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Book Review

The failure of a paradigm

Henk F. Moed. *Applied Evaluative Informetrics*, Springer International Publishing (2017)

1. Introduction

Applied Evaluative Informetrics is an ambitious book. The latest work of Henk Moed, a prize-winning bibliometrician who worked between 1986 and 2010 at the Centre for Science and Technology Studies, aims to give a sweeping overview of all aspects of the application of informetrics in the evaluation of scientific and scholarly research. The book is intended for non-specialist scholars from all domains of research as well as for all who are interested in research evaluation: senior researchers, students, research managers, funders and science policy actors.

The book consists of six parts. The first four parts cover past, present and future of evaluative informetrics, while the last two parts consist of lectures and articles by the author. In the first four parts the chapters present original arguments in combination with excerpts and presentations of results and insights from older articles. The book is more a synthesis of the state of the art in evaluative informetrics than a novel analysis. But it is more ambitious than just a review in book format. It is also framed as an intervention in the current debate about research evaluation and the role of indicators. Moed tries to make the case for a politically neutral form of informetrics, thereby hoping to clarify the current discourse which he apparently finds often confused and sometimes overly political.

2. Broad overview

Let me start with praising the author for his endeavor. Not many bibliometricians have both such a broad overview of the field and such a firm grounding in the practice of research evaluation. Most practitioners in our field limit themselves to their specific area and do not start such an ambitious project. So, the idea to write this book, which can also be seen as an extension of his earlier book *Citation Analysis in Research Evaluation* from 2005 (Moed, 2005), is commendable.

Readers who are not themselves scientometricians or informetricians will find valuable references they may wish to follow up. Policy officials and research managers pressed for time will find Part I especially useful. It gives a short introduction to the field of informetrics and bibliometrics whilst also presenting an extensive synopsis (in Chapter 2) of all following chapters. Indeed, for many users of evaluative informetrics these first 41 pages will be sufficient to understand the key arguments and references. It is also a good starting point for those in need of information about particular topics without wishing to cover the field as a whole.

Parts II, III and IV contain the key arguments of the book. Part II discusses indicators of research performance, Part III zooms in on the application context, and Part IV presents Moed's ideas about the way forward. Each part consists of several relatively short chapters (most are between 5 and 20 pages). The book has a wide scope; I could not think of topics that were not mentioned at least once in the book. Perhaps as a consequence of this sweeping excursion, the book does not dig deep into the issues. Readers with a taste for more in-depth analysis or discussion may be disappointed if they do not find more than what they see as obvious or common knowledge. This raises the question whether the author would not have served his audience better by focusing the book more on the most burning questions. Of course, this may also be a matter of taste.

3. Performance indicators

Part II about indicators of research performance has three chapters. The first (Chapter 3) introduces the different dimensions of research performance. It distinguishes components of the research process (input, output, process, and impact) and presents a table of 28 important informetric indicators and lists their definitions, their strong points as well as their limits. The indicators listed vary from very general indicators (such as "citations" or "measures of economic value") to very specific

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ones (such as the “Integrated Impact Indicator” or “Glanzel’s (sic) negative-binomial model”). Chapter 4 then discusses a number of these indicators in more detail under the heading of informetric tools. The currently existing types of indicators are discussed in short sections: publication and citation indicators, journal metrics, patent and usage indicators, altmetrics and webometric indicators, economic indicators, reputation and esteem based indicators, collaboration indicators and indicators of research infrastructure. Each type of indicators has about one page, so readers who wish to work with these indicators or understand them in some depth will also have to read the later chapters in which these indicators come back or consult the literature references. The chapter concludes with a short discussion of the fact that scientometric data have become big data and of the application of science maps.

