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Claims About Benefits of Open Access to Society (Beyond Academia)

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Abstract. This study tries to systematically identify claims about societal benefits of Open Access by analyzing different documents written by Open Access supporters. Three types of documents are used: key declarations and statements in support of Open Access, Open Access policies issued by public funding agencies and journal editorials announcing the adoption of Open Access. Analysis shows these three types emphasize different benefits for Open Access as they address different audience. There is strong support of the idea that Open Access has benefits to different groups of people outside side the university/credentialed research institutes. It is not clear how much evidence is available to support these claims, but identifying them would suggest new stakeholders to involve in the conversation and perhaps also inform the ongoing debate about who should bear the cost of Open Access..

Keywords. Open access mandate, open access policy, societal impact of research, funding agency, advocacy

1. Introduction

This paper presents the results of a study attempting to identify the different benefits of Open Access as anticipated by its supporters. Focus is mainly on claims about societal benefits of Open Access, i.e. those beyond the research community (outside the university and credentialed research institutes). As mentioned above, recent reviews of literature about Open Access [1] [2] have emphasized the lack of enough research to investigate the potential of Open Access to benefit individuals or groups of people who do not belong to universities and credentialed research institutes. This is in contrast to the abundance of studies about other aspects of Open Access (e.g. citation advantage). Davis & Walters [2] noted that "almost no studies have evaluated whether free access to the scientific literature has had an impact on the use of scientific information in non-research contexts such as teaching, medical practice, industry, and government". The reason for this has been speculated (by a recent Research Information Network (RIN) report [3]) to be that it is currently not possible to "gather systematic data on the demographics of users either on publisher platforms or via repositories".

This study comes in the context of a larger project [4] aiming to identify the societal benefits of Open Access and to devise new ways to measure and document this impact. Identifying the "claimed" societal benefits of Open Access (which is the aim of

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this study) will support the larger project in two ways. First, these claims can be tested against the currently available evidence about OA benefits to assess their credibility, which would be a useful exercise to guide the Open Access movement. Second, a deeper understanding of the discussion on societal benefits of OA will give insights about which stakeholders to include in the conversation and perhaps also inform the current debate on who should bear the cost of Open Access.

The paper is organized as follows. An overview of the study design is presented at the beginning. Then, owing to the different types of documents analyzed in the study, the data used for each group of OA supporters is presented in a separate section along with a brief background on the issue and the analysis results. A discussion of the overall outcomes and their implications then follows and the paper ends with some suggestions for future research based on the study findings.

2. Study Design

A total of 164 OA-related documents were chosen to represent the views of a wide range of OA supporters. Focus was not on the entire content of these documents but only the one or more key statement(s) within them, where the purpose behind supporting Open Access was stated. While many of these "statements of purpose" were mentioned in a straightforward manner under a separate section of the document (e.g. "Why Open Access", "Advantages of Open Access"), some were spread all around the document and were inferred from the context. Three types of documents were analyzed for the purpose of this study. First, a selection of prominent statements and declarations about Open Access was used to represent the views of Open Access advocates worldwide. Second, policies in support of Open Access issued by government bodies were used to understand how policymakers perceive OA's potential benefits. Third, it was important to include the perspective of researchers. Hence, editorials announcing the launch of open access journals (or conversion of traditional ones to OA) were examined as a possible source for journal editors' beliefs about Open Access. While it can be argued that there is some overlap between these three groups of OA supporters, it is also important to note that the chosen documents were written for different purposes and address different audiences.

3. Claims about OA Benefits by Group

3.1. Open Access Advocates

It is very difficult to define "OA Advocates" as a coherent group of people. It is a group that includes researchers, librarians, university administrators, research funders (both public and private), some scholarly publishers and even university students. Nonetheless, since what characterizes all of them is their outspoken support for Open Access, statements and declarations they produce can be a good representation of how they see Open Access and the benefits they expect from it. Declarations and statements in support of Open Access have played different roles at different points in the history of the Open Access movement. They were written to define the movement and lay out its main goals, to respond to related developments on the scholarly publishing scene or even to impose certain agendas on the debate. Many of them were used as tools to

gather support for OA and were usually accompanied by large scale campaigns to call on people to sign them. While there is a wide range of documents fit the "statements in support if OA" description (e.g. one can consider every OA mandate or policy as such), a representative list of key documents had to be chosen for this study. The Open Access Directory (OAD) was consulted for this purpose. OAD is a community-sourced database aiming to document the Open Access movement. It is administered by a group of prominent OA advocates and hosted by the Simmons College.

