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Analysis of Scientific Activities in the Field of Information Science: the case of Croatia

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Abstract: The journal is the basic medium of scientific communication and one of the most widely used sources for bibliometric analysis. In this paper, we will address the scientific activities in the field of information science in Croatia by means of bibliometric analysis of 1418 papers published in social sciences journals listed as references for promotion of scientists through academic ranks in the field of information science. Based on a list of scientific journals and specificity of scientific publishing in national and international scientific journals we will show trends of scientific activities. When it comes to the evaluation of scientific papers it is not the same whether the paper is published in national or international journals. A paper published in a national journal in native language is not evaluated the same (no matter how highly rated paper is) as the paper published in an international journal. For small countries and their languages (which we certainly belong to) an important indicator of the value of the journal is its representation in relevant databases. The possibility that a journal published in national language by an undersized publisher from a small country will enter relevant databases is certainly not the same as in cases when the journal is published in English by a large publisher from a country with strong scientific tradition. The majority of countries where English is not native language seek representation, visibility and recognition through its scientific production in citation indexes. This recognition is measured by the presence of national journals in citation indexes.
By the analysis of SSCI, which consists of journals from around the world and all disciplines, we will show the dominance of journals published in English speaking countries and also journals published by major publishers. So actually national journals whose publishers are "small" have no chance of survival because in the evaluation of scientific excellence needed for the academic promotion they have "little" value and are thus avoided by scientists. If we are planning to stimulate our own scientific production in our national language it is necessary to set the criteria which will particularly evaluate

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papers published in national language when planning scientific policy and the development of science.
The purpose of this study is to highlight the need for a new evaluation model and stimulate scientific research in the field of information science in the national context.

Keywords: bibliometry, information sciences, assessment, scientific publishing

1. Starting point: Information Science

Since narrow area of interest of this paper is scientific activities in the field of information science in Croatia by means of bibliometric analysis of 1418 papers published in social science journals listed as references for academic promotion in the field of information science. It is important, therefore, to say something about the development and current status of information science in Croatia.

In 1983 the University of Zagreb not only approved the status of information science as absolute scientific field, but also accepted the theoretical core of information science which includes following basic disciplines (Tuđman, m. 1990, p. 12): science of information, systems theory, theory of information systems, decision-making theory, communication theory, structuring and organization of information, database design, information-documentation systems, classification theory and semiotics. Scientific field of information science in Croatia was established by opening the postgraduate study (The first postgraduate study of information science in Croatia, and the first of its kind in the world, offered in 1961) at the Centre for the Study of Librarianship, Documentation and Information Sciences (CSLDIS) where first master theses and later in 1978 doctoral theses were done. Since information science was a new scientific discipline and first needed a certain number of PhD personnel to open graduate studies, graduate study at The Faculty of Humanities and Social Science at the University of Zagreb was offered in 1985. This graduate program in information sciences offers following study programs: archival, librarianship, museology and general information science (those the studies are the same as disciplines of information science in the official classification of scientific fields and disciplines provided by Croatian National Science Council. Narodne novine, 2005) This historical overview spoke about "young" life of a scientific community. Today 172 scientists are active in the field of information and communication science (Croatian Scientific Bibliography).

By national classification in 2009 the field was expanded, and today it includes information and communication science and has 11 disciplines: archrivals and documentation, information systems and information science, librarianship, communication, public relations, lexicography and encyclopedias, museology, mass media, organization and information technology, information and software engineering. All the disciplines are covered with journals that were created as professional journals and have undergone a difficult path to become established as scientific journals and enter international index bases. All of these journals (Vjesnik bibliotekara hrvatske, Muzeologija, Arhivski vjesnik, Informatologija, Medijska istraživanja) have a low circulation and low funding for their

publication. They are published because the community of 172 active scientists publishes their papers in these editions.

From the data of the Croatian Bureau of Statistics, we can conclude that the ratio of the information science scientific community in Croatia, measured by the number of doctoral dissertations is 2% of the total number of doctoral dissertations done in Croatia. The number of doctoral dissertations in other social science disciplines is 15% of the total number of doctoral dissertations done in Croatia. This point to the conclusion that there is a small number of active scientists even for a "small" country. This also means that there is a small number of publishers who publish publications for such a small community. Regulations that do not stimulate the printing of publications in their own language further obliterate such a small publishing production. If only papers published by foreign publishers and international journals, mainly in English, are valued for the academic promotion in order to be recognized in the world community, and the publication done in their own language is not valued at all or only to a small amount, who will provide paper for these journals, if this paper (regardless of quality) is not valued.

