics.

One can trace the origin of bibliometrics to some papers published between 1917 and 1935 by Cole and Eales (on measuring the contribution of different countries to microbiology), Hulme (on statistical bibliography), Lotka (on the frequency distribution of scientific productivity), Gross and Gross (on selection

of journals for a college library based on citations), and Bradford (on the frequency distribution of papers over journals; see <https://www.ecoom.be/nodes/degeschiedenisvanbibliometrie/en>). But the field really picked up only in the early 1960s when Derek de Solla Price came up with two books in quick succession – *Science since Babylon* in 1961 and *Little Science – Big Science* in 1963, and Garfield introduced SCI in 1964. Since then the field has grown rapidly, many indicators have been proposed, journals and societies have come up, and workshops and conferences are organized at regular intervals. Now informetrics has become a part of STI studies in many universities, including some in the emerging economies. But the developments have not been uniformly good.

The book is divided into six parts and 19 chapters, some as short as six pages. Part I provides the historical background, defines the terminology and gives an informative synopsis of the book. If a reader is in a hurry, she can get a good idea of what is presented in the rest of the book by reading this part.

In Part II, the author provides an overview of the use of informetric indicators for the measurement of research performance, highlights the multi-dimensional nature of research performance, and lists 28 commonly used indicators with their potential and limits.

Part III discusses the application context of research assessment as an evaluation science and distinguishes various assessment models, and attempts to show how external non-informetric factors influence indicator development and how the policy context affects the assessment process. The author illustrates how political or policy considerations influence the functional form of indicators and how indicator concepts mirror the political context in which they are developed.

Part IV attempts to offer solutions to some problems in the use of informetric indicators for evaluative purposes such as the assessment of individual scholars, the effect of a limited time horizon, assessment of societal impact, and the effects of the use of indicators upon authors and editors.

Part V presents a historical overview based on five lectures presented by the author. Three of these well-illustrated lectures were delivered in a doctoral course at Sapienza University, Rome, and they explain the pioneering contribu-

tions of Price, Garfield and Narin. One was delivered in the graduate course at CWTS, Leiden University, The Netherlands, and the fifth at the European Summer School of Scientometrics. Chapter 13 in part V presents two visionary papers by Price, the first on network of scientific papers that has led to concepts like research front and immediacy effect, and the second on modelling the relational structure of subject space and how it has evolved into advanced mapping tools. The next chapter starts with the genesis of SCI and proceeds to compare Web of Science, Scopus and Google Scholar. Chapter 15 focuses on the relationship between science and technology as reflected in citations in patents to the scientific literature starting from the early works of Narin and Olivastro. Chapter 16 begins with the limitations of the impact factor and goes on to present a series of alternative journal citation measures. Chapter 17 is dedicated to altmetrics.

Part VI has two chapters, and the first of these, a comparative study of five World University Ranking systems, viz. ARWU (Shanghai Ranking), Leiden, THE, QS and U-Multirank and this will be of great interest to many in India. In table 18.10, the author presents in the form of a matrix, an overview of the five systems on the performance of higher education institutions. There is considerable variation in the ranks of a given institution in the different systems, and only 35 institutions appear in the top 100 list of all five systems. Of course, the methodologies of these systems do not remain static and each one of them is evolving.

The last chapter presents a statistical analysis of full-text downloads of articles and citations. Download frequencies and their correlation with citations are dependent on discipline and document type. Download counts tend to be two orders of magnitude higher than citations.

I am surprised how a major publisher like Springer could publish a book, especially one meant for use by Master's and doctoral students, researchers and even by a general audience, without an index.

The author could have added a section on the connection between informetrics and open access. The subgroup of the ICSU Executive Board chaired by John Ball (University of Oxford, UK) had recognized in their 2014 report 'Open access to scientific data and literature and the assessment of research by metrics',

that metrics which ignore the semantic content of citations are a blunt instrument and that bibliometrics must encourage practices that are beneficial for the scientific process. As the chairman of this subgroup has said, 'metrics affect the behaviour of researchers, such as their choice of journals, as they seek to maximize their performance as measured by the metrics used. Metrics can contribute to the maintenance of high journal prices, and promote intense competition rather than openness and sharing, and fail to recognize research contributions such as the production of datasets, software, code, blogs, wikis and forums. Governments might argue that they also do not recognize the impact of research on society at large'.

