

GENERAL THEORETICAL ASPECTS REGARDING BIBLIOMETRICAL RESEARCH

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Abstract. *An important role in information services is bibliometrics, which monitors and analyzes information resources, and provides a knowledge management in a social and organizational context. Providing this information is done via bibliometric research through the librarian.*

Key words: *bibliometrics, scientometrics, metrics, bibliometric research, bibliometric indicators, bibliometric databases.*

1. INTRODUCTION

Today's term *bibliometrics* merges with the term *scientometrics*, and is increasingly replaced with the term *metrics*. For these terms some definitions have been attempted over the years [1,2,3]. Thus, in 1969, Pritchard, Nalimov and Mulcheko almost simultaneously introduced the terms *bibliometrics* and *scientometrics*; the definition they give for the former term is *an application of mathematical and statistical methods to books and other press communications of the media type* (Pritchard), and for the second, *the application of those quantitative methods dealing with the analysis of science seen as a process of information* (Nalimov).

In 1988, Vinita took over the term of *infometrics* and explained that it *deals with electronic media, and includes topics such as statistical analysis of scientific texts and the hypertext system, the circulation of documents in libraries, measurement of information in electronic libraries, models for production and management of information, and quantitative aspects of information storage.*

In 1994, Glanyel and Schoepplin argued that *bibliometrics* and *infometrics* include *all the quantitative aspects and scientific communication models, storage, dissemination and storage of scientific information.*

The most commonly used of the three terms, is *bibliometrics*, which is also the most frequent in the literature; it is defined as being the branch of bibliography whose scope is the quantitative study methods relating to the production, characteristics and flow of information [4].

2. MODERN BIBLIOMETRIC RESEARCH

Therefore, society as a whole needs a review of the exigencies of the moment. It seems that teachers, researchers and students increasingly need librarians.

Only they can restore the balance to the scientific community, it is they who will be responsible for the content of the information handled and used in libraries and documentation centers, in both processing and information processes, and the so-called info-documentary processes. At present only they have the necessary skills related to the specific specialty of that content. A reference librarian or bibliographer is an information specialist, a person who must prove both his/her analytical ability and his/her good knowledge of the various systems of information

retrieval. He/she can involve himself/herself in the work meant to support the education and research process by means of: a) providing consulting services and specialized assistance; guidance in the modern information system, by querying databases (which are purchased institutionally, because individual costs are not justified); b) supplying products in print and digital format regarding information literacy (first-year students are given a leaflet when they enrol, or are informed that there is a library guide, a guide for consulting the databases, etc). c) development of bibliographies on request.

In these circumstances, visiting the library becomes mandatory for users, who will discover an even wider range of publications and valuable information that meets their needs.

On the other hand, those who are expected to make knowledge in their areas advance are those who write and publish articles and papers in journals that are recognized by the scientific community. It is to their interest that the result of their research should reach all the colleagues in the scientific community as quickly as possible, and especially that they could get a feedback that expresses the measure of their value. Sometimes, this does not happen or happens with more difficulty because prices of subscriptions to scientific journals are prohibitive, or there are various hindrances from the publishers. The author is asked by the publisher, for his/her paper to be published in a top-ranking scientific journal, that he/she gives them their copyright, lest the author should not subsequently post the article on their Web site, being liable to be sued by the publisher. And it will take some time, because there occurs the "embargo" that delays information from reaching those interested, as a certain spell of time should elapse before it eventually appears in a commercial data base – a period the publisher needs to publish the paper version.

From that angle as well, librarians feel involved and advocate *open access to scientific information*, free and rapid implementation of literature in scientific periodicals for all researchers in all countries to use, and protecting it via non-restrictive licenses, which should allow any type of use in compliance with certain rules on attribution and citation.

In an attempt to understand the scope and dynamics of the scientific world and its interaction with the rest of society, we find that there are several different dimensions and dynamics to distinguish. A comprehensive approach to the problem is provided by the regular statistics and reporting released by the *National Science Foundation in the United States*. [5]

We can mention some of them:

I. The cognitive dimension of research

The activity of research has a set of special connotations, as an organized cognitive activity in society resulting in discovering more appropriate representations of reality, disseminated in society, that is published and stored in bibliometric databases that make them more available.

Research is usually carried out in the academic disciplines, and new knowledge is produced, which can be new only if it is recognized as such worldwide.

II. The commercial dimension of research

Research income = the income of the group concerned, arising from exploiting the intellectual property rights of the results of the research. This dimension can be determined directly from the accounts of the respective institution if the group assessed is the staff of one institution.

