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HOW TO EVALUATE UNIVERSITY PERFORMANCE*

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Abstract

The capacity of Library Science to produce knowledge in such an information system as the decision-taking process in scientific policy, is highlighted by the assessment of University teachers research activity, as recently performed in Spain. The social environment of written communication has been stated, noticing the controversy on scholarly productivity concentration and some key concerns in the analysis of citations as quality indicators. Different meanings of the term "quality" are studied and analysis of the relationships within bibliometric indicators and non-bibliometric data has been undertaken. From the investigation of an important information source in research areas, it is advanced the adequacy of dialogue in complex situations where problem solving oriented librarianship work shows defined features of a post-hoc rationalization of events.

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HOW TO EVALUATE THE UNIVERSITY PERFORMANCE

Enrique WULFF BARREIRO. IFES-Andalucia

MIT were after me. They wanted me to help them rule the world (The Beatles, in the film 'Help')

Spain has not arrived to give an image of quality
(A General Motors Executive)

I. Introduction

The American Library Association (ALA) stated in a biannual report, last year, intitled "Less Access to Less Information By and About the U.S. Government": Since 1982, from the sixteen thousand official publications one out of four has been removed", foreseeing "an acceleration of the current tendency to commercialize and private the government information" [1]. The automation of USA University Libraries has provoked that, as the search for information has been increasing its costs, what was public and freely accessible to all sorts of people has become commercialized, and private. On the pages of Science, the journal of the American Association for the Advancement of Science (AAAS), one can read: "commercial pressures and heightened competition are testing the notion that scientific data and materials should be widely shared" (25 May 1990) [2]. This is the present-day framework used for the estimation, from bibliographic criteria, of the evaluation standards used to measure, in Spain, the research activity of University teachers as stated in the Governmental Order, 5 february 1990 [3].

II. Data

Theodora Hodges, Ph.D. (Library School, South Hall, USA) supplies a certain number of answers from editors of scientific journals to questions on citation practices [4]. The physicist R. Powell (Annual Reviews) says that references are important because they appear in the index of the journal; the biologist J. Pettigrew finds that references are a good clue to worthwhile papers, and "especially to whether it's suited to the particular journal in question". The geneticist M. Lerner (Evolution) pointed out that paper's references are useful as a quick subject guide; and tremendously helpful in "picking suitable referees". This last suggestion was rejected by the librarian of the California University (Berkeley) R. Dougherty whose opinion is that "references don't help in deciding to whom to send a paper for refereeing". M. Protter's (Bulletin of the American Mathematical Society) opinion is that, occasionally, there's a certain editorial correspondence on references as when is asked if an author knows about a certain paper. Ironically in regard to written communication, physicist Emilio Segré (Annual Review of Nuclear Science) emphasizes that in Italy clarity, the main concern of an annual scientific journal editor, is more extensively implanted because all student examinations are oral!

Bensman [5] mentions the case of Sharon Johnson, a biochemist who was denied tenure at the University of Pittsburgh and charged sex discrimination. R.E. Davies, Benjamin Franklin Professor of Molecular Biology at the University of Pennsylvania, J.S. de Cani, chairman of the Department of Statistics at the same University, and N.L. Geller, an assistant professor in the latter Department, relying on the support of Derek J. de Solla Price, used Science Citation Index [6] data to construct a mathematical model, and with it they demonstrated that Johnson's citation rates were significantly higher than those of two men in her Department who had been promoted and given tenure. Nevertheless, the usage of citation frequency as a scientific quality indicator is liable to controversy. Sometimes, scientific establishment has openly showed its hostile objections against citation analysis believing it to be a certain evaluation of the work they do, undertaken by people outside the specific discipline and whose biased results are suspected to produce a radical redistribution of scientific resources. In this regard, data from Hagstrom are worthwhile when he comments that in a survey of scientists (mostly biologists and medical) 72 per cent of more than three hundred answered "always" to the question "In scientific or other professional papers about work to which you have made some contribution, is proper credit given

to your own contribution by means of authorship or acknowledgement?" [7]. In the case Johnson v. University of Pittsburgh, the results above mentioned drew such descriptions as "premature", "a product of methods whose reliability in individual cases has not been shown", or "frightening". Much of this criticism has focused on the nature of citations; Cole & Cole who developed a technique of weighting citations - note that available data suggest the use of citation counts as reasonably reliable indicators of the quality or the impact of a scientific research, and they don't consider citations as a measure of the absolute quality of work, emphasizing current citations as an adequate measure of the quality of work socially defined.