Eight declarations were selected from the OAD list of "Declarations in support of OA" [5]. They were selected owing to their significant influence on the Open Access movement, global nature and their representation of different stakeholders of the scholarly communication system (librarians, publishers, researchers, funders, students and prominent advocates). Table 1 lists the chosen statements, their respective years of adoption and keywords pointing to benefits of Open Access as believed by the statement authors/signatories.

Table 1. Key declarations supporting OA and benefits of OA according to them

Statement	Year	Beneficiaries of OA
Tempe Principles for Emerging Systems of Scholarly Publishing	2000	researchers, industry, professors, students, informed citizens, the public
Budapest Open Access Initiative	2002	researchers, teachers, students, other curious minds
Bethesda Statement on Open Access	2003	researchers, developing countries, the public
Access to Scientific Information (by the Inter-Academy Panel)	2003	researchers, developing countries
Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities	2003	researchers, society
IFLA Statement on Open Access to Scholarly Literature and Research Documentation	2004	researchers, disadvantaged researchers
The Student Statement on The Right to Research (R2RC)	2009	researchers, students, patients, informed citizens, developing countries
Washington D.C. Principles for Free Access to Science	2004	not researchers , not patients

As expected, all declarations assume that researchers are the main beneficiaries from Open Access. These benefits take two forms, either through direct gain (i.e. visibility and citations for one's own work) or as a general enhancement of the quality of research through the transparency and democratization offered by Open Access. Four declarations have made reference to the subgroup of "disadvantaged researchers". Those are researchers whose institutions could not (or have never been able to) cope up with the rising costs of access to journals, especially in developing countries. The Budapest Declaration later specifically argued that Open Access should not be understood as a one-way communication tool (i.e. from the knowledge-rich north to the knowledge-poor south) but as providing mutual benefits for both. The declaration argues that removing barriers to scholarly literature will "share the learning of the rich with the poor and the poor with the rich".

References to the benefits of Open Access to the educational process was made in three of the declarations. Needless to say, students' frustration with the lack of proper

access to research was the main driver of the R2R Statement. One of the signatories (The European Federation of Psychology Students' Associations) has even tried to systematically study this a few years later [6].

Beyond the academic/research community, three declarations made reference to "society" and "the public". It is not clear if that was intended to mean specific benefits to laypersons from access to scholarly literature, or indirect benefits from an enhanced body of knowledge. One of these declarations, the Tempe Principles, also mentioned "an informed citizenry and a healthy global economy". However, these were mentioned as the outcomes of "creation, dissemination, and application of new knowledge". In other words, they are not direct beneficiaries from access to literature. One could also argue that Budapest Declaration's reference to "other curious minds" is intended to encompass any groups of potential users outside academia. Nonetheless, none of the sources later cited in the declaration (as a proof of efficiency of OA) provide information about usage outside academia.

The R2RC statement was the only one to make explicit reference to some groups of society that could benefit from access to research. They mentioned patients who would "have access to the latest medical research" and citizens who could "evaluate scientific information on environmental impacts". The statement does not offer any supportive evidence in this regard. However, as the most recent declaration among the ones in this study, it is possible that some results of research about of OA's impact of society was already available to those who drafted it. Such a possibility is strengthen by the fact that four of the six Open Access policies cited by the R2R statement make similar claims about groups of societies that could benefit from access to scholarly literature. These include clinicians, policymakers (CIHR policy), families, patients (Autism Speaks policy), media (Canadian Cancer Society policy) and educators (Stanford GSE motion).

While many would consider the "Washington D.C. Principles for Free Access to Science" not a statement "in support" of OA as defined by this study, it was nonetheless important to include it here. This is mainly because this particular declaration argued against the societal benefits of Open Access. In addition to denying the need for access (even among researchers) by claiming that "published literature is routinely and readily available to all who need and want it", the declaration asserted that "[it] is debatable whether members of the general public can actually benefit from reading the original research literature, as its arcane and specialized reporting is intended primarily for other researchers,". This was also extended to imply that OA's benefits to clinicians is also debatable given that "many findings are not relevant for immediate clinical application". A few years later, some still maintained that there is no evidence for "unmet demand for the primary medical or health sciences literature among the general public", albeit this "does not necessarily reflect the absence of unmet demand" [2].

