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Journal Portals – an important infrastructure for non-commercial scholarly Open Access publishing

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Abstract

Purpose – This study looked at third party journal portals, which facilitate the low cost publishing of open access journals. Portals have become very important enablers for converting journals published by scholarly societies and universities to open access, in particular in the social sciences and humanities.

Design/methodological/approach – Portals were identified using a combination of methods including a literature search, interviews with experts, a key word web search and by analysing webaddresses and publishers in data from the Directory of Open Access journals (DOAJ).

Findings – 21 portals fitting our definition were identified. Together these published more than 6,000 journals. They contribute around 10 % of the journals indexed in the DOAJ, and the content is very highly skewed to certain countries, in particular Latin America and Asia.

Originality/Value – While there have been earlier case study reports about individual portals, especially SciELO, this is probably the first systematic study of this phenomenon as a whole.

Keywords – open access, scholarly journal, portal, SciELO

Paper type - Research paper

Introduction

Globally there are probably more than 20,000 Open Access journals claiming that they are scholarly and peer reviewed. Around 9,000 such journals are indexed in the Directory of Open Access Journals (DOAJ), but many, especially small journals published outside North America and Western Europe, often published in other languages than English, are not. In addition, there are around 10,000 journal of dubious quality published by so-called predatory publishers (Shen and Björk, 2015). These are nowadays excluded from inclusion in the DOAJ. The variation between journals is enormous, ranging from small journals in the humanities producing one issue per year, to the Megajournal *PLOS ONE*, with over 30,000 article per year. In quality the journals range from the predatory publisher journals which publish anything for paying customers, to journals like *eLife* and *Nucleic Acids Research*, which are leading journals in their respective fields, even compared to traditional subscription journals.

There are many different ways in which the journals can be split into groups. A common one is whether a journal charges authors or not. The majority of DOAJ indexed journals don't in fact (Morrison et al., 2015). And for those journals that charge authors, the price range is from as low as 9 USD to 4,000 USD (Solomon and Björk, 2012). Another one is whether the journal has been open access from the start or has converted from a print subscription journal (sometimes continuing to sell the print version, while the e-version is made OA). The country of the publisher, publishing language and scientific fields are also obvious criteria for classifying journals. A very important facet is the type of publisher: Commercial publisher, scientific society, university or university department, individual scientist/group of scientists etc. The IT platform for publishing (and often also for managing the review workflow) can be either using commercial software, an open source solution, or self-made. In particular, the Open Journals Systems has been adopted by many OA journals (Edgar and Willinsky, 2010).

In this study the focus is on the publishing of non-commercial OA journals, which usually don't charge APC, and a particular type of publishing infrastructure service supporting these, which has emerged in many countries around the world. We will call this type of service "journal portal". The journals using such services are mostly published by small scientific societies, universities and university departments. The vast majority are older journals that have converted to OA. When they have started publishing the electronic version, they have had different options for publishing platform. For instance, doing it themselves from scratch or using some Open source software. Sometimes different units within a university publish several such journals and the university library or publishing office is able to offer a centralised service. Another option has been to outsource the publishing to a commercial publisher. While most journals which are published by the major publishers are subscription journals there are also some, that via some sort of sponsorship or charging APCs are OA. There are also pure OA publishers with which to partner, such as Co-action publishing, which usually entails charging authors.

Another channel which in some countries and regions of the world has become very important is to use a national or regional portal for OA journals. Such

portals are mostly sponsored by public funding, grants etc., and offer very cost-effective ways for journals to publish electronic OA-versions. They webhost the journals, and can offer valuable services in improving visibility in helping in indexing the journals in leading citation indexes. They also obviously offer much more security in terms of long term archival.

