

MANAGEMENT REPORT 1/2007

Open Access & Science Publishing

Results of a Study on Researchers' Acceptance and Use
of Open Access Publishing

Thomas Hess / Rolf T. Wigand / Florian Mann / Benedikt von Walter

EXECUTIVE SUMMARY

This Management Report summarizes the main descriptive results of a study on researcher's acceptance of Open Access publishing. The study was conducted in 2006 by the Ludwig-Maximilians-University Munich, Germany, in cooperation with the University of Arkansas at Little Rock. The main focus is centered on the question if and why scientists decide or do not decide to publish their work according to the Open Access principle without access barriers and free of cost to readers. With the responses from 688 publishing scientists it could be demonstrated that the general attitude toward the Open Access principle is extremely positive. However, many seem to be rather reluctant to publish their own research work in Open Access outlets. Advantages like increased speed, reach and potentially higher citation rates of Open Access publications are seen alongside insufficient impact factors, lacking long-term availability and the inferior ability to reach the specific target audience of scientists within one's own discipline. Moreover the low level of use among close colleagues seems to be a barrier towards Open Access publishing.

PUBLISHED BY

Ludwig-Maximilians-Universität Munich, Germany
Institute for Information Systems and New Media

In cooperation with:
University of Arkansas at Little Rock, USA
Department of Information Science

Supported by the:
Maulden-Entergy Endowment at the University of Arkansas at Little Rock, USA

1 Background and Objectives of the Study

Since the foundation of the first scientific journals, their main objective has been the diffusion of research results, especially within the own discipline, but also the public documentation of copyright on research results. Because of declining budgets and rapidly rising subscription fees, libraries are under considerable financial strains for several years. This circumstance is generally referred to as the *serials crisis*. Paired with new possibilities enabled by the Internet as a medium for communication and content distribution, a discussion about alternative publishing models has arisen during the last years. Subscription fees act as entry barriers to scientific literature and are thus counterproductive in regards to the initially mentioned main objectives of scientific journals. In order to meet this development, the principle of Open Access to scientific publications has evolved during the last 15 years. The basic idea is barrier- and cost-free access to scientific literature for readers. Open Access offers are facilitated by new business models which do not indulge in the illusion of an entirely cost-free publication process. They rather focus on taking the burden of costs off the subscriber's shoulders.

Several studies assert that scientists have a rather positive attitude toward the idea of Open Access. All the more it is surprising that already existing Open Access opportunities are only taken advantage of very hesitantly. Therefore this study aims at identifying possible enablers and barriers for the further diffusion of the Open Access principle among researchers:

- Scientific publishing houses can use the results as a ground for decisions in regards to their business strategy and a possible implementation of the Open Access idea.
- Providers of Open Access publications are shown relevant problems and areas of potential activity.
- Scientists can decide on the study's results to what extent publishing their own work in terms of Open Access is an attractive alternative.

The basic idea of the Open Access principle: cost- and barrier-free access to scientific publications.

2 Study Design

This study has been conducted by the Institute for Information Systems and New Media at the Ludwig-Maximilians-University of Munich, Germany in cooperation with the Department of Information Science at the University of Arkansas at Little Rock, USA.

A standardized quantitative online survey offered in German and English was carried out in July/August 2006. Target groups were **publishing scientists** worldwide with a concentration on three heterogeneous disciplines, **Information Systems, German Literature and Medical Science**.

Large parts of the survey design have their source in a newer theory from the field of technology acceptance, the *Unified Theory of Acceptance and Use of Technology*. In this management report, however, we focus on some of the main descriptive results of the study rather than testing the researchers' proposed hypotheses based on this theory.

Focus of the study on three disciplines: Information Systems, German Literature und Medical Science.

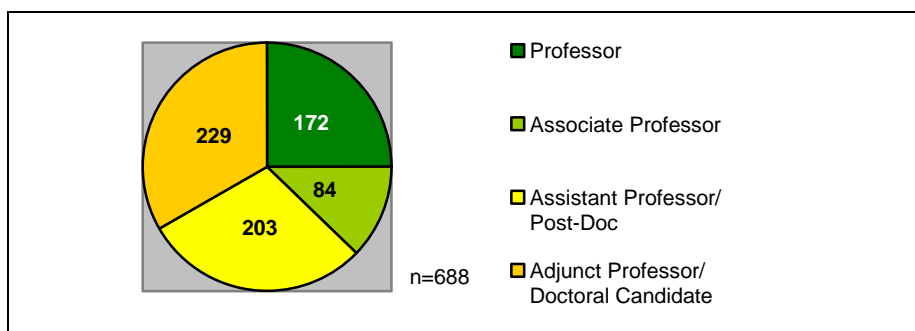


Figure 1: Participants according to positions

1433 people from 49 countries took part in the survey. 688 people stated to be scientists and thus were included in the following analysis. Among them were 172 professors, 84 associate professors, 203 assistant professors/post-docs and 229 adjunct professors/doctoral candidates (see Figure 1).

Based on the targeted disciplines the participants could be segmented into four main groups. 185 persons are in the group of Information Systems, 164 participants are from the field of German Literature and 132 participants could be allocated to Medical Science. In

addition, the answers of 207 persons from other disciplines („Others“) entered the results as well (see Figure 2).