Examining these key declarations shows that the issue of societal impact of Open Access was not strong on the agenda of most OA advocates who drafted them. Their main contention appeared to have been that it was not wise to ignore the value internet can add to scholarly communication. Open Access was the most efficient way to ensure the freedom of knowledge and internet's contribution to enhancing research quality and reach.

3.2. Policymakers

There have been several case studies published to examine the impact of Open Access policies and mandates on individual institutions. They examined things like policy efficiency [7] or the researchers' reaction to these policies [8]. Only a small amount of studies aimed at studying government OA policies though. PASTEUR4OA (Open Access Policy Alignment Strategies for European Union Research) is probably the most extensive research project concerned with OA policies. It is based on the same database of OA policies used in this study and analyzes different policies. The aim was to encourage EU member states to align their OA policies to ensure best practice and to make compliance easier for researchers funded by grants from multiple source. Addressing policymakers about the anticipated benefits of Open Access, PASTEUR4OA researchers referred in several documents (for example [9]), to OA as a strategy to cut publishing costs and a way to foster innovation by giving SMEs access to the scholarly literature. In fact, one of their policy briefs was dedicated to present a framework of how knowledge transfer (via Open Access) has "spillover" effects on many segments of society outside the research community [10]. Policy guidelines developed by UNESCO have also echoed similar arguments but also emphasized the impact of access to biomedical literature on patients and healthcare practitioners [11]. In this regard, Waltham noted that in the US this tendency (to encourage public access to research) is a result of pressure by patient advocacy groups, in the UK it stems from a more general mission to raise the public understanding of science [12].

The Registry of Open Access Repository Mandates and Policies (ROARMAP) is a well-known, comprehensive resource for OA policies from organizations all over the world. However, the majority of listed policies are issued by universities or research units requesting (or requiring) their faculty and research staff to make the outcomes of their research openly available on the internet. As of December 24, 2016, only 136 (of around 800 listed polices) were issued by organizations described as funders (82) or organizations the both perform and fund research (54). These were either government bodies (e.g. ministries, parliaments), national research councils, national academies, or other smaller units. Twenty-nine private research funders (e.g. Wellcome Trust) were excluded as well as four entries that were not government bodies but partnership programs or universities.

Of the remaining 103 public research-funding organizations listed in ROARMAP, some fell under policies of larger organizations (16), issued policies that were not about research papers (9, e.g. open data polices), or published other types of documents (4, e.g. not a policy but workshop recommendations). Three policies could also not be found. Therefore, analysis for this study was based on 72 policies that fit the initial criteria. The majority of policies had some English version available online. For those that did not (12 policies), online automatic translation was used to identify and translate the statement of purpose in the policy. A native speaker was consulted in cases where the automatic translation was not clear. Table 2 presents the overall results of analyzing the 72 valid policy documents.

Table 2. Beneficiaries of Open Access according to government policies

Benefits of OA	Sample Keywords	Frequency	Percentage
research	quality, impact, reproducibility, duplication of efforts, open science, globalization, pace	44	61
industry	economy, growth, (open) innovation, valorization	34	47
public	awareness, culture, public understanding of science, taxpayer right, public accountability, scrutiny	29	40
professionals	users, deployment of research, uptake, clinicians	10	14
government	policymakers, public sector	10	14
education	OER, educators, fast percolation to high education	9	13
credibility	evaluating program managers, government transparency, M&E, efficient use of funds	8	11
visibility	intellectual gap, global recognition	6	8
NGOs	charities, NPOs	4	6
no mention		17	24
TOTAL		72	100

The majority of policies (61%) make at least one claim about the positive impact of Open Access on the research community. This does not seem to be different whether the organization issuing the policy is only a funder or also conducts in-house research. This is understandable given that benefits to the research enterprise can safely be considered the main purpose behind all of these policies. As mentioned before, much evidence has been piling up over the years to support the belief in OA benefits to the research enterprise. Examples of this positive impact include enhancing the quality of the research, allowing for more reproducibility, avoiding duplication of efforts and supporting the globalization of science with more reading and citations.

