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**Scholarly publishing: one practice between the two systems of communication
and academic meriting**

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Abstract

The aim of this paper is to highlight and discuss the complexities of scholarly publishing being a practice closely relating to two different systems, the system of academic merit and the system of scholarly communication, by showing how the two systems work on different sets of logic and therefore needs to be analyzed in different ways and using different kinds of data. These complexities are discussed by looking at the ISI databases by Thomson Reuters, information searching and use among scholars and recent attempts at assessing research by using quantitative indicators; and are viewed in part through the recent development of the digitization of the scholarly communication process; and to a larger extent by relating the issues discussed to two models for understanding how academic research is organized.

Biographic note

Fredrik Åström got his PhD in library and information science (LIS) at Umeå University, Sweden, in 2006, defending a thesis on the social and intellectual development of LIS. He is working as research assistant at Lund University Libraries, pursuing his post-doctoral project on visualizations of research fields and is currently also a visiting scholar at Journalism, Information and Media Studies at University of Technology, Sydney. His research interests revolve around bibliometrics, scholarly communication and science studies.

Introduction

Scholarly publishing has been an important aspect in terms of research assessment and distribution of resources for a long time. However, over the last decade or so, the increased use of quantitative indicators for measuring scholarly productivity and quality has highlighted this aspect of scholarly publishing in a way previously unseen. But, scholarly publishing is obviously not only a part of the academic merit system; it is also a fundamental part of the communication system, reflecting the dissemination and use of information in research activities. How, and how well, these two systems relate to each other is not always obvious or uncomplicated. Simultaneous with the increased focus on the meriting aspects of scholarly publishing, another important change in the scholarly communication system is the digitization of the system, where academic texts and the representations of these texts in databases are increasingly made available digitally and online.

In the light of these changes, this paper aims at discussing the relation between the two systems of academic meriting and scholarly communication through academic publishing activities, how they relate to each other and how they are affected by the digitization of scholarly text. These issues will be addressed by discussing three different aspects:

- The Web of Science databases and their role as information retrieval system as well as data source for bibliometric research evaluations; and, some bibliometric indicators developed either by ISI/Thomson or based on ISI/Web of Science data.
- The information searching and use among scholars.
- The influence of quality indicators on publication practices.

These discussions will be based on findings in previous research, and the interpretations will in part be influenced by – and related to – two models for understanding how academic research is organized.

Two models for understanding academic research

In science studies, two main ways of explaining how research fields are structured has been developed by on one hand, Richard Whitley in the 1970s and -80s (2000), and on the other Michael Gibbons et al (1994). Whitley's model can best be described as an analytic scheme for studying and comparing research fields by defining different levels of dimensions for analyzing the fields, ending up with seven main types of research fields. In relation to previous science studies theories such as those developed by Thomas Kuhn and his adherents, Whitley's model is non-dichotomizing and less normative, making studies of various research fields – not the least the social sciences and the humanities – more analyzable. Whitley's model is, however, largely building on the notion of academic research primarily being organized on a disciplinary basis (Whitley, 2000).

An alternative view is presented by Gibbons et al (1994), when describing a turn of orientation of the sciences after 1945. According to Gibbons et al, the post-WWII sciences have to a large degree turned into a more applications oriented research, organized on an interdisciplinary basis and with a substantial amount of cooperation with non-academic organizations such as companies and government institutions. Gibbons et al termed the result of this development 'Mode 2' research; and it has also been discussed by e.g. Etzkowitz and Leydesdorff (2000) in terms of a 'triple helix' of university-industry-government relations.

Now, it would be a mistake to think that one of these models exclusively would be able to explain how academic research is organized. The disciplinary

organization is still present to a large degree: much research is still being done within defined research areas, a substantial amount of the activities at the national research councils and other funding bodies are still organized around disciplinary or subject defined assessment groups; and the whole idea of using e.g. citation analysis as an indicator of research quality builds on the idea of scholars citing high quality papers produced by peers within their own field.

Simultaneously, interdisciplinarity has become an important theme in research, making e.g. the body of literatures within research areas less clearly defined at the same time as communication between fields increase. And the cooperation between academic scholars and extra-academic actors, both in terms of actual research tasks performed together and funding of research, raises the issue of whether it is the disciplinary peers' prerogative to be the main assessors of the relevance and quality of research. Another issue is to what extent funding agencies or research collaborators from the corporate world are willing to fully communicate research performed to develop products. In the light of roughly 75% of the research and development funding in Sweden coming from the business sector (Statistics Sweden, 2008), albeit including both research performed solely within the companies as well as research performed in company-university cooperation, these questions are important.