Mostly these portals, due to their background predominantly public funding, don't charge participating journals for the service. Instead they often check the quality of applicant journals, before admitting them. Sometimes its difficult to draw the line between a just a basic portal and a proper publisher. But for the purpose of this study the following definition will be used :

A journal portal is a website planned for hosting a large number of predominantly OA journals. The website should be owned and administered by a third party separate from the actual journal publishers. The portal is thus not the owner or publisher of the journals. The service should be non-commercial and free of charge or at most the charge should be minimal (below 100 USD per article published). The funding can come from public sources, grants, a university etc. Technically the website can use proprietary or open source software. The service can include just the publishing or also workflow support for the review process. In most cases the portal should provide some level of branding, for instance using a consistent way of naming webaddresses of participating journals.

The OA-portal should accept journals on a global, regional or national level. Other criteria can be the language of publication and the scientific fields included. In particular, intra-university services for publishing the journals from within a university or a consortium of universities are outside this definition.

In general, the journals included in the portal should be OA, but there can be exceptions, for instance involving delayed OA after an embargo period. And some portals may contain a mix of OA journals and journals with access restrictions.

One important aspect to remember is that many of the journals published in this type of portals are not fully peer-reviewed, although the topics are scientific.

A clear distinction needs be made between OA portals (as we define them) and OA repositories. Portals house the published journals and articles in original, while repositories are meant for copies of the original or related manuscripts (usually called green OA). The number of such repositories, in particular institutional ones, has grown rapidly and now exceeds 2,000 (Pinfield et al., 2014).

The research question for this study was thus to identify the leading Portals (as defined above), in which country/region they are published, the number of journals they publish and the share of these journals that are indexed in the Directory of Open Access Journals (DOAJ). In addition, the aim was to provide more quantitative and qualitative information about the background and how they operated for some of the portals.

Earlier studies

The general dilemma of how the scientific output from the developing world has difficulties in finding readers internationally has been described by a number of authors. Gibbs in an early article describing the situation just prior to the breakthrough of the Internet talks of the "lost science in the third world" (1995). Much of the output was published (in English or other languages) in local scholarly journals, which had a small circulation to some few subscribers as well as being available in some places via the free journal exchanges between university libraries. Chan et al. (2011) emphasize the North-South Divide, where norms from the North (Leading Anglo-Saxon countries) define how scientific publications are indexed, evaluated and disseminated, which implies a strong disadvantage for scientists from outside an elite core of countries. They see open access as a solution to remedy the situation. Fox and Hanlon (2015) discuss the situation particularly for Africa and find that for a number of reasons OA has not yet been widely adopted.

There have been a number of earlier studies which have looked at OA journals from different perspectives of relevance for this study. Laakso and Björk (2012) studied the longitudinal evolution of OA journals indexed in the DOAJ. They found that in 2011 already roughly half of the articles published in the journals required APCs, although the share of journals doing so was only 27%. Until 2010 the biggest share of articles was in older print journals which had started making their e-version free. But starting from 2011 on-line only journals charging APCs became the biggest group, and also the share of articles in on-line only journals without APCs had grown rapidly.

Morrison et al. found that 33 % of the journals registered in DOAJ in May 2014, did charge authors for publishing (Morrison et al. 2015). Of these, 61 % were published by commercial publishers.

Crawford (2015) has reported the country distribution of the journals in DOAJ and the articles they publish. Particularly interesting is the share of "free to publish" (no APCs) journals per country, which is highly skewed. Latin American journals, which for a long time have benefitted from using portals like SciELO and Redalyc all have high percentages between 90 and 100 % with countries like the USA (62 %), Netherlands (54%) and the UK (29 %) much lower on the list.

Edgar and Willinsky (2010) conducted a web survey with editors of journals using the Open Journals Systems. They found that the vast majority of the journals were published or sponsored by an academic department (51 percent), a non-profit publisher (16 percent), research unit (10 percent) and independent group (10 percent). Also roughly half the journals were published in South America (28%), Africa (7%) or Asia (13%).

In a study of specifically SciELO, Vélez-Cuertas et al. (2016) found that the overwhelming majority of 795 Latin American journals using that portal were published by universities (48 %), scientific associations (28 %) or institutes (13 %). They also found that two thirds of the journal had Spanish or Portuguese as the main publishing language.