Some institutions have other purposes, too: practical (commercial exploitation of scientific authority in the form of consultancy services), educational or accounting. Whatever the involvement, the literature would profit, it will be promoted, ideas will be exchanged, will be professional improvement, and it will all reflect the quality and progress in the field. The bibliometric analysis envisages the evaluation of scientific research productivity and effectiveness. The rate of input / output is regularly calculated, and resources are monitored at all levels and, on that basis, allocated. The place of a researcher or organization in the national, regional or world system can be determined, who is the leader in a particular field of research, or even the dynamics of scientific directions, the history of science, etc.

Databases provide access to differentiated bibliometric indicators. The basic components of bibliometric tools are generally: 1) *the units of bibliometric analysis*: books, monographs, reports, theses, articles in journals, reviews and other periodicals; 2) *the basic unit in bibliometric analyses*: the article in peer reviewed scientific journals; 3) *the elements of bibliometric analysis*: the articles, the authors, the references and citations; 4) *the simple bibliometric indicators*: the number of items, the number of authors, the number of citations; 5) *complex bibliometric indicators*: index of citations, impact factor, Hirsch index, etc.

Therefore, the units of analysis can be books, theses, magazine articles, papers, etc. The statistical expression of the various ratios of these elements represents *the bibliometric indicators*. We use the following *bibliometric indicators for publications*: the impact factor, the relative influence score, and the Index Copernicus Value [6].

The impact factor is an index that allows us to approximate the value of scientific publications and help to compare them. It allows assessing the importance of a journal or review, and is calculated as equal to the number of citations of the article or paper, divided by the number of citable articles over a period of time (Thompson company do this calculation; it is generated using data from the Web of Science; it can be found in the *Journal Citation Reports* or on the website of the journal). It is assumed that, the more important a journal is in a field of science, the more it will be used and cited, and so it will have a higher impact factor.

The relative influence score is the ratio of the influence score of the articles in a journal and the influence score of the journal. The article influence score is calculated by Thomson Reuters in *Journal Citation Reports*. This indicator is important for the eligibility of the titles of teachers in higher education, of the professional degrees in research and development, and the habilitation certificate (for details one may consult the UEFISCDI link at: <http://uefiscdi.gov.ro/articole/3055/Scorul-relativ-de-influenta.html>).

The *Index Copernicus Value* comes from the international platform specialized in promoting scientific results. It enables collaboration between researchers and publishers of scientific journals. *IC Journal Master List* is a database that indexes over 13,000 journals in the world. For ICV calculation

methodology one can access: <http://jml2012.indexcopernicus.com/page.php?page=3>.

As *significant bibliometric indicators for articles* one can analyze the citation index and the Hirsch index. The *citation index* (number of citations) remains the most widely used indicator, and it represents all the citations of an article over a period. It is found in *Web of Science*, *Scopus*, *Google Scholar* and *Publish or Perish* and. However, *Google academic* does not search in library subscriptions. The *Hirsch index* (or *h-index*) is the bibliometric indicator that measures the scientific visibility of an author, his/her scientific performance. A scientist has an *h* index if *h* scientific articles of the total number of his/her published articles each has at least *h* citations numbers. This index (calculated by *Scopus*, *Web of Science* and *Publish or Perish*) has the capacity of highlighting those researchers who have made a significant contribution in their field, but did not gain the reputation they deserve from the scientific community.

Ca *indicatori bibliometrici pentru autori* există și este mai des accesat *Publish or Perish*, un software gratuit de analiză a citărilor ce utilizează datele din Google academic și Microsoft Academic Search. / As there bibliometric indicators for authors and Publish or Perish accessed often, a free software citation analysis using data from Google and Microsoft Academic Search Academic.

Other indicators that are often used are Altmetrics and Webometrics. The former shows how far and how wide the content of a paper was spread on the web, and the content of the papers could be signaled on social networks, blogs or libraries through the management of references such as Mendeley, Zotero, Connotea, End Notes (see <http://altmetrics.org/manifesto/>), the latter provides a) indicators underlying the ranking of universities (Nobel laureates, medals, Highly Cited Researchers, papers published in Nature or Science, large number of papers indexed Science Citation Index Expanded (SCIE) and Social Science Citation Index (SSCI), and b) indicators underlying the ranking of world universities: the volume of the web content, i.e. web pages and web files, as well as the visibility and impact of the web publications through the full number of occurrences of the link on the web <http://www.webometrics.info/en/Methodology>

Bibliometric research is aimed at three target groups of "contemporary bibliometrics": a) bibliometrics for *bibliometricians*, which considers information meant for users (it helps librarians to manage the collections of series and the subscription budgets, and publishers to monitor their competitors); this research represents basic research in bibliometrics and is aimed at the methodological aspects of developing and operation of instruments; b) bibliometrics for *researchers and scientists* (it helps them to keep abreast of scientific information in a particular area, to identify the journals relevant for their research). This is the group represented by most of the users; c) bibliometrics for *policy makers and managers in the field of science* (the tools provide data necessary for evaluating research, for individual and / or institutional scientific evaluation).