ISI

The basic idea of Eugene Garfield (1956) when suggesting a citation index for the sciences was to make it possible to search and retrieve relevant literature by indexing the reference lists of scholarly journal articles, thus identifying relations between documents previously not available more than on a very local scale. However, apart from presenting us with a whole new way of searching literature, the access to the

citation indexes also presented us with new alternatives for analyzing scholarly texts and relations between them. One of the ‘by-products’ of the citation indexes is the Journal Citation Reports, based on the Journal Impact Factor (JIF), developed by Garfield in 1963 (Garfield, 2006). As with the SCI, the original idea was not for the JIF to be used as source data for research evaluation, but to help searching where the most relevant (as defined by being the highly cited ones) articles could be found. Over time, the extent to which a document has been cited by others has also become closely related to the quality of the document. This has led to the JIF increasingly becoming a quality measurement of the journal, not only leading to it being considered an academic merit to get published in the journal, but also that the JIF of the journal also would reflect the quality and impact of the article (e.g. Garfield, 2006; Seglen, 1997). In addition to the relatively crude JIF quality indicator, other indicators such as ‘the crown indicator’ have also been developed taking factors as differences between research fields, publication types and age of the publications into account (e.g. van Raan, 2003). However, many of these are still indicators based on ISI data.

Within this line of development, we can identify good examples on problems with the utilization of scholarly publications as both a system of communication/dissemination of information and a system for gathering and assessing academic merit. At least to some extent, information searching and retrieval have other demands on quality and types of data and indexing than research evaluation. One aspect of this is the coverage of the ISI databases in general, in terms of types of media as well as languages; and in terms of the vast differences in how much of the literature of different research fields are covered (Glänzel & Schoepflin, 1999; van Leeuwen et al, 2001). Seeing the ISI databases as a system for retrieving scholarly research articles, this is not much of an issue: it is just the limitations of this

particular system. However, when starting to use ISI data for research evaluation purposes, the coverage issue gets strongly related to how representative data are. How much information on research activities is missing when focusing on a selection of scholarly journals, primarily in English? Another aspect of the issue of representativity of data and analyses is related to the quality of, and source information for, indexing in the ISI databases. Whereas known problems concerning e.g. address data, as well as personal and journal names in the cited references field, is of lesser consequences when searching journal articles; the lower publication count for a department due to variations in how department name and address is represented in the ISI databases might be significant and needs to be addressed in relation to the representativity of data (van Leeuwen, 2005).

Another aspect of problems related to ISI as a system for information retrieval as well as a data source for research evaluation is the categorization of research fields and research areas, or rather, of the journals in Journal Citation Reports. As a categorization of journals for searching and selection purposes, the subject categories in JCR are quite sufficient, and also reflecting various levels of specialization of different journals (Garfield, 2006). However, when using these subject categories to define different research fields for purposes of research evaluation – as is being done when using e.g. the crown indicator or the JIF – matters gets more complicated. One issue is the large variations in terms of how specific the categories are, another is the lack of categories for the humanities, since there is no JCR edition for A&HCI indexed journals (depending on alternative citation practices where there is basically no intra-journal references, making it impossible to calculate the JIF). This reflects problems of how representative the JCR categories are when looking at different research fields, and the problem of categorizing research, knowledge and information

in general, well known through centuries of knowledge organization and classification; as well as the question on how to deal with research fields not sufficiently covered by the JCR categories. Another important question is of course how to deal with research organized interdisciplinary and not within the traditional structures based on a disciplinary organization of the sciences (Rousseau, 2002).

Although these questions have a background in important theoretical questions on how to categorize scientific knowledge and how research and scholarly communication is organized, they can also be seen from a more practical and methodological problem on how to deal with representativity and quality of data. We must, however, also address the main assumptions leading to the use of citations as a quality indicator (e.g. Cronin, 1984; Leydesdorff, 1998; Wouters, 1999). One relates back to the question on how research is organized, assuming that research is basically cumulative. Thus, when we make references to other documents, we do so because we are building on their research to continue cumulating the mass of scientific knowledge. Research where we tend more to negotiate or debate interpretations of phenomena does not fit into this model, neither does research where we motivate our contribution to the field by emphasizing the uniqueness of our research. Based on this assumption, we also assume more or less of a causal relationship between the concepts of ‘use’, ‘relevance’, ‘impact’ and ‘quality’.

