

Part II

Indicators and Indexes for Assessment of Research Production

Publications are an important outcome of scientific research, since they contain the knowledge produced by a researcher or group of researchers. Citations of research publications are an important measure of the impact of these publications. But how are publications and their citations connected to the quality of research? High-quality research may remain unrecognized for years or even decades, but in most cases, high-quality research publications obtain many citations in a short time after publication. At the same time, review papers and methodological papers from the same scientific area may be highly cited, too. All the above shows that the quality of a research product is a complex quantity that may be assessed by multidimensional analysis based on qualitative tools combined with quantitative indicators and indexes.

Quantitative indicators and indexes of research production are discussed in this part of the book. The part consists of two chapters. Chapter 2 contains description of commonly used indexes for assessment of research production. These indexes are based mainly on the citations of research publications of the evaluated researcher(s). The chapter begins with several general remarks about indicators and indexes and about assessment of research production on the basis of a researcher's publications and citations of those publications. Then the most popular index of recent years, the *h*-index of Hirsch, is discussed in detail together with a description of variants of the *h*-index, many-*h*-like indexes, as well as indexes complementary to the *h*-index. After that, another popular index, the *g*-index of Egghe, is discussed. A description of numerous other indexes follows, e.g., *p*-index, IQ_p -index, *A*-index, *R*-index, *PI*-indexes, indexes of personal success of a researcher, etc. Finally, several indexes are mentioned in connection with the rapidly growing research area devoted to research networks.

Chapter 3 is devoted mainly to additional indexes for assessment of research production of groups of researchers. This chapter contains indexes that usually require the assessed groups to be separated into components that contain some units of interest, e.g., the components may be the researchers from a research group and the units may be the research publications or citations of research publications. The following groups of indexes are described: simple indexes; indexes for deviation from a simple tendency; indexes for difference; indexes for concentration; indexes for imbalance and fragmentation; indexes for dissimilarity, coherence, and diversity; indexes of advantage; indexes based on the concept of entropy; the Lorenz curve and

associated indexes; the RELEV method and associated indexes for assessment of scientific research; indicators and indexes for comparison of research communities in different countries; indicators for leadership; indicators and indexes for assessment of national scientific production: impact factor, intermediacy index, SJR, etc. Finally, an example of the application of the Lorenz curve in a geometric approach for detecting research elites is discussed.