Scientific policy is always determined also by the evaluation of scientific research paper that is based on published papers and publications in which the papers are published. First evaluation is through peer-review process. Major critic of peer-review process said that peer-review process is not necessarily objective or at least it expressed doubt about the objectivity of various reasons (Hermon and Schwartz, 2011). Therefore bibliometric process is considered as by far most objective because it is measurable and therefore it is more objective than peer-review process. National Science Councils establish the criteria by which rules for the methods and procedures of the evaluation of scientists are determined.

This is always related to the nature of scientific field, communications in the field, paper types, publications in which they were published and the databases where the journals are indexed. As science does not or should not have a national character (just national topics and issues that may not be interesting to a wider international scientific community), and the results of scientific research should be widely available, we turn to the criteria that would be an incentive to achieve these goals. To be recognized in a large international scientific community is the purpose of every scientist and national scientific community in the field scientist belongs to. However, not all scientific disciplines are in the same position with regard to the world's interest and therefore the possibility of publishing papers in prestigious journals that are indexed in particularly significant databases such as Thomson Reuters Web of Science (WoS). On the other hand, the question is whether WoS has a good coverage of the social science journals. The possibility that a journal published by undersized publisher from a small country in national language enters the relevant databases in relation to journals published by a large publisher, which are

published in English in a country with strong scientific tradition, is certainly not the same. The majority of countries where English is not native language seek representation of their own scientific production through the citation indexes in order to be visible and recognizable. This recognition is measured by the presence of national journals in citation indexes. However, the question remains what is the role of national indexed journal that publishes papers in national languages. As we decided to investigate the situation in the field of information and communication sciences which are by the national classification a part of social sciences, it is also important to see whether journals are basic medium of scientific communication in social sciences, more particularly, in the field of information and communication sciences.

2. Source of data

For the research we used a base of papers (1418 papers) from Agency for Science which performs the election to scientific (and academic) titles for certain areas. We followed elections to scientific titles for a period of four years in the field of information and communication science in order to determine the types of papers that were basis for the elections, and we also determined in which databases those papers were indexed. When evaluating papers for promotion, as prescribed by the regulations, it is not the same whether the paper is published in national or international journals, or whether the national journal is indexed in a relevant database. Publishing a paper in a national journal in native language is not valued the same (no matter how highly rated paper is) as publishing the paper in international journals. The list of relevant databases is defined by the University Council for the social sciences and humanities. It should be said that we have decided to do this analysis because the Ministry through the National Science Council is preparing a new Regulation for the promotion of scientific titles, whose task is to set up such criteria that would encourage scientists to publish their paper in international journals that are indexed in the WoS database.

So far Rules for the election to scientific titles in the field of information and communication sciences determined the following parameters relevant to the election:

- minimum number of papers (in two categories, a1 and a2) that the candidate must have
- features of internationally recognized journals or publications
- features of scientific paper (what is considered to be a scientific paper)
- under what conditions books are evaluated
- share of the contribution of individual authors in the paper. (Appendix 1)

Also, the Regulations defined bibliographic databases that are taken into account in the evaluation of papers in the category (a1) for promotion to scientific titles in social sciences:

Current Contents, Web of Science (SCI, SSCI, AHCI), ABI/INFORM, ASSIA – Applied Social Sciences Index and Abstracts, BIOSIS Previews, CAB Abstracts, Caredata Abstracts, Computer and Information Systems Abstracts, Criminal Justice Abstractas, Criminal Justice Periodical Index, CSA – Cambridge Scientific Abstracts, Current Law Index, Current Legal Theory, DOIS – Documents in Information Science, EconLit – American Economic Association's electronic database, ERIC – Educational Resources Information, European Legal Journal Index, Francis, Geobase, Human Resources Abstracts, IBSS – International Bibliography of the Social Sciences, Index to Foreign Legal Periodics, Index to Legal Periodicals, Information Science Abstracts, International Labour Documentation, INSPEC, ISI Proceedings, Journal of Economic Literature, LISA – Library and Information Science Abstract, MEDLINE, NCJRS – National Criminal Justice Reference Service Abstracts Database, Neue Kriminologische Literatur, PAIS International – Public Affairs Information Services, Population Demographics, PsychINFO, PsycLit (Psychological Abstracts), CSA – Social Services Abstracts, Sociological Abstracts, Worldwide Political Science Abstract

With listed bases Council wanted to solve the problem which papers belong to category a1. However, it is not a good solution because bibliographic database in the new paradigm of the availability of scientific information and their selection no longer has the role they had before the appearance of full-text journals and general availability of digitized papers.