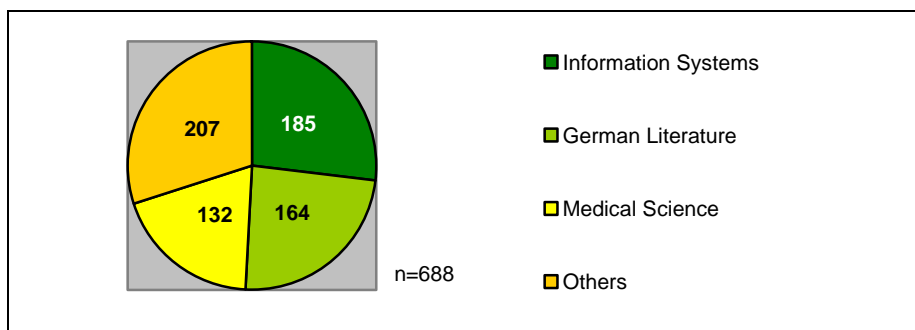


Figure 2: Number of participants according to disciplines

3 Results on Publishing Behavior

First, the publishing behavior and patterns of the respondents was examined by looking at their preferred publication media and the aimed for target groups of their publications.

3.1 Preferred Publication Media

The disciplines under examination show distinct differences in regards to their publishing behavior (see Figure 3). Within the subject of **Information Systems** *proceedings* play the major role, followed by *traditional journals*. Publications on *author-websites* rank third which conforms to the idea of Open Access. Publishing on author-websites is also known as „self-archiving“ or the *Green Road to Open Access* as this content is typically available free of costs and access restrictions. In the field of **German Literature** *anthologies* are the preferred publication medium. *Proceedings* rank second, prior to *traditional print-journals*. Within the **Medical Sciences** *traditional journals* reign supreme. However *proceedings* and *online journals* are used for the publication of research results as well. The publishing behavior of the **other disciplines** which were part of this study follows a similar pattern. *Journals* and *proceedings* also rank first and second. Anthologies rank third.

These results show that the affinity towards Open Access publication media is greatest within Informations Systems as self-archiving on author-websites is quite common already. Despite the fact that tradi-

In the selection of the preferred medium of publication, distinct differences among the studied disciplines are observed..

tional journals obviously still play the major role within the Medical Sciences, there exist already a number of established and frequently used Open Access platforms such as the *Public Library of Science (PLoS)* or *PubMed Central (PMC)* within this discipline.

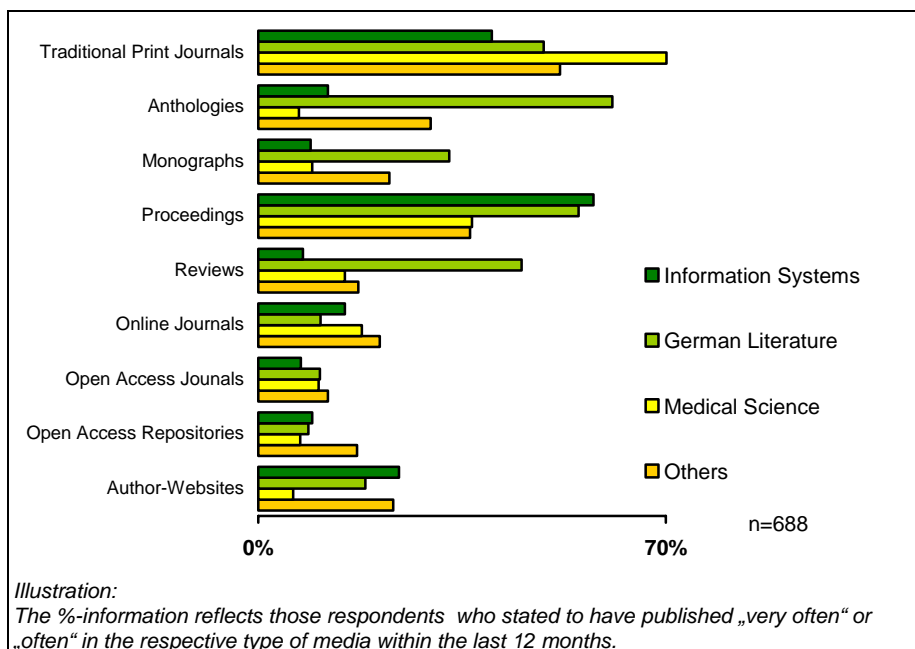


Figure 3: Preferred publication media by disciplines

3.2 Target Groups of Scientific Publications

By ranking the scientific publications core target groups were identified: 83% of the respondents stated that **scientists within their own discipline** are the most important target group (see Figure 4). A high level of agreement among scientists of all disciplines supported this finding which is not surprising as this is fully in accordance with the initially outlined main objective of scientific publications.

However, this result gains added relevance when considering that advocates of the Open Access principle often refer to the providing of and wide availability of research results to the general public as a main advantage of this new publishing model. The results presented above put this assumed advantage and researchers' true objectives into appropriate perspective.

Core target groups of scientific publications are scientists within their own discipline.