What emerges is a picture where journals from outside the few countries that dominate international commercial and society publishing (USA, UK, Netherlands, Germany) have eagerly taken up OA, mainly not resorting to collecting fees from authors, and for the majority of cases using either Open Source software, a portal or the combination of the two. The journals are predominantly older subscription journals, which at least have made the e-version free, if not converting fully to electronic only publishing, and which with the help of free software/a portal are able to find the low monetary revenues they need by other means. This is also helped by the fact that the publishers are usually universities or scholarly societies which can use budget money or other revenues for funding the operations.

Research Method

The portals were identified using a number of methods. Firstly, the author's existing knowledge of some leading portals and the literature in the field. Secondly via a search of the journals indexed in the Directory of Open Access Journals (DOAJ), based on the web addresses of journals. And thirdly via information obtained from colleagues.

There are many tricky portals which were borderline cases for inclusion. The central requirements for inclusion/exclusion were already discussed in the introduction. Below are the important ones:

- A website planned for hosting a large number of predominantly OA journals.
- The website should be owned and administered by a third party separate from the actual journal publishers. The portal is thus not the owner or publisher of the journals.
- The service should be non-commercial and free of charge for the journals or at most the charge should be minimal (below 100 USD per article published).
- The OA-portal should accept journals on a global, regional or national level.
- Intra-university services for publishing the journals from within a university or a consortium of universities are outside the portal definition

A number of presumptive portals were looked into but did not quite fill these requirements. For instance, the US based Highwire press was excluded. Most of the journals published via Highwire press are not OA, and the charge for the services is substantial. It is primarily used by some major Anglo-American publishers, as a way of outsourcing their technical infrastructure.

In order to collect information about how many journals these portals publish their websites were searched. Usually it was easy to obtain information about the total number of journals as well as how many of these are OA. In addition information about how many of these are indexed in DOAJ was calculated. The

full list of DOAJ indexed journals was downloaded as an Excel sheet on the 28th of January 2016. This contained 11,114 journals.

The DOAJ spreadsheet contains a column " Platform, host or aggregator" which was used to identify the number of journals published by each portal. This data is however, not necessarily fully accurate since it depends on the information supplied by the journals. In addition, the spreadsheet was sorted sorted according to the web address of the journals. In this the portals could easily be seen based on almost similar addresses containing the portal name. The figures obtained this way differed to some extent from the data in the portal column and the bigger of the figures were used.

Results

The basic data about the portals is shown in table 1 below

Table 1. Basic data about the identified journal portals

Journal Portal	Region/ Country	Number of Journals	% Indexed in DOAJ
AFRICA:			
African Journals On-line	All Africa	513	2
ASIA:			
J-stage	Japan	1903	4
COAJ: China Open Access Journals	China	177	0
Sciencepaper Online OA	China	222	0
Asian Journals On-line:			
<i>Nepal Journals On-line</i>	Nepal	106	12
<i>Sri Lanka Journals on-line</i>	Sri Lanka	63	5
<i>Philippines Journals On-line</i>	Philippines	43	0
<i>Mongolia Journals on-line</i>	Mongolia	5	0
<i>Vietnam Journals On-Line</i>	Vietnam	23	0
<i>Bangladesh journals on-line</i>	Bangladesh	136	9
<i>Indonesia Journals on-line</i>	Indonesia	9	0
SUM:		2687	3
AUSTRALIA:			
UTSePRESS	Australia	11	18
EUROPE:			
Revues.org	France	400	60
DOI-serbia	Serbia	66	62
Hrčak	Croatia	404	15
Scientific Journals Online	Finland	23	17
SUM:		893	39
LATIN AMERICA:			
Scielo	Latin America	1249	40
Redalyc	Latin America, Spain	1079	18
Latin America Journals on-line	Nicaragua, Honduras	31	3
SUM:		2359	29
International:			
Open Library of the Humanities	US & Europe mainly	10	0
BioLine International	Developing Countries	36	25
GLOBAL TOTAL:		6509	18

As can be seen from the table the portals list over 6,000 OA journals, but of these only one in five is indexed in DOAJ. The share of journals included in DOAJ differs a lot between portals.