But whereas ‘use’ and ‘relevance’ relates more to the searching and communicative aspects of scholarly publications and dissemination of information – and are also the basic idea of citation indexing in the first place – ‘impact’ and ‘quality’ relates more to the research evaluation aspect. And not only do the two main pairs of concepts compare poorly, the relation between e.g. ‘impact’ and ‘quality’ is not without problems either. There are many reasons for using other people’s research

and reflecting this by citing them, of which some reasons can be interpreted as reflecting quality while other reflect e.g. alternative standpoints on an issue; and in the same way, a document might be very relevant to the research being performed by a scholar without signaling any perception of quality through the eyes of the citing scholar.

And in the same way, an article might have an immense impact on a research field, without necessarily being cited because of its quality but because of a reaction towards a specific line or way of doing research. In addition to this, there is also the problematic assumption used when using the JIF for evaluating research, where an article published in a high impact journal is assumed to also be of high quality and impact (Seglen, 2003). And yes, in the light of the editorial process and selection criteria of e.g. *Nature*, we can assume that the paper is of fairly high standards, but: we do not know anything about to what extent the paper will be highly cited, if cited at all, regardless of assumed or confirmed quality of the publication; and an article might very well receive a lot more attention and citations if it was published in a more specialized journal with lower impact factor. Further more, when evaluating the CV of a scholar by looking at publications in high impact journals, a high number of publications in e.g. *Nature* is considered good. However, if these articles in *Nature* are not cited to any larger extent; and we use e.g. the crown indicator to evaluate: the comparison of citations per publication – and the high field citation score for a *Nature* article – will give the scholar very bad statistical values in the evaluation.

In addition to these problems, we can also identify other problems when relating these concepts together. A research effort can be of very high quality without have any impact on the research field or the sciences in general, because of a lack in terms of relevance or because of the article not receiving any attention. To this can be

added a temporal aspect, where it has taken research of very high impact on the whole of the sciences a long time to be used, because of varying relevance criteria over different periods of time or because of scholars being so far ahead of their time it took the scientific community a while to understand the significance of the research.

Journals and articles, searching and publishing

Not the least through the recent focus on research evaluation using publications and citations as indicators of scholarly productivity and quality, the importance of the scholarly journals and their reputation is great. When selecting a journal for publishing the results of a research effort, issues considered are not only how to as good as possible communicate research to the most relevant audience or where the effort will contribute to as much good as possible; but another important question is in what journal the publication will be of most merit to the individual scholar. One problem of this is of course the aforementioned lack of correspondence between impact of a journal and an article in terms of citation analyses, as shown with the example with evaluating research through the JIF or the crown indicator.

Another issue, however, is that whereas the journals are still of very high importance in terms of deciding where to publish, the relation between the journal and the selection of what information we use when doing our research has decreased. With the increased access to information – including scholarly journal articles – online, the strong connection to the journal as an entity as well as a physical object has become less important. When searching databases for relevant information, we find the article in e.g. Web of Science and many times there is also a direct link from the post in Web of Science to the full text document. Now, it is still the same journal article and it is provided by the website of the publisher of the journal, but, since we do not necessarily see the issue of the journal, the connection between the article and

the journal is not necessarily as strong as it used to be. The article as carrier of information has become more important than the journal article.

Not only the searching for more specific information in relation to research tasks have changed because of new structures and technologies for searching information have been affected. Browsing for information to keep updated on the general development in different research areas has also changed to some extent, where the browsing of e.g. tables of contents of journals to some extent has been replaced with searches and e.g. RSS feeds based on author names, research groups or subject categories, rather than looking for those aspects in the latest journal issue (Francke, 2008; Stanford University Library, 2002).

And whereas the traditional journals are still very important as places to publish from the merit perspective, many alternatives has appeared over the last few decades: such as pre-print archives, open access journals and other web based alternatives for scholarly communication. These are of major importance for communicating research results that needs to be published quickly, and are as such not only important when it comes to disseminating information but also stake the claim to a certain result or method, which is also of importance when deciding on the level of academic merit for a scholar or a research group (Fry & Talja, 2007). However, in terms of quantitative indicators on research productivity and quality, many alternative forms of communication are disregarded or seen as difficult to assess, or they just fall through the criteria set for inclusion in many data sources for research evaluation, such as the JIF as criteria for being included in the ISI databases.