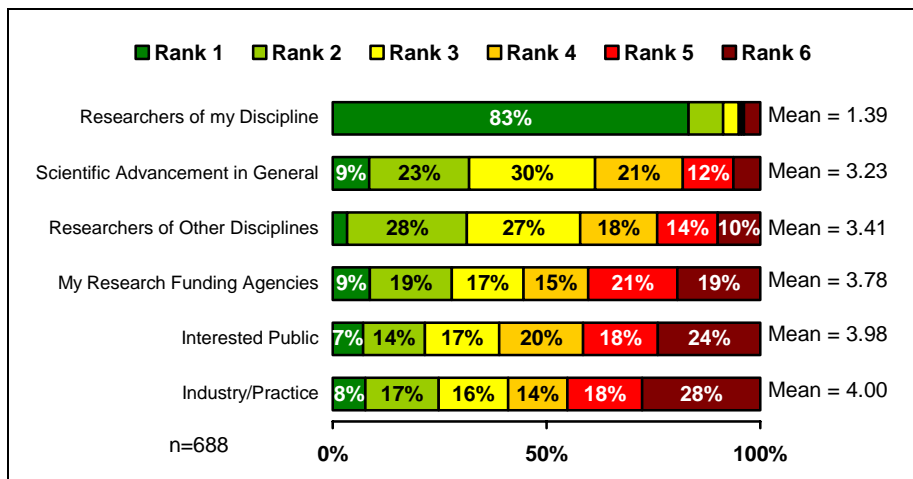


Figure 4: Target groups of scientific publications

4 Results on Attitude, Experience and Intention to Use

This section covers the results of researchers' attitude toward Open Access publishing on their level of experience with Open Access publications as well as future intentions of use. The results of this section in conjunction with the results of section 5 may lead to a better understanding of researchers' present and future acceptance and use of the Open Access publishing model. To the best of the authors' knowledge the body of research on the acceptance and adoption of Open Access publishing lacks systematic investigation with the configuration of measures employed in this study.

4.1 Attitude toward Open Access

In this study, the **highly positive attitude** by scientists towards the Open Access idea, already identified in previous studies, could be verified. While within Information Systems, Medical Science and "Others" between 90% and 91% of the respondents stated to have a positive or a very positive attitude, the approval within German Literature was evenly clear, albeit a bit more cautious. 76% within this latter group had very positive or positive feelings about the idea of Open Access Publications (see Figure 5).

The attitude toward Open Access is extremely positive.

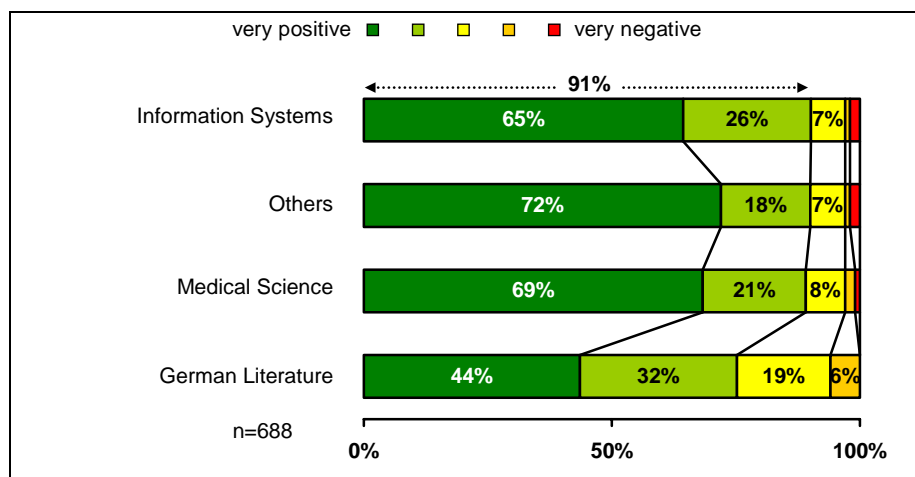


Figure 5: Attitude toward Open Access by disciplines

After investigating the attitude toward Open Access, the level of experience in working with Open Access and the intention to use Open Access for future publications were quantified.

4.2 Experience with Open Access

The experience of scientists in working with Open Access publications was examined by means of two dimensions. On the one hand the experience in **accessing** Open Access literature was analyzed; on the other hand the experience in **publishing** in Open Access outlets was part of this examination.

When comparing the groups, considerable differences emerge (see Figure 6). Within the group of people who neither are part of Information Systems, German Literature nor Medical Science, i.e. "Others", 80% stated to have already accessed Open Access literature. Thus, this group has the highest level of experience in this dimension. The members of Information Systems rank second, with 70% who have already accessed Open Access literature. Within German Literature there are 65%, whereas within Medical Science there are only 62% who knowingly have accessed Open Access literature before.

Open Access is already quite common for accessing literature.

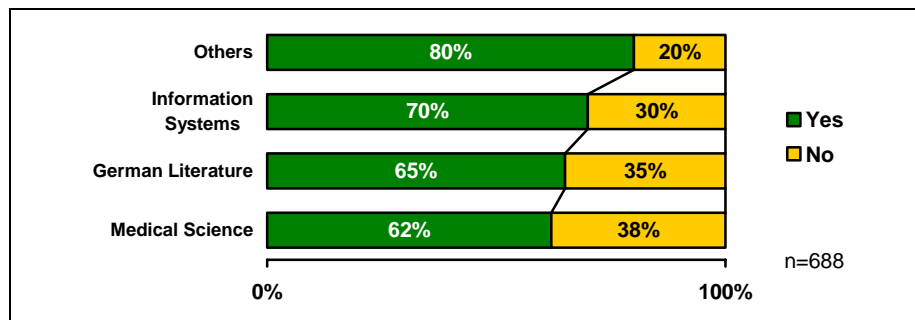


Figure 6: Experience in accessing Open Access literature by disciplines

For **publishing** in terms of Open Access the same pattern arises as for *accessing* Open Access literature (see Figure 7). The members of the “Other” disciplines with 34% agreement again have the highest level of experience. Within Information Systems, 31% state that they have already published at least one piece of work in Open Access outlets. German Literature shows a value of 27% while medical doctors with 23% again form the group with the lowest level of experience.