The by far biggest portals are Latin American ScELO and Redalyc, together with Japan's JSTAGE. The Network of journals Online, which concentrate on Africa and

South-East Asia is also important. All of these already have a fifteen-year long history. In terms of financing the portals represent three types of solutions. National mainly public funding, international funding as a form of development aid (Bioline, Journals On-line), and library consortium model (Open Library of the Humanities).

In addition to the number of journals in the included portals, some other characteristics were also studied. The only practical way of doing this was to use the data registered in the Directory of Open Access Journals, DOAJ. Only those journals which had more than 40 such journals were included, since it would not have made any sense to calculate distributions for very small numbers. The registry only includes around 20 % of the journals in the portals, and it is impossible to determine if there is a systematic bias in what kind of journals have been indexed. Also some of the information in the index might not be up to date. For this reason, the figures presented in table 2 must be regarded very tentatively.

Table 2 Data about journals from six of the portals, percentage shares

Journal Portal	Scielo	Redalyc	Revues	J-Stage	DOI-Serbia	Hrcak	All
LICENSING, BUSINESS MODEL							
Publishing charges (APCs)	0.4	0.0	0.0	0.0	0.0	0.0	0.2
Publishing with CC licenses	37.8	4.7	0.9	1.8	0.0	8.9	20.9
Median Year of becoming OA	2004	2001	2007	2002	2002	2003	2003
SUBJECT AREA:							
Science & Technology	19.0	15.2	3.7	43.8	30.9	16.1	18.3
Medicine	35.2	7.3	0.9	29.8	15.3	7.1	22.9
Geography & Agriculture	12.3	14.1	11.1	21.1	12.8	16.1	13.5
Social Sciences	25.3	52.9	46.3	5.3	25.6	35.7	32.4
Arts & Humanities	8.2	10.5	38.0	0.0	15.4	25.0	12.9
TYPE OF PUBLISHER:							
University	41.7	69.1	29.9	5.2	28.2	41.1	43.6
Institute	11.1	13.1	23.4	1.8	28.2	16.1	13.5
Society	34.5	14.7	21.5	91.2	33.3	37.4	31.9
Other	12.7	3.1	25.2	1.8	10.3	5.4	11.0

What does emerge, is that journals that charge APCs are extremely rare, only two such journals were registered in DOAJ. The use of Creative Commons Licenses is also not so frequent, although 38 % of SciELO journals used them, raising the overall share to 21 %. Since the portals are of different age, the first year of journals becoming OA varied from a median of 2001 for Redalyc to 2007 for Revues.

Universities (or their departments) and scholarly societies were the dominating publisher types. Different portals had different profiles, with Redalyc having 69 % universities and J-Stage 91 % Societies. In total social sciences, arts & humanities were the subject areas of almost half the journals (45%), with Revues having a very high share of those (84%). Medical journals were quite prominent in SciELO (35 %) and Science & Technology in J-Stage (43,8%).

An area for further research could be the language used in the journals. A priori all of these portals provide publishing possibilities for journals in the native language of the country or region in question. In the case of countries like Finland, Serbia, Croatia and also Japan, these languages are little understood by non-native readers, unless they for instance happen to be arts&humanities specialists. Portals like Redalyc, SciELO and Revues, on the other hand publish journals in widely understood world languages such as Spanish and French.

DOAJ data provide some indication of language, but unfortunately very often multiple languages are indicated. In practice a journal can publish using a number of options: native language alone, native language plus abstract in English, full articles in one of a number of languages (one usually being English) chosen by the author, or articles only in English. Especially in the hard sciences and medicine English seems to be quite popular. The Data in DOAJ for these six portals showed that 19 % of journals are only published in English, a further 33 % had English listed as one of optional languages and 17 % are published only in a non-English language (s). For 30 % of the journals the information was missing.