However, bibliometric research has some disadvantages. Some mediocre people may become 'learned' thanks to the "bibliometric method", while a real, innovative researcher fails to progress and remains unnoticed. What could be of interest is cognitive rather than quantitative evaluation: this is the only path leading performance. Another major drawback is the fact that older specialized literature

and it could be omitted, because the main goal is to cite recent literature (within 5 years).

The Library of the Pitești University provides access to the bibliometric database *Thomson ISI - Web of Science*—which is actually a complex and comprehensive information resource; it is at once a bibliometric and bibliographical database, available on line on the *Web of Knowledge* platform. There are references on journals and conferences, most of which have with an ISI impact index. It is a useful tool for librarians in terms of decisions on annual procurement of journals. The user can set up their personal account, thus becoming part of the online community of researchers, and so having the promise of visibility: i) alerts configured for citations; ii) list of relevant journals, viewing or sending their contents by e-mail; iii) lists of saved results; iv) reports of the articles published and criteria received in keeping with the years, and for some papers and articles it is even allowed to access the full version; v) citations, the sum of all citations, average number of citations per article and *Hirsch index*, etc. Also, an alert for citations can be created, so when the article is cited, a notification will be received by e-mail. In much the same way, the articles related to it can be seen, as well as the references used, and whether the journal that published the article selected is ISI or not, through a link to the database *Journal Citation Reports*. It can also generate a graphical representation of the impact factor.

The *Institute for Scientific Information* (ISI) has been indexing scientific journals, conferences and patents after an evaluation process since 1955, when it was founded by Eugene Garfield, now being part of Thomson Reuters Corporation. A journal that is not found among the journals indexed journal ISI is considered to be BDI (indexed in international databases), so it is part of the *Master Journal List*.

The *Master Journal List* includes all the journals that are found in the various scientific products of the Thomson Reuters Corporation of Philadelphia, USA. *Thomson ISI - Journal Citation Report* is available online on the *Web of Knowledge* platform and provides quantifiable statistical data that allow visualization of ISI journals, with no exceptions, and only the full list of the journals, and statistical data on the dynamics of citations (e.g. citations of the articles in the journal, in an annual report, and/or the table including the papers that have cited the papers in the journal).

At the address <http://admin.apps.isiknowledge.com> can be viewed Romanian ISI journals. ISI annually publishes the *Journal Citation Report*, which lists several scientometric indicators. Publishing in an ISI journal means to respect certain international requirements of research and writing, providing the chance of being read and commented on. *Thomson ISI - Derwent Innovation Index* includes data on patents and inventions recorded in 40 countries, including Romania.

It provides an international overview of an invention, including its novelty, its legal owner and its degree of protection. It helps users to identify the progress of technology, reduces duplication of research in a particular field, oversees the global activity of all competitors, develops new ideas, identifies the possible gaps in the market and leads to the patenting of new research. An important role in information services is bibliometrics that monitors and analyzes information resources and provides a knowledge management in a social and organizational context. Providing this information is done by means of bibliometric research, helped along by the librarian – a *guide and leader*, a *mediator of culture and science*, a *creator of links*.

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Excerpt from the list of publication of the authors of indexed articles THOMSON REUTERS ISI-WEB OK KNOWLEDGE at the University in Pitești, in 2013 (inter-, trans-, cross and multidisciplinary papers)