Almost two thirds of the respondents stated to have accessed Open Access publications before while only one third has already actively published in Open Access media.

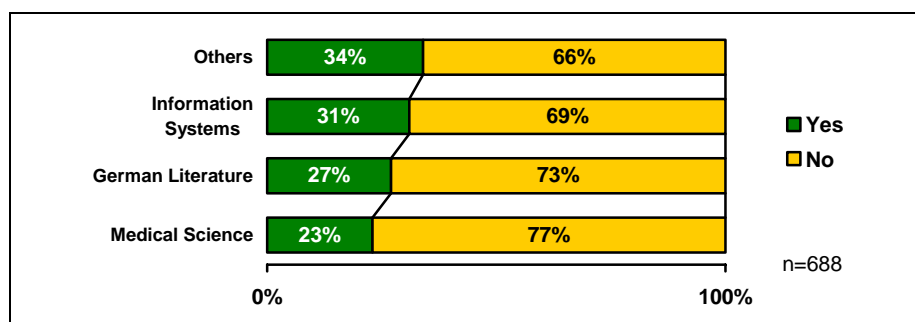


Figure 7: Experience in Open Access publishing by disciplines

In general, it is interesting to note that *accessing* Open Access literature is already roughly twice as common as *publishing* this way.

4.3 Intention to Publish as Open Access

The aim of another set of questions was to determine researchers' **future intention** to publish in terms of Open Access. Even though the group of medical doctors has the least experience with Open Access (see previous section), they – together with the members of Information Systems – lead the ranking of future intentions to publish in Open Access outlets. In these two groups 31% of the respondents consider it to be „very likely“ or „likely“ to publish in Open Access outlets within

the next six months. 30% of the „Others“, but only 16% of the German Literature are of the same opinion (see Figure 8).

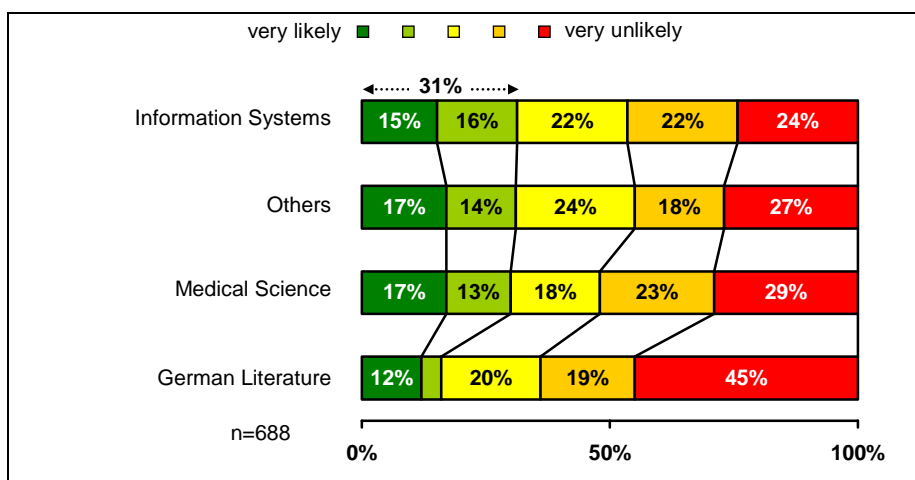


Figure 8: Intention to publish as Open Access within the next six months by disciplines

The following generalization emerges from these results: The attitude toward Open Access is highly positive, nevertheless only one third of the participants have experience in actually publishing in Open Access media. The actual use is thus rather low. Moreover, merely one third intends to publish in terms of Open Access within the next six months. A gap arises between the attitude toward and the actual behavior of publishing in Open Access outlets.

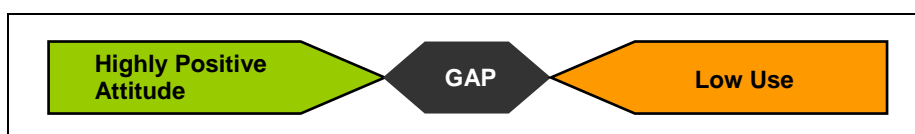


Figure 9: "Gap" between attitude and actual behavior

In the following section **supporting factors** as well as **repressive factors** regarding the use of Open Access for publishing scientific work will be presented.

5 Results on Determinants of Use

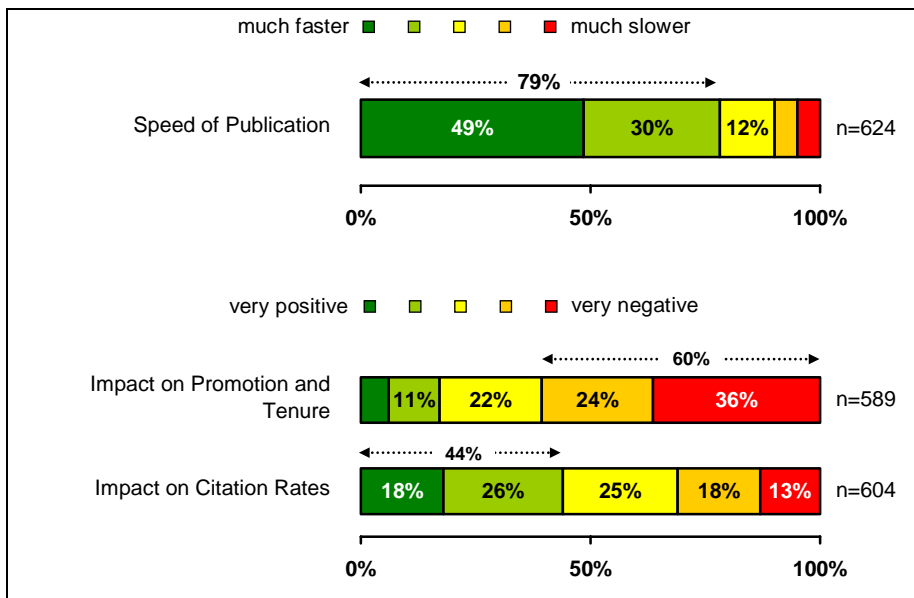
In this section we present first findings pertaining to the expected performance of Open Access publications by researchers. Next the role of social influence and the fulfillment of facilitating conditions are addressed. Lastly, a comparison between Open Access and traditional publication media is presented.