Example Portals

In the following some of the included portals are briefly presented. The selection was based on a number of factors. The first was an aim to pick portals which differ clearly from each other in some respects. A second factor was the availability of good reports, articles or otherwise good background information etc. about these portals.

ScELO

SciELO is the best known of the portals in this study, and has had the biggest overall impact on improving access and visibility (Packer et al. 2014, Alperin et al., 2015). It started out in 1998 with a pilot project of 10 journals and has since grown to a federated cluster of 15 national and regional journal collections serving more than 1,250 journals. Over half a million articles are currently available OA via the portal. The original ten journals were high-quality ones, since most of them were indexed in the Web of Science. Among the aims of the project was to provide facilities to deal with multiple languages, since many of the journal publish in Portuguese or Spanish, but might also include abstracts in English. The project was a partnership between BIREME (the Latin American and Caribbean Center on Health Sciences Information of the Pan American Health Organization/World Health Organization) and FAPESP (the São Paulo Research Foundation).

Over the years different technical features have been added to the platform. For instance, XML full text formatting, workflow features for managing the review and publications process, and dissemination of article meta data to various indexing services.

Due to its critical mass of high quality regional journals, one positive effect of SciELO has been its ability to negotiate with Scopus and Web of Science regarding the indexing of these journals (Packer, 2014). The fact that SciELO has an internal quality check before journals are included as well as can provide meta data systematically in a standardised form to the citation indexes has no doubt helped these negotiations.

Against this background it is strange that US Librarian Jeffrey Beall, who is best known for his crusade against so-called predatory OA publishers, wrote a very controversial blog item entitled "Is SciELO a Publication Favela?", essentially accusing the portal of largely keeping the articles published via it hidden from the world (Beall, 2015). His advice would instead be for the local publishers to co-operate with international commercial publishers, whose platforms according to Beall effectively help expose and promote published research, for instance by effectively distributing their content, both subscription and open access journals to academic libraries and their users. Beall's attack was followed by a heated debate between him and supporters of SciELO (Jones, 2015, SciELO2015). Beall's position seems to be based on the belief that only journals to which readers get access via the subscriptions and intranets of major western universities have any value. He also placed great emphasis on indexing in the monopolistic commercial indexes like Web of Science and talks in a highly derogatory tone of the vast majority of journals in SciELO ("Their content is not indexed except perhaps in Google Scholar, a database poisoned by fringe science"). He also doesn't seem to understand that only a small proportion of the biggest Latin American Medical journals are of commercial interest to the big international publishers, and that SciELO is the best viable option for all other journals.

Journals On-line

Journals On-line is a network of portal services for journals from developing countries developed since 1998 by The International Network for the Availability of Scientific Publications (INASP), an Oxford UK based charity (Smart, 2005). From a start as simple HTML pages the service has migrated to using OJS software. The portal has not been exclusively meant for OA journals, although many journals are that (currently 203 out of 513). Its work is funded by partner countries, governmental and non-governmental development agencies, and philanthropic foundations.

The service can be used in two ways. Latin America Journals On-line (serving Nicaragua and Honduras) as well as the JOLs for Bangladesh, Mongolia, Nepal and Sri Lanka are centrally administered by INASP. The by far biggest portal Africa Journals On-line is administered locally from South Africa. Also the portals for Vietnamese and Philippine Journals are locally administered.

A breakdown by subject category of the 513 journals on the African Journals On-line portal shows that the most popular topics are Health (21.4%), Biology & life sciences (9.2%), African Studies (7.3%), Agriculture & food sciences (6.8%),

Economics & Development (6.1%) and Sociology & development (5.3%). Overall 45 % of the journals are in the social sciences and humanities.

Bioline International

Canadian based Bioline International has pretty much the same aim as Journals On-line, but the focus is more narrowly on biomedical and health journals. The creators of Bioline especially emphasise the fact that a lot of mainstream medical research is focused on illnesses that particularly plague the population of the richest countries of the world. The needs of the developing world may differ and for instance drug companies have less incentives to sponsor research of particular importance for these. For these reasons it has been very important to create and support good channels for journals that report on research of importance for the global south (OASTories 2011a).