Name	Surname	Institution	Papers' title	Journal	ISSN	Impact Factor (IF)in2013
Savoiu Dinu	Gheorghe Vasile	Universitatea din Pitești Academia de Studii Economice Bucuresti	FOREIGN DIRECT INVESTMENT BASED ON COUNTRY RISK AND OTHER MACROECONOMIC FACTORS ECONOMETRIC MODELS FOR ROUMANIAN ECONOMY	ROUMANIAN JOURNAL OF ECONOMIC FORECASTING, VOL. 16:1, PAGES: 39-61 (THOMSON REUTERS ISI-WEB OK KNOWLEDGE) PUBLISHED :MARCH 2013	1582-6163	0.208
Ciuca	Suzana	Universitatea din Pitești				
Dicu Abrudeanu Moga Bubulinca Plaiasu	Maria Magdalena Marioara Sorin Constantin Adriana Gabriela	Universitatea din Pitești				
Giosanu Vajan Costinel Deliu Neagu Vajan Giosanu Giosanu Vajan	Daniela Loredana Elena Diana Ionica Mihaela Loredana Elena Daniela Daniela Loredana Elena	Universitatea din Pitești Universitatea din Pitești Icsi Rm. Valcea Universitatea din Pitești Universitatea din Ploiesti Universitatea din Pitești Universitatea din Pitești Universitatea din Pitești	RESEARCHES CONCERNING THE TITANIA COATINGS FORMED ON TITANIUM BY PLASMA ELECTROLYTIC OXIDATION	OPTOELECTRONICS AND ADVANCED MATERIALS - RAPID COMMUNICATIONS, VOL 7, ISSUE 5-6, MAI-IUNIE 2013, P. 402-405	1842-6573	0.449
Giosanu Vajan Paunescu Dima Ponepal Brainzea Iosub Soare Draganescu Dinu Pirvu Iosub Soare Rau Meghea Soare Dobrescu Popescu Boeru Savoiu Dinu Manea Manea Savoiu Tase Tase Teti Savoiu Stanculescu Mihaila Anghelescu Ionita Iana Sakthivel Raman Mitu	Alina Romulus Maria Cristina Gheorghita Ion Liliana Cristina Doina Cristina Silvia Liliana Cristina Ileana Aurelia Liliana Cristina Codruta Mihaela Monica Alina Gabriela Gheorghe Vasile Constantin Constantin Gheorghe Adrian Anca Ovidiu Gheorghe G. M. Petre Silviu Vasile Gabriel Arunagiri Natarajan Liviu	Usamv Cluj, Poli-Tehnica Bucuresti Politehnica Bucuresti Universitatea din Pitești Universitatea din Pitești Universitatea din Pitești Universitatea din Pitești UMF, Bucuresti UMF, Bucuresti Politehnica Bucuresti Universitatea din Pitești Universitatea din Pitești Universitatea din Pitești Universitatea din Pitești Universitatea din Pitești Universitatea din Pitești Universitatea din Pitești Universitatea din Pitești Universitatea din Pitești Universitatea din Pitești Universitatea din Pitești Universitatea din Pitești Vhnsn College, India Vhnsn College, India Universitatea din Pitești	THE ISOTOPIC ANALYSIS - A GOOD TOOL FOR VERIFYING THE GEOGRAPHICAL ORIGIN OT WINES	REV. CHI. (BUCHAREST), 64(4), P 414-416, APRILIE 2013	0034-7752	0.677
			ADSORPTION STUDY OF PHENOLIC COMPOUNDS SUBSTITUTED WITH NO2 AND CL GROUPS ON ACTIVATED CARBON	J ENVIRON PROT ECOL, 14(2), P 552-558, APRILIE-IUNIE 2013	1311-5065	0.338
			A COMPARATIVE STUDY OF DIFFERENT METHODES USED TO DETERMINATE THE CHROMATIC PARAMETERS OF RED WINES	J ENVIRON PROT ECOL, 14(3), P 907-912, IULIE-SEPTEMBRIE 2013	1311-5065	0.338
			THE PROTECTIVE ROLE OF MALVIDIN ON THE HEMATOLOGICAL, BIOCHEMICAL AND HISTOPATHOLOGICAL PARAMETERS OF MARSH FROG(PELOPHYLAX RIDIBUNDUS) EXPOSED TO SUBLETHAL DOSES OF ROUNDUP	FARMACIA, 61(3), P 439-447, 2013	0034-7752	1.251
			ANTHOCIANIN AND CARBOHY-DRATE CONTENT IN SELECTIVE EXTRACTS OBTAINED FROM BLACK GRAPES VARIETIES	REV. CHIM. (BUCURESTI), 64(10), 1078-1082, 2013	0034-7752	0.677
			THE EFFECTS OF SOME PESTICIDES ON SPORE GERMINATION AND GAMETOPHITE DIFFERENTIATION IN ATHYRIUM FILIX-FEMINA (L.) ROTH. AND POLYPODIUM VULGARE L.	NOT BOT HORTI AGROBO, 41(2), 458-462, 2013	1842-4309	0.476
			METHODOLOGY FOR CALCULA-TING A COMPLEX INDEX FOR ASSESSING THE PRESURE OF REGIONAL INDICATORS ON PUBLIC ADMINISTRATION	TRENSYLVANIAN REVIEW OF ADMINISTRATIVE SCIENCE, ISSUE 40E, P. 16-22, OCTOMBRIE 2013	2247-8310	0.532
			ECONOFIZICA: CONTEXT SI APLICATII IN ECONOMIE, FINANTE SI SOCIOFIZICA	AMFITEATRU ECONOMIC, NR. 33, P. 217-220, MAI 2013	1582-9146	0.838
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