There is a gap between the positive attitude towards Open Access and the low level of use and future intention to use Open Access publication media.

5.1 Performance Expectancy of Open Access Publications

Performance Expectancy is reflected by researchers' subjective assessment to what extent publishing in Open Access outlets can enhance their personal performance.

According to 79% of the respondents, the **speed** of publication is higher when publishing in Open Access outlets. On the other hand, 60% of the participants think that publishing in Open Access media has a negative impact on gaining **promotion and tenure**. In regards to **citation rates**, 44% see Open Access publications to have an advantage while 31% do not see any advantages (see Figure 10).



Open Access publications have a higher speed of publication, higher citation rates but have a negative impact on their personal career (promotion and tenure efforts).

Figure 10: Speed of publication, impact on personal career, frequency of citation

Another advantage of Open Access publications is the easy access to research results for researchers in **developing countries**; 92% (totally) agree with this particular question. Also beneficial seems to be the potential to reach a larger readership with Open Access publications; 75% of the respondents (totally) agree. Publishing in Open Access outlets is disadvantageous with regard to securing **research grants**, i.e. 64% consider Open Access publications a barrier in such efforts (see Figure 11).

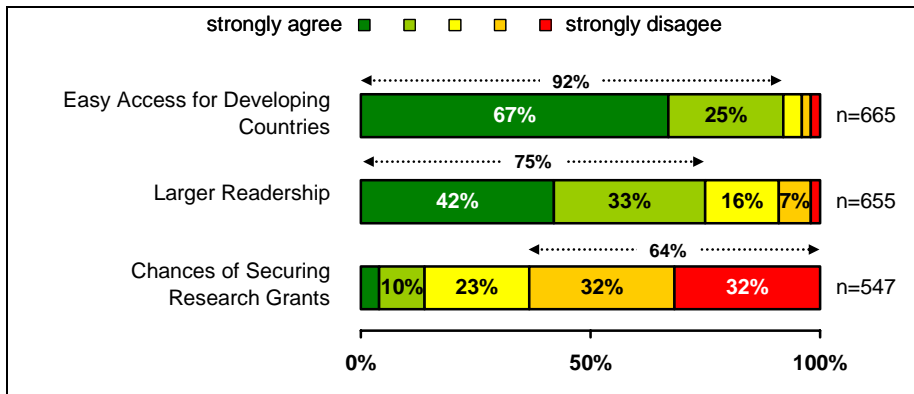
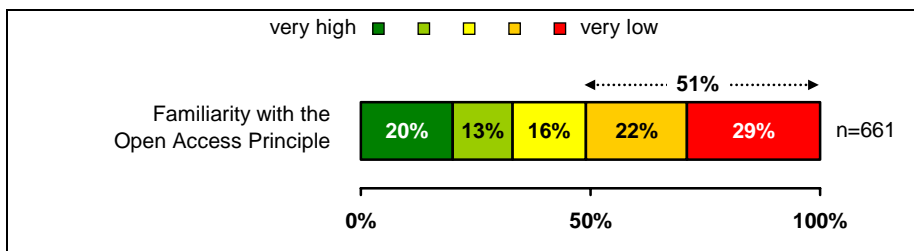


Figure 11: Access for developing countries, size of readership and securing research grants

51% of the participants state that Open Access is **not well-known** enough to use it as a medium for publishing their own work (see Figure 12).



Familiarity with the Open Access principle is rather low.

Figure 12: Familiarity with Open Access principle

58% perceive the **impact factor** of Open Access publications as a barrier, i.e. specifically as insufficient or non-existent. 53% think that Open Access publications **lack a guarantee of long-term availability** (see Figure 13).

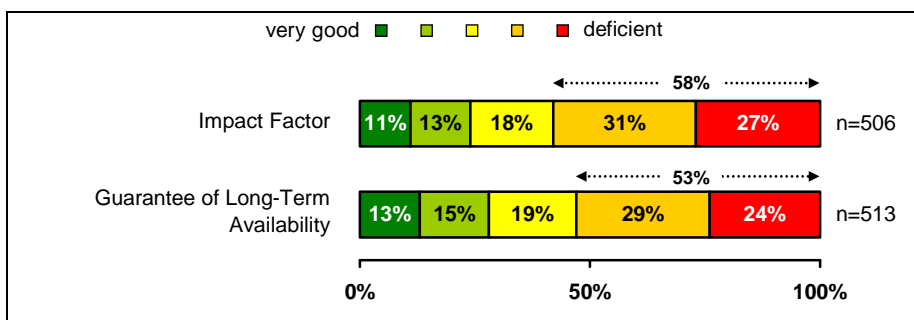


Figure 13: Impact factor and guarantee of long-term availability of Open Access publications

5.2 Social Influence

Social influence reflects the extent to which researchers are provided support when publishing in Open Access outlets, to what extent peers already use this form of publication and whether the choice of the preferred publication medium is within the researchers' control.