Specifying base CC for this purpose is unnecessary because access to the actual content is not possible. Information from this database may be useful in case we want to explore the impact factor of conferences, i.e. their citations. But it is not irrelevant to note that so far in Croatia nobody has legal access to those data and contents of this database because it is a commercial product we not subscribed to.

From 1418 papers that we used for analysis and sorted them by categories determined by the Regulations for scientific elections in different scientific fields, the following data (see table 1) are retrieved:

- In the four years (during the term of the committee for the election for scientific titles) 121 scientists have passed elections.
- For their election 1418 papers were needed.
- Total of elected scientists were: 62 assistant research fellows, 39 associate research fellows and 20 senior research fellows.

Table 1: Election of scientist for scientific title in the period 2009 to 2012

Scientific title	No. of scientist	No. of A1+A2 papers	Average of A1+A2 papers
senior research fellow	20	500	25
associate research fellow	39	546	14
assistant research fellow	62	372	6
Total	*121*	*1 418*	

To be elected in the title *senior research fellow* it is necessary to have 10 papers categorized as a1 papers and 15 papers categorized as a2 papers or a1. In the four year period (from 2009 to 2012) 20 *senior research fellows* who have undergone selection had a total of 500 papers categorized as a1 and a2. To be elected in the title *associate research fellow* it is necessary to have 6 papers categorized as a1 papers and 8 papers categorized as a2 papers or a1. In the four year period 39 *associate research fellows* had a total of 546 papers categorized as a1 and a2. To be elected in the title *assistant research fellow* it is necessary to have 3 papers categorized as a1 papers and 3 papers categorized as a2 papers. In researched period 62 *assistant research fellows* had 372 of a1 and a2 papers. This makes a total of 1418 papers.

Distribution according to the publication type of these 1418 papers was as follows.

- Author's books: 35
- Book chapters: 32
- Journal articles and review articles in CC journals: 22
- Scientific conference papers with international peer-review: 890
- Scientific papers in other journals: 274
- Other papers in other journals: 59
- Other conference papers with peer-review: 62

Scientific activities in the scientific field can be obtained by bibliometric method. Bibliometrics as a quantitative method of bibliographic units and written communication in science and knowledge representation in our study showed that scientific communication in the field of information science in observed period took place largely through conferences / international conferences and papers that have been printed in the Conferences Proceedings.
For information science conferences are one of the important ways of publishing scientific papers in extenso with international peer-review. The speed of the

development of technology demands publishing in publications with a shorter publication time than the classic journal. Scopus base selectively indexes elite conferences that publish proceedings with full text peer-reviewed papers as serial publications.

Full text papers from the conferences, especially the international conferences and especially if it is a plenary presentation, certainly has meaning for such a growing area. Indeed, many recognized international journals occasionally publish full text papers presented at scientific conferences. For Information Sciences, full texts in the form of a paper published in the Proceedings of scientific conferences, with an emphasized international peer-review, have great significance. In fact, in some sub-disciplines of information science which are very dynamic, the obsolescence of data and knowledge occur because the time difference between the acceptance and the publication in the journal is often more than two years.

A small number of papers represented in CC journals reflect primarily small numbers of Croatian journals in index database as well as English as a third language, i.e. a second foreign language, for older generation of scientists (for many of them their first foreign language was Russian, German or French). On the other hand it is very difficult to determine who is indexed in the database when they are not available because they are mostly commercial products for which we have no subscription (Croatia has subscribed to a small number of bases or to parts of some index bases). Only a list of indexed journals is publicly available, and to what extent and which papers are indexed is not visible and verifiable for us.

Proceedings, International and Croatian could be indexed in Conference Proceedings Citations from Thomson-Reuters but since we have no subscription for this base we could not verify. Quotation of CC base for this purpose is unnecessary because access to the actual content is not possible. Information from this database may be useful in case one wants to explore the impact factor of conference papers, in terms of citations.