III. Quantity and quality of scientific production

It must be noted that the measures of association between productivity - the total of each scientist's count of papers produced in the preceding three years - and other variables, according to Hagstrom (who considered publications as the most important component when determining the prestige of an University Department), have to be cautiously [7]. Defining the impact factor, with Narin & Moll, as the average number of citations received by an article during a specified period [10]; the usage of the instruments of science, objectives and quantitatives as they are, with regard to itself, has provoked strong criticisms - that talk about 'numberology' -, nevertheless, it isn't a case of mysticism but of numeric sciences showing us that there would be a significant correlation between qualitative solidity and quantitative solidity [11]. The misunderstanding takes the form of supposing an empirical finding that the elite in a research context (books, papers, reports statements, studies) - or anywhere else -, as measured by reasonable standards of quality or utility, represents some fixed proportion of the total population [12]. It would be necessary, to have a thorough knowledge of the context in which a citation is done, to take advantage of written communication condition as a process of social communication of information, what leads to the use of inductive impact models [13], thus suggesting the call in question of the 'transmission' notion.

Moravcsik and Murugesan, with a content analysis of citation requiring the reading of the primary source text, settled a citation typology of the contexts in which references are made [14], that Chubin & Moitra used to compare the results thus obtained with respect to the counts made by SCI, searching "to clarify the status of citation counts as a measure of quality or impact in science" [15], with confirmatory outcomes.

IV. Communication in science and quality assessment

Quality assessment is an action-oriented option, it consists of information supplied to be helpful in solving evaluation problems in communication processes. In value-added terms, a great quantity of value would be added to the considered information units [16]. The term quality would be considered with two meanings: internal quality of a work or estimation of its scientific value, and new ideas or "new knowledge" or innovation the work implies [16]. For example, to consider a patent as a kind of "new idea" would give, in I&D, an indication of the relationship between quality and quantity by correlation of the growth rate the amount of patents presents and the scientific and technical literature growth [16].

When the evaluative work on research quality in academic milieu draws from expert panels, the elite scientific peers, it has been demonstrated that two different components are involved, the number of publications and the "influence per paper" (according to the influence methodology developed by Computer Horizons Inc. (CHI), that puts quality in terms of weighted citation counts, with weights based on the prestige of the citing journals (determined by interactions [17])). The objectivity of this quality filtering is dubious because, it has been presumed, the global prestige of a University influences the ratings of its own Departments. Otherwise, the use of citation analysis as an instrument for the evaluation of research quality has been criticized as a simple visibility indicator (a consequence of personality, reputation, author's position in the social academic structure; the Coles places the awards visibility as a function of the number of recipients, scope, money, quality of work of recipients, being these factors of diverse degrees of relevance [9]), a function of the publication with minimal possibilities as a measure of the research production.

The comparison between expert judgements and bibliometric indicators in order to evaluate the research performance provides, in the case of the pharmaceutical industry - where marketed drugs

suppose a simple and objective of the approval pharmaceutical innovation -, enlightened suggestions [18]. By compiling the citation data from Science Citation Index, by scoring the specific productivity rates of the pharmaceutical companies, and by sending questionnaires to a panel of experts (in regard to the criteria of creativity, contribution, commercialization and basic research), the conclusions points to support the fact that bibliometric indicators are as good, if not probably better, as expert judgements when predicting research performance.

Anyone who undertakes the evaluation of the validity of a specific work and who is not used to decide what should be published or who should be promoted is in the correct place, at least in what concerns industrial and scientific research, to carry it out with precision. The information analyst, who is present in the emergent market for information specialists [19], going beyond the labour of provision of state-of-the-art summaries relevant to the work of the research team to which he belongs, could identify publications as being methodologically valid and also as containing new knowledge. This way another quality filter would be added to the information system.

V. University Research: Statistical evaluation

The display of the relationships between short-term impact (operationalized in citation counts) and the visibility of the research groups at the research front, when it's based on a definition of scientific quality including the degree to which researchers successfully perform "public relations" activities (such as awards, international contacts, invitations to take part in important conferences) as well as the basic quality in its triple meaning cognitive quality (importance of the specific content of scientific ideas), methodologically quality (accuracy of methods and techniques current in a particular scientific field) and aesthetic quality (the controversias question of the attractiveness of mathematical formulation models) - supposes, at least, two different kind of results [20].