The first two social aspects showed to be inhibiting factors for the individual decision to publish in Open Access outlets. 65% of the respondents state that they do **not get (any) support** from their institution when publishing in Open Access media.

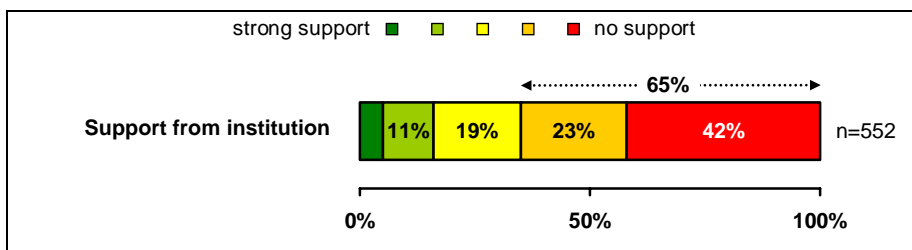


Figure 14: Open Access support from research establishments

The statement that **close colleagues** already publish in Open Access media is often negated. 73% strongly disagree or disagree with this respective question. Results shift, however, for the question whether **leading scientists of other disciplines** are already publishing in Open Access outlets. Here, 43% (totally) agree. This answer pattern is typical for the 'wait and see' position in which many scientists currently find themselves, with regard to Open Access publishing. Many think that others are already doing it, except they themselves and their close colleagues.

There is hardly any institutional support for Open Access publishing and only little peer use.

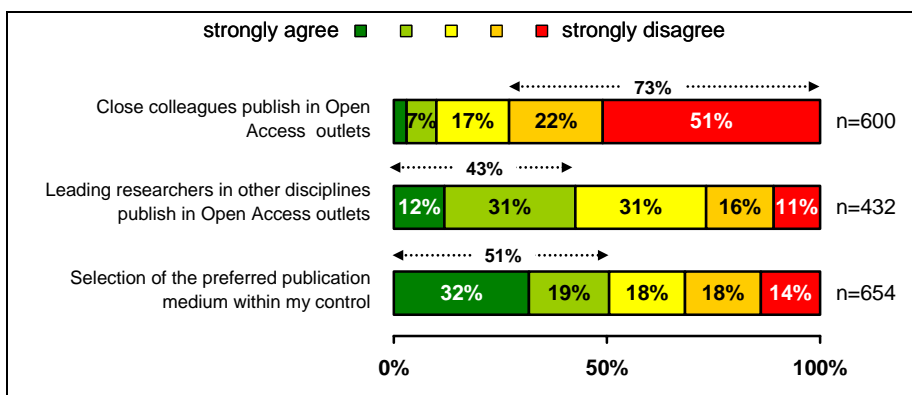


Figure 15: Peer use and decision about publication medium

Another component investigated is the question within whose control it is **to decide** on the preferred publication medium. This control is assumed to be a basic requirement for the publication in Open Access outlets. 51% of the respondents say this decision is their own, while 32% state that this decision is beyond their control.

5.3 Requirements for Open Access Publishing

First the **ease of learning** about publishing in Open Access outlets was examined. 80% of the respondents consider it to be very easy or easy to learn about publishing their work in Open Access media.

Publishing in terms of Open Access is considered to be easy to learn.

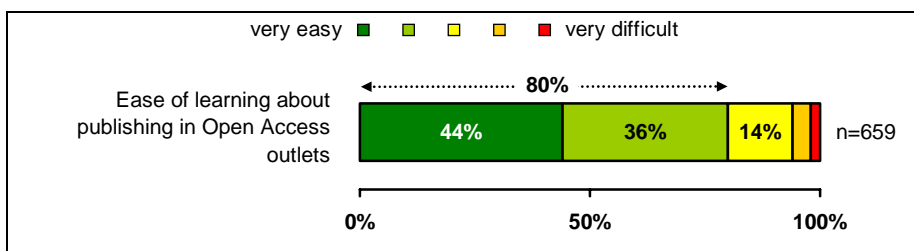
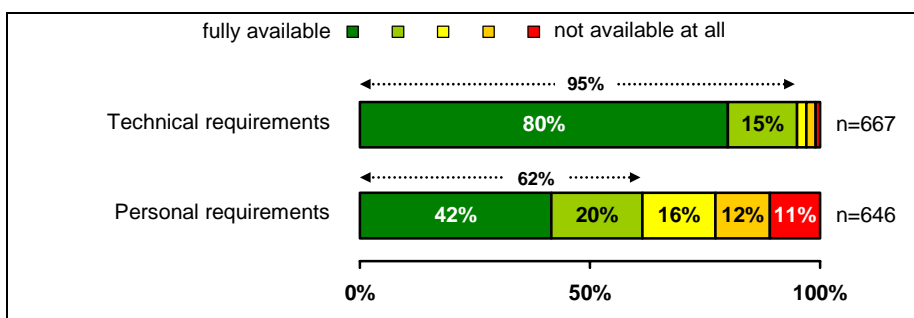


Figure 16: Ease of learning about Open Access publishing

Moreover, **technical** and **personal requirements** have to be met to provide Open Access publications. The technical requirements such as IT-infrastructure, Internet access and necessary software are fulfilled according to 95% of the participants. Existing knowledge, which is necessary for publishing in an Open Access mode, is sufficient say 62%. Thus the requirements for publishing in Open Access modes seem to be fulfilled.