Nowadays if contents of the journal are not available (in the open access), they should not be significant to scientists. So the question is who are we writing for if contents are not available?

3. Citation databases as instruments for evaluation in the Croatian scientific community

In Croatia, scientists have access to citation databases (but not complete) through Web services Web of Science.

Analysis of SSCI, which consists of journals from around the world and all disciplines (2700 journals from the social sciences and over 3800 journals in

sciences and applied sciences) we established the dominance of the journals from English-speaking countries and large publishers.

In the database 10 Croatian journals in the field of social sciences are indexed. These are:

- Collegium Antropologicum - SSCI
- Društvena istraživanja - SSCI
- Ekonomska istraživanja-Economic Research - SSCI
- Kinesiology - SCIE, SSCI
- Ljetopis Socijalnog Rada - SSCI
- Odgojne Znanosti-Educational Sciences - SSCI
- Revija za Socijalnu Politiku - SSCI
- Sociologija i Prostor - SSCI
- Suvremena Psihologija - SSCI
- Zbornik Radova Ekonomskog Fakulteta u Rijeci-Proceedings of Rijeka Faculty of Economics - SSCI

If we count the number of journals indexed in the database WoS (for social sciences areas in which scientists in the field of information and communication sciences can publish), we could conclude that WoS database opens opportunities to publish in national journals, moreover, in Croatian language. Publishing in Croatian creates a barrier that most fields of social sciences remain largely isolated from the relevant European and world community. If one wants to take as a criterion of excellence papers indexed in WoS and if one wants to get the international recognition it is necessary to provide measurable criteria for the status of a particular journal (IF, IF status within the range of the quartiles and median, h-index). However, if scientists are not encouraged to write and publish in their own language then they will neither develop terminology nor spread ideas and research results in the wider contexts of society which is the role of social science. Finally it should be said that science and research are funded by the Croatian citizens and we are obliged to give back at least a part of our work to them and to give back in language they can understand, and this then should also be evaluated for scientific promotion.

We can say that the Web of Science database is not equally relevant for all social sciences because this database does not contain at least one journal in the field of information and communication sciences, and thus it is questionable whether these database a good element for the evaluation of scientific activity in the field. SNIP and SCImago Journal Rank take into account differences in citation of various disciplines and are more appropriate and far easier to use than WoS and JCR (Journal Citation Reports), and are also available free of charge so their application is not dependent on the source of funding. They are based on the base Scopus.

As our research shows, for information science conferences were one of important communication channels. The speed of the development of technology demands publishing in publications with a shorter publication time than that of the classic journal. SCOPUS base selectively indexes elite conferences that publish proceedings with full text peer-reviewed papers as serial publications.

Another question should be raised and that is: is the interest of information and communication science, which is also their research topic, to be available through the new media free of charge and in open access and encourage such publishing and dissemination of scientific ideas and research.

A group of scientists at the beginning of the year announced Croatian declaration about open access that is accepted by the Senate of the University of Zagreb and the Ministry of Science and Technology. One of the fundamental principles stated in the Declaration is: "Methods of evaluation in science should not be an obstacle to open access". And especially: "We should encourage the establishment of evaluation criteria based on the scientific quality of the paper and which do not even implicitly prefer traditional publishing and closed roads of publishing". However to exclusively insist on traditional databases discriminates journals published in open access. On the other hand, the European Commission through the FP7 program encourages (and in some disciplines even conditions) publishing papers in open access. So, in a recent collection of statistical information the European Commission in the questionnaire asked information about the number of papers written by scientists at the Faculty published in the open access, individually in gold and green model. Without publications in open access journal and the collection of such information the University will not be able to respond to future requests for statistical data required from the European Commission.

The purpose of this study is to draw attention to the need for a new evaluation model and stimulate research in the field of information science in the national context.

In this context, in the development of initial assumptions for the development and transformation of the University of Zagreb in the chapter Science and Research it is written: "In this respect it is important to stimulate and support local scientific publications and their affirmation at international level, PARTICULARLY ENSURING THAT CROATIAN LANGUAGE BE OPTIMALLY PRESENT IN OUR RESEARCH AREA. I think that there is no need for any further arguments why it is necessary to count and evaluate scientific publications in the Croatian language. We owe that to all the citizens and taxpayers who largely financed our work.