An interesting finding from analyzing these government OA policies is their consistent emphasis on the benefits of OA to the economy. This is not about Open Access being economically more efficient by some "system‐wide cost savings", as it was shown by Houghton [13] for example. Rather, it is about OA making more knowledge available to firms to build on, creating innovative products and services that would consequently boost the economy. The argument is well summarized in the European Commission's position that "[fuller] and wider access to scientific publications and data … help to accelerate innovation" because "faster to market = faster growth" [14]. A similar sentiment can also be detected in the US government commitment to fund and make available research which "catalyzes innovative breakthroughs that drive [the American] economy" [15]. This is also consistent with Prosser's idea that the move to more knowledge-based economies is one of main drivers supporting the argument for Open Access among policymakers. He mentions that "[as] developed countries struggle with the transition to post-industrial economies, there is a growing belief that knowledge provides both power and economic growth" [16].

Policymakers concern about benefits to the taxpaying public is understandable. Of the 40% of policies that mentioned these benefits, some made broad claims like preserving knowledge and culture. Open Access would enhance the knowledge produced by researchers and allow for maintaining it, which consequently will make it more relevant and useful to society as a whole. What lacked evidence was the more specific claims made by other policies about Open Access making possible the public scrutiny of the research outcomes. It is not clear what mechanism this will happen through. Indeed, some policies mentioned that OA will allow for better evaluation of

the funding programs and their managers, which will consequently result in more credibility for the organization. However, this kind of benefit was included separately under "credibility" because it is more about accountability to other (superior) bodies of government than to the public per se. The claim that Open Access will increase the public understanding of science is also one that lacks supporting evidence. Even participating in citizen science projects does not guarantee an increase laypeople's understanding of science [17], let alone the mere presence of scholarly literature online.

Three other benefits get nearly equal attention from policymakers. These are OA research usage by practitioners (e.g. doctors, lawyers, etc.), usage by public sector researchers (e.g. policy research units) and the Open Access as a form of Open Educational Resources (OER). Each one of these benefits is acknowledged in one sixth of the policies.

The relatively high percentage of policies (24%) that mentioned no specific purpose for supporting Open Access is mainly because some policies were not issued in a separate policy document (e.g. law, resolution) but as a changes to already existing documents that included more topics than just Open Access (e.g. national science law, guidelines for using research funds, etc.).

3.3. Leading Researchers

First, as mentioned above, when considering the "anticipated" benefits of Open Access, the opinion of researchers cannot be dismissed. This is especially true for researchers who have leading positions in their fields. Editorials are by definition a good venue where journal editors can express their thoughts of ideas about different issues related to their field. For this study, a set of 85 editorials were collected (where a new Open Access journal is announced or when an existing journal announces conversion to Open Access) to determine the views of leading researchers about the benefits on Open Access. These editorials come from journals across different fields of research (albeit with very strong presence of biomedicine).

The selection was based on searching the content of Scopus database as of January 21, 2016. Search was limited to publications of the type "editorial", which contain the expression "Open Access" either in the title or in the indexing (or author-provided) keywords. After excluding publications where "Open Access" was used to describe an unrelated concept (e.g. open-access endoscopy or open access railway infrastructure), a list of 517 editorials remained (including 15 duplicate entries). Titles of these editorials were then checked to classify the editorials into four groups:

- editorials announcing a new OA journal or a subscription journal's transition to OA (85)
- editorials announcing some new green or hybrid OA policy (60)
- editorials discussing Open Access without announcing OA-related decisions (257)
- editorials whose topic is unidentifiable based on title (100)

Only the first of these three groups was used in this study as a source of journal editors' views on Open Access benefits. The second group was excluded because only reading the editorial might not have been enough to know the real intentions of choosing Open

Access. It is not clear too if the purpose was anything more than compliance with funder requirements or the increased revenue associated with the hybrid model. The results for analyzing the first group of editorials are summarized in Table 3.

Table 3. Beneficiaries of Open Access according to OA journal editors

Benefits of OA	Sample Keywords	Frequency	Percentage
wider dissemination	exposure, impact, visibility, indexing, archiving, citations, author retains copyright,	62	73
efficiency	access for developing countries, disadvantaged researchers, freedom of knowledge	33	39
rapid publication	immediacy, competitiveness	26	31
professionals	practitioners, clinicians, stakeholders	18	21
rising trend	citing OA declarations, compliance with funder mandates, revolution of scholarly publishing	17	20
public	taxpayer right, public understanding of science, interested laypersons	15	18
government	evidence-based policymaking	7	8
other groups	amateurs, media, parents, teachers	3	4
industry	drive innovation, private sector R&D	4	5
education	university students, professors	2	2
no mention		10	12
TOTAL		85	100

The most significant result from analyzing the Open Access benefits as seen by journal editors is their consistent focus on benefits to the research community. Unlike the previous two types of documents, editorials refer very little to any "public" or societal benefit of Open Access (only 18%). Even groups of people who might not necessarily be part of the research community but are very close to it (e.g. practitioners 21% or students 2%) are mentioned relatively very little. Benefits to industry are also rarely mentioned, although most of the editorials come from the field of biomedicine, which is traditionally associated with the very "science-intensive" pharmaceutical industry.