The necessary technical infrastructure and know-how are widely available.

Figure 17: Technical and personal requirements for Open Access publishing

6 Summary of the Results

This section provides a summary of the results of this study by means of comparing all factors that support the further diffusion of the Open Access principle, the factors which inhibit such further diffusion and thus prevent scientists from publishing their research work in Open Access media. Figure 18 illustrates this relationship and Figure 19 provides an overview of these identified factors.

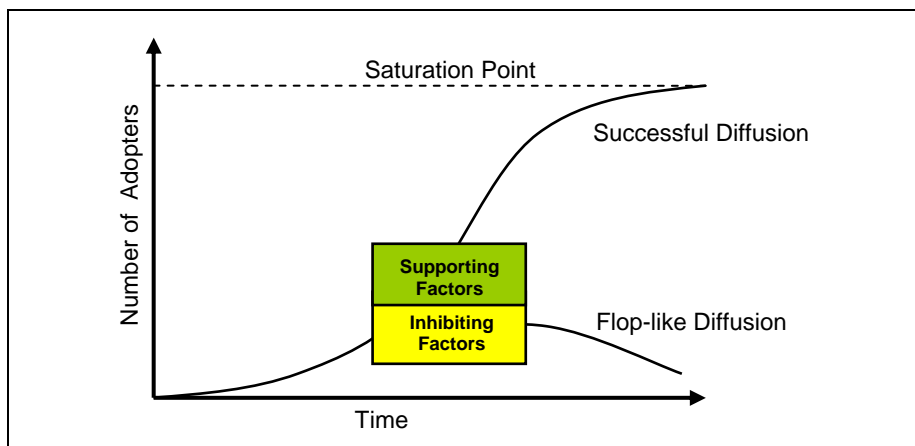


Figure 18: Influence of supporting and inhibiting factors in the diffusion of the Open Access principle

Supporting factors	Inhibiting factors
<i>... for the further diffusion of Open Access publishing</i>	
Attitude towards Open Access is extremely positive	Low level of peer use
Experience in accessing Open Access literature is quite high	Deficient reach of core target group of colleagues of own discipline
Almost one fourth of the respondents plans to publish in Open Access media	No institutional support
Higher speed of publication	Higher reputation of traditional publication media
Possibly higher citation rates	Little familiarity
Easy access for researchers in developing countries	Deficient impact factor
Large readership	No guarantee of long-term availability
Belief that Open Access publishing is easy to learn	Lower chances to secure research funds
Choice of preferred publication medium is mostly within researchers' control	Negative impact on promotion and tenure (career choices)
Technical requirements and know-how exist	

Figure 19: Supporting and inhibiting factors for the further diffusion of Open Access publishing

6.1 Comparison of Open Access and Traditional Publication Media

In order to compare Open Access publications and traditional publications along several **core attributes**, we conducted an additional two-dimensional examination of eight criteria. Their relevance was established in previous research studies. First of all we asked to what extent Open Access or traditional media are more suitable to fulfill certain criteria. In a second step the relative importance of these attributes was estimated. On a five-point-scale the respondents evaluated each item's significance (1=not important at all; 3=indifferent; 5=very important). The results of the comparison are illustrated in Figure 20 and are presented in detail in the order of their respective importance.

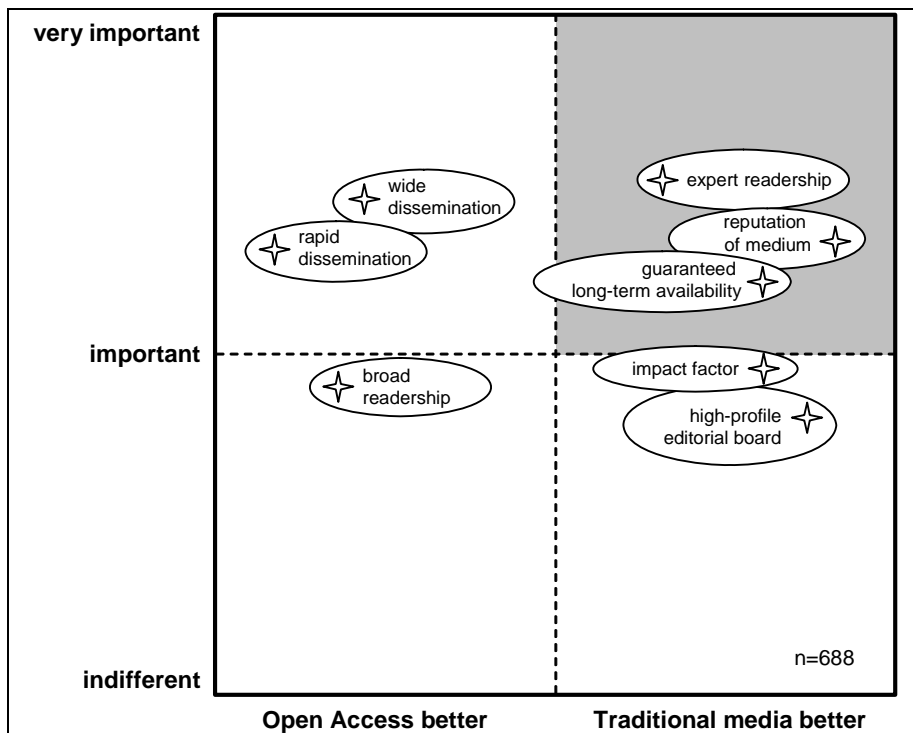


Figure 20: Comparison of Open Access and traditional publication media

Reaching an expert readership is seen the most important of the eight attributes. This finding is directly related to the result from section 3.2, whereby the colleagues of one own's discipline are by far the main target group of scientific publications. Since respondents believe that this most important attribute is better fulfilled by traditional publi-

cation media rather than by Open Access publications, this finding deserves special attention.