Bioline International is a collaboration between Bioline Toronto, which manages the portal and the Reference Center on Environmental Information (Brazil), which hosts the portal and does the software development. It has grown from an emailing service, in 1993, to a full-fledged portal currently serving more than 50 journals. Bioline director Leslie Chan was one of the participants at the Budapest Open Access Initiative meeting in 2002, which has been a milestone in defining what open Open Access is (including launching the term), its objectives and different strategies.

Bioline has published interesting statistics about the frequentation of their journal websites. Of 1,032,844 site visits in a one-year period in 2010-2011, the top six countries of visitors were: USA, India, Brazil, United Kingdom, Mexico and Nigeria (OASTories 2011a).

Open Library of humanities

Open Library of Humanities (OLH) is a newcomer among the portals, and has received a lot of positive publicity since it launched (Eve, 2015) . OLH differs from most of the other portals by its exclusive focus on the humanities, and the fact that it doesn't have a specified regional focus. Its however likely to cater primarily to English language journals from North America and Western Europe.

OLH has received a substantial start-up grant from Mellon foundation, but aims to fund its continuing operations via an academic library partnership program. To date 181 institutions have signed up for the program. From a funding perspective it is in fact closer to the model used by the SCOAP3 initiative for making journals in high energy physics Open Access, than the mainly governmental or charity schemes used by most other portals

A particularly interesting journal among the first 10 journals published via OLH is *Glossa*. It origins are in a movement of scholars in linguistic research to make journals in the field OA and more affordable to publish in if they charge APCs. These academics demanded the Elsevier journal *Lingua* to convert to open

access with a maximum APC of 400 Euros, which the publisher refused. As a result, the entire editorial board of the journal resigned and instead started the new journal *Glossa*, which originally was supposed to be published by Ubiquity Press at a low APC rates, but which has later joined forces with OLH (Jaschik, 2015). *Glossa* can in fact be seen as the true successor of *Lingua*, since the knowledge capital of the latter migrated to *Glossa*.

doiSerbia

This service was launched in 2005 by the national library of Serbia with the aim of improving the poor visibility of Serbian scientific journals, which then were predominantly published in paper format only by small societies and institutes or university departments (OASTories 2011b). The rather strange name of the portal is explained by the fact that one of the services it provides its journals is the assignment of a digital object identifier to each included article. Other services include quality assurance of the meta-data of the articles and inclusion in the Crossref system. From a pilot project of 5 journals the service has expanded to currently encompass 66 journals. The vast majority of Serbia's 300 scholarly journals would like to be included, but this has not been possible due to the limited resources available for the technical tasks of for instance assigning DOIs. The service is financed by a grant from the Serbian Ministry of Science. It was decided not to charge the journals small sums per article handled, since the administrative costs of handling such small invoices could not be justified (OASTories 2011b).

A particular measure of the success of the portal in improving the visibility of Serbian journals, is that since its start 20 Serbian journals (all in doiSerbia) have been included for indexing in the Web of Science. The service is a very good example of a centrally financed national portal providing a useful and cost effective service.

J-Stage

Taking into account the size of this portal (to date 2,7 million published articles) and the fact that it was launched as early as 1998, it was very difficult to find any background information about this portal. The Japan Science and Technology Information Aggregator, Electronic" (J-Stage) has been developed by the Japan Science and Technology Agency. The main aim has been improving the international visibility of Japan's numerous scholarly journals. It has offered many print journals the possibility to cheaply put up a digitized parallel version. Participating journals are not required to be Open Access and J-stage is in fact closer in the way it works to Highwire Press than to the the other portals in this study. Not all the journals are currently active, and several Japanese journals have opted for being published in co-operation with leading international commercial publishers in stead.

For those J-Stage journals where articles are available freely in full text, the Access and reuse rules seem rather prohibitive, compared to the Creative Commons licences currently widely used by OA journals. The copyright nevertheless lies with the societies and universities publishing the journals.