Another interesting aspect is that only six editorials (7%) made reference to compliance with funder mandates. This suggests that (at least for gold OA journals) a move to Open Access in communicating research might have happened naturally even in absence of funder mandates, given that editors chose to emphasis other benefits of Open Access.

Otherwise, the great emphasis that the majority of editors put on benefits to researchers in their field as the primary reason for support Open Access is very plausible. This was especially true for new journals that tried to emphasize benefits like citations and exposure as a way to attract their initial submissions (sometimes in combination with other strategies like waived APCs). It is however important to consider that for some journals the move to Open Access was also the move to online publishing, which by itself can account for benefits like rapid dissemination or more global visibility (relative to print-only publishing).

Some editorials mentioned adopting Open Access would be “sponsored” by a parent organization, i.e. no APCs will be required. However, it remains a limitation of this study the inability to know if the perceived financial gain from APCs was the main

reason behind choosing Open Access. This is especially important to consider in cases where the editorial mentioned Open Access as a way to support the "growth" of their journal.

4. Discussion

Comparing the position of each of the three groups of OA supporters signals two main differences. One difference is that ideas about what benefits Open Access has on the researching community seems to be more about the researchers themselves (e.g. citations, visibility, copyright ownership, etc.) as viewed by journal editors, while at the level of policymakers more "abstract" benefits are generally perceived (e.g. globalization of science, reproducibility, transparency, etc.). Declarations occupy a somewhat middle ground on this issue. Regarding the benefits to developing countries, policymakers are the least to refer to this point. However, five policies (coming from Ireland, France, Brazil, Belgium and Slovenia) make reference to the somewhat similar concept of bridging the intellectual gap by making their own research more visible.

The analysis has also shown that there is near consensus that benefits of Open Access go beyond the academic/research community. Still, there is a lot of variation among the three groups in how they perceive the extent and reach of these societal benefits. The little regard OA journal editors give to Open Access benefits beyond the research can be explained in two ways. It is possible that they do not believe those benefits exist. This is understandable given the very little research done on this issue. Supposedly, researchers are more inclined to make evidence-based claims than most activists and policymakers. The other possibility is that they believe those benefits exist but (in writing those editorials) chose to focus on benefits to researchers as a way to garner support for their decision to adopt Open Access. In both cases, more research is needed on this topic to inform researchers about any potential societal benefits for Open Access, which in turn might influence their decision to adopt it.

5. Agenda for the Future

Claims about the societal benefits of Open Access, as investigated in this study, necessitate more discussion into two vital issues.

First, how much evidence is available to support claims about the benefits of Open Access? Research is needed to identify, classify and compare any literature that investigated the impact of Open Access on society. As mentioned at the beginning, it would be also interesting to evaluate the claims of this study against any available related evidence. It might also prove necessary to add to this evidence base with more research projects targeting groups that might benefit from Open Access, but do not necessarily belong to universities or credentialed research institute. Examples of these groups can be extracted from claims in mentioned in this study (e.g. Clinicians, charities, industry researchers) and also from outside of it (e.g. citizen scientists, think tanks, people in legal practice, etc.)

Second, in the light of the emphasis on the benefits of Open Access to (research-intensive) industries, to what extend is it plausible to suggest that they also contribute to the cost of Open Access provision? Perhaps coordination of efforts towards Open Access can be much easier between entities that are somehow part of the research

community (e.g. university libraries or research funders). However, corporate subscriptions represent 15-17% of the journal publishing revenue and some leading publishers already view this segment as an expanding market [18]. It might not prove difficult to involve large corporations (or even other entities like think tanks and resourceful government research units) in cooperative models of funding for Open Access [19]. Smaller firms can also contribute through representative unions (e.g. Biotechnology Industry Organization), which was previously suggested as way for them to manage subscriptions [20].

In conclusion, the issue of societal benefits of Open Access can prove to be very complex and manifold. However, approaching it in the right way can take the debate on access to research to a whole new level, by reframing it as a social issue, rather than one that is just relevant to researchers.

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