Reporting, management and participation in international research projects and conferences is an indicator that the scientist created opportunities for scientific research in its wider environment.

The question is: what is the difference if open access journal (contrary to WoS base), which allows scientific papers to be publicly available as full texts, would be evaluated based on the number of citations that journal received, and also based on the type of citations received (different types of citation: self-citations independent citations, etc.) become an indicator of scientific activity?

If we already count the citations and we want to have "ID of scientists" there is no reason not to search the h-index (10i-index, etc.) of scientists in all three citation databases: WoS, Scopus and Google Schoolar. What is the general purpose of the classification of these papers in the highest category, if not their citation or impact in the relevant scientific community?

4. Final discussion

Classification of journals for the purpose of evaluation for the scientific titles as an indicator of scientific activity always starts from the viewpoint that it is necessary to ensure transparent reporting that will not unduly burden the administrative scientific community, and also that will not get into "conflict" with the system of categorization of papers in the categories a1 and a2, which are used in the election for the scientific titles. So we think that all papers should be evaluated regardless of whether they are represented in the relevant international bibliographic databases or in open access journals.

Croatian scientists from the field of social sciences, when publishing their research in journals indexed by WoS, come at best to the median JCR subject area. Only a few Croatian scientists publish in the most prestigious journals, which in our case should be journals above the median of JCR subject area.
We think that if scientific policy wants to evaluate papers published in scientific journals, then it is really advisable to categorize the journals that are indexed in citation databases WoS and Scopus, depending on their position in the subject category and thus above the median that is quartiles 1 and 2 (Q1 + Q2). Specifically, Croatian journals from the social sciences and humanities are present in representative manner in these two global bases that are commonly used for the evaluation and comparison on global level. We suggest that journals that are not indexed in these databases should go in the second group, and possibly in its subgroups. At the same time the most important factor should be the availability of full text papers in open access. For each journal, particularly for papers, the most crucial thing is not where it is published, but whether it is widely recognized, read and cited, that should be the purpose of such "ID of scientists"

When we include papers published in proceedings of international scientific conferences in promotion of scientific titles and evaluation of scientific

researches we believe that rules should not completely discourage publication of preliminary results of the research, as well as the exchange of experiences, which is for the scientific community regularly performed at the conferences. In doing it, we should not neglect indexing in relevant databases (Web of Science - CPCI and SCOPUS) as a condition for evaluating this form of scientific activity. Research books in social sciences and humanities, with papers in scientific journals are a key communication channel. In these areas of science publishing scientific author's books are a part of the identity of researchers and institutions. This type of scientific communication channel certainly should not be neglected in prescribing conditions for the evaluation of scientific publications and also in promotion of scientific titles.

If scientific policy wants to evaluate and categorize author's books and chapters in editorial books then more acceptable division for social sciences and humanities can be applied, for example: books published in the world's languages recognized by the prestigious publisher (every scientific field can give a description of the publisher), books published in Croatian whose importance is of national interest, as it can be proved by peer reviews and etc.
Traditionally, European scientific community evaluates the writing of scientific monographs and university textbooks. Moreover, it can be said that the "mission" of the university professors is to provide appropriate literature, adapted to local / regional needs and circumstances, and should also be published in Croatian. In this way it contributes to: a) affirmation of "small" languages b) prevention of the absolute domination of literature from English-speaking countries and c) the introduction of professional / scientific terminology in "small" languages. Bearing in mind that the above mentioned type of publications are usually not adequately paid, the abolition of the evaluation for the promotion in scientific titles may lead to a situation where in a few years there will be no local contemporary university textbooks. Furthermore, in European scientific community the writing of a monograph is considered obligatory, especially for young doctoral students, in order to ensure their visibility in the scientific community (Austria, Germany, Switzerland ...).

When evaluating scientists it is important to take into consideration the number of years one spent in doing scientific research! In the case of social sciences and humanities it is important to include Google Scholar analysis, since this tool significantly improved the system for tracking citations of different types of publications, not just journal articles.

In our final observation we can conclude that in a long term it would be more beneficial if we valued the scientific paper by measuring the impact of received citations through three different available index bases (WoS, Scopus, Google Scholar), but we also should measure the reading of papers (e.g. Google statistics).

Availability of publications is certainly the most important thing for the dissemination of research results and ideas. For this purpose, open access is there and should not be neglected.

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