The **wide dissemination** of research results is also considered to be very important and is better fulfilled by Open Access publications, according to the respondents. Regarding the **reputation of the medium**, traditional media are clearly superior to Open Access media. On the other hand, Open Access media are able to diffuse research results much **more rapidly**. According to the participants' opinion, the important attribute of a **guaranteed long-term availability** is also better fulfilled by traditional media. They are also superior with regard to the **impact factor**. The less important attribute of **reaching a broad readership** is better fulfilled by Open Access publications. It has to be said that reaching a broad readership often is communicated as *the* outstanding advantage of Open Access publications. The results of this study indeed confirm that Open Access publications are superior concerning this particular attribute. Nevertheless it has to be stated that this attribute is considered to be of comparably lesser importance.

The **reputation of the editorial boards** of traditional publications is superior to the one of Open Access publication media. As this attribute is of lesser importance, one should still keep an eye on it; yet according to the results of the study other criteria are comparably more relevant.

6.2 Practical Implications

Following we provide recommended courses of action for three groups that can be deduced from the findings: (1) for already established scientific publishing companies, (2) for suppliers of Open Access publications and (3) for publishing scientists and scholars.

→ Scientific Publishing Companies

For already existing publishing companies a medium-term *partial* and a long-term *complete* switch to an Open Access model could be attractive. Concerning several relevant dimensions (reaching the core target group, higher reputation, guaranteed long-term availability, etc.) established publishing companies still have an enormous advantage in terms of trust vis-à-vis new players in the marketplace. This

Traditional publications have advantages in reaching an expert readership, enjoy a higher reputation and are more trusted in assuring long-term availability.

makes it easier to react to current developments proactively and thus enhances the chances to improve product offerings. Higher speed of publications, higher citation rates and a wider dissemination of research results are currently impacted by the “closed access” model. Additionally it is possible to extend and improve the classical peer-review practice and to integrate an ex-post rating mechanism by readers. By exclusively offering *digital* publications with Open Access, there is room for reductions in publication costs. When looking at revenues, Open Access models are getting interesting if income is not generated through content itself but – similar to the advertising market – through the generated attention.

→ **Providers of Open Access Publications**

For providers of Open Access the problem of reaching a critical mass is most vital. That means that the Open Access principle will only diffuse successfully if a larger number of scientists already uses this form of publication. To enlarge the familiarity and use of Open Access media, Open Access providers should systematically address the inhibiting factors that are depicted in Figure 19. Moreover they should especially concentrate on new subject matter areas in which traditional publishing companies are not yet established. Cooperation with professional and academic associations can be helpful from a reputation as well as financial point of view.

→ **Scientists and Scholars**

In order to gain reputation *impact* in the form of citations is fundamental. In an effort to increase this, two dimensions are critical: quality and reach of publications. This study shows that Open Access publications have deficiencies with regard to the quality in the scientists' opinion, but distinct possible advantages concerning reach and frequency of citations exist. Today scientists should inform themselves about the possibility of *additional* publications going beyond only traditionally published contributions, e.g., on their own websites (“self-archiving”) or in institutional Open Access repositories (e. g., at universities). Thus advantages of “both worlds” can be utilized in the medium term and further evaluation and utilization of the Open Access model can be based on experience.

FURTHER READING

Study Website: <http://openaccess-study.com>

Björk, B.-C. (2004): Open access to scientific publications - an analysis of the barriers to change, *Information Research*, 9(2), Paper 170. <http://informationr.net/ir/9-2/paper170.html> (last accessed on February 20, 2007).

European Commission (2006): Study on the economic and technical evolution of the scientific publication markets in Europe. http://ec.europa.eu/research/science-society/pdf/scientific-publication-study_en.pdf (last accessed on February 20, 2007).

Harnad, S., Brody, T., Vallieres, F., Carr, L., Hitchcock, S., Gingras, Y., Oppenheim, C., Stamerjohanns, H., & Hilf, E. (2004): The Access/Impact Problem and the Green and Gold Roads to Open Access, *Serials Review* 30. <http://eprints.ecs.soton.ac.uk/10209> (last accessed on February 20, 2007).

Jacobs, N., (Ed.) (2006): *Open Access: Key Strategic, Technical and Economic Aspects*, Oxford, England: Chandos Publishing.

FOR FURTHER INFORMATION PLEASE CONTACT:

Prof. Dr. Thomas Hess
Ludwig-Maximilians-Universität Munich
Munich School of Management
Institute for Information Systems and New Media
Ludwigstr. 28
80539 Munich, Germany
Phone: +49 89 2180 6390
Fax: +49 89 2180 13541
E-Mail: thess@bwl.uni-muenchen.de
URL: <http://www.wim.bwl.uni-muenchen.de>

Prof. Rolf T. Wigand, Ph. D.
Maulden-Entergy Chair and Distinguished
Professor of Information Science and
Management
Department of Information Science
CyberCollege
258A ETAS Building
University of Arkansas at Little Rock
2801 South University Avenue
Little Rock, AR 72204-1099, USA
Phone: +1 501 569 8951
Fax: +1 501 683 7049
E-mail: rtwigand@ualr.edu
URL: <http://digital.is.ualr.edu>