Chapter 5 discusses what Moed sees as three important problems in applied informetrics: are journal impact factors good predictors of citations of individual articles?; to what extent do errors cancel out in large datasets?; and what is the correct interpretation of rank correlation coefficients? The interpretation of the journal impact factor is currently a hot topic and an important problem for all users of informetric tools and indicators. Moed is one of the best informed experts on this matter (Moed, 2002). Hence, I had expected a rigorous update to guide users in the application of the Journal Impact Factor. Instead, the chapter is a short presentation of the distribution of citations over articles (which is known to be highly skewed) compared to the length of soccer players (which is a normal one). Moed shows that this means that if one compares two journals with different impact factors, the probability that a randomly selected paper from the journal with the lower impact factor has a citation rate at least as high as that of a randomly selected paper from the journal with the higher impact factor cannot be ignored. So Moed builds his argument that the journal impact factor is not a good predictor of individual articles’ citation rates on the skewed distribution of citations over articles within journals. And yet, the section of this chapter ends inconclusively. Moed mentions in the concluding sentences that while preparing the final version of the book, an article by Waltman and Traag (2017) was published which engages with precisely the type of statistical arguments against the journal impact factor that Moed presents in this section. These authors agree with Moed’s statistical critique of the journal impact factor but argue that this does not mean that the journal impact factor cannot be used at the level of individual publications. Based on computer simulations, they even conclude that the journal impact factor may be a more accurate indicator of the “value” of an article than the number of citations to that article. Moed summarizes their argument but does not engage with this counter-argument. The reader is left on her own.

Unfortunately, this is a recurring phenomenon in this book: the most interesting points of discussion are brushed over, ignored, or left for the reader to sort out. I must say, I am a bit puzzled about this noncommittal attitude of an author who has spent his professional life in the field of scientometrics and informetrics. The third section of Chapter 5 is one page about errors with the conclusion that random errors do cancel out in large datasets but systematic errors do not. That might be conspicuous even for readers who are not familiar with informetrics but do have some basic statistical knowledge. The last section of this chapter is a two-page discussion of correlation coefficients, basically showing that correlation coefficients should never be taken at face value and that the underlying form of the distribution as well as the data range should be taken into account. Well, indeed.

4. The context of application

Part III is about the application context and consists of three chapters on respectively research assessment as an evaluation science, non-informetric factors influencing indicators, and the policy context. The chapter on research assessment as an evaluation science (Chapter 6 of the book) aims to explore the relationship between the field of quantitative research assessment and evaluation science. I see this indeed as a very important topic, and it was the reason to invite a keynote speaker from evaluation science, Peter Dahler-Larsen, to the ENID/STI 2014 conference in Leiden (Moed also gave a keynote at this conference). However, this chapter is quite disappointing. It observes, correctly, that evaluation science is a multi-disciplinary field with concepts and analytical distinctions that can be quite useful in research assessment, but then limits itself to a short presentation based on a very limited slice of the literature in evaluation science. Moed has missed the, in my view, most interesting areas in that field and seems to have thought that selecting one approach (Hunter & Nielsen, 2013) would be sufficient.

Perhaps more importantly, Moed shows in this chapter to be surprisingly uninformed about the research in which scholars from sociology of science and science & technology studies have already made the connection between research assessment and evaluation science (Fochler & De Rijcke, 2017; Gläser, Lange, Laudel & Schimank, 2010; Gläser & Laudel, 2016; Hammarfelt & De Rijcke, 2015; Hammarfelt & Rushforth, 2017; Kaltenbrunner & De Rijcke, 2016; Laudel & Gläser, 2006; Sauder & Espeland 2009; Whitley, 2010; Wouters et al., 2015). For example, Moed cites an article by the Danish evaluation researcher Peter Dahler-Larsen but does not mention his seminal book *The Evaluation Society* (Dahler-Larsen, 2012). As a result, he is regularly stating the obvious in this chapter but presents this as a new approach. Unfortunately, this decreases not only the extent to which the chapter can be called a presentation of the state of the art, but also the quality of the argument. The result is a mundane summing up of rather practical distinctions, such as the difference between a summative and a formative evaluation and between normative and criterion based reference frameworks, in addition to some hairsplitting about the supposed difference between the concepts of evaluation and assessment.

Chapter 7 discusses non-informetric factors that influence the development of indicators. This chapter shows how performance indicators inevitably are based on views on what constitutes research performance that cannot themselves be based on informetric data. This is clearly a crucial chapter for the argument of the book. Moed shows the role of assumptions

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