An approximation to the real influence of the research activity on its specific surroundings, meaning by this that the research peers do have the opportunity of consider the basic quality of that research, starts by choosing the adequate unit of research activity, a question that determines the relevance of productivity and impact analysis in what concerns university research policy.

The use of Journal Citation Report (JCR) by ISI (Philadelphia) in order to construct average counts of citations received by all the papers published in the journals where a research group publishes, for a comparative interpretation with the "actual" number of citations per publication a research group receives, complemented by an indication of the impact levels that present the journals in which the group has published, is a procedure that, by judging optimal tñe research group as an unity, was intended to neutralize the disturbing factors (such as, a mechanical interpretation - in impact terms - of the differences between citation counts for groups working in different fields, a change in citation practices into the own fields, ISI diverse editorial actitudes) that would reduce, otherwise, the validity of bibliometric indicators in that for which they were devised [20].

Now, the actual utility as a guide in what concerns the relative quality of scientific journals supposed to the impact factor (according to ISI) has become so dubious that it has been considered an uninformative derivation measure of the uncorrected citation rate (when searching to determina the qualitative effect of the journal on formal communication in science), as in the case of visibility index [21].

It's derived from these viewpoints that both the circumstances and the conditions in which the publication of the journals and the intellectual reception of its contents are realised, are constituent parts of the citation rates the journals receive. The combination of bibliometric data and non-bibliometric data (i.e., for example institutional data), the valuation of the visibility's influence underlying impact factor and thus the estimation of impact factor as a relevant aspect from which investigate the intensity employed by researchers in order to make their results known to colleagues, provide a meaningful basis for a dialogue between research policymakers and the researchers of various University groups in order to interpret the bibliometric results as relevant factors to policy.

VI. Qualitative study: impact factor and quality. The journal 'Science'.

To pose that the amount of citations received by a publication could be a valid representation of its utility for readers (scientific colleagues), as well as half a century ago, based on the idea that it's a

common thing to rely on previously published papers when writing an article [22]. Let's consider 'Science', a major information source, specific to research fields, from which scientists elaborate its reference lists, and let's study this journal, between 1980 and 1988, in order to reveal the possible relationship between quantitative indicators and the quality of the scientific contents. The research results available to the international scientific community via scientific journals compete with each other this way, using utility as their pretext. In this 'intersubjective' order the position attained by a published scientific work outlines the strength with which an information unit shifts usable knowledge in the research milieu. Studies concerning 'Science', starting from the evaluation of 27.892 citations between 1978-83 received by the 1.639 publications issued in 1978, show that, the initial utility of a specific publication decreases by "absorption" of (parts of) this initial usefulness as a result of the mechanisms of competition [23]. This judgement of usefulness, collectively established by the scientific community, seems to be well represented by the amount of received citations, a process similar, in this respect, with political elections (in the European political system, for example).

From data in the Table below, it could be considered that the annual citation rate (number of bibliographic citations obtained per citable paper and year) drops because the annual relative increase (positive) of the amount of bibliographic citations the journal receives - i.e. BC, Bibliographic Citations - is less than the rise of the total sum of the papers published in the period under consideration (citable papers, ART); in its turn, the impact factor (ISI) rises, reaching more than its double [24]. Consequently, as the two numeric computes don't present convergence, and when the reasons for this fact are pursued, the visibility effects which influence the impact factor point out to the non-bibliometric data. It's possible that the number of subscribers - 160.000 -, the amount of databases collecting the papers the journal publishes - 39 -, and the figure of SDI services disseminating them, are all relevant aspects to this proved influence [25]. The amount of annually published papers during 1980-88 shows a decreasing tendency, of course due to the conception of the editorial product. It may be that, in the case of the journal under analysis, this decision seeks to avoid a situation of saturated demand.

VII. Starting from ill-defined problems

It's possible that the introduction of a change in a management information system like the decision-taking process in scientific policy as a result of the evaluation of the research activity may have to be accompanied by the need of making use of a process of negotiation, consultation, and confrontation with which a change agent is faced in an organizational setting. The problem-solving management perspectiva becomes necessary in order to understand the more political concerns in an organization, it's an specially relevant approach when problems are ill defined [27].