The author lends legitimacy to the *h*-index by considering it as one of the 28 indicators (pp. 52–53; 105–106), of course with some caveats. He should have discussed the views of others, especially those who are critical of the *h*-index. According to Waltman and van Eck, it 'cannot be considered an appropriate indicator of a scientist's overall scientific impact'. Yves Gingras considers the *h*-index to be poorly constructed, 'inadequate and invalid' and it 'may even distort evaluation and hiring processes'. In his view, 'it is actually quite noxious when used as an aid to decision making because it can generate perverse effects'.

On the whole, the publication can be used as a textbook for an advanced course in science metrics.

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Annual Review of Entomology, 2019.

A. E. Douglas, J. Trumble and M. P. Zalucki (eds). Annual Reviews, 4139 El Camino Way, P.O. Box 10139, Palo Alto, California 94303-0139, USA. Vol. 64. xiv + 420 pages. Price: US\$ 116.

The *Annual Review of Entomology* is one of the eagerly awaited volumes by entomologists and insect enthusiasts all over

the world because of the range of articles it covers, the in-depth analysis of the topics it selects and the lucid presentation it makes. The 2019 volume containing totally 21 articles written by experts in their fields of specialization offers food for thought and opens up new avenues for research.

Among these 21 articles, seven relate to the management of insect pests, two touch upon anthropogenic factors affecting insects, seven cover the molecular dimensions of some insects, two deal with hymenopterans, two relate to arachnids and one is an autobiographical note. Many of the topics selected are relevant in today's context as we are struggling to control insect pests with less chemical inputs. The articles such as management of locusts and grasshoppers, cereal aphids, subterranean termites and blueberry pests give insight into many effective preventive management strategies that can be used to enhance our efforts. As the modern genetic techniques are offering new tools to delve deep and unravel many complicated insect systems, the articles such as epigenetics in insects, molecular evolution of chemoreceptor gene families and molecular mechanism of wing polymorphism throw light on the genetic control systems.

The first article 'An unlikely beginning: a fortunate life' by E. A. Bernays is an autobiographical sketch of the author's involvement throughout her life in the physiology, behaviour and ecology of feeding in herbivorous insects. Her observations on the behaviour of generalist and specialist grasshoppers in choosing their food are original and thought-provoking. Her life is an inspiration for many young researchers.

The article 'Locust and grasshopper management' presents the historical perspective, current reality, their economic impact, the strategies we need to manage them, monitoring, forecasting, control methods and the socio-economic context in relation to their management. In the context of the recent outbreak of locusts in some parts of Gujarat, this article has great relevance. The authors recommend more efficient monitoring and control techniques by increased use of biological products, satellite imaging and GIS.

The article 'Ecology of collective behavior in ants' summarizes the dynamics between the environment and collective behaviours. The author affirms that eco-

logical conditions shape the evolution of collective behaviour. The article 'Invasion success and management strategies for social *Vespula* wasps' describes how three species of *Vespula* became invasive in Australia, Hawaii, New Zealand, and North and South America and how they affected all trophic levels, more particularly, severely affecting pollination and the apicultural industry. The authors suggest the use of gene drive as a potential method of control.

The article 'Invasive cereal aphids of north America: ecology and pest management' takes into consideration three cereal aphids and their role in disrupting cereal production. The authors encourage the use of aphid-resistant cultivars and area-wide management systems. The article 'Blueberry IPM: past successes and future challenges' discusses the importance of blueberry trade globally and the great potential available for biological, behavioural, cultural, and physical methods to blueberry IPM.

The article 'Development of baits for population management of subterranean termites' elaborates on the history of bait development and the success of chitin synthesis inhibitor baits in colony elimination. In the context of termite infestation in many parts of the country, this article gives several relevant tips to manage them. The article 'Biology and control of the Klapra beetle *Trogoderma granarium*, a major quarantine threat to global food security' discusses the advances made so far and directions to consider for future research. The authors recommend research on molecular diagnostics. The articles 'Vectors of babesiosis, and movement and demography of at-risk butterflies: building blocks for conservation' are informative and stimulating.

In the article 'Epigenetics in insects: genome regulation and the generation of phenotypic diversity', the authors provide an introduction to the field of molecular epigenetics in insects, and the techniques for profiling and perturbing individual facets of the epigenome. They recommend the study of intergenerational epigenetic inheritance to know more about genomic imprinting in insects.

The article 'Bee viruses: ecology, pathogenicity and impacts' highlights the diversity of viruses that infest bees, the complexity of their transmission routes and the strategies evolved to combat virus infection. The article 'Molecular