The impact of research assessment criteria on scholarly publishing

The culture of evaluation of research has, as been said before, grown stronger over the last decade, not the least when it comes to using different bibliometric indicators as

one way of evaluating research. Norway and Finland has already developed and implemented systems for research evaluation drawing on among other aspects, bibliometric data, Australia has been doing attempts at using bibliometric analyses and data for assessing research and distributing research funds; and in this year's Research Assessment Exercise in the UK, bibliometric indicators are also utilized.

Not only does this raise questions about the representativity of certain methods or material being analyzed, but another issue is also the issue of scholars adapting their publication behavior to these models of evaluation, e.g. by publishing in ISI indexed journals instead of e.g. in books in other languages than English. One aspect of this is to what extent the scholars, by changing publication behavior; also miss out on relevant audiences who are still searching for relevant research in other publication media than ISI indexed journals. But also, when a quality indicator – such as having an article published in a high ranked journal – becomes a goal to meet, it ceases to be a quality indicator (Goodhart, 1984; Strathern, 1997). The problem of adapting to evaluation standards can quite clearly be illustrated by an attempt to allocate research funds based on numbers of publications in ISI indexed journals in Australia; where the consequences was that the number of articles from Australia in the ISI databases increased with 25%, while the amount of citations to journal articles from Australia decreased with 20% (Butler, 2003)

Another issue related to research assessment – and in particular bibliometric research assessment – in relation to the organization of research and scholarly communication, is how e.g. medical research at universities, but at least partially finances by pharmacological companies, gets trapped between the disciplinary oriented organization of research and the publication based assessment of research productivity; and the lack of interest from the pharmacological companies to present

some of the processes being important for producing their products; not to mention the reluctance of publishing unfavorable results (e.g. Baird, 2003). In instances like this, the credo of openness of research and the emphasis on publications is no longer as uncomplicated as it would be if research was more strictly organized according to the norm of disciplinary oriented research.

This reflects the issue of methods for research evaluation, as well as many underlying assumptions in theories on scholarly communication and bibliometrics in general, are assuming that research is not only cumulative, but also founded on a disciplinary based organization of research. While many methods for research evaluation based on bibliometric indicators, as well as the basic organization of many research councils, are structured according to a disciplinary organization of research; much of research being performed today is more or less applications oriented, organized interdisciplinary and being performed, as well as funded, in cooperation with institutions outside the universities. Not only does this mean that the evaluation methods might need to look at different aspects of research quality and impact, but also that there are other actors with an interest in participating in the evaluation of research (Gibbons et al, 1994).

Discussion

The aim of this article was to discuss and highlight some of the complexities of scholarly publishing when looking at it both from the point of view of a system for research evaluation and academic meriting; and as a system for scholarly communication. The two systems do not necessarily compare well; and sometimes the prerequisites for communication on one hand, and evaluation of research on the other are even clashing. This is not easily dealt with, scholarly publications are the main product of research and to a large extent the one thing that can be studied to assess

research productivity and quality of research, but at the same time communicating with colleagues and gathering credits in the merit system do have different prerequisites; and these differences need to be highlighted and addressed, especially when the focus on quantitative analyses of scholarly publications for evaluating research becomes more important.

A main issue in evaluating research from a bibliometric perspective – as well as research on citation analysis and scholarly communication – is the assumption of research essentially being a cumulative process, where we cite our colleagues because we are building on their results or methods to take research another step further. This does not only relate to citation behavior and related questions, but it is also an important part in explaining how we motivate our contributions to the wider field of research in general: by building onwards on established methods and material, by showing alternative interpretations or the uniqueness of our research efforts; all of which having varying implications on to what extent we can use e.g. citation analysis to evaluate quality of research.

Another important aspect in this is also to what extent research and scholarly communication on one hand; and the evaluation of research on the other hand, is based on research basically being viewed as organized on a disciplinary basis or being interdisciplinary and applications oriented, as well as being both performed and funded in relation to actors outside academia. Many methods for bibliometric evaluations, as well as the main organization of many research councils, are basically organized or based on a disciplinary organization of the sciences, whereas research today in many respects is based on other principles and involving other actors.

Thus, we have very complex interrelations between aspects of different types of organization of research – in-between different research fields as well as in terms

of disciplinary versus interdisciplinary based research – and communication, in terms of relating to colleagues and to gather academic credit and how to do categorizations of scientific knowledge. These issues are not easily resolved, but they require being addressed before we start counting publications and citation to evaluate productivity and quality of research.

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