Of the peer reviewed journals currently included in J-Stage 299 publish in English, 316 in Japanese and 544 in a mix of both languages. It is surprising how

few of the journals are index in DOAJ (62). A possible explanation might be that each journal must apply individually for inclusion and this hasn't been handled centrally by J-Stage.

According to download statistics posted in the Japanese language Wikipedia page about J-Stage, around 40 % of the 6-7 million monthly downloads come from Japan itself, followed by China (14 %), The United States (10 %) and the EU countries (4 %).

Scientific Journals Online

The efforts to build a portal for Finnish scholarly OA journals provide an example of the difficulties and challenges involved. In Finland the vast majority of around 150 national scientific journals are published by scholarly societies belong to the Federation of Finnish Learned Societies (TSV). Since most of these journals could not survive on only subscription income or subsidies from their parent associations the government has been channelling monetary journal support via the Federation. Traditionally these subsidies have been provided as percentage shares of a declared monetary budget, which has favoured journals with subscription income compared with OA journals.

With funding from the ministry of education TSV made an attempt to set up a portal for OA journals using OJS software in 2008-2009 but until now only 23 journals have joined (TSV, 2016). A major reason may have been fear of journals to convert to OA, since that would have required charging APCs in order to cover part of the costs and be eligible for public subsidies.

As part of an on-going national programme promoting Open Science, TSV in co-operation with the national Library of Finland is now developing an improved version of the portal now incorporating DOIs for the articles and ORCIDs for authors, as well as improving the flow of metadata (Ilva and Lilja, 2015). Since APCs don't seem to be realistic options for most journals an alternative consortial funding model is explored in which major libraries and research funders as well as possibly university-specific APC funds would participate.

Discussion

The documentation about many of the portals fitting our definition is scarce. The proposed contribution of this manuscript is looking at these portals collectively, although some of them (in particular Scielo) have earlier been reported on individually. The portals studied together published over 5,000 journals and over 1,000 journals included in the DOAJ. It is difficult to speculate about why only around 20 % of the journals are indexed in DOAJ. The percentage varies a lot depending on the portal, for instance for SciELO the share is as high as 40 %, but for J-Stage only 3 %.

Together with Open Source publishing software like OJS, and often in a combination of both, the portals have contributed a highly cost effective infrastructure leveraging the starting of new OA journals and in particular the conversion of older society and university journals to OA for the electronic version.

Many academics working in countries outside a few leading Industrial states face a difficult dilemma in the choice of journals to publish in. They are often in a very disadvantaged position to get their manuscripts accepted in the globally leading journals, because of language issues, the content often referring to local issues etc. At the same time there is strong pressure to publish in “international journals” in the academic evaluation practices in many countries. This has in fact given rise to the recent phenomenon of predatory OA publishing, of journals trying to create an impression of being international scientific one, with usually almost total lack of peer review. Such journals always charge authors for publishing.

For those that cannot get published in internationally leading quality journals and who avoid predatory journals, publishing in local journals, which have been made OA via portals such as in this study, or for instance supported by open source solutions, is a very viable solution. This offers two advantages, being published in journals that the core researchers in the topic area probably follow, at the same time as all the advantages that OA offers in reaching out to a potential international audience.

The spread of journals serviced by these portals is highly unevenly spread over continents and countries. In Latin America they have had a particularly high impact, and the same is true for some other countries like Japan, Serbia and Croatia. Since many of these portals are selective in the journals they want to service (and can service due to resource constraints) they have been in a good position to centrally negotiate with major indexing services.

Despite all the benefits these portals offer there is a considerable risk attached to their long-term financing. This is due to the fact that since they mostly don't charge participating journals but are often funded from a single government source, they become quite vulnerable in case of sudden changes in public policy or budget cuts in funding to science.

Despite such difficulties this author is fairly convinced that more of these portals will emerge, in particular in European countries. There is very strong pressure by for instance the European Commission for open science. OA portals offer a very cost effective solution for this, compared to journals trying to do it on their own. This is particularly true for existing subscription journals published by universities and scientific societies.

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