The political model of an information system in its organizational aspects is not adapted to make from it simplist inferences, otherwise it emphasizes that the organizational contexts are complex situations. one question that makes the work enormously complicated consists in that those who design the information system are entangled, during the process, in the informal system (as opposed to the functional model of the organization, the formal system). To pay attention to the bibliometric data as an important base for dialogue, in a problem solving negotiation process, includes to pay attention to non-bibliometric data issued from the organizational context of the research. It's not a strange activity to those that have introduced the idea of service studies, of empirical studies aimed to make a service better, thus proposing a positive and empiricval model of science in Librarianship [28].

The defence of value statements in written communication studies have an already prolonged tradition, possibly of little usefulness in order to produce knowledge. Arguments of this sort confronted on the question of running modern academic libraries, those that would recommend the professional library work to scholars/librarians and those who would let it to a business manager/chief librarian [28]. The presumed refutation, on the basis of the status quo defence, (including an elaborated model), of the empirical data on circulation of library materials in academic libraries presentes by a study of the University of Pittsburgh, points out an invalidating action with no relationship to knowledge production but rather with simple personal opinions [28].

VIII. Final Report

Norbert Wiener, father of the Cybernetics, cautions against the danger of wasting the notions

derived from information due to a mercantile attitude in its concern [29]. Perhaps this kind of factors could be checked on the excluding choice of certain pinpointed international criteria for evaluation of the publications quality.

It must not be forgotten that, recently, a prestigious research business, like Unión Musical Española, has not only didn't follow an information technical dissemination process through a musical documentation centre (at the INAEM, Spanish national institute for dramatic and musical arts), but also has it succumbed to an uncontrolled selling dynamics, with tones being destroyed as old paper [30].

TABLE

Title: Science Pounded: 1880 Suscriptors: 160.000 Databases: 39

l	11	iii	iv	v	vi	vii	viii	ix
1980	1.023	1978-80	3.061	1980	7.075	62.929	11.633	1978-79
1981	1.077	1978-81	4.138	1981	6.658	64.355	12.861	1979-80
1982	988	1978-82	5.126	1982	6.644	80.867	14.294	1980-81
1983	967	1978-83	6.093	1983	6.155	74.354	15.296	1981-82
1984	898	1978-84	6.991	1984	5.905	76.357	16.048	1982-83
1985	831	1978-85	7.822	1985	5.512	86.360	20.328	1983-84
1986	803	1978-86	8.625	1986	5.399	91.449	21.504	1984-85
1987	813	1978-87	9.438	1987	5.517	97.700	23.372	1985-86
1988	859	1978-88	10.297	1988	5.472	106.393	26.596	1986-87

x	xi	i	xii	xiii	xiv	xv	xvi			
							n	n-1	n-2	
2.038	5,708		1980 5,4	20.558	1.904		3,0	376	352	215
2.062	6,237		1981 5,0	15.552	1.968		3,0	400	376	251
2.100	6,807		1982 4,9	13.825	1.972		2,7	420	374	267
2.065	7,407		1983 4,8	12.203	2.003		2,6	492	421	286
1.955	8,209		1984 4,7	10.922	2.197		2,8	582	582	273
1.865	10,900		1985 4,2	11.040	2.288		2,6	501	648	324
1.729	12,437		1986 4,2	10.602	2.180		2,3	510	505	393
1.634	14,304		1987 4,1	10.351	2.216		2,2	555	481	321
1.616	16,458		1988 4,0	10.332	2.714		2,5	589	689	438

xvii			
	n	n-1	n-2
	61,025	61.599	58.705
	62,387	60.625	58.806
	68,895	61.967	61.708
	72,351	68.403	60.739
	74,160	71.769	68.313
	84,072	73.659	71.703
	82,824	83.670	73.655
	88,262	89.233	83.694
	103,679	96.397	89.126

KEY FOR THE DATA:

I:	Publication year;
II:	Published papers [ART];
III:	Editorial period;
IV:	Citable papers [Summ.ART];
V:	Citation year;
VI:	Citing journals according to JCR;
VII:	Total bibliographic citations [CB];
VIII:	Citations to citable papers [cb];
IX:	Citable papers publication years;
X:	Citable papers [art];
XI:	Impact factor [cb/art];
XII:	CB/cb;
XIII:	Citation quotient [CB/Summ. ART];
XIV:	Selfreferences;
XV:	Selfreferences [%];
XVI:	Selfreferences;
XVII:	Heteroreferences

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